



Shell Chemical Appalachia LLC
300 Frankfort Rd
Monaca, PA 15061

January 15, 2026

Mark Gorog, P.E.
Air Quality Program Regional Manager
Pennsylvania Department of Environmental Protection
Southwest Regional Office
400 Waterfront Drive
Pittsburgh, PA 15222

**RE: Shell Chemical Appalachia LLC
Shell Polymers Monaca Site
Potter and Center Townships, Beaver County
Replacement Initial Title V Operating Permit Application**

Dear Mr. Gorog:

Shell Chemical Appalachia LLC (“Shell”) is currently operating Shell Polymers Monaca (“SPM”) under Plan Approval Nos. 04-00740A (PA-04-00740A), 04-00740B (PA-04-00740B), and 04-00740C (PA-04-00740C). In a letter dated February 22, 2024, the Pennsylvania Department of Environmental Protection (DEP) requested Shell to submit an initial Title V operating permit application for SPM prior to June 21, 2024, in accordance with the Pennsylvania Air Pollution Control Act and Title 25 Pennsylvania Code (25 Pa. Code) § 127.505(a). Shell satisfied this request by submitting a timely initial Title V operating permit application to DEP on June 19, 2024 (hereinafter this permit application is referenced as the “June 19, 2024, initial Title V operating permit application”). DEP subsequently determined the June 19, 2024, initial Title V operating permit application to be administratively complete on June 25, 2024.

However, soon thereafter, on September 13, 2024, Shell submitted a plan approval application to DEP proposing the Wastewater Treatment Plant (WWTP) Permanent Controls Project and Ethylene Maximum Achievable Control Technology (EMACT) Project at SPM, as well as specific reconciliations to SPM’s plan approval source descriptions, potential to emit calculations, and conditions (referenced as the “Plan Approval Reconciliations”). Shell proposed the WWTP Permanent Controls Project to replace temporary equipment in the primary treatment section of SPM’s WWTP with permanent equipment to improve the primary treatment section’s oils, grease, and volatile organic compound (VOC) removal capabilities, which will result in an improvement in the overall wastewater treatment performance of the WWTP. Shell proposed the EMACT Project to comply with the 40 Code of Federal Regulations (CFR) 63 Subpart YY¹ pressure-assisted multi-point flare minimum net heating value of flare combustion zone gas (NHV_{cz}) requirement that is now applicable to the Totally Enclosed Ground Flare (TEGF) A and TEGF B, respectively, due to the 40 CFR 63 Subpart YY regulatory updates that the United States Environmental Protection Agency recently finalized for the ethylene production source category as a result of a mandated residual risk and technology review of the subpart. Shell proposed the Plan Approval Reconciliations to reconcile specific PA-04-00740A, PA-04-00740B, and PA-04-00740C source descriptions, potential to emit

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calculations, and conditions that Shell deemed necessary after completing a review of the facility's as-built equipment and operations against the source inventory, potential to emit calculations, and conditions included in or referenced by those plan approvals.

On May 27, 2025, DEP requested Shell to "update the pending [June 19, 2024] Title V operating permit application to reflect changes at the facility [SPM] that are currently being reviewed under the pending plan approval PA-04- 00740D application" within 90 days of receipt of the request (i.e., by August 25, 2025). Subsequently, on August 7, 2025, Shell requested DEP to provide a 90-day extension to submit an updated initial Title V operating permit application because DEP had not yet issued PA-04-00740D and Shell and DEP were engaged in an ongoing exchange of information in support of the issuance of PA-04-00740D. On August 21, 2025, DEP granted the requested extension for an additional 90 days to November 23, 2025. Most recently, on October 28, 2025, Shell requested an additional 60-day extension to submit an updated initial Title V operating permit application because PA-04-00740D had not yet been issued, and on November 21, 2025, DEP granted the requested extension for an additional 60 days to January 22, 2026.

Although DEP has not yet issued PA-04-00740D, Shell is submitting this replacement initial Title V operating permit application that incorporates the WWTP Permanent Controls Project, EMACT Project, and Plan Approval Reconciliations-related changes that are expected to be included in PA-04-00740D. Shell concluded that submitting a replacement permit application is the most effective way to update the June 19, 2024, initial Title V operating permit application to ensure that all the changes expected to be included in PA-04-00740D are clearly documented without confusion. Generally, the contents of this replacement initial Title V operating permit application represent updates to the contents of the June 19, 2024 initial Title V operating permit application, as needed, except copies of the May 15, 2024 local municipality and county notifications made pursuant to 25 Pa. Code §127.413 that were included in Appendix F of the June 19, 2024 initial Title V operating permit application are not included in this replacement permit application because it is not necessary to submit copies of these notifications to DEP again.

Enclosed with this letter are the required Title V Operating Permit Application forms and supporting documents. The fee required for the initial Title V operating permit was previously submitted with the June 19, 2024, initial Title V operating permit application through OnBase.

Shell looks forward to working with DEP to facilitate the processing of this Title V operating permit application. If you have any questions regarding the information presented in this Title V operating permit application, please contact Laura Sabolyk at (724) 709-2906 or Laura.L.Sabolyk@shell.com. I can be contacted at (724) 709-6068 or Nathan.Levin@shell.com.

Sincerely,



Nathan Levin
Operations Manager

CC: Tom Joseph, PADEP Environmental Group Manager (Permits)
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Martin Padilla, SPM HSSE Manager
Laura Sabolyk, Shell Sr. Regulatory Advisor
Alan Binder, Shell Sr. Environmental Engineer – Air Quality

Enclosure: Replacement Initial Title V Operating Permit Application including Appendices



REPLACEMENT INITIAL TITLE V OPERATING PERMIT APPLICATION FOR SHELL POLYMERS MONACA

Shell Chemical Appalachia LLC
Monaca, Pennsylvania

January 2026

Prepared for

Shell Chemical Appalachia LLC
300 Frankfort Road
Monaca, Pennsylvania

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LIST OF ABBREVIATIONS AND ACRONYMS

bhp	brake horsepower
BWON	Benzene Waste Operations NESHAP
CAA.....	Clean Air Act
CAM.....	Compliance Assurance Monitoring
CFR	Code of Federal Regulations
CI	compression ignition
CMPU	chemical manufacturing process unit
CO.....	carbon monoxide
CO ₂	carbon dioxide
CO ₂ e	carbon dioxide equivalent
Cogen Units.....	cogeneration units
CVS	closed-vent system
CVTO	continuous vent thermal oxidizer
DEP	Pennsylvania Department of Environmental Protection
DNF.....	dissolved nitrogen flotation
EGU	electric generating unit
EMACT.....	Ethylene Maximum Achievable Control Technology
EPA	United States Environmental Protection Agency
ERC	emission reduction credit
FEOR.....	flow equalization and oil removal
GHG.....	greenhouse gas
GIS	gas-insulated switchgear
HAP.....	hazardous air pollutant
HDPE	high-density polyethylene
HHV	higher heating value
hp	horsepower
HP	high pressure
HPSR.....	high-pressure solvent recovery
hr.....	hour
HRSG	heat recovery steam generator
IFR	internal floating roof
IGCC.....	integrated gasification combined cycle
ISO	International Organization for Standardization
kPa.....	kilopascals
LAER	lowest achievable emission rate
LDAR.....	leak detection and repair
LPSR.....	low-pressure solvent recovery
m ³	cubic meter

MCPU	miscellaneous organic chemical manufacturing process unit
Mg	megagrams
MIS	main incoming substation
MMBtu	million British thermal units
MPGF.....	multi-point ground flare
MW	megawatt
MWe	megawatt electric
NAICS.....	North American Industry Classification System
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFPA.....	National Fire Protection Association
NHV _{CZ}	net heating value of flare combustion zone gas
NOx	nitrogen oxides
NSPS	New Source Performance Standards
OLD.....	organic liquids distribution
Pa. Code	Pennsylvania Code
PM	particulate matter
PM _{2.5}	PM with an aerodynamic diameter less than or equal to 2.5 micrometers
PM ₁₀	PM with an aerodynamic diameter less than or equal to 10 micrometers
PSA	pressure swing adsorption
psia	pounds per square inch, absolute
psig	pounds per square inch, gauge
RICE	reciprocating internal combustion engine
RMP.....	risk management plan
SCR	selective catalytic reduction
SCTO	spent caustic thermal oxidizer
SF ₆	sulfur hexafluoride
Shell.....	Shell Chemical Appalachia LLC
SHP	super high pressure
SI.....	spark ignition
SIC	Standard Industrial Classification
SIP	state implementation plan
SO ₂	sulfur dioxide
SOCMI	synthetic organic chemicals manufacturing industry
SPM	Shell Polymers Monaca
TAB.....	total annual benzene
TDS	total dissolved solids
TEAL.....	triethylaluminum
TEB	triethylborane
TEGF	totally enclosed ground flare
tpy	tons per year

Replacement Initial Title V Operating Permit Application
Shell Polymers Monaca

TVP true vapor pressure
UTM Universal Transverse Mercator
VHAP volatile hazardous air pollutant
VOC volatile organic compound(s)
VOL..... volatile organic liquid
WWTP wastewater treatment plant
yr year

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1.0 INTRODUCTION

Shell Chemical Appalachia LLC (“Shell”) owns and operates Shell Polymers Monaca (“SPM”), which is an ethylene and polyethylene production facility in Monaca, Beaver County, Pennsylvania that was formerly referred to as the “Petrochemicals Complex, Ethylene and Polyethylene Manufacturing.” The Pennsylvania Department of Environmental Protection (DEP) authorized the initial construction and temporary operation of SPM by issuing Plan Approval No. 04-00740A (PA-04-00740A) to Shell on June 18, 2015. Shell began construction of SPM on February 10, 2016. DEP subsequently issued both Plan Approval Nos. 04-00740B (PA-04-00740B) and 04-00740C (PA-04-00740C) to Shell on February 18, 2021. PA-04-00740B authorized the installation and temporary operation of sulfur hexafluoride (SF₆)-insulated high-voltage equipment at SPM. PA-04-00740C authorized the installation and temporary operation of as-built changes at SPM. The startup date for SPM’s ethylene manufacturing unit was September 24, 2022. The startup dates for SPM’s three polyethylene manufacturing units were October 1, 2022, November 1, 2022, and February 23, 2024, respectively. On October 14, 2025, DEP granted its most recent 180-day extension to Shell for the temporary operation of SPM under all three of the referenced plan approvals through April 28, 2026.

In a letter dated February 22, 2024, DEP requested Shell to submit an initial Title V operating permit application for SPM prior to June 21, 2024, in accordance with the Pennsylvania Air Pollution Control Act and Title 25 Pennsylvania Code (25 Pa. Code) §127.505(a). Shell satisfied this request by submitting a timely initial Title V operating permit application to DEP on June 19, 2024 (hereinafter this permit application is referenced as the “June 19, 2024 initial Title V operating permit application”). DEP subsequently determined the June 19, 2024 initial Title V operating permit application to be administratively complete on June 25, 2024.

However, soon thereafter, on September 13, 2024, Shell submitted a plan approval application to DEP proposing the Wastewater Treatment Plant (WWTP) Permanent Controls Project and the Ethylene Maximum Achievable Control Technology (EMACT) Project at SPM, as well as specific reconciliations to SPM’s plan approval source descriptions, potential to emit calculations, and conditions (referenced as the “Plan Approval Reconciliations”). Shell proposed the WWTP Permanent Controls Project to replace temporary equipment in the primary treatment section of SPM’s WWTP with permanent equipment to improve the primary treatment section’s oils, grease, and volatile organic compound (VOC) removal capabilities, which will result in an improvement in the overall wastewater treatment performance of the WWTP. Shell proposed the EMACT Project to comply with the 40 Code of Federal Regulations (CFR) 63 Subpart YY¹ pressure-assisted multi-point flare minimum net heating value of flare combustion zone gas (NHV_{cz}) requirement that is now applicable to the Totally Enclosed Ground Flare (TEGF) A and TEGF B, respectively, due to the 40 CFR 63 Subpart YY regulatory updates that the United States Environmental Protection Agency (EPA) recently finalized for the ethylene production source category as a result of a mandated residual risk and technology review of the subpart. Shell proposed the Plan Approval Reconciliations to reconcile specific PA-04-00740A, PA-04-00740B, and PA-04-00740C source

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descriptions, potential to emit calculations, and conditions that Shell deemed necessary after completing a review of the facility's as-built equipment and operations against the source inventory, potential to emit calculations, and conditions included in or referenced by those plan approvals.

On May 27, 2025, DEP requested Shell to "update the pending [June 19, 2024] Title V operating permit application to reflect changes at the facility [SPM] that are currently being reviewed under the pending plan approval PA-04-00740D application" within 90 days of receipt of the request (i.e., by August 25, 2025). Subsequently, on August 7, 2025, Shell requested DEP to provide a 90-day extension to submit an updated initial Title V operating permit application because DEP had not yet issued PA-04-00740D and Shell and DEP were engaged in an ongoing exchange of information in support of the issuance of PA-04-00740D. On August 21, 2025, DEP granted the requested extension for an additional 90 days to November 23, 2025. Most recently, on October 28, 2025, Shell requested an additional 60-day extension to submit an updated initial Title V operating permit application because PA-04-00740D had not yet been issued, and on November 21, 2025, DEP granted the requested extension for an additional 60 days to January 22, 2026.

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The contents of this application are organized as follows.

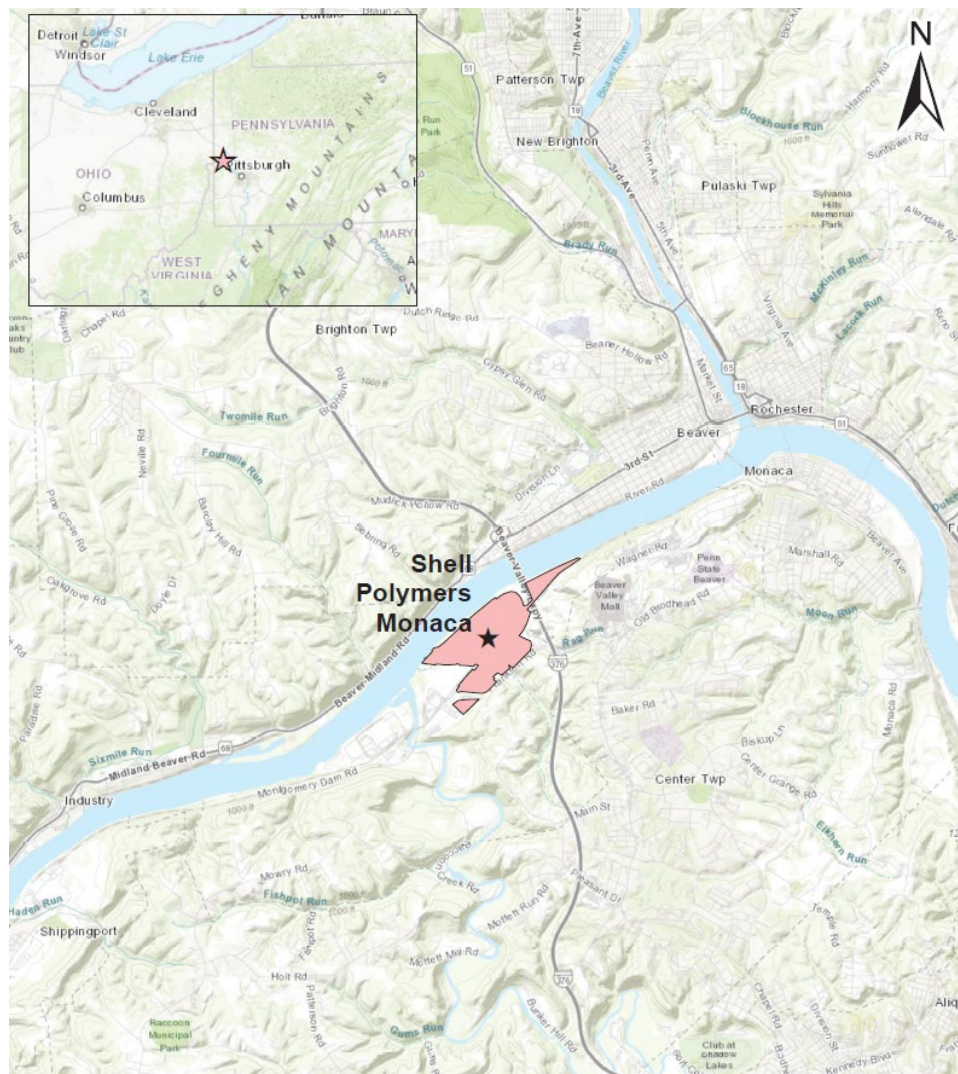
- Section 1.0 provides an overview of SPM, including facility location, process overview, and permit history.
- Section 2.0 presents process and emission source descriptions for each of the manufacturing processes which make up SPM.
- Section 3.0 discusses the Pennsylvania and federal air quality regulations that are applicable to SPM.
- Appendix A includes the Title V Operating Permit Application forms required for this application.
- Appendix B includes the potential to emit calculations for SPM.

- Appendix C includes process flow diagrams for SPM's manufacturing processes and VOC control systems.
- Appendix D includes a compliance plan as required by 25 Pa. Code §127.503.8(i-iv).
- Appendix E includes a completed Air Pollution Control Act Compliance Review Supplemental Form.

1.1 Facility Location

SPM occupies approximately 400 acres adjacent to the Ohio River in Beaver County, Pennsylvania. The Ohio River generally runs through the center of Beaver County and flows in a westerly direction. The Beaver River drains the northern portion of the county, converging with the Ohio River approximately 5 kilometers upstream of SPM. The approximate Universal Transverse Mercator (UTM) coordinates of SPM are 556,129 meters east and 4,502,450 meters north (UTM Zone 17, North American Datum of 1983). Figure 1 below shows the general location of SPM.

Figure 1. SPM Site Location Map



1.2 Process Overview

SPM is comprised of an ethylene manufacturing unit, three polyethylene manufacturing units, three cogeneration units (Cogen Units), and ancillary equipment. These integrated manufacturing, utility, and support facilities and operations are covered by PA-04-00740A, PA-04-00740B, and PA-04-00740C.

SPM's ethylene manufacturing unit includes seven ethane cracking furnaces that thermally "crack" ethane to produce ethylene. The ethane cracking reaction is accomplished by heating ethane to very high temperatures in the ethane cracking furnaces. "Tail gas" is one of the byproducts of the ethane cracking process, and the tail gas produced at SPM contains mostly hydrogen and methane. The tail gas is collected and primarily used to fuel the ethane cracking furnaces.

Ethylene produced by the ethylene manufacturing unit feeds two gas phase polyethylene manufacturing units and one liquid phase slurry polyethylene manufacturing unit at SPM. Both polyethylene manufacturing processes employ catalysts but use different equipment and operating parameters to produce different grades of polyethylene. Each polyethylene manufacturing unit has its own polyethylene pellet handling system prior to pellet blending. Common pellet storage, railcar loading, and truck loading equipment and operations follow the pellet blending operation.

Each of SPM's three Cogen Units includes a natural gas-fired combustion turbine that is coupled with a natural gas-fired duct burner and a heat recovery steam generator (HRSG). The Cogen Units supply electricity and steam to SPM and any excess electricity produced by the units is sold to the local electric utility grid.

Ancillary equipment at SPM includes two diesel-fired emergency generator engines, two natural gas-fired emergency generator engines, two diesel-fired firewater pump engines, two cooling water towers, atmospheric storage tanks, pressurized storage tanks, and a wastewater treatment facility (the WWTP). Additionally, SPM equipment is equipped with or vented to necessary air pollution control devices (e.g., selective catalytic reduction (SCR) systems, catalytic oxidation systems, thermal oxidizers, flares, and filters) to meet applicable state and federal air quality requirements.

The Standard Industrial Classification (SIC) codes applicable to SPM are the following:

- 2821 – Plastics Materials, Synthetic Resins, and Nonvulcanizable Elastomers
- 2869 – Industrial Organic Chemicals, Not Elsewhere Classified
- 4911 – Electric Services.

The North American Industry Classification System (NAICS) codes applicable to SPM are the following:

- 221112 – Fossil Fuel Electric Power Generation
- 325110 – Petrochemical Manufacturing
- 325211 – Plastics Material and Resin Manufacturing.

1.3 Permit History

In May 2014, Shell submitted the original plan approval application for construction of SPM. Shell submitted several individual updates to that application but ultimately submitted a complete replacement application in February 2015 that incorporated all previously submitted updates and additional information. The construction of SPM was subject to Prevention of Significant Deterioration review for nitrogen dioxide, carbon monoxide (CO), particulate matter (PM), PM with an aerodynamic diameter less than or equal to 10 micrometers (PM₁₀), and carbon dioxide equivalent (CO_{2e}); and, Nonattainment New Source Review for nitrogen oxides (NO_x), VOC, and PM with an aerodynamic diameter less than or equal to 2.5 micrometers (PM_{2.5}) based on the ozone and PM_{2.5} nonattainment status of Beaver County contemporaneous with DEP's review and issuance of SPM's initial plan approval, PA-04-00740A. DEP issued PA-04-00740A on June 18, 2015, authorizing construction of SPM. Shell commenced construction of SPM on February 10, 2016.

Shell submitted an application to modify PA-04-00740A on April 11, 2016, to incorporate NO_x, VOC, and PM_{2.5} emission reduction credits (ERCs), as required by Section C, Conditions #037 and #038 of PA-04-00740A. Shell submitted supplemental requests on April 27, 2016 and May 10, 2016, seeking DEP and EPA approval for interprecursor offset trading between NO_x and VOC that would allow Shell to use NO_x ERCs to partially satisfy VOC offsetting requirements. Shell later updated and resubmitted these supplemental requests as a single package on August 15, 2016. DEP sent a letter of summary evaluation, approval, and request for EPA evaluation to EPA Region 3 on September 14, 2016. EPA Region 3 granted a case-by-case approval on October 17, 2016. The modification to PA-04-00740A was subsequently issued by DEP on December 30, 2016, to incorporate the ERCs.

On December 18, 2019, Shell submitted a plan approval application specifically addressing SF₆-insulated high-voltage equipment associated with the Cogen Units at SPM. The application included potential to emit calculations and a control technology analysis for the SF₆ insulated high-voltage equipment. DEP issued PA-04-00740B on February 18, 2021, authorizing the installation and temporary operation of the SF₆-insulated high-voltage equipment.

On February 14, 2020, Shell submitted a plan approval application to reflect as-built changes to original design basis information reflected in PA-04-00740A. The as-built changes included equipment additions, removal and downsizing of permitted equipment, and increases and decreases in the design capacities of various equipment. The application included a control technology analysis for equipment additions that were in a class or category not previously evaluated and an update to the air quality impacts analysis and inhalation risk assessment originally completed in support of PA-04-00740A. PA-04-00740C authorizing the as-built changes was issued by DEP on February 18, 2021, concurrent with the issuance of PA-04-00740B for the SF₆-insulated high-voltage equipment.

On August 16, 2022, Shell submitted extension requests for PA-04-00740A, PA-04-00740B, and PA-04-00740C. On September 15, 2022, DEP approved the extension requests for 180 days. On October 14, 2025, DEP granted its most recent 180-day extension to Shell for the temporary operation of SPM under all three of the referenced plan approvals through April 28, 2026.

On June 19, 2024, Shell submitted a timely initial Title V operating permit application for SPM to DEP in accordance with the Pennsylvania Air Pollution Control Act and 25 Pa. Code §127.505(a).² However, on September 13, 2024, Shell submitted a plan approval application to DEP proposing the WWTP Permanent Controls Project, EMACT Project, and Plan Approval Reconciliations at SPM, which were briefly discussed earlier in Section 1.0. Although DEP has not yet issued PA-04-00740D, Shell is submitting this replacement initial Title V operating permit application that incorporates the WWTP Permanent Controls Project, EMACT Project, and Plan Approval Reconciliations-related changes that are expected to be included in PA-04-00740D.

² In a letter from Mark R. Gorog, P.E. (DEP) to William Watson (Shell) dated February 22, 2024, DEP requested Shell to submit an initial Title V operating permit application for SPM prior to June 21, 2024.

2.0 PROCESS AND EMISSION SOURCE DESCRIPTIONS

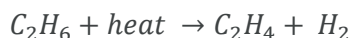
This section presents the process and emission source descriptions for SPM's equipment that is used to convert ethane into ethylene, which is then converted into low density polyethylene and high-density polyethylene (HDPE) pellets that are shipped offsite to plastic product manufacturing facilities. The descriptions are organized by processing areas as follows:

- Ethylene Manufacturing Process
- Polyethylene Manufacturing Process – Gas Phase Technology
- Polyethylene Manufacturing Process – Liquid Phase Slurry Technology
- Cogen Units
- Utilities and General Facilities.

2.1 Ethylene Manufacturing Process

2.1.1 Process Description

Figure C-1 in Appendix C shows a simplified process flow diagram of SPM's ethylene manufacturing unit. Ethane is thermally cracked at elevated temperatures in the presence of steam in SPM's seven ethane cracking furnaces, which operate in parallel as pyrolysis reactors, into the primary products of ethylene and hydrogen, as well as propylene, methane, carbon, and other byproducts. The general chemical reaction scheme for the ethane cracking reaction that occurs in the ethane cracking furnaces is shown by the following chemical equation:



The carbon byproduct generated in the ethane cracking furnaces as part of this cracking reaction is deposited as coke in the tubes of the furnaces. The gradual accumulation of coke in the tubes requires each of the ethane cracking furnaces to undergo a decoking cycle every 30 to 60 days to remove the coke buildup. Other cracking reaction byproducts such as C_{3+} , light gasoline, pyrolysis fuel oil, and blended pitch are separated from the cracked gases generated in the ethane cracking furnaces in downstream operations, which are described below.

The hot cracked gases generated in the ethane cracking furnaces are cooled in indirect heat exchangers that produce super high pressure (SHP) steam using heat absorbed from the gases. Among other uses, this SHP steam is used to drive the ethylene manufacturing unit's Cracked Gas Compressor. After passing through the SHP steam generation exchangers, the cooled cracked gases are quenched with water in the Quench Tower to further reduce the temperature and volume of the gas that must be compressed by the Cracked Gas Compressor. The quench water is also used to partially absorb acidic compounds that are formed in the ethane cracking furnaces. Water exiting the Quench Tower is cleaned to be recycled back to the process as dilution steam. Pyrolysis fuel oil and light gasoline are drawn off the middle and top sections of the quench system and sent to a gasoline/water separator. The gasoline from the separator is either sent to Gasoline Redistillation or to separate storage tanks before being transported offsite.

After the Quench Tower, the cracked gases are directed to the Cracked Gas Compressor, which is a five-stage centrifugal compressor. Between the fourth and fifth compression stages, the cracked gases are scrubbed using caustic to remove acid gases (primarily carbon dioxide [CO₂] and hydrogen sulfide). The spent caustic from this scrubbing operation is sent to a stripper tower where hydrocarbons are stripped from the spent caustic before the spent caustic is directed to the Spent Caustic Oxidation Unit. The spent caustic exiting the Spent Caustic Oxidation Unit is routed to SPM's WWTP.

After the compression section, the cracked gases pass through a cooling and drying section and then to a separation section where the gases are separated at low temperatures into a C₂ compounds/methane/hydrogen stream and a C₃₊ compounds stream. The C₂ compounds/methane/hydrogen stream is selectively hydrotreated to convert any acetylene in the stream to ethylene prior to separation into ethylene, unconverted ethane, and tail gas (hydrogen and methane). The ethylene manufacturing unit's ethylene product is used as feed in SPM's three polyethylene manufacturing units. The unconverted ethane is recycled back to the ethane cracking furnaces. Most of the tail gas is sent directly to SPM's fuel gas system to supply a significant amount of the fuel that is combusted in the ethane cracking furnaces. However, a small amount of the tail gas is sent to a pressure swing adsorption (PSA) unit where a high-purity hydrogen stream is generated for use in SPM's polyethylene manufacturing units. The tail gas generated by the PSA Unit is routed to the Cracked Gas Compressor and then routed through the processes following the compressor as described above. The unit's other products and byproducts are sent to storage prior to being transported to offsite facilities via truck or railcar.

In addition to the ethylene manufacturing unit's main processing sections, the following support systems are located inside the unit.

- **Ethylene Refrigerant Cycle:** The ethylene refrigeration cycle is an open-loop system that generates the reflux for the ethylene/ethane separation step, supplies ethylene coolant for the low-temperature section and methane/C₂ compounds separation step, and compresses ethylene product to required pressures.
- **Propane Refrigerant Cycle:** The propane refrigeration cycle is a closed-loop system that provides cooling in the intermediate temperature range between cooling water and ethylene refrigerant temperatures. The propane vapors used in this refrigeration system are compressed by a three-stage compressor.
- **Gasoline Redistillation:** The pyrolysis gasoline from the quench system is separated by distillation into light gasoline and a heavy bottom product. The light gasoline is partially re-used in the ethylene manufacturing unit as wash oil but has a net export from the unit to storage prior to being transported offsite.
- **Steam System:** SHP steam is generated in heat exchangers that are used to cool the cracked gases leaving the ethane cracking furnaces. SHP steam is supplied to several steam turbines that drive compressors at SPM, including the Cracked Gas Compressor. Additionally, steam is directed to heat consumers such as reboilers and process heat exchangers in the ethylene manufacturing unit.

- **Condensate System:** Condensate from steam turbines and heat exchangers is collected in the condensate system in the ethylene manufacturing unit. From there, it is routed to SPM's condensate treatment system.
- **Boiler Feed Water System:** Demineralized water produced at SPM is delivered to the ethane cracking furnaces and other consumers at the required flow, pressure, and quality.
- **Fuel Gas System:** Purchased natural gas and the ethylene manufacturing unit's tail gas are distributed by the fuel gas system to the ethane cracking furnaces and High Pressure (HP) Flare System.
- **Regeneration Gas System:** Part of the ethylene manufacturing unit's tail gas is used as regenerating gas for the molecular sieve dryers in the unit. The regeneration gas system includes heating, cooling, and water condensation equipment.
- **Chemical and Wash Oil System:** This system provides performance chemicals and wash oil to several injection points in the ethylene manufacturing unit. The performance chemicals used in the unit include methanol, ammonia, and dimethyl disulfide.
- **Blow Down System:** This system provides for the safe removal of process gases and liquids from the ethylene manufacturing unit's equipment to SPM's flares during upset conditions and shutdowns.
- **Slop and Sewer System:** This system collects the ethylene manufacturing unit's waste streams in separate collection systems, which ensures that the unit's effluents are processed in a safe, environmentally optimized manner.

2.1.2 Emissions

2.1.2.1 Ethane Cracking Furnace Emissions

Each of SPM's seven ethane cracking furnaces has a heat input capacity of approximately 620 million British thermal units per hour (MMBtu/hr) (higher heating value, HHV). The fuels combusted by the ethane cracking furnaces are tail gas and natural gas. The seven ethane cracking furnaces are operated in parallel and have the following operating modes.³

- **Ethane cracking:** This is the normal operating mode for an ethane cracking furnace when it is being used to crack ethane into ethylene.
- **Cold startup and shutdown:** These modes cover the operation of an ethane cracking furnace when it is initially started up following a turnaround and the period following feed being taken out of an ethane cracking furnace until it is shut down. In a cold startup situation when none of the ethane cracking furnaces is in ethane cracking mode, natural gas is used to fuel the ethane cracking furnaces until ethane cracking begins and tail gas becomes available to fuel the ethane cracking furnaces.
- **Decoking:** During the ethane cracking mode, coke gradually forms on the internal surface of the radiant tubes in an ethane cracking furnace. This coke buildup eventually leads to unacceptably

³ "Pilots Only Operation" is a mode in which an ethane cracking furnace is heated only by pilots and there is no hydrocarbon feed to the furnace. DEP concluded in a letter dated November 14, 2023, that the Pilots Only Operation mode is covered by the Cold Startup and Shutdown mode defined in PA-04-00740C because the ethane cracking furnace's coil operating temperature during Pilots Only Operation is below the stable operating temperature of 750°C.

high tube wall temperatures, thus requiring the ethane cracking furnace's tubes to be periodically decoked. Every 30 to 60 days an ethane cracking furnace's tubes undergo decoking, which lasts for approximately 36 hours, to remove the coke buildup from the tubes. The decoking mode of operation involves injecting steam into the radiant tubes of an ethane cracking furnace while progressively raising the concentration of air introduced into the tubes to achieve controlled combustion of the coke in the tubes. The gas stream exiting the tubes passes through a separator to remove large particulates before it is routed into the ethane cracking furnace's firebox where any CO and remaining particulates in the stream are combusted. The heat input rate required during decoking is approximately 30% of the ethane cracking furnace's maximum heat input. After an ethane cracking furnace has been decoked, it is placed into hot steam standby until another ethane cracking furnace shuts down or goes into decoking mode.

- **Hot steam standby:** After an ethane cracking furnace has been decoked, it is placed into hot steam standby until it is needed for cracking (i.e., one of the other ethane cracking furnaces requires decoking).
- **Feed in/Feed out:** When an ethane cracking furnace is being brought back online from hot steam standby, there is a period during which its firing rate is progressively increased prior to when feed is placed into the ethane cracking furnace. Similarly, as part of the process of bringing an ethane cracking furnace down for purposes of decoking or maintenance, its firing rate is progressively reduced to a point where the feed to the ethane cracking furnace can be completely stopped. These periods are referred to as feed in and feed out, respectively.

NOx emissions from the ethane cracking furnaces are controlled by low NOx burners and SCR. The CO, VOC, and hazardous air pollutant (HAP) emissions from the ethane cracking furnaces are controlled by combusting low-carbon fuel and following good combustion practices. The potential to emit calculations for the ethane cracking furnaces can be found in Appendix B for review.

2.1.2.2 Equipment Leak Emissions

VOC, HAP, and methane emissions may result from equipment leaks in the ethylene manufacturing process area. Processes within the ethylene manufacturing unit with potential for fugitive VOC, HAP, and/or methane emissions include:

- Ethane cracking furnace equipment
- Quench water system equipment
- Cracked gas compression, acid gas removal, and cracked gas drying equipment
- Cryogenic separation equipment
- C₂ compounds fractionation equipment
- C₂ compounds hydrogenation equipment
- Spent caustic oxidation equipment.

The potential to emit calculations for the fugitive component leaks associated with the ethylene manufacturing process can be found in Appendix B for review.

2.2 Polyethylene Manufacturing Process – Gas Phase Technology

2.2.1 Process Description

Figure C-2 in Appendix C shows a simplified process flow diagram of the gas phase polyethylene manufacturing process at SPM. SPM has two gas phase polyethylene manufacturing units (PE Units 1 and 2).

PE Units 1 and 2 consist of the following process sections: Purification, slurry catalyst system, reaction, purging and vent recovery, additive handling and pelletizing, and granular resin seed bed storage. The main feeds to PE Units 1 and 2 are ethylene, comonomer, and hydrogen.

2.2.1.1 Purification

Fresh ethylene feed flows through a series of purifiers where trace quantities of impurities are removed from the ethylene. These purifiers require periodic regeneration. Before and during regeneration the purifiers are vented to one of SPM's VOC control systems, which are described in more detail in Section 2.5.5. Purified ethylene is injected into the reactors in PE Units 1 and 2.

Several of the other raw materials used in PE Units 1 and 2 are also processed in purification equipment. Some of these materials are routed to a degassing column and then through purifiers to remove impurities before being injected into the reactors in PE Units 1 and 2, while others are only passed through a series of purifiers before being injected into the reactors. These purifiers are vented to the atmosphere or a flare before and during regeneration.

2.2.1.2 Slurry Catalyst System

Slurry catalyst used in the reactors in PE Units 1 and 2 is prepared by mixing precursor with additives. The prepared slurry catalyst is transferred to the reactors. To prevent catalyst release to the atmosphere, vessels in this process section vent to a disposal tank and seal pot.

2.2.1.3 Reaction

The reaction section consists of two fluidized bed reactors, cycle gas compressors, coolers, and product discharge tanks. Ethylene, catalyst, and other raw materials are fed continuously to the reactors. Polyethylene resin flows from the reactors to the product discharge tanks where it is separated from a small amount of accompanying gas. The separated gas is recycled back to the reactors. A mixture of resin and residual gas is then sent to resin degassing and vent recovery.

2.2.1.4 Purging and Vent Recovery

Resin from the reactors is conveyed to two purge bins where the dissolved hydrocarbons are stripped from the resin and recycled back to the reactors. Any excess gas not recycled back to the reactors is vented to one of SPM's VOC control systems. Resin from both purge bins flows to the additive handling and pelletizing section.

2.2.1.5 Additive Handling and Pelletizing

Resin from the purge bins and additives are metered to the pelletizing process. The resin and additives are thoroughly mixed, melted, and pelletized. The pellets are dried, cooled, and conveyed from the pelletizing process to homogenization silos where they are blended. From the homogenization silos, the pellets are transferred to storage silos prior to being loaded into trucks and railcars.

2.2.1.6 Granular Resin Seed Bed Storage

Granular resin is routed from the additive handling and pelletizing section to the granular resin seed bed storage section. From that section, resin is conveyed to the reaction section for seed bed use or back to the additive handling and pelletizing section.

2.2.2 Emissions

Two types of pollutant emissions result from the gas phase polyethylene manufacturing process: VOC and PM. All the vents with VOC-containing gases located upstream of and including the product purge bins are directed to one of SPM's VOC control systems. VOC emissions from the vents located downstream of the product purge bins are abated by minimizing the residual VOC content in the polyethylene resin exiting the product purge bins. In addition to VOC emissions associated with vents, fugitive VOC emissions may result from equipment leaks.

All the vents with particulate-containing gases located upstream of and including the product purge bins are directed through filters prior to release to the atmosphere. Except for the pellet dryer, particulate filters are also used to control the non-fugitive PM emissions from all vents located downstream of the product purge bins.

The potential to emit calculations for the gas phase polyethylene process atmospheric vents and fugitive component leaks associated with the gas phase polyethylene manufacturing process can be found in Appendix B for review.

2.3 Polyethylene Manufacturing Process - Liquid Phase Slurry Technology

2.3.1 Process Description

SPM has one liquid phase slurry polyethylene manufacturing unit (PE Unit 3). Figure C-3 in Appendix C shows a simplified process flow diagram of PE Unit 3.

PE Unit 3 consists of the following process sections: Catalyst activation, reaction, solvent recovery, and additive handling and pelletizing. The main feeds to PE Unit 3 are ethylene, comonomer (butene and/or hexene), hydrogen, and light hydrocarbon diluent (isobutane).

2.3.1.1 Catalyst Activation

PE Unit 3 uses Ziegler and chromium-based catalysts to manufacture polyethylene. When Ziegler catalyst is needed, a drum of the catalyst is tumbled to mix its contents into a catalyst slurry that is

pumped into a day tank with a mixer.⁴ From the mixing day tank, the catalyst slurry flows into the catalyst slurry tank where further dilution is achieved by diluent addition.

Triethylaluminum (TEAL) and triethylborane (TEB) are used as co-catalysts with the Ziegler catalyst. TEAL and TEB are volatile, colorless liquids and highly pyrophoric.⁵ Nitrogen is used to transfer TEAL and TEB from delivery containers to the co-catalyst feed pot. When transfer from a new delivery container is first initiated, the nitrogen used for the transfer process is vented through a mineral oil seal pot prior to being directed to a remote sand pit for safe, managed destruction. During upsets, the co-catalyst feed pot is vented directly to the sand pit. The sand pit is fenced, weather-protected, and accessible by authorized personnel only.

The chromium catalyst used in PE Unit 3 is delivered by trucks and is activated using an electric heater. SPM has two of these heaters. Each catalyst activation system has a vent to the atmosphere through which air, nitrogen, moisture, and catalyst fines are vented after passing through a knockout pot and high efficiency particulate air filter system. Once the catalyst has been activated, it is transferred into tote bins that are unloaded to the catalyst day tank, similar to the Ziegler catalyst. All the vents in this system are controlled using particulate filters.

2.3.1.2 Reaction

The reaction section is based on the slurry loop principle. The reaction in PE Unit 3 takes place in an isobutane diluent. Ethylene is dissolved in the diluent. Catalysts, comonomer, and hydrogen are also fed to the reactor. The ethylene contacts the catalysts in the diluent and polymer “grows” into a white powder.

Depending on the characteristics of the HDPE being manufactured, two reactors are used in series for both mono-modal and bi-modal operation. Intermediate treatment occurs during the bi-modal operation. The intermediate system is used to generate differences in the reaction conditions in each reactor to enable different HDPE properties (i.e., polymer molecular weight).

The slurry from the second reactor is discharged to hydroclones where the concentration of the polyethylene powder is increased by separating liquid from the slurry. After the hydroclones, the thickened slurry is heated up to the diluent vaporization temperature prior to discharge to the high-pressure separator.

2.3.1.3 Solvent Recovery

In PE Unit 3, the solvent recovery section includes two hydrocarbon (mostly diluent) recovery and recycle systems. These two recovery and recycle systems are the High-Pressure Solvent Recovery (HPSR) system and the Low-Pressure Solvent Recovery (LPSR) system, which are described below.

- **HPSR:** Most of the hydrocarbon recovery occurs in the HPSR system. Vaporized hydrocarbon and polyethylene powder exiting the reaction section are primarily separated from each other in

⁴ The Ziegler catalyst is purchased in 55-gallon drums.

⁵ Pyrophoric means that the material can ignite spontaneously in air.

the high-pressure separator in the HPSR system. The separated polyethylene powder is transferred to the LPSR system, while the hydrocarbon is recycled back to the reaction section.

- **LPSR:** Polyethylene powder enters the LPSR degasser from the HPSR system. This powder is “dry” but still saturated with hydrocarbon. The powder in the degasser is stripped by two counterflow gas streams. One of these gas streams is a mixture of nitrogen and light hydrocarbons. The second gas stream is a fresh pure nitrogen stream that is fed at a lower level in the degasser. Degassed polyethylene powder is pneumatically transferred to the additive handling and pelletizing section.

The recovered hydrocarbon from the HPSR and LPSR systems is combined with purified comonomer and recycled back to the reaction section.

2.3.1.4 Additive Handling and Pelletizing

Polyethylene powder from the solvent recovery section is received and blended with additives for extrusion and pelletizing. The extruder consists of a continuous mixer with gear pump and is fitted with a screen pack changer, diverter valve, die plate, and an underwater face-cutting system. Pellets are extruded and cut under water. Then the pellets are separated from the water and dried in the pellet dryer. Water recovered in the pellet dryer is recycled through the water tank to the pelletizing process. Finally, pellets are collected in a hopper before being pneumatically conveyed to homogenization silos where they are blended. From the homogenization silos, the pellets are transferred to storage silos prior to being loaded into trucks and railcars.

2.3.2 Emissions

Two types of pollutant emissions result from the liquid phase slurry polyethylene manufacturing process: VOC and PM. The LPSR degasser vent stream and all vent streams located upstream of the LPSR degasser that contain VOC are directed to one of SPM’s VOC control systems. VOC emissions from the vents located downstream of the LPSR degasser are abated by minimizing the residual VOC content in the polyethylene powder exiting the LPSR degasser. In addition to VOC emissions associated with vents, fugitive VOC emissions may result from equipment leaks.

All the vents with particulate-containing gases located upstream of the LPSR degasser are directed through filters prior to release to the atmosphere. Except for the pellet dryer, particulate filters are used to control the non-fugitive PM emissions from the pelletizing and downstream vents.

The potential to emit calculations for the liquid phase slurry polyethylene process atmospheric vents and fugitive component leaks associated with the liquid phase slurry polyethylene manufacturing process can be found in Appendix B for review.

2.4 Cogen Units

SPM has three Cogen Units that supply electricity and steam to the facility. Additionally, any excess electricity produced by the Cogen Units is sold to the local electric utility grid. Each Cogen Unit includes a natural gas-fired combustion turbine that is coupled with a natural gas-fired duct burner and an HRSG. Each combustion turbine is a General Electric Frame 6B turbine that has a baseload heat input at

average ambient site conditions equal to 481.4 MMBtu/hr (HHV) and a baseload electricity output rating at average ambient site conditions equal to 41.5 megawatts electric (MWe), for a total electricity output rating of 124.5 MWe for the three Cogen Unit combustion turbines. The exhaust system of each combustion turbine is equipped with a duct burner capable of firing natural gas up to a rated capacity of 234 MMBtu/hr (HHV). Lastly, the HRSG that is equipped on the exhaust system of each combustion turbine-duct burner combination supplies steam to two steam turbines at SPM that are rated at 75.6 MWe output each, for a total electricity output rating of 151.2 MWe for the two steam turbines.

Emissions from the Cogen Units result from the combustion of natural gas. Methane emissions may also result from equipment leaks in the natural gas supply system used to deliver fuel to the Cogen Units. NOx emissions from the Cogen Units are controlled by dry low-NOx combustion technology/low-NOx burners and SCR. Emissions of CO, VOC, and HAPs from the Cogen Units are controlled by a combination of good combustion practices and oxidation catalysts. The potential to emit calculations for the Cogen Units can be found in Appendix B for review.

2.5 Utilities and General Facilities

2.5.1 Engines

SPM has four diesel-fired reciprocating internal combustion engines (RICEs). Two of these engines, each rated at 488 brake horsepower (bhp), are used to drive emergency firewater pumps. The remaining two engines, rated at 67 and 103 bhp, respectively, are used to drive emergency electric generators. SPM also has two natural gas-fired emergency generator engines rated at 158 bhp and 50 bhp.

Emissions from SPM's stationary RICEs result from the combustion of diesel and natural gas. Emissions of NOx, VOC, CO, and PM are controlled through engine design. In addition, combustion of natural gas and low sulfur diesel results in low sulfur dioxide (SO₂) and PM emissions. The potential to emit calculations for the engines can be found in Appendix B for review.

2.5.2 Storage Tanks

Several atmospheric fixed roof storage tanks and internal floating roof (IFR) storage tanks are located at SPM, and these tanks are generally used to store fuels, raw materials, products, byproducts, and wastes. The emissions mechanisms for an atmospheric fixed roof tank are the following: (1) the contraction and expansion of the vapor in the vapor space of the tank caused by operating temperature fluctuations; and (2) the hydraulic displacement of vapor caused by cyclic increases in the tank's liquid level. The first mechanism results in standing losses, while the second mechanism results in working losses. IFR tank emissions occur because of: (1) gaps in the floating roof's rim seal; (2) openings in the floating roof that are necessary for certain tank equipment, such as gauges and floating roof deck legs, to properly operate; and (3) the volatilization of stored material that clings to the exposed walls of the tank as the liquid level in the tank decreases.

The losses from atmospheric fixed roof storage tanks at SPM that have a capacity greater than 10,000-gallons and store VOC-containing materials are collected and routed to a process or SPM's VOC control systems, and the losses from all the IFR tanks at SPM are collected and routed to SPM's VOC control

systems. The equipment components (e.g., flanges, valves, and connectors) associated with the storage tanks are sources of fugitive VOC emissions that are minimized by SPM's leak detection and repair (LDAR) program.

It is worth noting that SPM's ethylene storage system is comprised of the Refrigerated Ethylene Storage Tank, an atmospheric vertical fixed roof storage tank that is refrigerated, and the Off-spec Ethylene Sphere, which is a spherical pressure vessel that is used to store off-spec ethylene. As part of SPM's flare minimization plan, the Off-spec Ethylene Sphere is managed such that there is available storage space to accommodate an off-spec ethylene product incident. The off-spec ethylene stored in the Off-spec Ethylene Sphere is recycled back as feed to the ethylene manufacturing unit's process gas compressor for reprocessing in the unit.

2.5.3 Product Loading

The products and byproducts generated by SPM's ethylene and polyethylene manufacturing units are transported offsite via truck and railcar using various types of loading facilities. Polyethylene pellet loading is the primary loading operation at SPM, followed by C₃₊, pyrolysis fuel oil, light gasoline, PE3 heavies, recovered oil, and blended pitch loading operations. The loadout facilities and emission control devices and techniques used to minimize product and byproduct loading emissions at SPM include the following.

- **Polyethylene Pellets:** Polyethylene pellets are transported from SPM via truck and railcar. The pellets are conveyed from the homogenization silos to storage silos. Hopper cars are gravity-loaded with polyethylene pellets from the storage silos using a loading arm. Trucks are either gravity-loaded directly from the silos or loaded via conveyor. The potential to emit calculations for polyethylene pellet handling, storage, and loading can be found in Appendix B for review.
- **C₃₊:** C₃₊ is loaded into pressurized railcars using a vapor balance system that routes the collected vapors back to the two C₃₊ Storage Tanks, which are the storage vessels from which the liquid being loaded originated. The potential to emit calculations for the hose decoupling activities performed as part of this loading operation can be found in Appendix B for review.
- **Pyrolysis Fuel Oil and Light Gasoline:** Pyrolysis fuel oil and light gasoline are loaded into railcars using a vapor balance system that routes the collected vapors back to the two Pyrolysis Fuel Oil Storage Tanks, which vent to the Continuous Vent Thermal Oxidizer (CVTO) (primary control device) or Multi-Point Ground Flare (MPGF) CVTO Trip (backup control device) for control.
- **PE3 Heavies:** The PE3 heavies material is loaded into railcars using a vapor collection system that routes the collected vapors back to the two Pyrolysis Fuel Oil Storage Tanks, which vent to the CVTO (primary control device) or MPGF CVTO Trip (backup control device) for control.
- **Recovered Oil:** Recovered oil is transferred into trucks for transport offsite. The vent gases that result from loading this material are directed to a carbon adsorption system for control. The potential to emit calculations for recovered oil loading can be found in Appendix B for review.
- **Blended Pitch:** Blended pitch is transferred into trucks for transport offsite. The vent gases that result from loading this material are directed back to the process or to the HP Header System.

Four types of emissions result from SPM's loadout operations: 1) PM, PM₁₀, and PM_{2.5} emissions from filtration control devices that are used to minimize such emissions during the loading of polyethylene pellets into trucks and railcars, 2) fugitive VOC and organic HAP emissions from equipment components (e.g., pumps, valves, and connectors), trucks, and railcars, 3) VOC and organic HAP emissions from connecting and disconnecting loading hoses to and from railcars in association with loading organic materials into pressurized railcars, and 4) combustion emissions from combustion control devices that are used to minimize VOC and organic HAP emissions during the loading of organic materials into trucks and railcars.

2.5.4 Cooling Water Towers

Two counter-flow mechanical draft recirculating cooling water towers provide cooling water to SPM's operations. The Process Cooling Tower is a 26-cell cooling water tower that provides cooling water to SPM's process units, and the Cogeneration Plant Cooling Tower is a 6-cell cooling water tower that provides cooling water to the Cogen Units. Clarified, multimedia-filtered water is used as makeup water in these two recirculating cooling water systems to replace the cooling water that evaporates to the atmosphere, exits the cooling towers as water droplets (i.e., "drift" droplets), and is removed from the recirculation circuit to manage the cooling water's total dissolved solids (TDS) levels (i.e., the "blowdown" from the recirculating cooling water circuit). SPM directs cooling water blowdown to the WWTP for treatment prior to discharge.

The Process Cooling Tower and Cogeneration Plant Cooling Tower are PM emission sources. PM is formed when a cooling water tower's drift droplets evaporate in air because the TDS constituents contained in the droplets will remain airborne upon evaporation. The PM emissions from the Process Cooling Tower and Cogeneration Plant Cooling Tower are controlled by equipping and maintaining the towers with high-efficiency demisters (i.e., high efficiency drift eliminators) and minimizing the TDS level in the cooling water that passes through the towers.

The Process Cooling Tower is also a source of VOC emissions. VOC is emitted by a cooling water tower when a VOC leaks from the process fluid side of a heat exchanger in the cooling water tower's circuit to the cooling water side of the exchanger and a portion of the VOC contained in the recirculated cooling water volatilizes when the cooling water passes through the cooling water tower. The VOC emissions from the Process Cooling Tower are minimized through the implementation of an LDAR program on the cooling water tower's recirculating cooling water and the heat exchangers in the cooling water tower's circuit.

The potential to emit calculations for the Process Cooling Tower and Cogeneration Plant Cooling Tower can be found in Appendix B for review.

2.5.5 VOC Control Systems (Flares and Thermal Oxidizers)

Figure C-4 in Appendix C shows a simplified diagram of the VOC control systems at SPM. The VOC control systems are comprised of multiple headers and VOC control devices that gather and control VOC

emissions during normal, startup, and shutdown operations; maintenance activities; and unforeseeable events at SPM. The VOC control systems include the following VOC control devices:

- TEGF A
- TEGF B
- HP Elevated Flare
- CVTO
- MPGF CVTO Trip
- MPGF Ethylene Tank
- MPGF PE Units 1/2 Episodic Vent
- Spent Caustic Thermal Oxidizer (SCTO).

The HP Header System is used to collect VOC- and HAP-containing vent streams from the ethylene and polyethylene manufacturing units at SPM. The HP Header System includes ancillary equipment such as knockout pots and connects to the TEGF A, TEGF B, and HP Elevated Flare. The TEGF A and TEGF B are both pressure-assisted multi-point flares. The HP Elevated Flare is a secondary flare to the TEGF A and TEGF B; therefore, it does not continuously receive vent streams. The HP Elevated Flare is a steam-assisted flare.

The CVTO is used to control VOC- and HAP-containing vent streams generated by the polyethylene manufacturing units and specific storage tanks and loading activities at SPM. The CVTO Header System connects these polyethylene manufacturing unit, storage tank, and loading activity vent streams to the CVTO.

The MPGF CVTO Trip is a backup control device to the CVTO. The MPGF CVTO Trip Header connects the CVTO Header System to the MPGF CVTO Trip. The MPGF Ethylene Tank serves as the control device for a VOC-containing vent stream that is intermittently vented from the Refrigerated Ethylene Storage Tank through the MPGF Ethylene Tank Header to the MPGF Ethylene Tank. The MPGF PE Units 1/2 Episodic Vent is the control device for VOC-containing vent streams that are intermittently vented from PE Units 1 and 2 through the MPGF PE Units 1/2 Episodic Vent Header to the MPGF PE Units 1/2 Episodic Vent. The MPGF CVTO Trip, MPGF Ethylene Tank, and MPGF PE Units 1/2 Episodic Vent are all perimeter air assisted flares.

The SCTO is used to control VOC, reduced sulfur compounds, and organic HAPs contained in the vent streams from the Spent Caustic Storage Tank, Spent Caustic Oxidation Unit, Flow Equalization and Oil Removal (FEOR) Tanks, Recovered Oil Storage Tank, and temporary primary treatment vessels in the WWTP. Additionally, the SCTO will be used to control VOC and organic HAPs contained in the vent streams from the permanent primary treatment vessels that will be installed in the WWTP in association with the WWTP Permanent Controls Project.

The flares and thermal oxidizers at SPM emit the following pollutants: SO₂, NO_x, PM, PM₁₀, PM_{2.5}, CO, VOC, and HAPs. SPM minimizes these emissions from the flares by operating in accordance with a flare

minimization plan. In addition, the flares are operated in accordance with the applicable limits on net heating value in the combustion zone under 40 CFR 63 Subpart YY, 40 CFR 63 Subpart FFFF, and 25 Pa. Code §127.12b. The potential to emit calculations for SPM's flares and thermal oxidizers can be found in Appendix B for review.

2.5.6 Wastewater Treatment Plant

The WWTP consists of primary treatment (oils, grease, and VOC removal operations), secondary treatment (biotreatment operations), and tertiary treatment (filtration operations) of process wastewater and potentially contaminated stormwater generated at SPM. The WWTP is currently comprised of the following wastewater treatment equipment.

- Two FEOR Tanks, which are IFR tanks that vent to a closed-vent system (CVS) that routes collected vent gases to the SCTO
- A Recovered Oil Storage Tank, which is an IFR tank that vents to a CVS that routes collected vent gases to the SCTO
- A temporary WEMCO Vessel (a mechanically induced gas flotation device)
- A temporary Enviro-Cell Vessel (a hydraulically induced gas flotation device)
- Two Biotreater Aeration Tanks
- Two Secondary Clarifiers
- Two Biosludge Holding Tanks
- A Centrifuge
- A Sand Filter
- A Sump (for centrate and sand filter backwash)
- A Treated Effluent Sump

The wastewater received by the WWTP enters the two FEOR Tanks where oil that rises to the top of the liquid surface in the FEOR Tanks is skimmed off and routed to the Recovered Oil Storage Tank. The effluent from the FEOR Tanks currently flows to the temporary WEMCO and/or Enviro-Cell Vessels for the additional removal of oils, grease, and VOC prior to being routed to the two Biotreater Aeration Tanks, which represents the beginning of the WWTP's biological treatment section.

After the completion and successful commissioning of the WWTP Permanent Controls Project, the following wastewater treatment equipment will be present and operating in the WWTP, replacing the temporary WEMCO and Enviro-Cell Vessels.

- A Settlement Drum
- Two Dissolved Nitrogen Flotation (DNF) Units (DNF Unit #1 and DNF Unit #2)
- A Float/Sludge Drum
- A Steam Stripper and associated Reflux Drum

The following describes the WWTP's primary treatment process after the WWTP Permanent Controls Project. The wastewater received by the WWTP will enter the Settlement Drum, which will provide for three-phase gravity separation of the wastewater's main constituents (i.e., gravity separation of the oil, water, and sludge contained in the inlet wastewater). The oil phase will be routed to the Float/Sludge Drum and then to the existing Recovered Oil Storage Tank or recycled back to the Settlement Drum. The water phase will be routed to DNF Unit #1 or DNF Unit #2 for further treatment. The sludge material will be transferred to a truck to be transported offsite or routed to the existing Recovered Oil Storage Tank. DNF Unit #1 will remove oils, grease, and solids from the water phase received from the Settlement Drum. The effluent from DNF Unit #1 will be routed to the Steam Stripper. The float and sludge from DNF Unit #1 will be routed to the Float/Sludge Drum. DNF Unit #2 will typically receive effluent from the two FEOR Tanks, but it will also serve as a spare to DNF Unit #1. When receiving effluent from the FEOR Tanks, the effluent from DNF #2 will be routed to the Biotreater Aeration Tanks. Alternatively, when DNF #2 is used in place of DNF #1, the effluent from DNF Unit #2 will be routed to the Steam Stripper. The float and sludge from DNF Unit #2 will be routed to the Float/Sludge Drum. The Float/Sludge Drum will receive float and sludge from DNF Unit #1 and DNF Unit #2 and oils from the Settlement Drum and Steam Stripper. The material collected in the drum will be transferred to the Recovered Oil Storage Tank or routed to the Settlement Drum. Lastly, the Steam Stripper will use low-pressure steam as the stripping media. The Steam Stripper overhead will be routed through a condenser and then to the reflux drum from which condensed steam will be recycled back to the Steam Stripper as reflux. Any condensed hydrocarbons collected in the reflux drum will be routed to the Float/Sludge Drum. The effluent from the Steam Stripper will be routed to the FEOR Tanks. The Settlement Drum, DNF Unit #1, DNF Unit #2, Float/Sludge Drum, and Steam Stripper/Reflux Drum will vent to a CVS that will be routed to the SCTO.

The Biotreater Aeration Tanks and downstream Secondary Clarifiers, Biosludge Holding Tanks, Centrifuge, and Sand Filter use a combination of biotreatment, gravity settlement, filtration, and centrifugation mechanisms to treat wastewater and biosolids managed in the WWTP. Specifically, effluent from the Biotreater Aeration Tanks flows to the two Secondary Clarifiers. The overflow stream from the Secondary Clarifiers, as well as cooling water tower blowdown, is pumped through the Sand Filter, while the underflow stream is pumped to the Biosludge Holding Tanks, which feed the Centrifuge that is used for concentrating clarifier solids into a cake. The backwash from the Sand Filter and the centrate from the Centrifuge are pumped into the Centrate/Sand Filter Backwash Sump and then recycled back to the Biotreater Aeration Tanks. The effluent from the Sand Filter is routed to the Treated Effluent Sump before being discharged through an outfall to the Ohio River.

The WWTP is a source of VOC and HAP emissions. However, these emissions are minimized by venting WWTP primary treatment vessels to the SCTO. The potential to emit calculations for the WWTP can be found in Appendix B for review.

2.5.7 SF₆-Insulated High-Voltage Equipment

Certain electrical equipment installed at SPM includes gas-insulated switchgear (GIS), which uses SF₆ as an insulating medium. SF₆-insulated high-voltage equipment at SPM includes substation switchgear and transformer surge arrestors. SF₆-insulated high-voltage equipment are located at the Main Incoming

Substation (MIS), Power Distribution Substation, MIS transformers, gas turbine generator step up transformers, and steam turbine generator step up transformers. This equipment is a potential source of greenhouse gas (GHG) emissions due to the potential for leakage of SF₆ from the gas-tight compartments. Each gas compartment is equipped with a fill port to add or withdraw SF₆, dedicated pressure relief rupture diaphragms, and where necessary, diverter nozzles to divert an overpressure gas discharge away from the normal operating area of the switchgear. Fugitive emissions can occur during initial filling, operating leaks, and periodic recharging following a leak. GIS is designed to be gas-tight and is tested and designed with a maximum acceptable leakage of 0.1% per year. Transformers are designed with a maximum acceptable rate of leakage of 0.5% per year.

Emissions are minimized through equipment design and an LDAR program. Each SF₆-insulated compartment is equipped with a pressure indicator that is monitored and alerts personnel when the pressure drops below a setpoint level. Additionally, the MIS is equipped with a multi-zone SF₆ gas monitoring system as a safety device to protect SPM personnel. This monitoring system uses infrared sensing technology to detect leaks of SF₆ at low levels.

Fugitive emissions were estimated for SF₆-insulated high-voltage equipment based upon the licensor's guaranteed leak rates of 0.1% for GIS equipment and 0.5% for transformers. The potential to emit calculations for these fugitive component leaks can be found in Appendix B for review.

2.5.8 Plant Roadways

Although much of the material that moves in and out of SPM is transported by rail, certain materials are transported in and out by truck. As a result, fugitive PM emissions occur at SPM as trucks travel over the paved surfaces of its plant roadways.

PM emissions resulting from travel on paved roads are primarily associated with the re-suspension of loose material on the road surface as travel occurs. PM emissions from travel on paved roads have been correlated with what is termed the "silt loading" present on the road surface and the average weight of the vehicles traveling the road, where "silt loading" refers to the mass of silt-size material (i.e., loose surface dust equal to or less than 75 micrometers in physical diameter) per unit area of the travel surface. Only a small fraction of SPM's PM emissions from truck travel on SPM's paved plant roadways were estimated to be PM₁₀ (about 20%), and an even smaller fraction of the PM emissions were estimated to be PM_{2.5} (about 5%). The potential to emit calculations for SPM's plant roadways can be found in Appendix B for review.

3.0 REGULATORY APPLICABILITY

This section briefly addresses the applicability of Pennsylvania and federal (e.g., 40 CFR Parts 60, 61, and 63) air quality regulations to SPM, including potentially applicable federal New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations. Specific requirements that apply to SPM are addressed in the Title V Operating Permit Application forms in Appendix A.

3.1 Pennsylvania Air Pollution Control Regulations

The Commonwealth of Pennsylvania has promulgated ambient air quality standards and pollution control regulations under Title 25 of the Pa. Code.⁶ Below is a discussion of some of the 25 Pa. Code Chapter 121 through 145 requirements that are applicable to SPM. See the Title V Operating Permit Application forms in Appendix A for additional details regarding applicable 25 Pa. Code Chapter 121 through 145 requirements.

3.1.1 25 Pa. Code Chapter 121. General Provisions

Chapter 121 provides for the control and prevention of air pollution anywhere in Pennsylvania and generally includes the following: Definitions, purpose, applicability, DEP organizational structure, prohibition of air pollution, requirement to comply with other provisions of Title 25, and prohibition of circumventing Article III rules by using a device (e.g., stack height), which would otherwise be in violation of Article III rules. SPM complies with these provisions by obtaining necessary permits and complying with the requirements of these permits and applicable Title 25 provisions.

3.1.2 25 Pa. Code Chapter 122. National Standards of Performance for New Stationary Sources

Chapter 122 adopts NSPS (40 CFR Part 60) regulations promulgated by the EPA under the Clean Air Act (CAA) that regulate the construction and modification of specific facilities at stationary sources. The applicability of NSPS regulations to SPM emission sources is addressed in Section 3.2.1 herein, and additional NSPS regulatory applicability detail is provided in the Title V Operating Permit Application forms in Appendix A.

3.1.3 25 Pa. Code Chapter 123. Standards for Contaminants

Chapter 123 contains standards for sources of PM, sulfur compounds, odors, visible emissions, and nitrogen compounds, as well as NO_x allowance requirements. SPM is subject to various requirements under this chapter, which were previously incorporated into SPM's plan approvals. Additional details regarding applicable 25 Pa. Code Chapter 123 requirements are provided in the Title V Operating Permit Application forms in Appendix A.

⁶ The Pennsylvania Code is an official publication of the Commonwealth of Pennsylvania. Title 25. Environmental Protection; Subpart C. Protection of Natural Resources; Article III. Air Resources; Chapters 121-145.

3.1.4 25 Pa. Code Chapter 124. National Emission Standards for Hazardous Air Pollutants

Chapter 124 adopts the 40 CFR Part 61 NESHAP promulgated by the EPA under the CAA. SPM's 40 CFR Part 61 NESHAP applicability is addressed in Section 3.2.2 herein. Also, additional details regarding 40 CFR Part 61 NESHAP regulatory applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.1.5 25 Pa. Code Chapter 127. Construction, Modification, Reactivation and Operation of Sources

Chapter 127 includes requirements applicable to the construction, modification, reactivation, and operation of emission sources in Pennsylvania.

3.1.5.1 25 Pa. Code §127.441. Operating Permit Terms and Conditions

25 Pa. Code §127.441(b) requires each operating permit to “incorporate by reference the emission and performance standards and other requirements of the act, the Clean Air Act or the regulations thereunder.” DEP recently indicated that specific PA-04-00740C conditions for the following control devices will be incorporated into Pennsylvania's state implementation plan (SIP) to satisfy reasonably available control technology requirements that are applicable to SPM's HDPE manufacturing operations (PE Unit 3) and these control devices.

- TEGF A
- TEGF B
- HP Elevated Flare
- CVTO
- MPGF CVTO Trip

In the Title V Operating Permit Application forms in Appendix A, Shell has identified the PA-04-00740C conditions for these control devices that DEP indicated it will incorporate into Pennsylvania's SIP by assigning a 25 Pa. Code §127.441(b) citation to such conditions.

3.1.5.2 25 Pa. Code §127.505. Initial Application Submittal for Title V Facilities

DEP sent a February 22, 2024, dated letter to Shell indicating SPM's initial Title V operating permit application was due to DEP within 120 days from receipt of the letter pursuant to 25 Pa. Code §127.505(a). Shell submitted an initial Title V operating permit application to DEP for SPM on June 19, 2024, meeting the June 21, 2024 deadline indicated in DEP's February 22, 2024 letter. As previously discussed, this replacement initial Title V operating permit application replaces the June 19, 2024 initial Title V operating permit application that Shell submitted to DEP.

3.1.6 25 Pa. Code Chapter 129. Standards for Sources

Chapter 129 contains regulations applicable to specific sources and emissions units that emit certain pollutants, including NO_x and VOC. Below is a discussion of the 25 Pa. Code Chapter 129 requirements that are applicable to SPM. Additional details regarding applicable 25 Pa. Code Chapter 129 requirements are provided in the Title V Operating Permit Application forms in Appendix A.

3.1.6.1 25 Pa. Code §129.14. Open Burning Operations

SPM is in an area of Beaver County designated in 25 Pa. Code §121.1 as an air basin, which, pursuant to 25 Pa. Code §129.14, has a restriction on open burning. *Open burning* is defined in 25 Pa. Code §121.1 as “a fire, the air contaminants from which are emitted directly into the outdoor atmosphere and not directed thereto through a flue.”

SPM uses TEAL and TEB as co-catalysts in the polyethylene manufacturing process. TEAL and TEB are highly pyrophoric, igniting immediately upon exposure to air. During routine co-catalyst transfer and process upsets, the lines containing these pyrophoric materials in nitrogen are routed to a remote sand pit for safe, managed destruction. The sand pit is a controlled emission point.

The TEAL and TEB releases cannot be sent to SPM’s VOC control systems due to the oxygen and moisture that may be present in the other gas streams that are vented to the system. Sending the TEAL and TEB vapors to the sand pit meets the exception to the open burning ban at 25 Pa. Code §129.14(c)(1) because the purpose of the sand pit is to abate a fire hazard at SPM. Note that the sand pit is fenced, weather protected, and accessible by authorized personnel only.

3.1.6.2 25 Pa. Code §129.56. Storage Tanks Greater than 40,000 Gallons Capacity Containing VOCs

Except as identified in 25 Pa. Code §129.56(d), this section requires any stationary tank, reservoir, or other container with a capacity greater than 40,000 gallons used to store VOC with a vapor pressure greater than 1.5 pounds per square inch, absolute (psia; 10.5 kilopascals [kPa]) under actual storage conditions to be a pressure tank capable of always maintaining working pressures sufficient to prevent vapor or gas loss to the atmosphere or designed and equipped with an appropriate device, including:

- **An external or an internal floating roof:** This option is not permitted if the storage tank stores a VOC that has a vapor pressure of 11 psia (76 kPa) or greater at actual storage conditions.
- **A vapor recovery system:** This option consists of a vapor-gathering system capable of collecting the VOC discharged from the storage tank and a vapor disposal system capable of processing the collected VOC. Additionally, tank gauging and sampling devices shall be gas-tight except when gauging or sampling is taking place, and the vapor recovery system shall be maintained in good working order and recover at least 80% of the vapors emitted by the tank.

SPM has several storage tanks with a capacity greater than 40,000 gallons containing VOC with a vapor pressure greater than 1.5 psia at actual storage conditions, such as hexene, methanol, pentane, and light gasoline. These storage tanks are either pressure tanks capable of always maintaining working pressures sufficient to prevent vapor or gas loss to the atmosphere or they are equipped with controls

that meet lowest achievable emission rate (LAER) requirements, which meet or exceed the requirements of 25 Pa. Code §129.56. A table included in Appendix B provides a list of the storage tanks in SPM's plan approvals and the control techniques used on these storage tanks. Additional details regarding applicable 25 Pa. Code §129.56 requirements are provided in the Title V Operating Permit Application forms in Appendix A.

3.1.6.3 25 Pa. Code §129.57. Storage Tanks Less than or Equal to 40,000 Gallons Capacity Containing VOCs

Section 129.57 applies to aboveground stationary storage tanks with a capacity greater than or equal to 2,000 gallons but less than or equal to 40,000 gallons that contain VOC with a vapor pressure greater than 1.5 psia (10.5 kPa) under actual storage conditions. Storage tanks subject to 25 Pa. Code §129.57 must have pressure relief valves that are maintained in good operating condition and that are set to release at either no less than 0.7 pounds per square inch, gauge (psig; 4.8 kPa) of pressure, 0.3 psig (2.1 kPa) of vacuum, or the highest possible pressure and vacuum in accordance with state or local fire codes, the National Fire Prevention Association guidelines, or other national consensus standards acceptable to DEP.

SPM has a methanol storage tank that is subject to the requirements of 25 Pa. Code §129.57. This storage tank is equipped with controls that meet LAER requirements, which meet or exceed the requirements of this section. A table included in Appendix B provides a list of the storage tanks in SPM's plan approvals and the control techniques used on these storage tanks. Additional details regarding applicable 25 Pa. Code §129.57 requirements are provided in the Title V Operating Permit Application forms in Appendix A.

3.1.6.4 25 Pa. Code §129.65. Ethylene Production Plants

Section 129.65 requires waste gas streams from ethylene production plants to be combusted at 1,300 °F or greater for at least 0.3 seconds, except that VOC from a vapor blowdown system may be combusted by smokeless flares. The ethylene manufacturing unit at SPM is equipped with combustion control devices (i.e., TEGF A, TEGF B, and HP Elevated Flare) that constitute LAER and meet or exceed the noted waste gas stream control requirements of 25 Pa. Code §129.65.

3.1.6.5 25 Pa. Code §129.71. Synthetic Organic Chemical and Polymer Manufacturing—Fugitive Sources

This section applies to facilities that manufacture surface active agents and are subject to 25 Pa. Code §129.72 and to facilities that manufacture 1,000 tons per year (tpy) or more of one or a combination of the following:

- Synthetic organic chemicals listed in 40 CFR 60.489, which includes ethylene
- Methyl tert-butyl ether
- Polyethylene
- Polypropylene
- Polystyrene.

SPM manufactures more than 1,000 tpy of ethylene and polyethylene, respectively. Accordingly, to comply with the requirements of 25 Pa. Code §129.71, SPM must meet the following requirements for equipment that is not exempt under 25 Pa. Code §129.71(b):

- Install a second valve, blind flange, plug, cap, or other equivalent sealing system on open-ended lines, except for safety pressure relief valves.
- Develop and initiate an LDAR program including liquid leaks for pumps, valves, compressors, vessels, and safety pressure relief valves, and a repair program for components that cause a hydrocarbon detection instrument reading equal to or greater than 10,000 parts per million.

SPM must comply with equipment design and LDAR LAER requirements for the facility's equipment that are both equivalent to or more stringent than the requirements in 25 Pa. Code §129.71 and as enforceable as 25 Pa. Code §129.71. Thus, in accordance with 25 Pa. Code §129.71(d), these equivalent or more stringent equipment design and LDAR LAER requirements satisfy the requirements under this section. Additional details regarding applicable equipment leak LAER requirements are provided in the Title V Operating Permit Application forms in Appendix A.

3.1.6.6 25 Pa. Code §129.71a. Control of VOC Emissions from the Synthetic Organic Chemical Manufacturing Industry—Air Oxidation, Distillation and Reactor Processes

Except if more stringent requirements are contained in an applicable permit or plan approval issued by DEP, 25 Pa. Code §129.71a applies to synthetic organic chemical manufacturing facilities that have a vent stream originating from a process unit in which an air oxidation unit process, distillation operation, or reactor process produces one or more of the chemicals listed in Table 1 of the section as a product, coproduct, byproduct, or intermediate. However, pursuant to 25 Pa. Code §129.71a(b)(1), compliance with 40 CFR Part 60 or 63 requirements, including the requirements of 40 CFR 60 Subpart NNN (distillation operations) and 40 CFR 60 Subpart RRR (reactor processes), constitutes compliance with the provisions of this section.

Although SPM's ethylene manufacturing unit does not include any air oxidation unit processes, it does include distillation operations and reactor processes that produce one or more of the chemicals listed in Table 1 of 25 Pa. Code §129.71a as a product, coproduct, byproduct, or intermediate. However, pursuant to the 40 CFR Part 60 compliance overlap provisions noted above, SPM complies with 25 Pa. Code §129.71a with respect to its ethylene manufacturing unit's distillation operations and reactor processes by complying with 40 CFR 60 Subpart NNN and 40 CFR 60 Subpart RRR, respectively.

Alternatively, SPM's polyethylene manufacturing units do not include any air oxidation unit processes or distillation operations, and the polyethylene manufacturing units do not include any reactor processes that produce one or more of the chemicals listed in Table 1 of 25 Pa. Code §129.71a as a product, coproduct, byproduct, or intermediate. As a result, SPM's polyethylene manufacturing units are not subject to 25 Pa. Code §129.71a.

3.1.7 25 Pa. Code Chapter 135. Reporting of Sources

Chapter 135 contains regulations addressing recordkeeping and reporting requirements focused on emissions inventory data for specific stationary sources. SPM maintains records necessary to comply with the emissions inventory requirements outlined in Chapter 135. Also, SPM complies with the emissions inventory reporting requirements indicated in this chapter by submitting an annual emissions inventory by March 1 of each year for the preceding calendar year. Additional details regarding applicable emissions inventory reporting requirements at SPM are provided in the Title V Operating Permit Application forms in Appendix A.

3.1.8 25 Pa. Code Chapter 137. Air Pollution Episodes

Chapter 137 provides for DEP to declare air pollution episodes to prevent the excessive buildup of air pollutants during an episode. Chapter 137 requires that specific industries, including chemical industry facilities, in designated counties prepare standby plans for implementation during such episodes. SPM has a standby plan that will be implemented when requested by DEP.

3.1.9 25 Pa. Code Chapter 139. Sampling and Testing

This chapter contains the following subchapters that address the noted topics:

- Subchapter A. Sampling and Testing Methods and Procedures
- Subchapter B. Monitoring Duties of Certain Sources
- Subchapter C. Requirements for Source Monitoring for Stationary Sources.

SPM follows the methods and procedures contained in this chapter as laid out in its plan approvals and as directed by DEP. Additional details regarding applicable sampling, testing, and monitoring requirements at SPM are provided in the Title V Operating Permit Application forms in Appendix A.

3.2 Federal Air Quality Regulations

Shell briefly discusses the applicability of federal air quality regulations to SPM and its emission sources below. However, additional details regarding federal regulatory applicability at SPM are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.1 40 CFR Part 60: New Source Performance Standards

40 CFR Part 60 regulations are referenced as New Source Performance Standards regulations or “NSPS” regulations, and they establish emission standards, work practices, or both, for *affected facilities*⁷ and certain *existing facilities*⁸ within specific stationary source categories, which the EPA has determined contribute to air pollution that may cause or contribute to the endangerment of public health or

⁷ *Affected facility* – means, with reference to a stationary source, any apparatus to which a standard is applicable. (40 CFR Part 60, Subpart A).

⁸ *Existing facility* – means, with reference to a stationary source, any apparatus of the type for which a standard is promulgated in this part, and the construction or modification of which was commenced before the date of proposal of that standard; or any apparatus which could be altered in such a way as to be of that type. (40 CFR Part 60, Subpart A).

welfare. As required by section 111 of the CAA, the emission standards and work practices included in 40 CFR Part 60 are intended to reflect “the degree of emission limitation achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction and any non-air quality health and environmental impact and energy requirements) the Administrator [EPA] determines has been adequately demonstrated.”

3.2.1.1 40 CFR Part 60, Subpart A – General Provisions

The NSPS general provisions in 40 CFR 60 Subpart A are applicable to facilities and associated control devices subject to 40 CFR Part 60 standards. SPM has affected facilities subject to 40 CFR 60 Subparts Kb, VV, VVa, DDD, NNN, RRR, IIII, JJJJ, KKKK, and TTTT. Therefore, SPM is also subject to applicable requirements under 40 CFR 60 Subpart A. In general, 40 CFR 60 Subpart A provisions specify performance test, performance evaluation (monitoring systems), notification, recordkeeping, reporting, and control device requirements for affected facilities.

Emission control devices used to comply with 40 CFR Part 60 requirements must comply with 40 CFR 60.11(d), which requires an owner or operator to maintain and operate any affected facility including associated air pollution equipment in a manner consistent with good air pollution control practice for minimizing emissions. Also, unless exempt due to compliance with requirements found in another part, any flare used as a VOC control device under 40 CFR 60 Subparts Kb, VV, VVa, DDD, NNN, and RRR must comply with the applicable control device requirements in 40 CFR 60.18. Additional details regarding 40 CFR 60 Subpart A applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.1.2 40 CFR Part 60, 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, and On or Before October 4, 2023

Except for the types of *storage vessels*⁹ described in 40 CFR 60.110b(d), which include storage vessels that are pressure vessels designed to operate in excess of 204.9 kPa (29.7 psia) and without emissions to the atmosphere, 40 CFR 60 Subpart Kb applies to the following storage vessels with a design capacity¹⁰ greater than or equal to 75 cubic meters (m³) (19,813 gallons) for which construction, reconstruction, or modification commenced after July 23, 1984, and on or before October 4, 2023:

⁹ *Storage vessel* – means each tank, reservoir, or container used for the storage of volatile organic liquids but does not include:

- (1) Frames, housing, auxiliary supports, or other components that are not directly involved in the containment of liquids or vapors;
- (2) Subsurface caverns or porous rock reservoirs; or
- (3) Process tanks. (40 CFR Part 60, Subpart Kb).

¹⁰ “Design capacity, as used in 40 C.F.R. Part 60 Subpart Kb, and Capacity, as used in 40 C.F.R. Part 60 Subpart Ka, shall mean the internal cross-sectional area of a tank multiplied by the internal height of the tank shell and shall be reported in cubic meters. Operational restrictions such as design liquid levels and overflow valve heights shall not be a consideration in determining internal height and shall not impact the calculations. The nominal capacity assigned by the tank manufacturer shall only be used to assess capacity or design capacity if a tank is not close to a size of regulatory concern.” (Gil Haselberger, Manager, Air Enforcement and Program Support Unit, EPA, Region 10 to Randy Poteet, Arco Alaska Inc. December 19, 1997. EPA Applicability Determination Index Control Number 9800034).

- Any storage vessel with a design capacity greater than or equal to 19,813 gallons but less than 151 m³ (39,890 gallons) storing a volatile organic liquid (VOL) with a *maximum true vapor pressure*¹¹ (TVP) greater than or equal to 15.0 kPa (2.2 psia); and
- Any storage vessel with a design capacity greater than or equal to 39,890 gallons storing a VOL with a maximum TVP greater than or equal to 3.5 kPa (0.51 psia).

A *volatile organic liquid (VOL)* is “any organic liquid which can emit volatile organic compounds (as defined in 40 CFR 51.100) into the atmosphere.” A *process tank*¹² is not a “storage vessel” under 40 CFR 60 Subpart Kb.

Storage vessels meeting the following criteria are subject to 40 CFR 60 Subpart Kb control requirements:

- Any storage vessel with a design capacity greater than or equal to 19,813 gallons but less than 39,890 gallons storing a VOL with a maximum true vapor pressure greater than or equal to 4 psia but less than 11.1 psia;
- Any storage vessel with a design capacity greater than or equal to 39,890 gallons storing a VOL with a maximum true vapor pressure greater than or equal to 0.75 psia but less than 11.1 psia; and
- Any storage vessel with a design capacity greater than or equal to 19,813 gallons storing a VOL with a maximum true vapor pressure greater than or equal to 11.1 psia.

Table 1 below summarizes 40 CFR 60 Subpart Kb applicability for “storage vessels” of VOL at SPM that have a design capacity greater than or equal to this subpart’s minimum applicability threshold of 19,813 gallons and are not pressure vessels designed to operate at a pressure greater than 29.7 psia and without emissions to the atmosphere.

¹¹ *Maximum true vapor pressure* – means the equilibrium partial pressure exerted by the volatile organic compounds (as defined in 40 CFR 51.100) in the stored VOL at the temperature equal to the highest calendar-month average of the VOL storage temperature for VOL’s stored above or below the ambient temperature or at the local maximum monthly average temperature as reported by the National Weather Service for VOL’s stored at the ambient temperature, as determined:

(1) In accordance with methods described in American Petroleum Institute Bulletin 2517, Evaporation Loss From External Floating Roof Tanks, (incorporated by reference – see §60.17); or

(2) As obtained from standard reference texts; or

(3) As determined by ASTM D2879–83, 96, or 97 (incorporated by reference – see §60.17); or

(4) Any other method approved by the Administrator. (40 CFR Part 60, Subpart Kb).

¹² *Process tank* – means a tank that is used within a process (including a solvent or raw material recovery process) to collect material discharged from a feedstock storage vessel or equipment within the process before the material is transferred to other equipment within the process, to a product or by-product storage vessel, or to a vessel used to store recovered solvent or raw material. In many process tanks, unit operations such as reactions and blending are conducted. Other process tanks, such as surge control vessels and bottoms receivers, however, may not involve unit operations. (40 CFR Part 60, Subpart Kb).

Table 1. 40 CFR 60 Subpart Kb Applicability Summary

Storage Tank	Capacity (gallons)	Material	Maximum TVP (psia)	Applicability Determination	Applicability Determination Background
Refrigerated Ethylene Storage Tank	7,925,162	Ethylene	>11.1	Applicable	The tank is used to store a VOL, its capacity is >19,813 gallons, and the maximum TVP of the VOL stored in the tank is >11.1 psia. Therefore, the tank is a storage vessel affected facility under 40 CFR 60 Subpart Kb that must comply with the subpart's applicable control, monitoring, recordkeeping, and reporting requirements.
Light Gasoline Storage Tank	151,899	Light Gasoline	>0.75 but <11.1	Exempt	The tank is used to store a VOL, its capacity is >39,890 gallons, and the maximum TVP of the VOL stored in the tank is >0.75 psia but <11.1 psia. Therefore, the tank meets the criteria to be a storage vessel affected facility under 40 CFR 60 Subpart Kb that is subject to the subpart's control, monitoring, recordkeeping, and reporting requirements. However, pursuant to 40 CFR 63.1100(g)(1)(ii) in 40 CFR 63 Subpart YY, the tank is exempt from 40 CFR 60 Subpart Kb requirements and is required to comply only with 40 CFR 63 Subpart YY storage vessel requirements.

Storage Tank	Capacity (gallons)	Material	Maximum TVP (psia)	Applicability Determination	Applicability Determination Background
Pyrolysis Fuel Oil Storage Tank A	126,803	Pyrolysis Fuel Oil	>0.75 but <11.1	Exempt	The tank is used to store a VOL, its capacity is >39,890 gallons, and the maximum TVP of the VOL stored in the tank is >0.75 psia but <11.1 psia. Therefore, the tank meets the criteria to be a storage vessel affected facility under 40 CFR 60 Subpart Kb that is subject to the subpart's control, monitoring, recordkeeping, and reporting requirements. However, pursuant to 40 CFR 63.1100(g)(1)(ii) in 40 CFR 63 Subpart YY, the tank is exempt from 40 CFR 60 Subpart Kb requirements and is required to comply only with 40 CFR 63 Subpart YY storage vessel requirements.
Pyrolysis Fuel Oil Storage Tank B	126,803	Pyrolysis Fuel Oil	>0.75 but <11.1	Exempt	The tank is used to store a VOL, its capacity is >39,890 gallons, and the maximum TVP of the VOL stored in the tank is >0.75 psia but <11.1 psia. Therefore, the tank meets the criteria to be a storage vessel affected facility under 40 CFR 60 Subpart Kb that is subject to the subpart's control, monitoring, recordkeeping, and reporting requirements. However, pursuant to 40 CFR 63.1100(g)(1)(ii) in 40 CFR 63 Subpart YY, the tank is exempt from 40 CFR 60 Subpart Kb requirements and is required to comply only with 40 CFR 63 Subpart YY storage vessel requirements.

Storage Tank	Capacity (gallons)	Material	Maximum TVP (psia)	Applicability Determination	Applicability Determination Background
Wash Oil Storage Drum	33,343	Wash Oil	<2.2	Not Applicable	The tank is used to store a VOL and its capacity is >19,813 but <39,890 gallons, but the maximum TVP of the VOL stored in the tank is <2.2 psia. Therefore, the tank is not a storage vessel affected facility under 40 CFR 60 Subpart Kb.
Hexene Storage Tank A	802,026	Hexene	>0.75 but <11.1	Applicable	The tank is used to store a VOL, its capacity is >39,890 gallons, and the maximum TVP of the VOL stored in the tank is >0.75 psia but <11.1 psia. Therefore, the tank is a storage vessel affected facility under 40 CFR 60 Subpart Kb that must comply with the subpart's applicable control, monitoring, recordkeeping, and reporting requirements.
Hexene Storage Tank B	802,026	Hexene	>0.75 but <11.1	Applicable	The tank is used to store a VOL, its capacity is >39,890 gallons, and the maximum TVP of the VOL stored in the tank is >0.75 psia but <11.1 psia. Therefore, the tank is a storage vessel affected facility under 40 CFR 60 Subpart Kb that must comply with the subpart's applicable control, monitoring, recordkeeping, and reporting requirements.

Storage Tank	Capacity (gallons)	Material	Maximum TVP (psia)	Applicability Determination	Applicability Determination Background
Recovered Oil Storage Tank	521,211	Recovered Oil	<0.51	Not Applicable	The tank is used to store a VOL and its capacity is >39,890 gallons, but the maximum TVP of the VOL stored in the tank is <0.51 psia. Therefore, the tank is not a storage vessel affected facility under 40 CFR 60 Subpart Kb. However, pursuant to 40 CFR 61.351(a)(1) in 40 CFR 61 Subpart FF, the tank complies with the fixed roof and internal floating roof requirements in 40 CFR 60.112b(a)(1) in 40 CFR 60 Subpart Kb to comply with the alternative standards for tanks in 40 CFR 61 Subpart FF.
FEOR A Tank	877,051	Wastewater	<0.51	Not Applicable	The tank is used to store a VOL and its capacity is >39,890 gallons, but the maximum TVP of the VOL stored in the tank is <0.51 psia. Therefore, the tank is not a storage vessel affected facility under 40 CFR 60 Subpart Kb. However, pursuant to 40 CFR 61.351(a)(1) in 40 CFR 61 Subpart FF, the tank complies with the fixed roof and internal floating roof requirements in 40 CFR 60.112b(a)(1) in 40 CFR 60 Subpart Kb to comply with the alternative standards for tanks in 40 CFR 61 Subpart FF.

Storage Tank	Capacity (gallons)	Material	Maximum TVP (psia)	Applicability Determination	Applicability Determination Background
FEOR B Tank	877,051	Wastewater	<0.51	Not Applicable	The tank is used to store a VOL and its capacity is >39,890 gallons, but the maximum TVP of the VOL stored in the tank is <0.51 psia. Therefore, the tank is not a storage vessel affected facility under 40 CFR 60 Subpart Kb. However, pursuant to 40 CFR 61.351(a)(1) in 40 CFR 61 Subpart FF, the tank complies with the fixed roof and internal floating roof requirements in 40 CFR 60.112b(a)(1) in 40 CFR 60 Subpart Kb to comply with the alternative standards for tanks in 40 CFR 61 Subpart FF.
Spent Caustic Storage Tank	345,273	Spent Caustic	<0.51	Not Applicable	The tank is used to store a VOL and its capacity is >39,890 gallons, but the maximum TVP of the VOL stored in the tank is <0.51 psia. Therefore, the tank is not a storage vessel affected facility under 40 CFR 60 Subpart Kb. However, pursuant to 40 CFR 61.351(a)(1) in 40 CFR 61 Subpart FF, the tank complies with the fixed roof and internal floating roof requirements in 40 CFR 60.112b(a)(1) in 40 CFR 60 Subpart Kb to comply with the alternative standards for tanks in 40 CFR 61 Subpart FF.

Additional details regarding 40 CFR 60 Subpart Kb, 40 CFR 61 Subpart FF, and 40 CFR 63 Subpart YY applicable requirements are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.1.3 40 CFR Part 60, 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 the group of all equipment (each pump, compressor, pressure relief device, sampling connection system, open-ended valve or line, valve, and flange or other connector “in VOC service,” and any devices or systems required by the subpart) within a process unit in the *synthetic organic chemicals manufacturing industry*¹³ for which construction, reconstruction, or modification commenced after January 5, 1981, and on or before November 7, 2006. *In VOC service* “means that the piece of equipment contains or contacts a process fluid that is at least 10 percent VOC by weight. (The provisions of §60.485(d) specify how to determine that a piece of equipment is not in VOC service.).” Also, 40 CFR 60 Subpart VV is referenced for applicability and control requirement purposes by other 40 CFR Part 60 standards (e.g., 40 CFR 60 Subpart DDD, 40 CFR 60 Subpart GGG).

Although SPM’s polyethylene manufacturing units were not constructed, reconstructed, or modified after January 5, 1981, and on or before November 7, 2006, and they do not produce, as intermediates or final products, one or more of the chemicals listed in 40 CFR 60.489, the groups of “fugitive emissions equipment” in the polyethylene manufacturing units are subject to 40 CFR 60 Subpart VV requirements as specifically referenced in 40 CFR 60.562-2 in 40 CFR 60 Subpart DDD. However, pursuant to the overlap provisions at 40 CFR 63.2535(k) in 40 CFR 63 Subpart FFFF, a miscellaneous organic chemical manufacturing affected source under 40 CFR 63 Subpart FFFF with equipment subject to the requirements of 40 CFR 60 Subpart VV may elect to apply 40 CFR 63 Subpart FFFF to all such equipment provided that all total organic compounds, minus methane and ethane, in the equipment are considered as if they were organic HAPs for purposes of compliance with 40 CFR 63 Subpart FFFF. In accordance with 40 CFR 63.2535(k), SPM has elected to comply with the equipment leak requirements of 40 CFR 63 Subpart FFFF (i.e., 40 CFR 63 Subpart UU) instead of 40 CFR 60 Subpart VV for PE Units 1, 2, and 3.

Additional details regarding 40 CFR 60 Subpart VV, 40 CFR 63 Subpart FFFF, and 40 CFR 63 Subpart UU applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.1.4 40 CFR Part 60, Subpart VVa – Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for which Construction, Reconstruction, or Modification Commenced After November 7, 2006, and on or Before April 25, 2023

40 CFR 60 Subpart VVa applies to the group of all equipment (each pump, compressor, pressure relief device, sampling connection system, open-ended valve or line, valve, and flange or other connector “in VOC service,” and any devices or systems required by the subpart) within a *process unit*¹⁴ in the

¹³ *Synthetic organic chemicals manufacturing industry* – means the industry that produces, as intermediates or final products, one or more of the chemicals listed in §60.489. (40 CFR Part 60, Subpart VV).

¹⁴ *Process unit* – means components assembled to produce, as intermediate or final products, one or more of the chemicals listed in §60.489 of this part. A process unit can operate independently if supplied with sufficient feed or raw materials and sufficient storage facilities for the product (40 CFR Part 60, Subpart VVa).

*synthetic organic chemicals manufacturing industry*¹⁵ for which construction, reconstruction, or modification commenced after November 7, 2006, and on or before April 25, 2023. *In VOC service* “means that the piece of equipment contains or contacts a process fluid that is at least 10 percent VOC by weight. (The provisions of §60.485a(d) specify how to determine that a piece of equipment is not in VOC service.).”

40 CFR 60 Subpart VVa is applicable to the group of all equipment within the ethylene manufacturing unit at SPM because this unit produces ethylene, which is a synthetic organic chemicals manufacturing industry (SOCMI) chemical listed in 40 CFR 60.489, and the group of all equipment was constructed after November 7, 2006, but before April 25, 2023. However, pursuant to the overlap provisions at 40 CFR 63.1100(g)(4)(iii) in 40 CFR 63 Subpart YY, equipment in an ethylene production unit affected source that must be controlled according to both 40 CFR 60 Subpart VVa and 40 CFR 63 Subpart YY is required only to comply with the equipment leak requirements of 40 CFR 63 Subpart YY, except an owner or operator must also comply with the calibration drift assessment requirements specified at 40 CFR 60.485a(b)(2), as necessary. SPM has elected to use this compliance option and therefore comply with the equipment leak requirements of 40 CFR 63 Subpart YY (i.e., 40 CFR 63 Subpart UU) instead of 40 CFR 60 Subpart VVa for all equipment in the ethylene manufacturing unit that is subject to control under both regulations. Additionally, for all equipment in VOC service in the ethylene manufacturing unit that is subject to control under 40 CFR 60 Subpart VVa but not 40 CFR 63 Subpart YY, SPM has elected to comply with 40 CFR 63 Subpart YY equipment leak requirements instead of 40 CFR 60 Subpart VVa requirements.

Alternatively, 40 CFR 60 Subpart VVa is not applicable to the groups of all equipment within the polyethylene manufacturing units at SPM because these units do not produce, as an intermediate or final product, one or more of the chemicals listed in 40 CFR 60.489. Therefore, the groups of all equipment within SPM’s polyethylene manufacturing units are not subject to 40 CFR 60 Subpart VVa requirements.

Additional details regarding 40 CFR 60 Subpart VVa, 40 CFR 63 Subpart YY, and 40 CFR 63 Subpart UU applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.1.5 40 CFR Part 60, Subpart DDD – Standards of Performance for Volatile Organic Compound (VOC) Emissions from the Polymer Manufacturing Industry

Except for the exemptions listed at 40 CFR 60.560(d)-(h), 40 CFR 60 Subpart DDD applies to affected facilities involved in the manufacture of polypropylene, polyethylene, polystyrene, or poly (ethylene terephthalate) that commenced construction, modification, or reconstruction after the applicability dates specified in 40 CFR 60.660(b). The polypropylene and polyethylene affected facilities for VOC emissions from *vent streams*¹⁶ (i.e., process vents) include all equipment used in the manufacture of

¹⁵ *Synthetic organic chemicals manufacturing industry* – means the industry that produces, as intermediates or final products, one or more of the chemicals listed in §60.489 (40 CFR Part 60, Subpart VVa).

¹⁶ *Vent stream* – means any gas stream released to the atmosphere directly from an emission source or indirectly either through another piece of process equipment or a material recovery device that constitutes part of the normal recovery operations in a polymer process line where potential emissions are recovered for recycle or resale, and any gas stream directed to an air pollution control device. The emissions released from an air pollution control device are not considered a

these polymers, beginning with raw materials preparation and ending with product storage, and cover all continuous and intermittent process emissions emanating from such equipment. The polystyrene and poly (ethylene terephthalate) affected facilities for VOC emissions from vent streams are described in 40 CFR 60.660(a)(2) and (3), respectively, and cover only continuous process emissions. Additionally, the affected facilities for VOC emissions from equipment leaks from polypropylene, polyethylene, and polystyrene (including expandable polystyrene) manufacturing processes are each group of *fugitive emissions equipment*¹⁷ within any polypropylene, polyethylene, and polystyrene *process unit*¹⁸. 40 CFR 60 Subpart DDD does not apply to VOC emissions from equipment leaks from poly(ethylene terephthalate) manufacturing processes.

SPM's polyethylene manufacturing units include affected facilities subject to certain 40 CFR 60 Subpart DDD requirements. Specifically, the 40 CFR 60 Subpart DDD affected facilities in SPM's polyethylene manufacturing units are all the equipment in the raw materials preparation, polymerization reaction, material recovery, product finishing, and product storage sections in the units that are used in the manufacture of polyethylene and each group of "fugitive emissions equipment" within the polyethylene manufacturing units.

Regarding process vents in SPM's polyethylene manufacturing units that are subject to process vent control requirements in 40 CFR 60 Subpart DDD, pursuant to the process vent overlap provisions at 40 CFR 63.2535(h) in 40 CFR 63 Subpart FFFF, a facility with a process unit that contains process vents subject to control requirements of 40 CFR 63 Subpart FFFF that are also subject to control requirements of 40 CFR 60 Subpart DDD may apply only 40 CFR 63 Subpart FFFF to all such process vents. Also, a facility with a process unit subject to the provisions of 40 CFR 63 Subpart FFFF that has process vents to which 40 CFR 63 Subpart FFFF does not apply, but which are subject to process vent control requirements in 40 CFR 60 Subpart DDD, may elect to comply with the requirements for Group 1 process vents in 40 CFR 63 Subpart FFFF for all such process vents instead of 40 CFR 60 Subpart DDD requirements. However, a facility that chooses to comply with these two process vent overlap options under 40 CFR 63 Subpart FFFF must consider VOC in the subject process vents for purposes of compliance with 40 CFR 63 Subpart FFFF, as if it were organic HAP. Compliance with 40 CFR 63 Subpart FFFF in this manner constitutes compliance with 40 CFR 60 Subpart DDD. Accordingly, for process vents in SPM's polyethylene manufacturing units that are subject to 40 CFR 60 Subpart DDD process vent control requirements, SPM has elected to comply with the two referenced process vent overlap options of 40 CFR 63 Subpart FFFF instead of 40 CFR 60 Subpart DDD.

vent stream unless, as noted above, the control device is part of the normal material recovery operations in a polymer process line where potential emissions are recovered for recycle or resale. (40 CFR Part 60, Subpart DDD).

¹⁷ *Fugitive emissions equipment* – means each pump, compressor, pressure relief device, sampling connection system, open-ended valve or line, valve, and flange or other connector in VOC service and any devices or systems required by subpart VV of this part. (40 CFR Part 60, Subpart DDD).

¹⁸ *Process unit* – means equipment assembled to perform any of the physical and chemical operations in the production of polypropylene, polyethylene, polystyrene, (general purpose, crystal, or expandable), or poly(ethylene terephthalate) or one of their copolymers. A process unit can operate independently if supplied with sufficient feed or raw materials and sufficient storage facilities for the product. Examples of process units are raw materials handling and monomer recovery. (40 CFR Part 60, Subpart DDD).

There are also process vents in SPM's polyethylene manufacturing units that are exempt from the process vent control requirements in 40 CFR 60 Subpart DDD due to low VOC concentration. These process vents are subject to certain testing, recordkeeping, and reporting requirements in 40 CFR 60 Subpart DDD.

As previously presented under the 40 CFR 60 Subpart VV applicability discussion, the groups of fugitive emissions equipment in SPM's polyethylene manufacturing units are subject to 40 CFR 60 Subpart VV requirements as specifically referenced in 40 CFR 60.562-2 in 40 CFR 60 Subpart DDD. However, pursuant to the overlap provisions at 40 CFR 63.2535(k) in 40 CFR 63 Subpart FFFF, the groups of fugitive emissions equipment in the polyethylene manufacturing units that are subject to 40 CFR 60 Subpart VV comply with the equipment leak requirements of 40 CFR 63 Subpart FFFF (i.e., 40 CFR 63 Subpart UU) instead of 40 CFR 60 Subpart VV, which constitutes compliance with 40 CFR 60 Subpart VV.

Additional details regarding 40 CFR 60 Subpart DDD, 40 CFR 60 Subpart VV, 40 CFR 63 Subpart FFFF, and 40 CFR 63 Subpart UU applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.1.6 40 CFR Part 60, Subpart NNN – Standards of Performance for Volatile Organic Compound (VOC) Emissions from Synthetic Organic Chemicals Manufacturing Industry (SOCMI) Distillation Operations After December 30, 1983, and on or Before April 25, 2023

Except for the exemptions listed at 40 CFR 60.660(c), 40 CFR 60 Subpart NNN applies to each *distillation unit*¹⁹ that meets the criteria specified below:

- The distillation unit discharges its *vent stream*²⁰ directly to the atmosphere (i.e., it is a distillation unit alone with no *recovery device*²¹) or indirectly to the atmosphere after the vent stream passes through one or more recovery devices (i.e., it is a distillation unit-*recovery system*²² combination or distillation units-common recovery system combination);
- The distillation unit, distillation unit-recovery system combination, or distillation units-common recovery system combination is part of a *process unit*²³ that produces any of the SOCMI chemicals listed in 40 CFR 60.667 as a product, co-product, byproduct, or intermediate; and

¹⁹ *Distillation unit* – means a device or vessel in which distillation operations occur, including all associated internals (such as trays or packing) and accessories (such as reboiler, condenser, vacuum pump, steam jet, etc.), plus any associated recovery system. (40 CFR Part 60, Subpart NNN).

²⁰ *Vent stream* – means any gas stream discharged directly from a distillation facility to the atmosphere or indirectly to the atmosphere after diversion through other process equipment. The vent stream excludes relief valve discharges and equipment leaks including, but not limited to, pumps, compressors, and valves. (40 CFR Part 60, Subpart NNN).

²¹ *Recovery device* – means an individual unit of equipment, such as an absorber, carbon adsorber, or condenser, capable of and used for the purpose of recovering chemicals for use, reuse, or sale. (40 CFR Part 60, Subpart NNN).

²² *Recovery system* – means an individual recovery device or series of such devices applied to the same vent stream. (40 CFR Part 60, Subpart NNN).

²³ *Process unit* – means equipment assembled and connected by pipes or ducts to produce, as intermediates or final products, one or more of the chemicals in §60.667. A process unit can operate independently if supplied with sufficient fuel or raw materials and sufficient product storage facilities. (40 CFR Part 60, Subpart NNN).

- The distillation unit, distillation unit-recovery system combination, or distillation units-common recovery system combination commenced construction, modification, or reconstruction after December 30, 1983, and on or before April 25, 2023.

40 CFR 60 Subpart NNN is applicable to the distillation units in SPM's ethylene manufacturing unit because these distillation units are part of a process unit that produces SOCMI chemicals listed in 40 CFR 60.667, and they were constructed after December 30, 1983, but before April 25, 2023. The referenced distillation units comply with 40 CFR 60 Subpart NNN by ultimately routing their vent streams to a fuel gas system at SPM, which directs the fuel gas (tail gas) to Ethane Cracking Furnaces #1 through #7, TEGF A, TEGF B, and/or HP Elevated Flare for fuel combustion (and destruction) purposes. These distillation unit vent streams are not "ethylene process vents" under 40 CFR 63 Subpart YY because they are routed to a fuel gas system, which also directs fuel gas to flares that comply with 40 CFR 63.1103(e)(4) flare requirements. As a result, the SPM ethylene manufacturing unit distillation unit vent streams that are subject to 40 CFR 60 Subpart NNN do not qualify for the 40 CFR 60 Subpart NNN and 40 CFR 63 Subpart YY process vent overlap provisions at 40 CFR 63.1100(g)(2)(ii) and must comply with applicable 40 CFR 60 Subpart NNN vent stream requirements.

Alternatively, SPM's polyethylene manufacturing units do not include any distillation units. Also, the polyethylene manufacturing units do not produce any of the chemicals listed in 40 CFR 60.667 as a product, co-product, byproduct, or intermediate. Therefore, SPM's polyethylene manufacturing units do not include any distillation units subject to 40 CFR 60 Subpart NNN requirements.

Additional details regarding 40 CFR 60 Subpart NNN and 40 CFR 63 Subpart YY applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.1.7 40 CFR Part 60, Subpart RRR – Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemicals Manufacturing Industry (SOCMI) Reactor Processes After June 29, 1990, and on or Before April 25, 2023

Except for the exemptions listed at 40 CFR 60.700(c), 40 CFR 60 Subpart RRR applies to each *reactor process*²⁴ that meets the criteria specified below:

- The reactor process discharges its *vent stream*²⁵ directly to the atmosphere (i.e., it is a reactor process alone with no recovery device) or indirectly to the atmosphere after the vent stream passes through one or more recovery devices (i.e., it is a reactor process-recovery system combination or reactor processes-common recovery system combination);
- The reactor process, reactor process-recovery system combination, or reactor processes-common recovery system combination is part of a *process unit*²⁶ that produces any of the

²⁴ *Reactor processes* – unit operations in which one or more chemicals, or reactants other than air, are combined or decomposed in such a way that their molecular structures are altered and one or more new organic compounds are formed. (40 CFR Part 60, Subpart RRR).

²⁵ *Vent stream* – means any gas stream discharged directly from a reactor process to the atmosphere or indirectly to the atmosphere after diversion through other process equipment. The vent stream excludes relief valve discharges and equipment leaks. (40 CFR Part 60, Subpart RRR).

²⁶ *Process unit* – means equipment assembled and connected by pipes or ducts to produce, as intermediates or final products, one or more of the chemicals in §60.707. A process unit can operate independently if supplied with sufficient feed or raw materials and sufficient product storage facilities. (40 CFR Part 60, Subpart RRR).

SOCMI chemicals listed in 40 CFR 60.707 as a product, co-product, byproduct, or intermediate; and

- The reactor process, reactor process-recovery system combination, or reactor processes-common recovery system combination commenced construction, modification, or reconstruction after June 29, 1990, and on or before April 25, 2023.

40 CFR 60 Subpart RRR is potentially applicable to the reactor processes in SPM's ethylene manufacturing unit because these reactor processes are part of a process unit that produces SOCMI chemicals listed in 40 CFR 60.707, and they were constructed after June 29, 1990, but before April 25, 2023. However, pursuant to 40 CFR 60.700(c)(5) in 40 CFR 60 Subpart RRR, SPM's ethylene manufacturing unit reactor processes are exempt from all provisions of the subpart except for the reporting requirements at 40 CFR 60.705(r) because they route their vent streams to distillation units in the ethylene manufacturing unit that are subject to 40 CFR 60 Subpart NNN.

Alternatively, 40 CFR 60 Subpart RRR is not applicable to reactor processes in SPM's polyethylene manufacturing units because these process units do not produce any of the chemicals listed in 40 CFR 60.707 as a product, co-product, byproduct, or intermediate. Therefore, SPM's polyethylene manufacturing unit reactor processes are not subject to 40 CFR 60 Subpart RRR requirements.

Additional details regarding 40 CFR 60 Subpart RRR and 40 CFR 60 Subpart NNN applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.1.8 40 CFR Part 60, Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

40 CFR 60 Subpart IIII applies to manufacturers, owners, and operators of certain stationary compression ignition (CI) internal combustion engines. Both non-emergency stationary internal combustion engines and *emergency stationary internal combustion engines*²⁷ are regulated under the subpart. For the purposes of 40 CFR 60 Subpart IIII, construction of a stationary CI engine by an owner or operator commences on the date the engine is ordered by the owner or operator.

Excluding CI *fire pump engines*,²⁸ 40 CFR 60 Subpart IIII applies to stationary CI engines that were manufactured after April 1, 2006, and for which the owner or operator commenced construction after July 11, 2005. Regarding stationary CI fire pump engines, the subpart applies to each such engine that

²⁷ *Emergency stationary internal combustion engine* – means any stationary reciprocating internal combustion engine that meets all of the criteria in paragraphs (1) through (3) of this definition. All emergency stationary ICE must comply with the requirements specified in §60.4211(f) in order to be considered emergency stationary ICE. If the engine does not comply with the requirements specified in §60.4211(f), then it is not considered to be an emergency stationary ICE under this subpart.

(1) The stationary ICE is operated to provide electrical power or mechanical work during an emergency situation. Examples include stationary ICE used to produce power for critical networks or equipment (including power supplied to portions of a facility) when electric power from the local utility (or the normal power source, if the facility runs on its own power production) is interrupted, or stationary ICE used to pump water in the case of fire or flood, etc.

(2) The stationary ICE is operated under limited circumstances for situations not included in paragraph (1) of this definition, as specified in §60.4211(f).

(3) The stationary ICE operates as part of a financial arrangement with another entity in situations not included in paragraph (1) of this definition only as allowed in §60.4211(f)(3)(i). (40 CFR Part 60, Subpart IIII).

²⁸ *Fire pump engine* – means an emergency stationary internal combustion engine certified to NFPA requirements that is used to provide power to pump water for fire suppression or protection. (40 CFR Part 60, Subpart IIII).

was manufactured as a certified National Fire Protection Association (NFPA) fire pump engine after July 1, 2006, and for which the owner or operator commenced construction after July 11, 2005.

Additionally, 40 CFR 60 Subpart IIII applies to any stationary CI engine that is modified or reconstructed after July 11, 2005. Lastly, the subpart establishes deadlines for an owner or operator to install stationary CI engines that do not meet applicable requirements in the subpart. However, those deadlines do not apply to owners and operators of a stationary CI engine that has been modified or reconstructed, or that was removed from one location and reinstalled at a new location.

The relevant emission standards under 40 CFR 60 Subpart IIII are dependent on a CI engine's model year, horsepower rating, cylinder displacement (i.e., liters per cylinder), and intended use (i.e., emergency stationary internal combustion engine versus non-emergency stationary internal combustion engine).

The following CI fire pump engines at SPM were manufactured after July 1, 2006, and construction of the engines commenced after July 11, 2005.

- Fire Pump Engines (2); Firewater Pump 1
- Fire Pump Engines (2); Firewater Pump 2

Therefore, these engines are affected facilities under 40 CFR 60 Subpart IIII. The two engines are "fire pump engines" under 40 CFR 60 Subpart IIII because they are emergency stationary internal combustion engines certified to NFPA requirements that are used to provide power to pump water at SPM for fire suppression or protection. As a result, the two engines are subject to applicable fire pump engine requirements under 40 CFR 60 Subpart IIII, including engine certification, diesel sulfur limitation, monitoring, recordkeeping, and reporting requirements.

Additionally, the following CI emergency generator engines at SPM were manufactured after April 1, 2006, and construction of the engines commenced after July 11, 2005.

- Diesel-Fired Emergency Generator Engines (2); Generator 1 - Parking Garage
- Diesel-Fired Emergency Generator Engines (2); Generator 2 - Telecom Hut

Therefore, the two engines are also affected facilities under 40 CFR 60 Subpart IIII. Each engine is an "emergency stationary internal combustion engine" under the subpart because it is used to provide electrical power to specific equipment at SPM when electric power from the normal power source is interrupted. As a result, the two engines are subject to applicable emergency generator engine certification, diesel sulfur limitation, monitoring, recordkeeping, and reporting requirements under 40 CFR 60 Subpart IIII. Additional details regarding 40 CFR 60 Subpart IIII applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.1.9 40 CFR Part 60, Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

40 CFR 60 Subpart JJJJ applies to manufacturers, owners, and operators of certain stationary spark ignition (SI) internal combustion engines. Both non-emergency stationary internal combustion engines

and *emergency stationary internal combustion engines*²⁹ are regulated under the subpart. For the purposes of NSPS Subpart JJJJ, construction of a stationary SI engine by an owner or operator commences the date the engine is ordered by the owner or operator.

40 CFR 60 Subpart JJJJ applies to owners and operators that commence construction of a stationary SI engine after June 12, 2006, where the engine is manufactured:

- On or after July 1, 2007, for an engine with a maximum engine power greater than or equal to 500 horsepower (hp) (except a lean burn engine with a maximum engine power greater than or equal to 500 hp and less than 1,350 hp);
- On or after January 1, 2008, for a lean burn engine with a maximum engine power greater than or equal to 500 hp and less than 1,350 hp;
- On or after July 1, 2008, for an engine with a maximum engine power less than 500 hp; or
- On or after January 1, 2009, for an emergency engine with a maximum engine power greater than 25 hp.

Additionally, 40 CFR 60 Subpart JJJJ applies to owners and operators of a stationary SI engine that is modified or reconstructed after June 12, 2006. Lastly, 40 CFR 60 Subpart JJJJ establishes deadlines for an owner or operator to install stationary SI engines that do not meet applicable requirements in the subpart. However, those deadlines do not apply to owners and operators of a stationary SI engine that has been modified or reconstructed, or that was removed from one location and reinstalled at a new location.

The relevant emission standards under 40 CFR 60 Subpart JJJJ are dependent on a SI engine's model year, horsepower rating, fuel, stoichiometric conditions for combustion, and intended use (i.e., emergency stationary internal combustion engine versus non-emergency stationary internal combustion engine).

The following SI engines at SPM have a maximum engine power greater than 25 hp but less than 500 hp, the engines were manufactured after January 1, 2009, and construction of the engines commenced after June 12, 2006.

- Natural Gas-Fired Emergency Generator Engines (2); Generator 3 - Lift Station

²⁹ *Emergency stationary internal combustion engine* – means any stationary reciprocating internal combustion engine that meets all of the criteria in paragraphs (1) through (3) of this definition. All emergency stationary ICE must comply with the requirements specified in §60.4243(d) in order to be considered emergency stationary ICE. If the engine does not comply with the requirements specified in §60.4243(d), then it is not considered to be an emergency stationary ICE under this subpart.

(1) The stationary ICE is operated to provide electrical power or mechanical work during an emergency situation. Examples include stationary ICE used to produce power for critical networks or equipment (including power supplied to portions of a facility) when electric power from the local utility (or the normal power source, if the facility runs on its own power production) is interrupted, or stationary ICE used to pump water in the case of fire or flood, etc.

(2) The stationary ICE is operated under limited circumstances for situations not included in paragraph (1) of this definition, as specified in §60.4243(d).

(3) The stationary ICE operates as part of a financial arrangement with another entity in situations not included in paragraph (1) of this definition only as allowed in §60.4243(d)(3)(i). (40 CFR Part 60, Subpart JJJJ).

- Natural Gas-Fired Emergency Generator Engines (2); Generator 4 - Lift Station

Therefore, the two engines are affected facilities under 40 CFR 60 Subpart JJJJ. However, each engine is an “emergency stationary internal combustion engine” under the subpart because it is used to provide electrical power to specific equipment at SPM when electric power from the normal power source is interrupted. As a result, these engines are subject to applicable emergency generator engine certification, monitoring, recordkeeping, and reporting requirements under 40 CFR 60 Subpart JJJJ. Additional details regarding 40 CFR 60 Subpart JJJJ applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.1.1040 CFR Part 60, Subpart KKKK – Standards of Performance for Stationary Combustion Turbines

Except for the exemptions listed at 40 CFR 60.4310, 40 CFR 60 Subpart KKKK applies to the NO_x and SO₂ emissions from the following types of *stationary combustion turbines*³⁰ with a heat input at peak load equal to or greater than 10 MMBtu/hr, based on the HHV of the fuel combusted in the turbine, that commenced construction, modification, or reconstruction after February 18, 2005: simple cycle stationary combustion turbines, regenerative/recuperative cycle stationary combustion turbines, combined cycle stationary combustion turbines, and combined heat and power stationary combustion turbines. Only heat input to the combustion turbine is included when determining 40 CFR 60 Subpart KKKK applicability (i.e., any additional heat input to HRSGs or duct burners equipped on the exhaust stream of a combustion turbine is not included when determining the turbine’s peak heat input for 40 CFR 60 Subpart KKKK applicability purposes). However, 40 CFR 60 Subpart KKKK does apply to emissions from HRSGs and duct burners associated with a combustion turbine. As a result, HRSGs and duct burners regulated under 40 CFR 60 Subpart KKKK are exempt from the requirements of 40 CFR 60 Subparts Da, Db, and Dc.

Each Cogen Unit at SPM includes a lean premix gas-fired (natural gas-fired) stationary combustion turbine that is coupled with a duct burner and an HRSG. Each combustion turbine along with its associated duct burner and HRSG is subject to 40 CFR 60 Subpart KKKK. As a result, the Cogen Units must comply with applicable 40 CFR 60 Subpart KKKK emission standards and testing, monitoring, recordkeeping, and reporting requirements. Additional details regarding 40 CFR 60 Subpart KKKK applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.1.1140 CFR Part 60, Subpart TTTT – Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units

Except for certain electric generating units (EGUs) described in 40 CFR 60.5509(b), 40 CFR 60 Subpart TTTT applies to each of the following EGUs that has a base load rating greater than 250 MMBtu/hr of

³⁰ *Stationary combustion turbine* – means all equipment, including but not limited to the turbine, the fuel, air, lubrication and exhaust gas systems, control systems (except emissions control equipment), heat recovery system, and any ancillary components and sub-components comprising any simple cycle stationary combustion turbine, any regenerative/recuperative cycle stationary combustion turbine, any combined cycle combustion turbine, and any combined heat and power combustion turbine based system. Stationary means that the combustion turbine is not self propelled or intended to be propelled while performing its function. It may, however, be mounted on a vehicle for portability. (40 CFR Part 60, Subpart KKKK).

fossil fuel (either alone or in combination with any other fuel) and serves one or more generators capable of selling greater than 25 MWe to a utility power distribution system.

- Each steam generating unit and integrated gasification combined cycle (IGCC) facility that commenced construction after January 8, 2014.
- Each steam generating unit and IGCC that commenced reconstruction after June 18, 2014.
- Each steam generating unit and IGCC that commenced modification after June 18, 2014, but on or before May 23, 2023.
- Each stationary combustion turbine that commenced construction after January 8, 2014, but on or before May 23, 2023.
- Each stationary combustion turbine that commenced reconstruction after June 18, 2014, but on or before May 23, 2023.

The three Cogen Units at SPM are natural gas-fired EGU affected facilities under 40 CFR 60 Subpart TTTT because each Cogen Unit has a base load rating greater than 250 MMBtu/hr of fossil fuel (natural gas), serves generators capable of selling greater than 25 MWe to a utility power distribution system, and commenced construction after January 8, 2014, but before May 23, 2023. None of the Cogen Units has been modified or reconstructed since being constructed. Accordingly, the Cogen Units are subject to applicable 40 CFR 60 Subpart TTTT emission standards, monitoring, recordkeeping, and reporting requirements. Additional details regarding 40 CFR 60 Subpart TTTT applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.2 40 CFR Part 61: National Emission Standards for Hazardous Air Pollutants

40 CFR Part 61 regulations are referenced as National Emission Standards for Hazardous Air Pollutants regulations or “NESHAP” regulations, and they establish emission standards, work practices, or both, for certain source categories of HAPs designated by EPA, with a particular source category typically representing a specific activity or type of equipment commonly resulting in the emissions of a specific HAP (e.g., radon emissions from phosphogypsum stacks, benzene emissions from benzene storage vessels, and benzene emissions from benzene transfer operations). These NESHAP regulations are risk-based standards intended to provide an ample margin of safety to protect public health that were established by EPA pursuant to the federal regulatory mechanism used to regulate the following HAPs under the CAA before it was amended November 15, 1990.

- Asbestos
- Benzene
- Beryllium
- Coke oven emissions
- Inorganic arsenic
- Mercury
- Radionuclides

- Vinyl chloride

The only 40 CFR Part 61 NESHAP regulations applicable to SPM are benzene-related regulations.

3.2.2.1 40 CFR Part 61, Subpart A - General Provisions

The NESHAP general provisions in 40 CFR 61 Subpart A are applicable to sources and associated HAP control devices subject to standards promulgated under 40 CFR Part 61. SPM is subject to requirements under 40 CFR 61 Subparts J, V, and FF. As such, SPM is also subject to applicable requirements under 40 CFR 61 Subpart A. In general, 40 CFR 61 Subpart A provisions specify performance testing, performance evaluation (monitoring systems), notification, recordkeeping, reporting, and control device requirements. Additional details regarding 40 CFR 61 Subpart A applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.2.2 40 CFR Part 61, Subpart J - National Emission Standard for Equipment Leaks (Fugitive Emission Sources) of Benzene

Except for equipment located in coke by-product plants and equipment meeting the exemptions listed at 40 CFR 61.110(c), 40 CFR 61 Subpart J applies to the following equipment that operates in benzene service: pumps, compressors, pressure relief devices, sampling connection systems, open-ended valves or lines, valves, connectors, surge control vessels, bottoms receivers, and control devices or systems required by this subpart. *In benzene service* “means that a piece of equipment either contains or contacts a fluid (liquid or gas) that is at least 10 percent benzene by weight as determined according to the provisions of §61.245(d).”

SPM has equipment that is “in benzene service” because the equipment contains benzene as a byproduct of the ethylene manufacturing process at a concentration equal to or greater than 10 percent benzene by weight. 40 CFR 61 Subpart J requires such equipment to comply with the equipment leak requirements of 40 CFR 61 Subpart V, which is discussed below. However, pursuant to the overlap provisions at 40 CFR 63.1100(g)(4)(i) in 40 CFR 63 Subpart YY, equipment in an ethylene production unit affected source subject to the requirements of 40 CFR 61 Subpart J or Subpart V is required only to comply with the equipment leak requirements of 40 CFR 63 Subpart YY. Accordingly, SPM has elected to comply with the requirements of 40 CFR 63 Subpart YY (i.e., 40 CFR 63 Subpart UU) instead of 40 CFR 61 Subpart J or Subpart V for all such equipment.

Additional details regarding 40 CFR 61 Subpart J, 40 CFR 61 Subpart V, 40 CFR 63 Subpart YY, and 40 CFR 63 Subpart UU applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.2.3 40 CFR Part 61, Subpart V – National Emission Standard for Equipment Leaks (Fugitive Emission Sources)

40 CFR 61 Subpart V applies to the following equipment that operates in *volatile hazardous air pollutant (VHAP)*³¹ service: pumps, compressors, pressure relief devices, sampling connection systems, open-ended valves or lines, valves, connectors, surge control vessels, bottoms receivers, and control devices or systems required by this subpart. *In VHAP service* “means that a piece of equipment either contains or contacts a fluid (liquid or gas) that is at least 10 percent by weight a volatile hazardous air pollutant (VHAP) as determined according to the provisions of §61.245(d).”

As discussed above, SPM has equipment associated with the ethylene manufacturing process that is “in benzene service” (i.e., “in VHAP service”) because the equipment contains benzene at a concentration equal to or greater than 10% benzene by weight. As a result, this equipment is subject to the equipment leak requirements of 40 CFR 61 Subpart V, as referenced by 40 CFR 61 Subpart J. However, pursuant to the overlap provisions at 40 CFR 63.1100(g)(4)(i) in 40 CFR 63 Subpart YY, equipment in an ethylene production unit affected source subject to the requirements of 40 CFR 61 Subpart J or Subpart V is required only to comply with the equipment leak requirements of 40 CFR 63 Subpart YY. Accordingly, SPM has elected to comply with the requirements of 40 CFR 63 Subpart YY (i.e., 40 CFR 63 Subpart UU) instead of 40 CFR 61 Subpart J or Subpart V for all such equipment. Additional details regarding 40 CFR 61 Subpart J, 40 CFR 61 Subpart V, 40 CFR 63 Subpart YY, and 40 CFR 63 Subpart UU applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.2.4 40 CFR Part 61, Subpart FF – National Emission Standard for Benzene Waste Operations

40 CFR 61 Subpart FF, which is often referenced as “the BWON (Benzene Waste Operations NESHAP) rule,” applies to owners and operators of *chemical manufacturing plants*³², coke by-product recovery plants, and petroleum refineries, as well as owners and operators of hazardous waste treatment, storage, and disposal facilities that treat, store, or dispose of hazardous waste generated by such facilities. The purpose of the BWON rule is to minimize benzene emissions from *waste*³³ handling and treatment operations at the referenced facilities.

A key concept of the BWON rule is a facility’s total annual benzene (TAB) quantity, which establishes the BWON rule requirements that are applicable to the facility. A facility’s TAB quantity is calculated by

³¹ *Volatile hazardous air pollutant or VHAP* – means a substance regulated under this part for which a standard for equipment leaks of the substance has been proposed and promulgated. Benzene is a VHAP. Vinyl chloride is a VHAP. (40 CFR Part 61, Subpart V).

³² *Chemical manufacturing plant* – means any facility engaged in the production of chemicals by chemical, thermal, physical, or biological processes for use as a product, co-product, by-product, or intermediate including but not limited to industrial organic chemicals, organic pesticide products, pharmaceutical preparations, paint and allied products, fertilizers, and agricultural chemicals. Examples of chemical manufacturing plants include facilities at which process units are operated to produce one or more of the following chemicals: benzenesulfonic acid, benzene, chlorobenzene, cumene, cyclohexane, ethylene, ethylbenzene, hydroquinone, linear alkylbenzene, nitrobenzene, resorcinol, sulfolane, or styrene. (40 CFR Part 61, Subpart FF).

³³ *Waste* – means any material resulting from industrial, commercial, mining or agricultural operations, or from community activities that is discarded or is being accumulated, stored, or physically, chemically, thermally, or biologically treated prior to being discarded, recycled, or discharged. (40 CFR Part 61, Subpart FF).

summing together the annual benzene quantity for each benzene-containing waste stream at the facility, except for wastes generated by remediation activities conducted at the facility, that has a flow-weighted annual average water content greater than 10% or that is mixed with water, or other wastes, at any time and the resulting mixture has an annual average water content greater than 10%. A facility that has a TAB quantity of 10 Megagrams per year (Mg/yr) or greater is required to comply with the BWON rule's full suite of emission control, monitoring, testing, recordkeeping, and reporting requirements.

SPM is a "chemical manufacturing plant" that has a TAB quantity greater than 10 Mg/yr. Therefore, SPM is subject to the BWON rule's emission control, monitoring, testing, recordkeeping, and reporting requirements. However, pursuant to the overlap provisions at 40 CFR 63.1100(g)(6)(ii) in 40 CFR 63 Subpart YY, compliance with 40 CFR 63 Subpart XX/40 CFR 63 Subpart YY constitutes compliance with the BWON rule for waste streams generated by an ethylene production unit affected source that are subject to the control requirements of 40 CFR 63 Subpart XX/40 CFR 63 Subpart YY and the BWON rule. Note that SPM utilizes the "6 BQ" compliance option outlined in 40 CFR 61.342(e) to comply with 40 CFR 63 Subpart XX/40 CFR 63 Subpart YY/BWON rule. The 6 BQ option allows a facility to exempt certain aqueous waste streams from the emission control requirements of the BWON rule, but the total benzene quantity of the qualifying waste streams chosen for exemption must not exceed 6.0 Mg/yr, as determined in accordance with 40 CFR 61.355(k).

Additional details regarding BWON rule, 40 CFR 63 Subpart XX, and 40 CFR 63 Subpart YY applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.3 40 CFR Part 63: National Emission Standards for Hazardous Air Pollutants for Source Categories

40 CFR Part 63 regulations, like 40 CFR Part 61 regulations, are referenced as National Emission Standards for Hazardous Air Pollutants regulations or "NESHAP" regulations, and they establish emission standards, work practices, or both, for certain source categories of federal HAP emissions, with a particular source category typically representing a type of industrial facility that emits several different HAPs from numerous types of activities and equipment (e.g., HAP emissions from phosphoric acid plants, HAP emissions from petroleum refineries, and HAP emissions from SOCM plants). These NESHAP regulations are a combination of control technology and risk-based standards established by EPA pursuant to the federal regulatory mechanism used to regulate HAPs under the CAA after it was amended November 15, 1990.

A key element of regulatory applicability under 40 CFR Part 63 is the distinction between a "major source" and an "area source" of HAPs. A *major source* is "any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit considering controls, in the aggregate, 10 tons per year or more of any hazardous air pollutant or 25 tons per year or more of any combination of hazardous air pollutants, unless the Administrator establishes a lesser quantity, or in the case of radionuclides, different criteria from those specified in this sentence." An *area source* is "any stationary source of hazardous air pollutants that is not a major source as defined in this part."

SPM has in the recent past met the “major source” criteria for both an individual HAP and total HAPs on both an actual and potential to emit basis, as documented in past actual emissions reporting and potential to emit calculations. In 2024, SPM reported actual annual emissions of 1,3 butadiene and aggregate total HAPs for calendar year 2023 of 14.57 tpy and 32.90 tpy, respectively. Additionally, as originally permitted through the issuance of PA-04-00740A in 2015 and as currently permitted under PA-04-00740C, SPM’s potential to emit for both an individual HAP and total HAPs exceeds 10 tpy and 25 tpy, respectively.

In 2025, SPM reported actual annual emissions for calendar year 2024 less than 10 tpy for all individual HAPs and less than 25 tpy for aggregate total HAPs. Additionally, SPM’s latest potential to emit calculations reflect a facility-wide potential to emit less than 10 tpy for all individual HAPs and less than 25 tpy for aggregate total HAPs. These lower HAP emission rates are a result of SPM completing the shakedown of various emission sources and progressing towards sustained periods of normal operations, continuous improvement to reduce and minimize the impact of unplanned or malfunction emissions episodes, and the completion of emission source performance testing for HAPs to more accurately define HAP emission profiles and characteristics. Shell continues to assert that SPM’s latest potential to emit calculations represent the correct potential to emit for SPM’s expected normal operations. However, it is too soon and inappropriate timing to currently consider reclassification of SPM to an “area source.” Additional time and regulatory analysis are required to make this determination, as SPM’s existing compliance programs, applicability determinations, and reporting are premised on major source classification for HAPs.

As indicated in 40 CFR 63.1(c)(6), “A major source may [emphasis added] become an area source at any time upon reducing its emissions of and potential to emit hazardous air pollutants, as defined in this subpart, to below the major source thresholds established in § 63.2, subject to the provisions in paragraphs (c)(6)(i) and (ii) of this section.” Additional emphasis has been placed on the operator “may” in the above excerpt because Shell does not wish at this time to reclassify SPM as an area source. In the future, Shell may request to reclassify SPM as an area source after SPM continues to demonstrate area source status, Shell completes a regulatory analysis for area source requirements that may apply to SPM, and Shell requests the establishment of appropriate enforceable requirements in SPM’s Title V permit to make the area source status for SPM effective. However, at this time, Shell requests that SPM remain identified as a major source of HAPs. Therefore, SPM remains subject to applicable 40 CFR Part 63 NESHAP major source regulations.

3.2.3.1 40 CFR Part 63, Subpart A - General Provisions

The NESHAP general provisions in 40 CFR 63 Subpart A are applicable to sources and associated HAP control devices subject to standards promulgated under 40 CFR Part 63. SPM has affected sources and associated HAP control devices subject to 40 CFR 63 Subparts CC (flare compliance requirements only), SS, UU, XX, YY, MMM (fabric filter monitoring requirements only), EEEE, FFFF, YYYY, and ZZZZ. Therefore, SPM is also subject to requirements under 40 CFR 63 Subpart A. In general, 40 CFR 63 Subpart A includes requirements related to notification, recordkeeping, monitoring, and performance testing. This subpart also contains control device requirements comparable to those in 40 CFR 60.18.

Additional details regarding 40 CFR 63 Subpart A applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.3.2 40 CFR Part 63, Subpart SS – National Emission Standards for Closed Vent Systems, Control Devices, Recovery Devices and Routing to a Fuel Gas System or a Process

40 CFR 63 Subpart SS applies to a stationary source when another subpart of 40 CFR Part 63 references its use for the control and/or recovery of HAPs. This subpart specifically includes requirements for CVS, control devices, recovery devices, and systems that are used to route HAP emissions to a fuel gas system or process for use or reuse. 40 CFR 63 Subparts YY and FFFF apply to sources in the ethylene manufacturing unit and polyethylene manufacturing units, respectively, at SPM, and these applicable subparts refer to 40 CFR 63 Subpart SS or sections of the subpart in relation to certain CVS and non-flare control device requirements at SPM. As a result, 40 CFR 63 Subpart SS applies to certain ethylene manufacturing unit and polyethylene manufacturing unit CVS and non-flare control devices at SPM.

Additional details regarding 40 CFR 63 Subpart SS, 40 CFR 63 Subpart YY, and 40 CFR 63 Subpart FFFF applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.3.3 40 CFR Part 63, Subpart UU – National Emission Standards for Equipment Leaks– Control Level 2 Standards

40 CFR 63 Subpart UU applies to the control of air emissions from equipment leaks for which another subpart of 40 CFR Part 63 references the use of the subpart for such air emission control. Except for the following equipment, 40 CFR 63 Subpart UU applies to pumps, compressors, agitators, pressure relief devices, sampling connection systems, open-ended valves or lines, valves, connectors, and instrumentation systems that contain or contact regulated material above a specified HAP threshold, as well as CVS and control devices used to meet the requirements of this subpart.

- Equipment in vacuum service (i.e., equipment operated at an internal pressure that is at least 5 kPa [0.73 psi] below ambient pressure).
- Equipment intended to be in regulated material service less than 300 hours per calendar year if it is identified as required in 40 CFR 63.1022(b)(5).
- Lines and equipment not containing process fluids, such as utilities and other non-process lines (e.g., heating and cooling systems that do not combine their materials with those in the processes they serve), because these lines and equipment are not considered to be part of a process unit or affected facility.

40 CFR 63 Subparts YY and FFFF apply to sources in the ethylene manufacturing unit and polyethylene manufacturing units, respectively, at SPM, and these subparts refer to 40 CFR 63 Subpart UU for the control of equipment leaks in the ethylene manufacturing and polyethylene manufacturing units. As a result, the provisions of 40 CFR 63 Subpart UU are applicable to certain pumps, compressors, agitators, pressure relief devices, sampling connection systems, open-ended valves or lines, valves, connectors, instrumentation systems, and CVS and control devices used to meet the requirements of this subpart that are located at SPM.

Additional details regarding 40 CFR 63 Subpart UU, 40 CFR 63 Subpart YY, and 40 CFR 63 Subpart FFFF applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.3.4 40 CFR Part 63, Subpart XX – National Emission Standards for Ethylene Manufacturing Process Units: Heat Exchange Systems and Waste Operations

Except for the exemptions described in 40 CFR 63.1084(a), (b), and (e), 40 CFR 63 Subpart XX applies to each *heat exchange system*³⁴ that is part of an ethylene production unit affected source subject to 40 CFR 63 Subpart YY. Additionally, 40 CFR 63 Subpart XX applies to each *continuous butadiene waste stream*³⁵ and benzene-containing *waste stream*³⁶ that is part of an ethylene production unit affected source subject to 40 CFR 63 Subpart YY. SPM includes one ethylene production unit affected source that is subject to 40 CFR 63 Subpart YY, as presented in more detail below under the 40 CFR 63 Subpart YY applicability discussion. Therefore, all the heat exchange systems and waste streams that are associated with this ethylene production unit affected source and meet the previously described applicability criteria for such systems and streams are subject to 40 CFR 63 Subpart XX.

The Process Cooling Tower system is a “heat exchange system,” as defined in 40 CFR 63 Subpart XX, that is part of an ethylene production unit affected source at SPM. Additionally, the Process Cooling Tower heat exchange system includes heat exchangers that cool process fluids that contain 5% by weight or greater total HAPs listed in 40 CFR 63 Subpart XX Table 1 and do not otherwise meet criteria that would exempt the Process Cooling Tower heat exchange system from 40 CFR 63 Subpart XX requirements. Therefore, the Process Cooling Tower heat exchange system is subject to 40 CFR 63 Subpart XX heat exchange system LDAR requirements.

As previously noted under the BWON rule applicability discussion, SPM has a TAB quantity greater than 10 Mg/yr. Therefore, in accordance with 40 CFR 63.1095(b)(2) in 40 CFR 63 Subpart XX, SPM must manage and treat benzene-containing waste streams generated by the ethylene production unit onsite pursuant to any of the options in 40 CFR 61.342(c)(1) through (e) in the BWON rule to comply with 40 CFR 63 Subpart XX. As previously discussed, SPM uses the 6 BQ option outlined in 40 CFR 61.342(e) to comply with 40 CFR 63 Subpart XX.

³⁴ *Heat exchange system* – means any cooling tower system or once-through cooling water system (e.g., river or pond water). A heat exchange system can include more than one heat exchanger and can include an entire recirculating or once-through cooling system. (40 CFR Part 63, Subpart XX).

³⁵ *Continuous butadiene waste stream* – means the continuously flowing process wastewater from the following equipment: The aqueous drain from the debutanizer reflux drum, water separators on the C4 crude butadiene transfer piping, and the C4 butadiene storage equipment; and spent wash water from the C4 crude butadiene carbonyl wash system. The continuous butadiene waste stream does not include butadiene streams generated from sampling, maintenance activities, or shutdown purges. The continuous butadiene waste stream does not include butadiene streams from equipment that is currently an affected source subject to the control requirements of another NESHAP. The continuous butadiene waste stream contains less than 10 parts per million by weight (ppmw) of benzene. (40 CFR Part 63, Subpart XX).

³⁶ *Waste stream* – means the waste generated by a particular process unit, product tank, or waste management unit. The characteristics of the waste stream (e.g., flow rate, HAP concentration, water content) are determined at the point of waste generation. Examples of a waste stream include process wastewater, product tank drawdown, sludge and slop oil removed from waste management units, and landfill leachate. (40 CFR Part 63, Subpart YY).

Lastly, SPM does not include any “continuous butadiene waste streams;” therefore, the facility is not subject to continuous butadiene waste stream requirements under 40 CFR 63 Subpart XX.

Additional details regarding BWON rule and 40 CFR 63 Subpart XX applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.3.5 40 CFR Part 63, Subpart YY – National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards

40 CFR 63 Subpart YY applies to certain *ethylene production unit*³⁷ equipment located at a major source of HAPs. Specifically, the NESHAP Subpart YY ethylene production unit affected source comprises all the emission points listed below that are associated with an ethylene production unit that is located at a major source of HAP emissions.

- All storage vessels (as defined in 40 CFR 63.1101) that store liquids containing organic HAP.
- All ethylene process vents [as defined in 40 CFR 63.1103(e)(2)] from continuous unit operations.
- All transfer racks [as defined in 40 CFR 63.1103(e)(2)] that load HAP-containing material.
- Equipment (as defined in 40 CFR 63.1101) that contains or contacts organic HAP.
- All waste streams [as defined in 40 CFR 63.1103(e)(2)].
- All heat exchange systems [as defined in 40 CFR 63.1082(b)].
- All ethylene cracking furnaces and associated decoking operations.

SPM includes one ethylene production unit affected source that is subject to 40 CFR 63 Subpart YY. Therefore, all relevant emission points that are associated with this ethylene production unit affected source and meet the applicability criteria for such emission points under 40 CFR 63 Subpart YY are subject to 40 CFR 63 Subpart YY (and 40 CFR 63 Subpart XX as referenced by 40 CFR 63 Subpart YY for heat exchange systems and waste streams that are associated with an ethylene production unit subject to 40 CFR 63 Subpart YY). Below is a brief discussion of 40 CFR 63 Subpart YY (and 40 CFR 63 Subpart XX) applicability for SPM’s ethylene production unit emission points.

Storage Vessels

The following are “storage vessels,” as defined in 40 CFR 63 Subpart YY, that are associated with SPM’s ethylene production unit.

- Light Gasoline Storage Tank
- Two Pyrolysis Fuel Oil Storage Tanks

³⁷ *Ethylene production or production unit* – means a chemical manufacturing process unit in which ethylene and/or propylene are produced by separation from petroleum refining process streams or by subjecting hydrocarbons to high temperatures in the presence of steam. The ethylene production unit includes the separation of ethylene and/or propylene from associated streams such as a C₄ product, pyrolysis gasoline, and pyrolysis fuel oil. Ethylene production does not include the manufacture of SOCM chemicals such as the production of butadiene from the C₄ stream and aromatics from pyrolysis gasoline. (40 CFR Part 63, Subpart YY).

- Wash Oil Storage Drum
- Blended Pitch Drum

As previously indicated, the Light Gasoline Storage Tank and two Pyrolysis Fuel Oil Storage Tanks are subject to control according to both 40 CFR 60 Subpart Kb and 40 CFR 63 Subpart YY. Therefore, pursuant to 40 CFR 63.1100(g)(1)(ii) in 40 CFR 63 Subpart YY, SPM has elected to comply only with 40 CFR 63 Subpart YY storage vessel requirements for the three storage tanks, which constitutes compliance with 40 CFR 60 Subpart Kb. Alternatively, the Wash Oil Storage Drum is not subject to control according to 40 CFR 60 Subpart Kb and 40 CFR 63 Subpart YY because wash oil maximum TVPs of VOC and organic HAPs, respectively, are not equal to or greater than applicable 40 CFR 60 Subpart Kb VOC and 40 CFR 63 Subpart YY organic HAP maximum TVP thresholds, while the Blended Pitch Drum is only subject to control according to 40 CFR 63 Subpart YY storage vessel requirements.

The Light Gasoline Storage Tank and two Pyrolysis Fuel Oil Storage Tanks are equipped with CVS and add-on control devices [i.e., CVTO (primary control device)/MPGF CVTO Trip (backup control device)] to comply with 40 CFR 63 Subpart YY storage vessel requirements. The Blended Pitch Drum vents to a CVS that routes the vent stream to a process. Specifically, the vent stream from the Blended Pitch Drum is collected and routed to the Quench Tower in SPM's ethylene manufacturing unit.

The two C₃₊ Storage Tanks that are associated with SPM's ethylene production unit contain organic HAP, but neither of these tanks is a "storage vessel," as defined in 40 CFR 63 Subpart YY, because both tanks are pressure vessels designed to operate in excess of 204.9 kPa (29.7 psia) and without emissions to the atmosphere. Therefore, these two C₃₊ Storage Tanks are not subject to 40 CFR 63 Subpart YY storage vessel requirements.

Process Vents

SPM's ethylene production unit generates "ethylene process vents," as defined in 40 CFR 63 Subpart YY, that must comply with the ethylene process vent requirements in 40 CFR 63 Subpart YY. These ethylene process vents are routed to the TEGF A, TEGF B, and HP Elevated Flare to comply with the ethylene process vent control requirements in 40 CFR 63 Subpart YY.

Transfer Racks

The transfer racks that are used to load the following materials that are produced in SPM's ethylene production unit into railcars are subject to 40 CFR 63 Subpart YY transfer rack control requirements because they do not vapor balance during the loading of all materials and the amount of HAP-containing materials with a true vapor pressure of total organic HAP greater than 3.4 kPa (0.5 psia) that is loaded through these transfer racks exceeds 76 m³ per day (20,000 gallons per day), averaged over any consecutive 30-day period.

- Light Gasoline
- Pyrolysis Fuel Oil

The transfer racks that are used to load light gasoline and pyrolysis fuel oil into railcars vapor balance with the two Pyrolysis Fuel Oil Storage Tanks during the loading of these materials. Specifically, the HAP-containing vapors displaced from railcars during the loading of light gasoline are collected and routed to a vapor balance system that routes the collected vapors to the two Pyrolysis Fuel Oil Storage Tanks, which are connected to a common header with the Light Gasoline Storage Tank, while the HAP-containing vapors displaced from railcars during the loading of pyrolysis fuel oil are collected and routed to a vapor balance system that routes the collected vapors to the two Pyrolysis Fuel Oil Storage Tanks, which are the storage vessels from which the liquid being loaded originated. Both configurations comply with the transfer rack compliance options outlined in 40 CFR 63.1105(a)(4) of 40 CFR 63 Subpart YY.

Alternatively, the transfer racks that are used to load C_{3+} into railcars are not subject to 40 CFR 63 Subpart YY because these racks are not “transfer racks,” as defined in 40 CFR 63 Subpart YY, since they vapor balance during all C_{3+} loading operations, which are the only loading operations conducted at the racks. Specifically, the transfer racks that are used to load C_{3+} into railcars vapor balance with the two C_{3+} Storage Tanks, which are the storage vessels from which the liquid being loaded originated, during all loading operations.

The transfer of recovered oil into tank trucks at SPM is not subject to 40 CFR 63 Subpart YY transfer rack requirements because the recovered oil does not have a true vapor pressure of total organic HAP equal to or greater than 3.4 kPa (0.5 psia). Also, the transfer of blended pitch into tank trucks at SPM is not subject to 40 CFR 63 Subpart YY transfer rack requirements because the amount of blended pitch transferred into tank trucks is not equal to or greater than 76 m³ per day (20,000 gallons per day), averaged over any consecutive 30-day period.

Equipment Leaks

The ethylene production unit at SPM includes equipment components that contain or contact 5% by weight or greater organic HAP and do not otherwise meet criteria that would exempt the components from 40 CFR 63 Subpart YY equipment leak requirements. Therefore, these equipment components are subject to the equipment leak requirements in 40 CFR 63 Subpart YY. Additionally, pursuant to 40 CFR 63.1100(g)(4)(iii) in 40 CFR 63 Subpart YY, SPM has elected to apply 40 CFR 63 Subpart YY to all equipment components in the ethylene production unit that are subject to control under both 40 CFR 60 Subpart VVa and 40 CFR 63 Subpart YY, as well as all equipment in the ethylene production unit that is subject to control under 40 CFR 60 Subpart VVa but not 40 CFR 63 Subpart YY. In summary, SPM uses a combination of equipment design features and LDAR to achieve compliance with 40 CFR 63 Subpart YY equipment leak requirements for relevant equipment components in SPM’s ethylene production unit.

Waste Streams

As previously discussed, there are waste streams generated by SPM’s ethylene production unit that meet the criteria to be subject to the waste requirements in 40 CFR 63 Subpart XX. Accordingly, SPM must manage and treat benzene-containing waste streams generated by the ethylene production unit onsite pursuant to any of the options in 40 CFR 61.342(c)(1) through (e) in the BWON rule to comply with 40 CFR 63 Subpart XX. SPM uses the 6 BQ option outlined in 40 CFR 61.342(e) to comply with 40 CFR 63 Subpart XX.

Heat Exchange Systems

As previously discussed, there are cooling water-process fluid heat exchangers in SPM's ethylene production unit that meet the criteria to be subject to the heat exchange system requirements in 40 CFR 63 Subpart XX. These heat exchangers are in the Process Cooling Tower heat exchange system. SPM follows applicable LDAR requirements to achieve compliance with 40 CFR 63 Subpart XX heat exchange system requirements for the Process Cooling Tower heat exchange system.

Ethylene Cracking Furnaces

The seven ethane cracking furnaces and their associated decoking operations are a part of SPM's ethylene production unit and are therefore subject to the ethylene cracking furnace and ethylene cracking furnace decoking requirements in 40 CFR 63 Subpart YY. SPM follows applicable ethylene cracking furnace component inspection and decoking parameter monitoring requirements to comply with 40 CFR 63 Subpart YY ethylene cracking furnace and ethylene cracking furnace decoking requirements applicable to SPM's seven ethane cracking furnaces.

Additional details regarding 40 CFR 60 Subpart Kb, 40 CFR 60 Subpart VVa, 40 CFR 63 Subpart XX, and 40 CFR 63 Subpart YY applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.3.6 40 CFR Part 63, Subpart EEEE - National Emission Standards for Hazardous Air Pollutants: Organic Liquids Distribution (Non-Gasoline)

Except for *organic liquids distribution (OLD) operations*³⁸ located at research and development facilities under section 112(c)(7) of the CAA, oil and natural gas production field facilities, and natural gas transmission and storage facilities, 40 CFR 63 Subpart EEEE applies to each new, reconstructed, or existing OLD operation affected source that is located at, or is part of, a major source of HAP emissions. The OLD operation affected source under 40 CFR 63 Subpart EEEE is made up of the following.

- All *storage tanks*³⁹ storing *organic liquids*.⁴⁰

³⁸ *Organic liquids distribution (OLD) operation* – means the combination of activities and equipment used to store or transfer organic liquids into, out of, or within a plant site regardless of the specific activity being performed. Activities include, but are not limited to, storage, transfer, blending, compounding, and packaging. (40 CFR Part 63, Subpart EEEE).

³⁹ *Storage tank* – means a stationary unit that is constructed primarily of nonearthen materials (such as wood, concrete, steel, or reinforced plastic) that provide structural support and is designed to hold a bulk quantity of liquid. Storage tanks do not include:

- (1) Units permanently attached to conveyances such as trucks, trailers, rail cars, barges, or ships;
- (2) Pressure vessels designed to operate in excess of 204.9 kilopascals and without emissions to the atmosphere;
- (3) Bottoms receivers;
- (4) Surge control vessels;
- (5) Vessels storing wastewater; or
- (6) Reactor vessels associated with a manufacturing process unit. (40 CFR Part 63, Subpart EEEE).

⁴⁰ *Organic liquid* – means:

- (1) Any non-crude oil liquid, non-condensate liquid, or liquid mixture that contains 5 percent by weight or greater of the organic HAP listed in Table 1 to this subpart, as determined using the procedures specified in §63.2354(c).
- (2) Any crude oils or condensates downstream of the first point of custody transfer.
- (3) Organic liquids for purposes of this subpart do not include the following liquids:

- All transfer racks at which organic liquids are loaded into or unloaded out of transport vehicles and/or containers.
- All equipment leak components in organic liquids service that are associated with:
 - Storage tanks storing organic liquids
 - Transfer racks loading or unloading organic liquids
 - Pipelines that transfer organic liquids directly between two storage tanks that are subject to this subpart
 - Pipelines that transfer organic liquids directly between a storage tank subject to this subpart and a transfer rack subject to this subpart
 - Pipelines that transfer organic liquids directly between two transfer racks that are subject to this subpart.
- All transport vehicles while they are loading or unloading organic liquids at transfer racks subject to this subpart.
- All containers while they are loading or unloading organic liquids at transfer racks subject to this subpart.

However, the equipment listed below is excluded from the 40 CFR 63 Subpart EEEE OLD operation affected source.

- Storage tanks, transfer racks, transport vehicles, containers, and equipment leak components that are part of an affected source under another 40 CFR Part 63 NESHAP.
- Non-permanent storage tanks, transfer racks, transport vehicles, containers, and equipment leak components when used in special situation distribution loading and unloading operations, such as maintenance or upset liquids management.
- Storage tanks, transfer racks, transport vehicles, containers, and equipment leak components when used to conduct maintenance activities, such as stormwater management, liquid removal from tanks for inspections and maintenance, or changeovers to a different liquid stored in a storage tank.

An OLD operation may occupy an entire plant site or be collocated with other industrial (e.g., manufacturing) operations at the same plant site. An OLD operation affected source under 40 CFR 63 Subpart EEEE is a new or reconstructed source if construction or reconstruction of the source commenced after April 2, 2002. Alternatively, an OLD operation affected source is an existing source if it is not a new or reconstructed source.

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- (i) Gasoline (including aviation gasoline), kerosene (No. 1 distillate oil), diesel (No. 2 distillate oil), asphalt, and heavier distillate oils and fuel oils;
 - (ii) Any fuel consumed or dispensed on the plant site directly to users (such as fuels for fleet refueling or for refueling marine vessels that support the operation of the plant);
 - (iii) Hazardous waste;
 - (iv) Wastewater;
 - (v) Ballast water; or
 - (vi) Any non-crude oil or non-condensate liquid with an annual average true vapor pressure less than 0.7 kilopascals (0.1 psia). (40 CFR Part 63, Subpart EEEE).

SPM includes the three methanol vessels below that are potentially subject to 40 CFR 63 Subpart EEEE.

- 35,952-gallon pressurized horizontal vessel
- 67,223-gallon pressurized horizontal vessel
- 6,452-gallon pressurized vertical vessel

These vessels store methanol, which is an “organic liquid,” as defined in 40 CFR 63 Subpart EEEE. Moreover, although the referenced methanol vessels are associated with SPM’s ethylene production unit affected source, they are not part of the 40 CFR 63 Subpart YY ethylene production unit affected source because they do not store a liquid containing an “organic HAP,” as defined in 40 CFR 63.1103(e)(2) of 40 CFR 63 Subpart YY for ethylene production unit affected sources. Therefore, the vessels are potentially subject to 40 CFR 63 Subpart EEEE. However, the 35,952-gallon and 67,223-gallon pressurized horizontal vessels are not “storage tanks” under 40 CFR 63 Subpart EEEE because each of these vessels is a pressure vessel designed to operate in excess of 204.9 kPa and without emissions to the atmosphere. Additionally, the 6,452-gallon pressurized vertical vessel is not a “storage tank” under 40 CFR 63 Subpart EEEE because it is a “surge control vessel,” as defined in 40 CFR 63 Subpart EEEE. Therefore, these three vessels are not subject to 40 CFR 63 Subpart EEEE.

Alternatively, the piping and equipment that are used to unload methanol from trucks into the 35,952-gallon and 67,223-gallon pressurized horizontal vessels are “transfer racks” subject to 40 CFR 63 Subpart EEEE. However, pursuant to 40 CFR 63.2343(a) in 40 CFR 63 Subpart EEEE, the only 40 CFR 63 Subpart EEEE requirement applicable to these transfer racks that only unload an organic liquid is to keep documentation that verifies that each transfer rack is not required to be controlled. This documentation must be kept up-to-date and must be in a form suitable and readily available for expeditious inspection and review according to 40 CFR 63.10(b)(1), including records stored in electronic form in a separate location. Furthermore, pursuant to 40 CFR 63.2346(c) of 40 CFR 63 Subpart EEEE, because these transfer racks are not subject to emission control requirements under the subpart, the equipment leak components that are associated with the transfer racks are not subject to 40 CFR 63 Subpart EEEE LDAR requirements. Additional details regarding 40 CFR 63 Subpart EEEE applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.3.7 40 CFR Part 63, Subpart FFFF – National Emission Standards for Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing

Except for the operations specified in 40 CFR 63.2435(c)(1) through (c)(7), 40 CFR 63 Subpart FFFF applies to each miscellaneous organic chemical manufacturing process unit (MCPU), which includes equipment necessary to operate a *miscellaneous organic chemical manufacturing process*,⁴¹ that is

⁴¹ *Miscellaneous organic chemical manufacturing process* – means all equipment which collectively function to produce a product or isolated intermediate that are materials described in §63.2435(b). For the purposes of this subpart, process includes any, all or a combination of reaction, recovery, separation, purification, or other activity, operation, manufacture, or treatment which are used to produce a product or isolated intermediate. A process is also defined by the following:

- (1) Routine cleaning operations conducted as part of batch operations are considered part of the process;
- (2) Each nondedicated solvent recovery operation is considered a single process;
- (3) Each nondedicated formulation operation is considered a single process that is used to formulate numerous materials and/or products;

located at, or is part of, a major stationary source of HAPs and that meets all three of the criteria specified below.

1. The MCPU produces material or a family of materials that is described below.
 - a. An organic chemical(s) classified using the 1987 version of SIC code 282, 283, 284, 285, 286, 287, 289, or 386 or the 1997 version of NAICS code 325, except as provided below.
 - i. Production activities described using the 1997 version of NAICS codes 325131, 325181, 325188 (except the requirements do apply to hydrazine), 325314, 325991 (except the requirements do apply to reformulating plastics resins from recycled plastics products), and 325992 (except the requirements do apply to photographic chemicals).
 - b. Quaternary ammonium compounds and ammonium sulfate produced with caprolactam.
 - c. Hydrazine.
 - d. Organic solvents classified in any of the SIC or NAICS codes listed below that are recovered using nondedicated solvent recovery operations.
 - i. 1987 version of SIC code 282, 283, 284, 285, 286, 287, 289, or 386 or 1997 version of NAICS code 325, except for 1997 version of NAICS codes 325131, 325181, 325188 (except the requirements do apply to hydrazine), 325314, 325991 (except the requirements do apply to reformulating plastics resins from recycled plastics products), and 325992 (except the requirements do apply to photographic chemicals).
2. The MCPU processes, uses, or generates any of the organic HAPs listed in section 112(b) of the CAA or hydrogen chloride, hydrogen fluoride, or chlorine.
3. The MCPU is not an affected source or part of an affected source under another subpart of 40 CFR Part 63, except for process vents from batch operations within a chemical manufacturing process unit (CMPU), as identified in 40 CFR 63.100(j)(4). For this situation, the MCPU is the same as the CMPU, and a stationary source is subject only to the requirements for batch process vents in 40 CFR 63 Subpart FFFF.

An MCPU under 40 CFR 63 Subpart FFFF also includes any assigned storage tanks and transfer racks; equipment in open systems that is used to convey or store water having the same concentration and flow characteristics as wastewater; and components such as pumps, compressors, agitators, pressure relief devices, sampling connection systems, open-ended valves or lines, valves, connectors, and instrumentation systems. The affected source under 40 CFR 63 Subpart FFFF is the facility-wide collection of MCPUs and the heat exchange systems, wastewater, and waste management units that are associated with the same MCPUs.

(4) Quality assurance/quality control laboratories are not considered part of any process; and

(5) Ancillary activities are not considered a process or part of any process.

(6) The end of a process that produces a solid material is either up to and including the dryer or extruder, or for a polymer production process without a dryer or extruder, it is up to and including the die plate or solid-state reactor, except in two cases. If the dryer, extruder, die plate, or solid-state reactor is followed by an operation that is designed and operated to remove HAP solvent or residual HAP monomer from the solid, then the solvent removal operation is the last step in the process. If the dried solid is diluted or mixed with a HAP-based solvent, then the solvent removal operation is the last step in the process. (40 CFR Part 63, Subpart FFFF).

SPM includes three polyethylene manufacturing unit affected sources (PE Units 1, 2, and 3) that are subject to 40 CFR 63 Subpart FFFF. Therefore, the process vents, storage tanks, transfer racks, equipment leak components, wastewater streams and liquids in open systems, and heat exchange systems of these three polyethylene manufacturing units must comply with 40 CFR 63 Subpart FFFF, as applicable.

Process Vents

Any PE Unit 1, 2, or 3 “batch process vent” or “continuous process vent,” as those terms are defined in 40 CFR 63 Subpart FFFF, that must comply with the control requirements in 40 CFR 63 Subpart FFFF based on the organic HAP characteristics of the specific gas stream will comply with applicable 40 CFR 63 Subpart FFFF control requirements. Additionally, as previously presented under the 40 CFR 60 Subpart DDD applicability discussion, pursuant to the process vent overlap provisions at 40 CFR 63.2535(h) in 40 CFR 63 Subpart FFFF, Shell has elected to comply with the requirements for Group 1 process vents in 40 CFR 63 Subpart FFFF for all the process vents in PE Units 1, 2, and 3 that are subject to process vent control requirements in 40 CFR 60 Subpart DDD but not 40 CFR 63 Subpart FFFF.

Also, PE Unit 3 has the potential to emit chromium compounds (a HAP metal) in an uncontrolled amount greater than 150 pounds per year. Therefore, pursuant to 40 CFR 63.2465 in 40 CFR 63 Subpart FFFF, the overall uncontrolled emissions of HAP metals in PE Unit 3 process vents must be reduced by greater than or equal to 97% by weight. SPM uses filtration equipment to comply with the referenced 40 CFR 63 Subpart FFFF HAP metal reduction requirement for process vents.

Storage Tanks

The storage tanks assigned to PE Units 1, 2, and 3 are not subject to 40 CFR 63 Subpart FFFF storage tank requirements because each such storage tank does not contain an organic HAP (other than as an impurity) or it contains an organic HAP but it is a pressure vessel designed to operate in excess of 204.9 kPa (29.7 psia) and without emissions to the atmosphere.

Transfer Racks

The same transfer racks that are used to load light gasoline and pyrolysis fuel oil into railcars at SPM are used to load PE3 heavies into railcars. The predominant use of the referenced transfer racks is the loading of light gasoline and pyrolysis fuel oil into railcars, which means the railcar transfer racks must comply with applicable 40 CFR 63 Subpart YY transfer rack requirements for all materials that are conveyed through the transfer racks into railcars. As previously indicated, the transfer racks that are used to load light gasoline and pyrolysis fuel oil into railcars are subject to 40 CFR 63 Subpart YY transfer rack control requirements when loading a material that has a true vapor pressure of total organic HAP greater than or equal to 0.5 psia. The PE3 heavies material has a true vapor pressure of total organic HAP greater than 0.5 psia. Therefore, the vapors resulting from the loading of PE3 heavies into railcars must be controlled in accordance with 40 CFR 63 Subpart YY transfer rack control requirements. The vent from the loading of PE3 heavies into railcars is routed to a CVS that directs the vent to add-on control devices [i.e., CVTO (primary control device)/MPGF CVTO Trip (backup control device)] to comply with 40 CFR 63 Subpart YY transfer rack requirements.

Equipment Leaks

PE Unit 3 includes equipment components that contain or contact 5% by weight or greater of total organic HAP and do not otherwise meet criteria that would exempt the components from 40 CFR 63 Subpart FFFF equipment leak requirements. Therefore, these equipment components are subject to the equipment leak requirements in 40 CFR 63 Subpart FFFF. Pursuant to 40 CFR 63.2535(k) in 40 CFR 63 Subpart FFFF, SPM has elected to apply 40 CFR 63 Subpart FFFF to all equipment in PE Unit 3 that is subject to both 40 CFR 60 Subpart VV and 40 CFR 63 Subpart FFFF, as well as all equipment in PE Unit 3 that is subject to 40 CFR 60 Subpart VV but not 40 CFR 63 Subpart FFFF, which in total constitutes compliance with 40 CFR 60 Subpart VV because SPM considers the VOC contained or contacted by such equipment as if it were organic HAP for purposes of complying with 40 CFR 63 Subpart FFFF. Additionally, as previously presented under the 40 CFR 60 Subpart VV applicability discussion, pursuant to the overlap provisions at 40 CFR 63.2535(k) in 40 CFR 63 Subpart FFFF, SPM has elected to apply 40 CFR 63 Subpart FFFF to all equipment in PE Units 1 and 2 that is subject to the requirements of 40 CFR 60 Subpart VV, which constitutes compliance with 40 CFR 60 Subpart VV because SPM considers the VOC contained or contacted by such equipment as if it were organic HAP for purposes of complying with 40 CFR 63 Subpart FFFF. In summary, SPM uses a combination of equipment design features and LDAR to achieve compliance with 40 CFR 63 Subpart FFFF equipment leak requirements for relevant equipment components in PE Units 1, 2, and 3.

Wastewater Streams and Liquid Streams in Open Systems

PE Units 1, 2, and 3 do not generate “wastewater,” as defined in 40 CFR 63 Subpart FFFF, because the wastewater generated in these units does not contain any HAPs listed in 40 CFR 63 Subpart FFFF Table 8 or 9. Additionally, PE Units 1, 2, and 3 do not include any liquid streams in open systems that have the same concentration and flow characteristics as 40 CFR 63 Subpart FFFF “wastewater.” As a result, PE Units 1, 2, and 3 are not subject to 40 CFR 63 Subpart FFFF wastewater and liquid stream in open system requirements.

Heat Exchange Systems

PE Units 1, 2, and 3 do not include any cooling water-process fluid heat exchangers that meet the criteria to be subject to the heat exchange system requirements in 40 CFR 63 Subpart FFFF. Therefore, the cooling water-process fluid heat exchangers in these units are not subject to 40 CFR 63 Subpart FFFF heat exchange system requirements.

Additional details regarding 40 CFR 60 Subpart VV, 40 CFR 60 Subpart DDD, 40 CFR 63 Subpart YY, and 40 CFR 63 Subpart FFFF applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.3.8 40 CFR Part 63, Subpart YYYY - National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines

Except for certain stationary combustion turbines located at a research or laboratory facility where research is conducted on the turbine itself, 40 CFR 63 Subpart YYYY applies to the following types of

*stationary combustion turbines*⁴² located at a major source of HAPs: lean premix oil-fired, diffusion flame oil-fired, lean premix gas-fired, and diffusion flame gas-fired simple cycle stationary combustion turbines, regenerative/recuperative cycle stationary combustion turbines, cogeneration cycle stationary combustion turbines, and combined cycle stationary combustion turbines. However, as indicated in 40 CFR 63 Subpart YYYYY, specific categories of these stationary combustion turbines, including existing stationary combustion turbines, new and reconstructed emergency stationary combustion turbines, and new and reconstructed stationary combustion turbines with a rated peak power output of less than 1.0 megawatt (MW) at International Organization for Standardization (ISO) standard day conditions, are subject to only limited requirements of this subpart or are not subject to any requirements of the subpart.

Pursuant to 40 CFR 63.6092 of 40 CFR 63 Subpart YYYYY, duct burners and waste heat recovery units are considered steam generating units and are not covered under this subpart. Nonetheless, because it may be difficult to separately monitor emissions from a stationary combustion turbine and its duct burners, 40 CFR 63 Subpart YYYYY allows such sources to meet the emission limitations under this subpart with their duct burners in operation.

A stationary combustion turbine affected source under 40 CFR 63 Subpart YYYYY is a new or reconstructed source if construction or reconstruction of the source commenced after January 14, 2003. Alternatively, a stationary combustion turbine affected source is an existing source if it is not a new or reconstructed source.

Each Cogen Unit at SPM includes a lean premix gas-fired (natural gas-fired) stationary combustion turbine. Construction of these combustion turbines commenced after January 14, 2003, the combustion turbines are not emergency combustion turbines, and each of the combustion turbines has a rated peak power output considerably greater than 1.0 MW at ISO standard day conditions. As a result, each Cogen Unit combustion turbine is a new lean premix gas-fired stationary combustion turbine affected source subject to a full suite of requirements under 40 CFR 63 Subpart YYYYY. Accordingly, the Cogen Units must comply with applicable 40 CFR 60 Subpart YYYYY emission standards, testing, monitoring, recordkeeping, and reporting requirements. Additional details regarding 40 CFR 63 Subpart YYYYY applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.3.9 40 CFR Part 63, Subpart ZZZZ - National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

Except for a stationary RICE that is tested at a stationary RICE test cell/stand, each existing, new, and reconstructed stationary RICE located at a facility that is a major source or area source of HAPs is an

⁴² *Stationary combustion turbine* – means all equipment, including but not limited to the turbine, the fuel, air, lubrication and exhaust gas systems, control systems (except emissions control equipment), and any ancillary components and sub-components comprising any simple cycle stationary combustion turbine, any regenerative/recuperative cycle stationary combustion turbine, the combustion turbine portion of any stationary cogeneration cycle combustion system, or the combustion turbine portion of any stationary combined cycle steam/electric generating system. Stationary means that the combustion turbine is not self propelled or intended to be propelled while performing its function. Stationary combustion turbines do not include turbines located at a research or laboratory facility, if research is conducted on the turbine itself and the turbine is not being used to power other applications at the research or laboratory facility. (40 CFR Part 63, Subpart YYYYY).

affected source subject to 40 CFR 63 Subpart ZZZZ. The following is a summary of the relevant dates for determining the “existing” or “new” status of a stationary RICE affected source under 40 CFR 63 Subpart ZZZZ.

- A stationary RICE with a site rating of more than 500 bhp located at a major source of HAPs is an existing source if construction or reconstruction of the RICE commenced before December 19, 2002. Alternatively, the same size stationary RICE located at a major source of HAPs is a new source if construction of the RICE commenced on or after December 19, 2002.
- A stationary RICE with a site rating of less than or equal to 500 bhp located at a major source of HAPs is an existing source if construction or reconstruction of the RICE commenced before June 12, 2006. Alternatively, the same size stationary RICE located at a major source of HAPs is a new source if construction of the RICE commenced on or after June 12, 2006.
- A stationary RICE located at an area source of HAPs is an existing source if construction or reconstruction of the RICE commenced before June 12, 2006. Alternatively, a stationary RICE located at an area source of HAPs is a new source if construction of the RICE commenced on or after June 12, 2006.

For 40 CFR 63 Subpart ZZZZ purposes, EPA has indicated the construction of a stationary RICE occurs when the RICE is installed at a source and not when it is assembled as a final unit at the manufacturer.⁴³

Each of the following RICEs at SPM is a new *emergency stationary RICE*⁴⁴ affected source under 40 CFR 63 Subpart ZZZZ because each has a rating less than 500 hp; was installed as a new engine at SPM after June 12, 2006; and is only used to either pump water at SPM for fire suppression or protection or to provide electrical power to specific equipment at SPM when electric power from the normal power source is interrupted.

- Fire Pump Engines (2); Firewater Pump 1
- Fire Pump Engines (2); Firewater Pump 2
- Diesel-Fired Emergency Generator Engines (2); Generator 1 - Parking Garage

⁴³ “We disagree with the first set of comments and feel that the date an engine was constructed is the date it was installed at the operator site and not when it was assembled as a final unit at the manufacturer. Thus, any engine constructed (i.e., installed at the site of the operator) prior to December 19, 2002, is an existing engine for purposes of the final rule, while any engine constructed on or after that date is a new engine...Engines manufactured prior to December 19, 2002, but where installation was not commenced until after that date, are considered new engines and must comply with the requirements for new engines.” 69 Federal Register 33480-33481 (June 15, 2004).

⁴⁴ *Emergency stationary RICE* – means any stationary reciprocating internal combustion engine that meets all of the criteria in paragraphs (1) through (3) of this definition. All emergency stationary RICE must comply with the requirements specified in §63.6640(f) in order to be considered emergency stationary RICE. If the engine does not comply with the requirements specified in §63.6640(f), then it is not considered to be an emergency stationary RICE under this subpart.

(1) The stationary RICE is operated to provide electrical power or mechanical work during an emergency situation. Examples include stationary RICE used to produce power for critical networks or equipment (including power supplied to portions of a facility) when electric power from the local utility (or the normal power source, if the facility runs on its own power production) is interrupted, or stationary RICE used to pump water in the case of fire or flood, etc.

(2) The stationary RICE is operated under limited circumstances for situations not included in paragraph (1) of this definition, as specified in §63.6640(f).

(3) The stationary RICE operates as part of a financial arrangement with another entity in situations not included in paragraph (1) of this definition only as allowed in §63.6640(f)(4)(i) or (ii). (40 CFR Part 63, Subpart ZZZZ).

- Diesel-Fired Emergency Generator Engines (2); Generator 2 - Telecom Hut
- Natural Gas-Fired Emergency Generator Engines (2); Generator 3 - Lift Station
- Natural Gas-Fired Emergency Generator Engines (2); Generator 4 - Lift Station

Pursuant to 40 CFR 63.6590(c)(6) in 40 CFR 63 Subpart ZZZZ, the above engines comply with this subpart by complying with 40 CFR 60 Subpart IIII (CI engines) or 40 CFR 60 Subpart JJJJ (SI engines), as applicable. No additional requirements under 40 CFR 63 Subpart ZZZZ or any other part of 40 CFR Part 63 apply to the RICE.

Additional details regarding 40 CFR 60 Subpart IIII, 40 CFR 60 Subpart JJJJ, and 40 CFR 63 Subpart ZZZZ applicability are provided in the Title V Operating Permit Application forms in Appendix A.

3.2.4 40 CFR Part 64: Compliance Assurance Monitoring

40 CFR Part 64, which is often referenced as “the CAM (Compliance Assurance Monitoring) rule,” applies to a pollutant-specific emissions unit that:

- Is located at a "major source," as defined in 40 CFR Part 70 or 71;
- Is subject to an emission limitation or standard (i.e., an *applicable requirement*⁴⁵ that constitutes an emission limitation, emission standard, standard of performance, or means of emission limitation as defined under the CAA) for an applicable regulated air pollutant and the emission limitation or standard is not exempt under 40 CFR 64.2(b)(1);
- Uses a *control device*⁴⁶ to achieve compliance with the subject emission limitation or standard; and
- Has pre-control device potential emissions of the applicable regulated air pollutant equal to or greater than 100% of the amount, in tpy, required for a stationary source to be classified as a major source (e.g., 100 tpy for section 302 of the CAA, 10 or 25 tpy of HAPs for section 112 of the CAA).

There are no emissions units at SPM that are subject to the CAM rule. Additional details regarding CAM rule applicability are provided in the Title V Operating Permit Application forms in Appendix A.

⁴⁵ *Applicable requirement* – means all of the following as they apply to emissions units in a part 70 source (including requirements that have been promulgated or approved by EPA through rulemaking at the time of issuance but have future-effective compliance dates):

- (1) Any standard or other requirement provided for in the applicable implementation plan approved or promulgated by EPA through rulemaking under title I of the Act that implements the relevant requirements of the Act, including any revisions to that plan promulgated in part 52 of this chapter;
- (2) Any term or condition of any preconstruction permits issued pursuant to regulations approved or promulgated through rulemaking under title I, including parts C or D, of the Act;
- (3) Any standard or other requirement under section 111 of the Act, including section 111(d);
- (4) Any standard or other requirement under section 112 of the Act, including any requirement concerning accident prevention under section 112(r)(7) of the Act; [...] (40 CFR Part 70).

⁴⁶ *Control device* – means equipment, other than inherent process equipment, that is used to destroy or remove air pollutant(s) prior to discharge to the atmosphere...For purposes of this part, a control device does not include passive control measures that act to prevent pollutants from forming, such as the use of seals, lids, or roofs to prevent the release of pollutants, use of low-polluting fuel or feedstocks, or the use of combustion [ultra-low NOx burners] or other process design features or characteristics. [...] (40 CFR Part 64).

3.2.5 40 CFR Part 68: Chemical Accident Prevention Provisions

40 CFR Part 68 applies to the owner or operator of a stationary source that has more than a threshold quantity of a *regulated substance*⁴⁷ in a *process*,⁴⁸ as determined under 40 CFR 68.115, to prevent the accidental release of such substances. The regulated substances and their associated thresholds are listed at 40 CFR 68.130.

A key component of 40 CFR Part 68 is the requirement of an owner or operator to develop a risk management plan (RMP) for a subject stationary source. An RMP contains, among other things: an offsite consequence analysis for all covered processes; a five-year accident history for all covered processes; prevention program information for all covered processes, as applicable; and emergency response program information.

SPM has regulated substances that may exceed the relevant threshold quantity indicated in 40 CFR Part 68. Shell submitted an RMP to EPA on April 6, 2022, prior to SPM having regulated substances in a process onsite above a relevant threshold quantity. On April 25, 2022, Shell received a completeness review notification letter from the EPA acknowledging that the RMP was considered “complete.” Shell will revise and update the RMP, as required by 40 CFR 68.190.

3.2.6 40 CFR Parts 72 through 78: Acid Rain Program

The Acid Rain Program was established pursuant to Title IV of the CAA to significantly reduce NO_x and SO₂ emissions from EGUs in the power sector. 40 CFR Parts 72 through 78 contain the Acid Rain Program regulations. The Acid Rain Program required phased-in NO_x emission limitations for certain coal-fired EGUs. To limit SO₂ emissions, the Acid Rain Program established a permanent cap on the total amount of SO₂ that may be emitted by certain EGUs.

The Cogen Units are “affected units” subject to applicable requirements of the Acid Rain Program because they are new “utility units” since each unit cogenerates steam and electricity, was constructed after November 15, 1990, and sells more than one-third of its potential electric output capacity and more than 219,000 MWe-hrs actual electric output (on a gross basis) to a power distribution system. Thus, the Cogen Units are subject to the Acid Rain Program requirements in 40 CFR Parts 72, 73, and 75. 40 CFR Part 74 does not apply to the Cogen Units because they are affected units under 40 CFR Part 72. 40 CFR Part 76 does not apply to the Cogen Units because they are not coal-fired units. 40 CFR Part 77 addresses excess emissions under the Acid Rain Program and 40 CFR Part 78 governs appeal procedures under 40 CFR Parts 72 through 77. As required by 40 CFR 72.9(a)(1)(i), Shell submitted an Acid Rain permit application on June 29, 2016, at least 24 months prior to commencing operation of the Cogen Units. Additionally, Shell complies with all other applicable requirements under the Acid Rain Program.

⁴⁷ *Regulated substance* – is any substance listed pursuant to section 112(r)(3) of the Clean Air Act as amended, in §68.130. (40 CFR Part 68).

⁴⁸ *Process* – means any activity involving a regulated substance including any use, storage, manufacturing, handling, or on-site movement of such substances, or combination of these activities. For the purposes of this definition, any group of vessels that are interconnected, or separate vessels that are located such that a regulated substance could be involved in a potential release, shall be considered a single process. (40 CFR Part 68).

3.2.7 40 CFR Part 98: Mandatory Greenhouse Gas Reporting

40 CFR Part 98, which is often referenced as the “GHG Reporting Rule,” requires the reporting of GHG emissions and certain operating and business data for specific direct emitting facilities, fuel and industrial gas suppliers, and CO₂ injection sites. Certain types of facilities, suppliers, and sites are subject to GHG Reporting Rule requirements regardless of the amount of GHG emitted, produced, or handled. Other facilities, suppliers, and sites are subject to GHG Reporting Rule requirements only if they annually emit, produce, or handle GHGs above a specific threshold, which is generally 25,000 metric tons or more of CO₂e per year.

The GHG Reporting Rule applies to certain combustion sources at SPM emitting CO₂, methane, and nitrous oxide, as well as equipment leaks of SF₆. Relevant combustion sources at SPM include the ethane cracking furnaces, Cogen Units, and flares. Equipment leaks of SF₆ occur from the SF₆-insulated high-voltage equipment located at SPM. SPM reports its GHG emissions from the noted emission sources as required under the GHG Reporting Rule.

Title V Operating Permit Application Forms



OP #: _____
Date: _____

TITLE V OPERATING PERMIT APPLICATION

Section 1 - General Information

1.1 Application Type

Type of permit for which application is made: (Check one)

☒ Initial Title V

☐ Renewal Operating Permit No. _____

1.2 Facility Information

Firm Name: Shell Chemical Appalachia LLC Federal Tax ID: 46-1624986

Facility Name: Shell Polymers Monaca Plant Code: 1

NAICS Code: 325110; 325211; and 221112 SIC Code: 2869; 2821; and 4911

Description of NAICS Code: Petrochemical Manufacturing; Plastics Material and Resin Manufacturing; and Fossil Fuel Electric Power Generation

Description of SIC Code: Industrial Organic Chemicals, Not Elsewhere Classified; Plastics Materials, Synthetic Resins, and Nonvulcanizable Elastomers; and Electric Services

County: Beaver Municipality: Potter and Center Townships

Latitude: 40°, 40', 17.724" Longitude: 80°, 20', 10.724"

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDR Reference Point: CENTER

1.3 Permit Contact Information

Name: Nathan Levin Title: Operations Manager

Address: 300 Frankfort Road

City: Monaca State: PA ZIP: 15061

Telephone: (724) 709-6068

Email: Nathan.Levin@shell.com

1.4 Small Business Question

Are you a small business as defined by the Pennsylvania Air Pollution Control Act? ☐ Yes ☒ No

Are you a small business as defined by the U.S. Small Business Administration? ☐ Yes ☒ No

1.5 Request for Confidentiality

Do you request any information on this application to be treated as "Confidential"? ☐ Yes ☒ No

Place confidential information on separate page(s) marked "Confidential".

In order to request confidential treatment for information in any document, you must submit a redacted version of the relevant document with the confidential information blacked out (and thus suitable for public disclosure), along with a letter of request containing a table identifying the page and line number of each redaction, along with a justification for each redacted item as to why it should be deemed confidential under the specific criteria allowed under 25 Pa. Code § 127.12(d) and Section 13.2 of the APCA.

1.6 Certification of Truth, Accuracy and Completeness by a Responsible Official

I certify that, subject to the penalties of Title 18 Pa. C.S.A. Section 4904 and 35 P.S. Section 4009(b)(2), I am the responsible official having primary responsibility for the design and operation of the facilities to which this application applies and that the information provided in this application is true, accurate, and complete to the best of my knowledge, information, and belief formed after reasonable inquiry.

(Signed)



Date:

1-15-26

Name (Typed): Nathan Levin

Title: Operations Manager

Telephone: (724) 709-6068

Email: Nathan.Levin@shell.com

Section 2 - Applicable Requirements for the Entire Site		
Describe and cite all applicable requirements pertaining to the entire site. Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.		
Citation No.	Citation Limitation	Limitation Used
25 Pa. Code §121.7	No person may permit air pollution as that term is defined in the act.	The same limitation as the limitation associated with the citation is used for the site.
25 Pa. Code §123.1	(a) No person may permit the emission into the outdoor atmosphere of fugitive air contaminant from a source other than the following: (1) Construction or demolition of buildings or structures. (2) Grading, paving and maintenance of roads and streets. (3) Use of roads and streets. Emissions from material in or on trucks, railroad cars and other vehicular equipment are not considered as emissions from use of roads and streets. (4) Clearing of land. (5) Stockpiling of materials. (6) Open burning operations. (7) [Not applicable] (8) [Not applicable] (9) Sources and classes of sources other than those identified in paragraphs (1)-(8), for which the operator has obtained a determination from the Department that fugitive emissions from the source, after appropriate control, meet the following requirements: (i) the emissions are of minor significance with respect to causing air pollution; and (ii) the emissions are not preventing or interfering with the attainment or maintenance of any ambient air quality standard. (b) An application form for requesting a determination under either subsection (a)(9) or 129.15(c) is available from the Department. In reviewing these applications, the Department may require the applicant to supply information including, but not limited to, a description of proposed control measures, characteristics of emissions, quantity of emissions, and ambient air quality data and analysis showing the impact of the source on ambient air quality. The applicant shall be required to demonstrate that the requirements of subsections (a)(9) and (c) and 123.2 (relating to fugitive particulate matter) or of the requirements of 129.15(c) have been satisfied. Upon such demonstration, the Department will issue a determination, in writing, either as an operating permit condition, for those sources subject to permit requirements under the act, or as an order containing appropriate conditions and limitations.	The same limitation as the limitation associated with the citation is used for the site.

Section 2 - Applicable Requirements for the Entire Site

Describe and cite all applicable requirements pertaining to the entire site.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Citation No.	Citation Limitation	Limitation Used
25 Pa. Code §123.1 (cont'd)	(c) A person responsible for any source specified in subsections (a)(1)-(7) or (9) shall take all reasonable actions to prevent particulate matter from becoming airborne. These actions shall include, but not be limited to, the following: (1) Use, where possible, of water or chemicals for control of dust in the demolition of buildings or structures, construction operations, the grading of roads, or the clearing of land. (2) Application of asphalt, oil, water or suitable chemicals on dirt roads, material stockpiles and other surfaces which may give rise to airborne dusts. (3) Paving and maintenance of roadways. (4) Prompt removal of earth or other material from paved streets onto which earth or other material has been transported by trucking or earth moving equipment, erosion by water, or other means. (d) [Not applicable]	The same limitation as the limitation associated with the citation is used for the site.
25 Pa. Code §123.2	A person may not permit fugitive particulate matter to be emitted into the outdoor atmosphere from a source specified in 25 Pa. Code §123.1(a)(1)-(9) (relating to prohibition of certain fugitive emissions) if such emissions are visible at the point the emissions pass outside the person's property.	The same limitation as the limitation associated with the citation is used for the site.
25 Pa. Code §123.31	A person may not permit the emission into the outdoor atmosphere of any malodorous air contaminants from any source in such a manner that the malodors are detectable outside the property of the person on whose land the source is being operated.	The same limitation as the limitation associated with the citation is used for the site.
25 Pa. Code §123.41	A person may not permit the emission into the outdoor atmosphere of visible air contaminants in such a manner that the opacity of the emission is either of the following: (1) Equal to or greater than 20% for a period or periods aggregating more than three minutes in any 1 hour. (2) Equal to or greater than 60% at any time.	The same limitation as the limitation associated with the citation is used for the site.
25 Pa. Code §123.42	The limitations of 25 Pa. Code §123.41 (relating to limitations) shall not apply to a visible emission in any of the following instances: (1) When the presence of uncombined water is the only reason for failure of the emission to meet the limitations. (2) When the emission results from the operation of equipment used solely to train and test persons in observing the opacity of visible emissions. (3) When the emission results from sources specified in 25 Pa. Code §123.1(a)(1)-(9) (relating to prohibition of certain fugitive emissions). (4) [Not applicable]	The same limitation as the limitation associated with the citation is used for the site.

Section 2 - Applicable Requirements for the Entire Site

Describe and cite all applicable requirements pertaining to the entire site.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Citation No.	Citation Limitation	Limitation Used												
25 Pa. Code §127.12b	Emissions from the Facility shall not equal or exceed the following in any consecutive 12-month period: <table><tr><td>NOx - 455.13 tons</td><td>VOC - 509.99 tons</td></tr><tr><td>CO - 1,214.35 tons</td><td>VOC (ERC)* - 598 tons</td></tr><tr><td>PM (filterable) - 78.41 tons</td><td>HAP - 23.44 tons</td></tr><tr><td>PM10 - 184.02 tons</td><td>Ammonia - 137.23 tons</td></tr><tr><td>PM2.5 - 178.15 tons</td><td>CO2e** - 2,566,563 tons</td></tr><tr><td>SOx - 27.24 tons</td><td></td></tr></table> * This limit is included to ensure that the proper amount of VOC ERCs had been secured by the applicant in accordance with the VOC offset ratios for flue and fugitive emissions under 25 Pa. Code §127.210. Compliance with this limit will be determined by actual VOC emissions at the Facility and the following equation: VOC (ERC) = 1.15 * sum(flue VOC emissions) + 1.3 * sum(fugitive VOC emissions) (Eq. 1) Where: Flue VOC emissions are actual emissions from the ethane cracking furnaces, combustion turbines/duct burners, thermal oxidizers, flares, engines, miscellaneous storage tanks, and polyethylene pellet residual VOC. Fugitive VOC emissions are actual emissions from liquid loadout, component leaks, the process cooling tower, and wastewater treatment plant. ** This limit includes 880 tpy CO2e from SF6-Insulated High Voltage Equipment included in PA-04-00740B.	NOx - 455.13 tons	VOC - 509.99 tons	CO - 1,214.35 tons	VOC (ERC)* - 598 tons	PM (filterable) - 78.41 tons	HAP - 23.44 tons	PM10 - 184.02 tons	Ammonia - 137.23 tons	PM2.5 - 178.15 tons	CO2e** - 2,566,563 tons	SOx - 27.24 tons		The same limitation as the limitation associated with the citation is used for the site.
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PM2.5 - 178.15 tons	CO2e** - 2,566,563 tons													
SOx - 27.24 tons														
25 Pa. Code §129.14	Open burning operations: a. Air basins. No person may permit the open burning of material in an air basin. b. Outside of air basins. [Not applicable] c. Exceptions. The requirements of subsections a) and b) do not apply where the open burning operations result from: 1) A fire set to prevent or abate a fire hazard, when approved by the Department and set by or under the supervision of a public officer. 2) Any fire set for the purpose of instructing personnel in fire fighting, when approved by the Department. 3) A fire set for the prevention and control of disease or pests, when approved by the Department. 4) [Not applicable] 5) [Not applicable] 6) A fire set solely for recreational or ceremonial purposes. 7) A fire set solely for cooking food.	The same limitation as the limitation associated with the citation is used for the site.												

Section 2 - Applicable Requirements for the Entire Site

Describe and cite all applicable requirements pertaining to the entire site.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Citation No.	Citation Limitation	Limitation Used
25 Pa. Code §129.14 (cont'd)	d. Clearing and grubbing wastes. The following is applicable to clearing and grubbing wastes: 1) As used in this subsection the following terms shall have the following meanings: Air curtain destructor - A mechanical device which forcefully projects a curtain of air across a pit in which open burning is being conducted so that combustion efficiency is increased and smoke and other particulate matter are contained. Clearing and grubbing wastes - Trees, shrubs and other native vegetation which are cleared from land during or prior to the process of construction. The term does not include demolition wastes and dirt laden roots. 2) Subsection (a) notwithstanding, clearing and grubbing wastes may be burned in a basin subject to the following requirements: i. Air curtain destructors shall be used when burning clearing and grubbing wastes. ii. Each proposed use of air curtain destructors shall be reviewed and approved by the Department in writing with respect to equipment arrangement, design and existing environmental conditions prior to commencement of burning. Proposals approved under this subparagraph need not obtain plan approval or operating permits under Chapter 127 (relating to construction, modification, reactivation and operation of sources). iii. Approval for use of an air curtain destructor at one site may be granted for a specified period not to exceed 3 months, but may be extended for additional limited periods upon further approval by the Department. iv. The Department reserves the right to rescind approval granted if a determination by the Department indicates that an air pollution problem exists. 3) [Not applicable] 4) During an air pollution episode, open burning is limited by Chapter 137 (relating to air pollution episodes) and shall cease as specified in that chapter.	The same limitation as the limitation associated with the citation is used for the site.
25 Pa. Code §127.12b	Sulfur content of the gaseous fuels combusted at this facility shall not exceed 0.5 grains per 100 dscf.	The same limitation as the limitation associated with the citation is used for the site.

Section 2 - Applicable Requirements for the Entire Site

Describe and cite all applicable requirements pertaining to the entire site.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Citation No.	Citation Limitation	Limitation Used
25 Pa. Code §127.12b	The Owner/Operator shall manage and treat facility waste with a flow-weighted annual average water content of less than 10% in accordance with 40 CFR § 61.342(c)(1). The Owner/Operator shall manage and treat facility waste (including remediation and process unit turnaround waste) with a flow-weighted annual average water content equal to or greater than 10%, on a volume basis as total water, and each waste stream that is mixed with water or wastes at any time resulting in a mixture that has an annual water content equal to or greater than 10% such that the benzene quantity for the wastes is less than or equal to 6 Mg/yr (6.6 ton/yr), as determined in accordance with 40 CFR 61.355(k).	The same limitation as the limitation associated with the citation is used for the site.

Section 2 - Applicable Requirements for the Entire Site

Describe and cite all applicable requirements pertaining to the entire site.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Citation No.	Citation Limitation	Limitation Used
25 Pa. Code §127.12b	Develop and implement a leak detection and repair (LDAR) program for this facility. All aspects of the LDAR program shall be consistent with 40 CFR Part 63 Subpart UU – National Emission Standards for Equipment Leaks – Control Level 2 Standards, except as follows: a. LDAR shall be applied to equipment in organic compound service (including fuel gas equipment). b. Organic compound service means that piece of equipment either contains or contacts a fluid (liquid or gas) that is at least 5 wt% of organic compounds as determined according to the provisions of 40 CFR §63.180(d) of Subpart H [except that “organic compound” replaces instances of “organic HAP”]. The provisions of 40 CFR §63.180(d) of Subpart H also specify how to determine that a piece of equipment is not in organic compound service. c. Leak detection shall be conducted on a monthly basis for non-bellows seal valves unless 98.0% or greater of the nonbellows seal gas/vapor and/or light liquid valves are found to leak at a rate less than 100 ppmv for two consecutive months, then the detection frequency may be changed to a quarterly basis. The annual monitoring frequency for valves (skip periods) is not applicable. d. Equipment is also defined to include screwed connections, heat exchanger heads, sight glasses, meters, gauges, sampling connections, bolted manways, and hatches. e. Leak detection thresholds for organic compounds shall be as follows: i. 100 ppmv from pump seals, compressor seals, flanges, and valves in gas/vapor and light liquid service; ii. 200 ppmv from atmospheric pressure relief devices without a rupture disk; and iii. 500 ppmv for all other equipment. f. A first attempt at repair shall be required for all leaking components within 5 days of detection and repair shall be completed within 15 days for all components unless the repair would require a unit shutdown that would create more emissions than the repair would eliminate, and if so, the repair may be delayed until the next scheduled shutdown, except the first attempt at repair for: i. Any leak > 10,000 ppmv & < 25,000 ppmv – 2 days; ii. Atmospheric pressure relief device leak without a rupture disk > 200 & < 25,000 ppmv – 2 days; iii. Any leak > 25,000 ppmv – 1 day; iv. Heavy liquid components > 500 ppmv – 1 day; and v. Any leak in HRVOC service > 10,000 ppmv – 1 day. g. Compressors equipped with a closed vent system that captures and transports leakages to the HP Flare System shall meet the LAER requirements for the HP Flare System.	The same limitation as the limitation associated with the citation is used for the site.

Section 2 - Applicable Requirements for the Entire Site		
Describe and cite all applicable requirements pertaining to the entire site. Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.		
Citation No.	Citation Limitation	Limitation Used
25 Pa. Code §127.12b	Equipment with inherently leakless design features will be installed as practicable.	The same limitation as the limitation associated with the citation is used for the site.
25 Pa. Code §127.12b	All sampling systems in organic compound service shall be closed-purge, closed loop, or closed-vent systems. In-situ sampling systems shall be exempt.	The same limitation as the limitation associated with the citation is used for the site.
25 Pa. Code §127.12b	A second valve, blind flange, plug, cap or other equivalent sealing system shall be installed on open ended lines subject to LDAR, except for safety pressure relief valves.	The same limitation as the limitation associated with the citation is used for the site.
25 Pa. Code §137.4	Prepare a standby plan for the reduction of emissions during alert, warning, and emergency levels. Design the standby plan to reduce or eliminate emissions in accordance with the objectives in 25 Pa. Code §§137.11-14. Identify in the standby plan the approximate amount of emissions reductions and a description of the manner in which the reductions will be achieved.	The same limitation as the limitation associated with the citation is used for the site.
25 Pa. Code §137.5(a)	Implement the standby plan required by 25 Pa. Code §137.4 when DEP declares alert, warning, and emergency levels for an area that may be impacted by the facility's emissions.	The same limitation as the limitation associated with the citation is used for the site.
40 CFR Part 61 Subpart FF §61.342(e)	As an alternative to the requirements of 40 CFR 61.342(c) and (d), a facility may elect to manage and treat its waste as described in 40 CFR 61.342(e).	The same limitation as the limitation associated with the citation is used for the site.
40 CFR Part 61 Subpart FF §61.342(e)(1)	Manage and treat facility waste with a flow-weighted annual average water content of less than 10% in accordance with 40 CFR 61.342(c)(1).	The same limitation as the limitation associated with the citation is used for the site.
40 CFR Part 61 Subpart FF §61.342(e)(2)	Manage and treat facility waste (including remediation and process unit turnaround waste) with a flow-weighted annual average water content equal to or greater than 10%, on a volume basis as total water, and each waste stream that is mixed with water or wastes at any time resulting in a mixture that has an annual water content equal to or greater than 10% such that the benzene quantity for the wastes is equal to or less than 6 Mg/yr (6.6 ton/yr), as determined in accordance with 40 CFR 61.355(k).	The same limitation as the limitation associated with the citation is used for the site.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☒	Entire Site		
☐	Group of Sources	Group ID	
☐	Single Source	Unit ID	
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	PA-04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒ Testing	☒ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	NA		
Monitoring Device Location	NA		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Employees involved in the operation of any air contamination sources, air cleaning devices, stacks, fugitive emission areas, or process equipment at the Facility shall conduct observations of all air contamination sources, air cleaning devices, stacks, fugitive emission areas, and process equipment at a minimum of once per shift while the Facility is in operation. These observations are to ensure continued compliance with source-specific visible emission limitations, fugitive emissions prohibited under 25 Pa. Code §§123.1 or 123.2, and malodors prohibited under 25 Pa. Code §123.31. Observations shall be conducted for the presence of the following: a. Visible stack emissions; b. Fugitive emissions; and c. Potentially objectionable odors. If any visible stack emissions, fugitive emissions, or potentially objectionable odors are apparent; the Owner/Operator shall take corrective action. Each observation of a visible stack emission, fugitive emission, or potentially objectionable odor shall be reported to a centralized incident coordinator and recorded.			
How will data be reported?	NA		

SECTION C. TESTING

Reference Test Method Description

Performance testing shall be conducted as follows:

- a. The Owner/Operator shall submit one electronic copy of a pre-test protocol to the Department for review at least 90 days prior to the performance of any EPA Reference Method stack test. The Owner/Operator shall submit one electronic copy of a one-time protocol to the Department for review for the use of a portable analyzer and may repeat portable analyzer testing without additional protocol approvals provided that the same method and equipment are used. All proposed performance test methods shall be identified in the pre-test protocol and approved by the Department prior to testing.
- b. The Owner/Operator shall notify the Regional Air Quality Manager and Division of Source Testing and Monitoring at least 15 days prior to any performance test so that an observer may be present at the time of the test. This notification may be sent by email. Notification shall not be made without prior receipt of a protocol acceptance letter from the Department.
- c. Pursuant to 40 CFR Part 60.8(a) and 40 CFR Part 63.9(h), a complete test report shall be submitted to the Department no later than 60 calendar days after completion of the on-site testing portion of an emission test program.
- d. Pursuant to 40 CFR Part 61.13(f), a complete test report shall be submitted to the Department no later than 31 calendar days after completion of the on-site testing portion of an emission test program.
- e. Pursuant to 25 Pa. Code Section 139.53(b) a complete test report shall include a summary of the emission results on the first page of the report indicating if each pollutant measured is within permitted limits and a statement of compliance or non-compliance with all applicable permit conditions. The summary results will include, at a minimum, the following information:
 1. A statement that the owner or operator has reviewed the report from the emissions testing body and agrees with the findings.
 2. Permit number(s) and condition(s) which are the basis for the evaluation.
 3. Summary of results with respect to each applicable permit condition.
 4. Statement of compliance or non-compliance with each applicable permit condition.
- f. Pursuant to 25 Pa. Code § 139.3 all submittals shall meet all applicable requirements specified in the most current version of the Department's Source Testing Manual.
- g. All testing shall be performed in accordance with the provisions of Chapter 139 of the Rules and Regulations of the Department of Environmental Protection.
- h. Pursuant to 25 Pa. Code Section 139.53(a)(1) and 139.53(a)(3),
 1. All submittals, except test notifications & portable emission monitor tests, shall be accomplished through PSIMS*Online, available through <https://www.depgreenport.state.pa.us/ecommm/Login.jsp>, if it is available.
 2. For test notifications & portable analyzer results, or if internet submittal cannot be accomplished, one electronic copy of the test submission (notifications, protocols, reports, supplemental information, etc.) shall be sent to both PSIMS Administration in Central Office and to the Regional Office AQ Program Manager at the following addresses:

CENTRAL OFFICE:
RA-EPstacktesting@pa.gov

SOUTHWEST REGIONAL OFFICE:
RA-EPSWstacktesting@pa.gov
- i. The permittee shall ensure all federal reporting requirements contained in the applicable subpart of 40 CFR are followed, including timelines more stringent than those contained herein. In the event of an inconsistency or any conflicting requirements between state and the federal, the most stringent provision, term, condition, method or rule shall be used by default.

SECTION C. TESTING

If, at any time, the Department has cause to believe that air contaminant emissions from the sources listed in this operating permit may be in excess of the limitations specified in, or established pursuant to this operating permit, the permittee may be required to conduct test methods and procedures deemed necessary by the Department to determine the actual emissions rate. Such testing shall be conducted in accordance with 25 Pa. Code Chapter 139, where applicable, and in accordance with any restrictions or limitations established by the Department at such time as it notifies the company that testing is required.

Reference Test Method Citation	As specified
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SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Records of each reported visible stack emission, fugitive emission, or potentially objectionable odor observation shall be maintained in a log and at the minimum include the date, time, name and title of the observer, along with any corrective action taken as a result.

All logs and required records shall be maintained on site, or at an alternative location acceptable to the Department, for a minimum of five years and shall be made available to the Department upon request.

Maintain the following comprehensive and accurate records:

- a. Monthly rolling 12-month totals of the hours of operation in each defined operating mode for each ethane cracking furnace and each combustion turbine.
- b. Calendar year totals for each diesel-fired emergency generator, natural gas-fired emergency generator, and fire pump engine of (and as defined in 40 CFR Part 60 Subpart IIII and 40 CFR Part 60 Subpart JJJJ):
 - 1) Hours of emergency operation,
 - 2) Hours of maintenance and/or testing operation,
 - 3) Hours of non-emergency operation that is not maintenance and/or testing, and
 - 4) Hours of operation.
- c. Monthly rolling 12-month totals (in MMscf) of tail gas and natural gas consumed by each ethane cracking furnace, combustion turbine, and duct burner.
- d. Monthly rolling 12-month totals (in MMscf) of gas combusted by the CVTO, MPGF CVTO Trip, MPGF Ethylene Tank, MPGF PE Units 1/2 Episodic Vent, TEGFs, HP Elevated Flare, and SCTO.
- e. Monthly rolling 12-month totals (in metric tons) of produced ethylene and polyethylene.
- f. Monthly rolling 12-month totals (in gallons) of C3+, blended pitch, recovered oil, pyrolysis fuel oil, light gasoline, and PE3 heavies loaded out from the Facility.
- g. Rolling 12-month totals (in gallons) of methanol throughput.
- h. Monthly rolling 12-month totals of calculated actual VOC and VOC (ERC) emissions in accordance with Equation 1 specified in Plan Approval 04-00740D.
- i. Monthly rolling 12-month averages of calculated TDS from each cooling tower.
- j. Records including a description of testing methods, results, all operating data collected during tests, and a copy of the calculations performed to determine compliance with emission standards for the ethane cracking furnaces, combustion turbines, and thermal oxidizers.
- k. Copies of manufacturer's or EPC contractor's equipment design specifications necessary to determine compliance with required control efficiencies or outlet emission rates.
- l. Copies of maintenance procedures and schedules for all air contamination sources and air cleaning devices authorized under Plan Approval 04-00740D.
- m. Records of any maintenance conducted on the air contamination sources and air cleaning devices authorized under Plan Approval 04-00740D.
- n. Records that diesel fuel's total sulfur content does not exceed 15 ppm, and that either cetane index is a minimum of 40 or aromatic content does not exceed 35 % by volume.
- o. Records that each gaseous fuel's total sulfur content does not exceed 0.5 grains per 100 dscf. This may be demonstrated by a current, valid purchase contract, tariff sheet or transportation contract for the fuel; or fuel total sulfur content monitoring in accordance with 40 CFR §§60.4360 and 60.4370, applicable to the combustion turbines.
- p. Records of observations of visible stack emissions, fugitive emissions, and potentially objectionable odors including the date, time, name, and title of the observer, along with any corrective action taken as a result.

Maintain the following comprehensive and accurate records for Gas Insulated Switchgear (SF6):

- a. Emissions (expressed in tons) of CO₂e on a 12-month rolling sum basis.
- b. Monitoring information and report data as specified in 25 Pa. Code Chapter 139 Subchapter C and the most recent version of the Department's Continuous Source Monitoring Manual.
- c. Amount of sulfur hexafluoride (SF₆) dielectric added to each SF₆-insulated high voltage equipment on a monthly basis.
- d. Date and time that each alarm associated with SF₆-insulated high voltage equipment is activated, the corrective action taken to remedy the problem associated with each alarm, and the date the corrective action remedied the problem.
- e. Results of quarterly SF₆ LDAR inspections required under Plan Approval 04-00740B, including the date, time, name, and title of the observer, along with any corrective action taken as a result.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Provide the Department with a statement; in a form as the Department may prescribe; for classes or categories of sources; showing the actual emissions of NO_x, CO, VOC, SO_x, PM₁₀, PM_{2.5}, HAP (per the Department's Emissions Inventory Reporting Instructions), NH₃, and GHG (including but not limited to CO₂, CH₄, and N₂O) for each reporting period. A description of the method used to calculate the emissions and the time period over which the calculation is based shall be included. The statement shall also contain a certification by a company officer or the plant manager that the information contained in the statement is accurate.

Provide EPA with the notifications required by 40 CFR 40 CFR Part 60 Subpart A, 40 CFR Part 61 Subpart A, and 40 CFR Part 63 Subpart A.

Comply with all applicable requirements under 40 CFR Part 98 related to the Mandatory Greenhouse Gas Reporting Rule.

Malfunction notification, reporting, and responses shall be conducted as follows:

- a. For purpose of this condition a malfunction is defined as any sudden, infrequent, and not reasonably preventable failure of air pollution control or monitoring equipment, or the unauthorized operation of a source that may result in an increase in the emission of air contaminants above allowable levels. Examples of malfunctions may include, but are not limited to: large dust plumes, heavy smoke, a spill or release that results in a malodor that is detectable outside the property of the person on whose land the source is being operated.
- b. When the malfunction, emergency, or incident of excess emissions poses an imminent danger to the public health, safety, welfare, or environment, it shall be reported to the Department and the County Emergency Management Agency by telephone within one (1) hour after the discovery of the malfunction, emergency or incident of excess emissions. The owner or operator shall submit a written or emailed report of instances of such malfunctions, emergencies, or incidents of excess emissions to the Department within three (3) business days of the telephone report. The notification shall include the items identified in (d) to the extent known.
- c. Notify the Department by phone no later than the next business day after discovery of all other malfunctions. The notification shall include the items identified in (d) to the extent known.
- d. The notification shall describe the:
 - i. Name and location of the facility;
 - ii. Nature and cause of the malfunction or breakdown;
 - iii. Time when the malfunction or breakdown was first observed;
 - iv. Expected duration of excess emissions; and
 - v. Estimated rate of emissions.
- e. The Owner/Operator shall submit a written report to the Department no later than thirty (30) days following the end of a malfunction. The report shall include the following:
 - i. The date and time that the malfunction started and ended.

- ii. An estimate of the emissions associated with the malfunction and the calculations that were used to determine that quantity;
- iii. The steps, if any, that the facility took to limit the duration and/or quantity of emissions associated with the malfunction;
- iv. A detailed analysis that sets forth the Root Cause of the malfunction, to the extent determinable;
- v. An analysis of the measures, if any, that are available to reduce the likelihood of a recurrence of a malfunction resulting from the same Root Cause or contributing causes in the future. The analysis shall discuss the alternatives, if any, that are available, the probable effectiveness and cost of the alternatives. Possible design, operational, and maintenance changes shall be evaluated. If the facility concludes that corrective action(s) is (are) required, the report shall include a description of the action(s) and, if not already completed, a schedule for implementation, including proposed commencement and completion dates. If the facility concludes that corrective action is not required the report shall explain the basis for that conclusion;
- vi. To the extent that investigations of the causes and/or possible corrective action(s) still are underway on the due date of the report, a statement of the anticipated date by which a follow-up report will be submitted.
- f. To the extent that completion of the implementation of corrective action(s), if any, is not finalized at the time of the submission of the report under subsection (e), then, by no later than 30 days after completion of the implementation of corrective action(s), the Owner/Operator shall submit a written report identifying the corrective action(s) taken and the date(s) of completion of implementation.
- g. In response to any malfunction, the Owner/Operator, as expeditiously as practicable, shall take such interim and/or longer-term corrective actions, if any, as are consistent with good engineering practice to minimize the likelihood of a recurrence of the Root Cause and all contributing causes of that malfunction.
- h. Malfunction phone notifications and written reports shall be submitted to the Department at the following address:
PA DEP
Office of Air Quality
400 Waterfront Drive
Pittsburgh, PA 15222-4745
412-442-4000

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

All air contamination sources and air cleaning devices authorized under Plan Approval 04-00740B and Plan Approval 04-00740D shall be operated and maintained in accordance with the specifications and maintenance schedule recommended by the manufacturer, developed and approved by the engineering procurement and construction contractor, or developed by the Owner/Operator in accordance with industry standards. Developed maintenance plans shall be in place and available within 180 days of startup of each air contamination source or air cleaning device.

Employees involved in the operation of any air contamination sources, air cleaning devices, stacks, fugitive emission areas, or process equipment at the Facility shall be trained to observe air contamination sources, air cleaning devices, stacks, fugitive emission areas, and process equipment to demonstrate compliance with source-specific visible emission limitations, fugitive emissions prohibited under 25 Pa. Code §§123.1 or 123.2, and malodors prohibited under 25 Pa. Code §123.31.

- a. New employees shall be trained upon hiring.
- b. Existing employees shall be trained prior to source startup.
- c. Employees shall be given refresher training annually.
- d. A copy of the written employee training program shall be maintained at the Facility. The training program shall include provisions for the following:
 - 1) Equipment and areas to be observed;

- 2) That observation is to be made for the presence of visible stack emissions, fugitive emissions, and potentially objectionable odors;
 - 3) Information to be collected in the event of an affirmative observation; and
 - 4) Whom at the Facility to report affirmative observations to.
- e. Records of successful completion of initial and annual training shall be maintained for a minimum of five years for each employee trained.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☒	Entire Site		
☐	Group of Sources	Group ID	
☐	Single Source	Unit ID	
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	25 Pa. Code §135.3		
Compliance Method Based Upon		☒ Applicable Requirement	☐ CAM ☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☐ Monitoring	☐ Testing	☒ Reporting	
☐ Record Keeping	☐ Work Practice Standard		
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)			
Monitoring Device Location			
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter.			
How will data be reported?			
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Annual emission reporting shall be conducted as follows:

- a. In accordance with 25 Pa. Code §135.3, the permittee shall submit to the Department via AES*Online or AES*XML at www.depgreenport.state.pa.us/ by March 1 of each year, a facility inventory report for the preceding calendar year for all facility sources. The inventory report shall include all emissions information for all sources operated during the preceding calendar year. Emissions data including, but not limited, to the following shall be reported: carbon monoxide (CO); oxides of nitrogen (NO_x); particulate matter less than 10 micrometers in diameter (PM₁₀); particulate matter less than 2.5 micrometers in diameter (PM_{2.5}); sulfur dioxide (SO₂); volatile organic compounds (VOC); total hazardous air pollutants (HAP); speciated HAP including, but not limited to, benzene, ethyl benzene, formaldehyde, n-hexane, toluene, isomers and mixtures of xylenes, and 2,2,4-trimethylpentane; carbon dioxide (CO₂); methane (CH₄); and nitrous oxide (N₂O).
- b. A source Owner/Operator may request an extension of time from the Department for the filing of a source report, and the Department may grant the extension for reasonable cause.

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☒	Entire Site		
☐	Group of Sources	Group ID	
☐	Single Source	Unit ID	
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	25 Pa. Code §137.4		
Compliance Method Based Upon			
☒	Applicable Requirement	☐	CAM
☐		☐	Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☐	Monitoring	☐	Testing
☒	Record Keeping	☒	Reporting
☐		☐	Work Practice Standard
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)			
Monitoring Device Location			
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter.			
How will data be reported?			
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
During alert, warning, and emergency levels, make the standby plan available on the premises to any employee of DEP. [25 Pa. Code §137.4(f)].			

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Submit standby plan for the reduction or elimination of emissions during alert, warning, and emergency levels to DEP within 90 days of DEP's request. [25 Pa. Code §137.4(c)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☒	Entire Site		
☐	Group of Sources	Group ID	
☐	Single Source	Unit ID	
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 61 Subpart FF		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☐	Monitoring	☒ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)			
Monitoring Device Location			
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter.			
How will data be reported?			
SECTION C. TESTING			
Reference Test Method Description			
Determine compliance with 40 CFR 61 Subpart FF using the test methods and procedures specified in 40 CFR 61.355(a) through (k), as applicable. [40 CFR 61.355].			
Reference Test Method Citation	As specified		
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
Equipment/operational data recordkeeping by electronic or hard copy at the regulation's specified frequency. Maintain records as specified in 40 CFR 61.356(a) through (n), as applicable. Maintain each record in a readily accessible location at the facility site for a period not less than two years from the date the information is recorded unless otherwise specified. [40 CFR 61.356].			

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Submit report: Due by initial startup. Submit a report that summarizes the regulatory status of each waste stream subject to 40 CFR 61.342 and is determined by the procedures specified in 40 CFR 61.355(c) to contain benzene. Include the information specified in 40 CFR 61.357(a)(1) through (a)(4). [40 CFR 61.357(a)].

Submit report: Due by the date of initial startup. Submit a certification that the equipment necessary to comply with 40 CFR 61 Subpart FF has been installed and that the required initial inspections or tests have been carried out in accordance with 40 CFR 61 Subpart FF. [40 CFR 61.357(d)(1)].

Submit report: Due annually, beginning on the date that equipment necessary to comply with 40 CFR 61 Subpart FF has been certified in accordance with 40 CFR 61.357(d)(1). Submit updates to the information listed in 40 CFR 61.357(a)(1) through (a)(3) or, if the information in 40 CFR 61.357(a)(1) through (3) is not changed in the following year, a statement to that effect. [40 CFR 61.357(d)(2)].

Include in the report required by 40 CFR 61.357(d)(2) a table presenting the information specified in 40 CFR 61.357(d)(5)(i) and (d)(5)(ii) for each waste stream. [40 CFR 61.357(d)(5)].

Submit report: Due quarterly, beginning three months after the date that the equipment necessary to comply with 40 CFR 61 Subpart FF has been certified in accordance with 40 CFR 61.357(d)(1). Submit a certification that all of the required inspections have been carried out in accordance with the requirements of 40 CFR 61 Subpart FF. [40 CFR 61.357(d)(6)].

Submit report: Due quarterly, beginning three months after the date that the equipment necessary to comply with 40 CFR 61 Subpart FF has been certified in accordance with 40 CFR 61.357(d)(1). Include the information specified in 40 CFR 61.357(d)(7)(i) through (d)(7)(v). [40 CFR 61.357(d)(7)].

Submit report: Due annually, beginning one year after the date that the equipment necessary to comply with 40 CFR 61 Subpart FF has been certified in accordance with 40 CFR 61.357(d)(1). Submit a report that summarizes all inspections required by 40 CFR 61.342 through 61.354 during which detectable emissions are measured or a problem that could result in benzene emissions is identified, including information about the repairs or corrective action taken. [40 CFR 61.357(d)(8)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Section 3 - Site Inventory

3.1 Provide a complete list of all air pollution sources, control equipment, emission points, and fuel material locations within this site.

If preprinted information is provided, correct and/or add any new sources as necessary. Note: One (1) of the following sections (5, 6 or 7) of the application must be completed for each new source listed here.

Unit ID	Unit Name	Unit Type
031	Ethane Cracking Furnace #1	Combustion
032	Ethane Cracking Furnace #2	Combustion
033	Ethane Cracking Furnace #3	Combustion
034	Ethane Cracking Furnace #4	Combustion
035	Ethane Cracking Furnace #5	Combustion
036	Ethane Cracking Furnace #6	Combustion
037	Ethane Cracking Furnace #7	Combustion
101	Combustion Turbine/Duct Burner Unit #1	Combustion
102	Combustion Turbine/Duct Burner Unit #2	Combustion
103	Combustion Turbine/Duct Burner Unit #3	Combustion
104	Cogeneration Plant Cooling Tower	Process
105	Diesel-Fired Emergency Generator Engines (2)	Combustion
106	Fire Pump Engines (2)	Combustion
107	Natural Gas-Fired Emergency Generator Engines (2)	Combustion
201	Ethylene Manufacturing Line	Process
202	Polyethylene Manufacturing Lines	Process
203	Process Cooling Tower	Process
204	Continuous Vent Thermal Oxidizer (CVTO) Header System	Process
205	High Pressure (HP) Header System	Process
206	Spent Caustic Vent Header System	Process
207	Multipoint Ground Flare (MPGF) CVTO Trip Header	Process
208	MPGF Ethylene Tank Header	Process
209	MPGF PE Units 1/2 Episodic Vent Header	Process
301	Polyethylene Pellet Material Storage/Handling/Loadout	Process
302	Liquid Loadout (Recovered Oil)	Process
303	Liquid Loadout (Pyrolysis Fuel Oil, Light Gasoline, PE3 Heavies)	Process
304	Liquid Loadout (C3+, Butene, Isopentane, Isobutane, C3 Ref)	Process
305	Liquid Loadout (Blended Pitch)	Process
401	Storage Tanks (Recovered Oil, Equalization Wastewater)	Process

Section 3 - Site Inventory		
3.1 Provide a complete list of all air pollution sources, control equipment, emission points, and fuel material locations within this site. If preprinted information is provided, correct and/or add any new sources as necessary. Note: One (1) of the following sections (5, 6 or 7) of the application must be completed for each new source listed here.		
Unit ID	Unit Name	Unit Type
402	Storage Tank (Spent Caustic)	Process
403	Storage Tank (Light Gasoline)	Process
404	Storage Tanks (Hexene)	Process
405	Storage Tanks (Misc. Pressurized)	Process
406	Storage Tanks (Diesel Fuel >150 Gallons)	Process
407	Storage Tanks (Pyrolysis Fuel Oil)	Process
408	Storage Tanks (Diesel Fuel <150 Gallons)	Process
409	Methanol Storage Vessels and Associated Components	Process
410	Refrigerated Ethylene Storage Tank	Process
501	Equipment Components	Process
502	Wastewater Treatment Plant (Secondary and Tertiary Treatment)	Process
503	Plant Roadways	Process
504	Gas Insulated Switchgear (SF6)	Process
505	WWTP (Settlement and Float/Sludge Drums, DNF Units, and Steam Stripper)	Process
C031	SCR (Ethane Cracking Furnace #1)	Control Device
C032	SCR (Ethane Cracking Furnace #2)	Control Device
C033	SCR (Ethane Cracking Furnace #3)	Control Device
C034	SCR (Ethane Cracking Furnace #4)	Control Device
C035	SCR (Ethane Cracking Furnace #5)	Control Device
C036	SCR (Ethane Cracking Furnace #6)	Control Device
C037	SCR (Ethane Cracking Furnace #7)	Control Device
C101	SCR (Unit #1)	Control Device
C101A	Oxidation Catalyst (Unit #1)	Control Device
C102	SCR (Unit #2)	Control Device
C102A	Oxidation Catalyst (Unit #2)	Control Device
C103	SCR (Unit #3)	Control Device
C103A	Oxidation Catalyst (Unit #3)	Control Device
C104	Drift Eliminators (Cogen Cooling Tower)	Control Device
C202	Particulate Filters (PE MFG)	Control Device
C203	Drift Eliminators (Process Cooling Tower)	Control Device
C204	CVTO	Control Device

Section 3 - Site Inventory

3.1 Provide a complete list of all air pollution sources, control equipment, emission points, and fuel material locations within this site.

If preprinted information is provided, correct and/or add any new sources as necessary. Note: One (1) of the following sections (5, 6 or 7) of the application must be completed for each new source listed here.

Unit ID	Unit Name	Unit Type
C205	HP Flare System	Control Device
C205A	Totally Enclosed Ground Flare (TEGF) A	Control Device
C205B	TEGF B	Control Device
C205C	HP Elevated Flare	Control Device
C206	Spent Caustic Thermal Oxidizer (SCTO)	Control Device
C207	MPGF CVTO Trip	Control Device
C208	MPGF Ethylene Tank	Control Device
C209	MPGF PE1/2 Episodic Vent	Control Device
C301	Fabric Filters (PE Pellet Storage/Handling/Loadout)	Control Device
C302	Carbon Canisters (Recovered Oil Loading)	Control Device
S031	Stack (Ethane Cracking Furnace #1)	Stack
S032	Stack (Ethane Cracking Furnace #2)	Stack
S033	Stack (Ethane Cracking Furnace #3)	Stack
S034	Stack (Ethane Cracking Furnace #4)	Stack
S035	Stack (Ethane Cracking Furnace #5)	Stack
S036	Stack (Ethane Cracking Furnace #6)	Stack
S037	Stack (Ethane Cracking Furnace #7)	Stack
S101	Stack (Unit #1)	Stack
S102	Stack (Unit #2)	Stack
S103	Stack (Unit #3)	Stack
S105	Stacks (Diesel-Fired Emergency Generator Engines)	Stack
S106	Stacks (Fire Pump Engines)	Stack
S107	Stacks (Nat Gas-Fired Emergency Generator Engines)	Stack
S202	Stacks (PE MFG Particulate Filters)	Stack
S204	Stack (CVTO)	Stack
S205A	Stack (TEGF A)	Stack
S205B	Stack (TEGF B)	Stack
S205C	Stack (HP Elevated Flare)	Stack
S206	Stack (SCTO)	Stack
S207	Stack (MPGF CVTO Trip)	Stack
S208	Stack (MPGF Ethylene Tank)	Stack
S209	Stack (MPGF PE1/2 Episodic Vent)	Stack

Section 3 - Site Inventory

3.1 Provide a complete list of all air pollution sources, control equipment, emission points, and fuel material locations within this site.

If preprinted information is provided, correct and/or add any new sources as necessary. Note: One (1) of the following sections (5, 6 or 7) of the application must be completed for each new source listed here.

Unit ID	Unit Name	Unit Type
S301	Stacks (PE Pellet Fabric Filters)	Stack
S302	Stacks (Carbon Canisters)	Stack
Z104	Fugitive Emissions (Cogen Cooling Tower)	Stack
Z203	Fugitive Emissions (Process Cooling Tower)	Stack
Z302	Fugitive Emissions (Liquid Loadout)	Stack
Z406	Fugitive Emissions (Diesel Fuel Tanks >150 Gallons)	Stack
Z408	Fugitive Emissions (Diesel Fuel Tanks <150 Gallons)	Stack
Z501	Fugitive Emissions (Component Leaks)	Stack
Z502	Fugitive Emissions (WWTP)	Stack
Z503	Fugitive Emissions (Plant Roadways)	Stack
Z504	Fugitive Emissions (Gas Insulated Switchgear)	Stack

3.2 Provide a narrative description of the facility's operation. The project narrative should include a description of the basic operational activities this facility is engaged in. The narrative should describe how these activities generate air emissions and how they are controlled. Attach the narrative if more space is needed.

See Section 2.0 – Process and Emission Source Descriptions in this submittal for a description of SPM's operations and emission sources.

3.3 Attach flow diagram of processes giving all (gaseous, liquid and solid) flow rates. Also, list all raw materials charged to process equipment, and the amounts charged (tons/hour, etc.) at rated capacity (give maximum, minimum and average charges describing fully expected variations in production rates). Indicate (on diagram) all points where contaminants are controlled (location of water sprays, collection hoods, or other pickup points, etc.) Describe collection hood's location, design, airflow, and capture efficiency. Describe any restriction requested and how it will be monitored. Indicate all fugitive emission points and any by-pass stack.

See Appendix C – Process Flow Diagrams in this submittal for a quick reference to flow diagrams for SPM's processes. The remaining information (raw materials, rates, etc.) is unchanged from that provided in the most recent plan approval applications. No restrictions on SPM's production capacity are requested as part of this submittal.

Section 3 - Site Inventory

3.4 Provide a listing of all changes in chronological order (additions and subtractions) made at a facility since the last submittal and attach it to this application. For example:

- March 2016 - Added shot blast booth 5, exempted by the attached Request for Determination.
- Dec 2017 - Installed new paint line in accordance with Plan Approval XX-XXXXX
- Etc.

NA

3.5 For renewals, please review the current operating permit. If you are proposing any changes to the conditions of the permit, please provide the condition number, the requested change, and justification for the requested change.

NA

Section 4 - Source Group (optional)	
4.1 Source Group Definition Define groups of sources that are subject to one or more applicable requirements that apply to all sources in the group.	
Group No.	Source ID (for sources in this group)
G01	031-037: Ethane Cracking Furnaces
G02	101-103: Cogeneration Units
G03	105-106: Diesel-Fired Emergency Generator/Fire Pump Engines
G04	201-202 and 501: NESHAP Part 63 Subpart UU
G05	031-037, 201, 203-207, 302-303, 401-403, 407, 501-502, and 505: NESHAP Part 63 Subpart YY
G06	201, 203, 206, 302, 401-402, 501-502, and 505: NESHAP Part 63 Subpart XX
G07	201 and 501: NSPS Part 60 Subpart VVa
G08	201-202 and 204: NESHAP Part 63 Subpart SS
G09	202, 204-205, 207, 209, and 501: NESHAP Part 63 Subpart FFFF (partial)
G10	302-305: Liquid Loadout
G11	403-405 and 409-410: Storage Tanks
G12	202 and 501: NSPS Part 60 Subpart VV and NESHAP Part 63 Subpart FFFF (partial)
G13	101-103: NSPS Subpart TTTT
G14	101-103: NESHAP Part 63 Subpart YYYY

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G01	Plan Approval 04-00740D [25 Pa. Code §127.12b]	GHG emissions from the ethane cracking furnaces shall not exceed 1,101,555 tons of CO ₂ e from all furnaces combined in any consecutive 12-month period. Compliance with this limit may be determined through CO ₂ e calculations in accordance with 40 CFR §98.34(b)(3) or utilizing an in-line gas chromatograph.	The same limitation as the limitation associated with the citation is used for the source.
G01	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Visible emissions from each of the ethane cracking furnace stacks shall not exceed the following: • 10% opacity for a period or periods aggregating more than 3 minutes in any one hour. • 30% opacity at any time.	The same limitation as the limitation associated with the citation is used for the source.
G01	Plan Approval 04-00740D [25 Pa. Code §127.12b]	VOC emissions from each of the ethane cracking furnaces shall not exceed 1.18 lb/hr.	The same limitation as the limitation associated with the citation is used for the source.
G01	Plan Approval 04-00740D [25 Pa. Code §127.12b]	CO emissions from the ethane cracking furnaces shall not exceed the following: • 0.035 lb/MMBtu from each furnace on a monthly 12-month rolling average; excluding periods of startup, shutdown, and decoking. • 52.2 lb/hr from each furnace during periods of startup, shutdown, and decoking. • 409.85 tons from all furnaces combined in any consecutive 12-month period.	The same limitation as the limitation associated with the citation is used for the source.
G01	Plan Approval 04-00740D [25 Pa. Code §127.12b]	PM ₁₀ and PM _{2.5} emissions, respectively, from the ethane cracking furnaces shall not exceed the following: • 3.10 lb/hr from each furnace, excluding periods of decoking. • 1.86 lb/hr from each furnace during periods of decoking. • 86.8 tons from all furnaces combined in any consecutive 12-month period.	The same limitation as the limitation associated with the citation is used for the source.
G01	Plan Approval 04-00740D [25 Pa. Code §127.12b]	NH ₃ emissions from each of the ethane cracking furnaces shall not exceed 10 ppmvd at 3% O ₂ on a daily average.	The same limitation as the limitation associated with the citation is used for the source.

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G01	Plan Approval 04-00740D [25 Pa. Code §127.12b]	NOx emissions from the ethane cracking furnaces shall not exceed the following: • 0.010 lb/MMBtu from each furnace on a monthly 12-month rolling average, during normal operating mode. • 0.015 lb/MMBtu from each furnace on a 1-hour average, during normal operating mode. • 6.20 lb/hr from each furnace during periods of decoking, hot steam standby, feed in, or feed out. • 31.1 lb/hr from each furnace during periods of startup or shutdown. • 181.3 tons from all furnaces combined in any consecutive 12-month period.	The same limitation as the limitation associated with the citation is used for the source.
G01	Plan Approval 04-00740D [25 Pa. Code §127.12b]	The Owner/Operator may only operate an ethane cracking furnace in a defined operating mode. Operating modes of the ethane cracking furnaces are defined as follows: • Startup – Beginning when fuel is introduced to the furnace and ending when the SCR catalyst bed reaches its stable operating temperature. Stable operating temperature is achieved when the furnace coil outlet temperature (COT) reaches 750°C. • Hot Steam Standby – When the furnace COT is greater than or equal to 750°C, no hydrocarbon feed is being charged to the furnace, and the furnace is not operating in decoking, startup, or shutdown mode. • Feed In – Beginning when hydrocarbon feed is introduced to the furnace and ending when the hydrocarbon feed reaches 29 metric tons per hour. • Normal – When the furnace is at or above a hydrocarbon feed rate of 29 metric tons per hour. • Feed Out – Beginning when the furnace drops below a hydrocarbon feed rate of 29 metric tons per hour and ending when hydrocarbon feed is isolated from the furnace. • Shutdown – Beginning when the SCR catalyst bed drops below its stable operating temperature and ending upon removing all fuel from the furnace. Stable operating temperature is lost when the furnace COT drops below 750°C. • Decoking – Beginning when air is introduced to the furnace for the purpose of decoking and ending when decoking air is removed.	The same limitation as the limitation associated with the citation is used for the source.
G01	Plan Approval 04-00740D [25 Pa. Code §127.12b]	No more than two ethane cracking furnaces may be operating in decoking mode at any time, and no more than two furnaces may be operating with NOx emissions greater than 6.20 lb/hr at any time, except in cases where a furnace must be taken offline for unscheduled maintenance.	The same limitation as the limitation associated with the citation is used for the source.

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G01	Plan Approval 04-00740D [25 Pa. Code §127.12b]	A startup for each furnace shall not exceed 24 hours and shall not exceed 25% of the maximum allowable firing rate, except during startups requiring refractory dry out which is limited to 72 hours at 25% or less of the maximum allowable firing rate. The 25% maximum allowable firing rate limitation does not apply at times during a startup when a furnace's NOx emissions are 6.2 lb/hr or less.	The same limitation as the limitation associated with the citation is used for the source.
G01	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Exhaust gas temperature from each of the ethane cracking furnace stacks shall not exceed 350°F on a monthly 12-month rolling average; excluding periods of startup, shutdown, hot steam standby, or decoking.	The same limitation as the limitation associated with the citation is used for the source.
G01	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Exhaust gas generated from each of the ethane cracking furnaces while operating in decoking mode shall be directed through a separator and back into the furnace firebox to ensure complete combustion.	The same limitation as the limitation associated with the citation is used for the source.
G01	40 CFR Part 60 Subpart NNN §60.662(a)	Introduce the vent stream into the flame zone of the process heater that is used to comply with the requirement to reduce emissions of TOC (less methane and ethane) by 98 wt%, or to a TOC (less methane and ethane) concentration of 20 ppmvd corrected to 3% oxygen, whichever is less stringent.	The same limitation as the limitation associated with the citation is used for the source.
G01	40 CFR Part 60 Subpart RRR §60.700(c)(5)	A reactor process vent stream is exempt from all provisions of 40 CFR 60 Subpart RRR except for the reporting requirements at 40 CFR 60.705(r) when the vent stream is routed to a distillation unit that is subject to 40 CFR 60 Subpart NNN. Accordingly, SPM's ethylene manufacturing unit reactor process vent streams are exempt from all provisions of 40 CFR 60 Subpart RRR except for the reporting requirements at 40 CFR 60.705(r) because the vent streams are routed to distillation units in the ethylene manufacturing unit that are subject to 40 CFR 60 Subpart NNN.	The same limitation as the limitation associated with the citation is used for the source.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	G01 (Ethane Cracking Furnaces)
☒	Group of Sources	Unit ID	
☐	Single Source	Scenario Name	
☐	Alternative Operating Scenario		
Citation No.	25 Pa. Code §123.51		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☐	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	CEMS		
Monitoring Device Location	Stack		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Install and operate NOx continuous monitoring systems to monitor NOx emissions from each ethane cracking furnace in accordance with 25 Pa. Code §123.51.			
How will data be reported?	Annual emissions inventory; as requested by DEP		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
SECTION E. REPORTING			
Describe what is to be reported and the frequency of reporting.			
Reporting Start Date			
SECTION F. WORK PRACTICE STANDARD			
Describe any work practice standard(s).			



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	G01 (Ethane Cracking Furnaces)
☒	Group of Sources	Unit ID	
☐	Single Source	Scenario Name	
☐	Alternative Operating Scenario		
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒ Testing	☐ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	CEMS/CMS		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Continuously monitor for ammonia slip from each ethane cracking furnace via in-situ tunable diode laser (TDL) (or equivalent monitor) as approved by the Department.			
Continuously monitor and record the catalyst bed inlet temperature for each SCR system.			
Install and operate CO continuous monitoring systems to monitor CO emissions from each ethane cracking furnace. The following sub-requirements shall be met and in compliance with 25 Pa. Code Chapter 139, Subchapter C:			
a. Other monitoring systems shall be installed and operated to convert data to required reporting units.			
b. Results shall be submitted on a regular schedule and in a format acceptable to the Department.			
c. Installed monitors shall meet the minimum data availability requirements.			
How will data be reported?	Annual emissions inventory; as requested by DEP		

SECTION C. TESTING

Reference Test Method Description

Perform VOC, PM10, PM2.5, NH3, and n-Hexane emission testing upon each of the seven ethane cracking furnaces while operating in normal operating mode and according to the requirements of 25 Pa. Code Chapter 139. Initial performance testing is required within 180 days of startup of the furnaces or on an alternative schedule as approved by the Department. Subsequent performance testing is required at minimum of once every 5 years thereafter. Extension to the initial and subsequent performance testing deadlines may be granted by the Department in writing in response to a written request from the Owner/Operator and upon a satisfactory showing that an extension is justified. EPA Reference Method performance testing shall be conducted for the initial and subsequent performance tests.

Perform PM10 and PM2.5 emission testing upon each of the seven ethane cracking furnaces while operating in decoking mode and according to the requirements of 25 Pa. Code Chapter 139. Initial performance testing is required during the first decoking cycle after startup of the furnaces or on an alternative schedule as approved by the Department. Testing shall be performed as early as practicable after commencement of the decoking cycle. Subsequent performance testing is required at minimum of once every 5 years thereafter. Extension to the initial and subsequent performance testing deadlines may be granted by the Department in writing in response to a written request from the Owner/Operator and upon a satisfactory showing that an extension is justified. EPA Reference Method performance testing shall be conducted for the initial and subsequent performance tests.

Reference Test Method Citation As specified

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Continuously monitor and record the catalyst bed inlet temperature for each SCR system.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Perform a tune-up of each ethane cracking furnace at a minimum of once every 5 years as follows:

- a) Inspect the burner, as applicable, and clean or replace any components of the burner as necessary (the burner inspection may be delayed until the next scheduled unit shutdown). At units where entry into a piece of process equipment or into a storage vessel is required to complete the tune-up inspections, inspections are required only during planned entries into the storage vessel or process equipment;
- b) Inspect the flame pattern, as applicable, and adjust the burner as necessary to optimize the flame pattern. The adjustment should be consistent with the manufacturer's specifications, if available;
- c) Inspect the system controlling the air-to-fuel ratio, as applicable, and ensure that it is correctly calibrated and functioning properly;
- d) Optimize total emissions of CO. This optimization should be consistent with the manufacturer's specifications, if available, and with any NOx requirement to which the unit is subject;
- e) Record the concentrations in the effluent stream of CO in parts per million, by volume, and oxygen in volume percent, before and after the adjustments are made. Concentrations may be taken from CEM data; and
- f) Maintain on-site and submit, if requested by the Department, a report containing the following information:
 - 1) The concentrations of CO in the effluent stream in parts per million by volume, and oxygen in volume percent, measured at high fire or typical operating load, before and after the tune-up of the boiler or process heater; and
 - 2) A description of any corrective actions taken as a part of the tune-up.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	G01 (Ethane Cracking Furnaces)
☒	Group of Sources	Unit ID	
☐	Single Source	Scenario Name	
☐	Alternative Operating Scenario		
Citation No.	40 CFR Part 60 Subpart NNN		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	CMS		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Flow monitored by flow indicator hourly. Monitor the vent stream flow to the process heater. Install the flow indicator in the vent stream from each distillation unit within an affected facility at a point closest to the inlet of each process heater and before being joined with any other vent stream. [40 CFR 60.663(c)(1)].			
Operating time monitored by hour/time monitor continuously. Monitor the periods of operation of the process heater. [40 CFR 60.663(d)].			
How will data be reported? See Section E. Reporting below.			
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording. Flow recordkeeping by electronic or hard copy hourly. Record the vent stream flow to the process heater at least once every hour for each affected facility. Make records readily available for inspection. [40 CFR 60.665(c) and 60.665(d)].			
Maintain up-to-date, readily accessible records of all periods when the vent stream is diverted from the control device or has no flow rate. [40 CFR 60.665(d)].			
Operating time recordkeeping by electronic or hard copy. Record the periods of operation of the process heater. Make records readily available for inspection. [40 CFR 60.665(e)].			

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Notify the Department with the specific provisions of 40 CFR 60.662 (40 CFR 60.662(a), (b), or (c)) with which the facility operator has elected to comply. Submit the notification with the notification of initial start-up required in 40 CFR 60.7(a)(3). [40 CFR 60.665(a)].

Notify the Department 90 days before implementing any change in the provision of 40 CFR 60.662 with which the operator elects to comply. [40 CFR 60.665(a)].

For a process heater with a design heat input capacity of 150 MMBtu/hour or greater that is used to comply with 40 CFR 60.662(a), submit a report to the Department containing a description of the location at which the vent stream is introduced into the process heater. [40 CFR 60.665(b) and 60.665(b)(2)(i)].

Submit report: Due semiannually. Submit initial report within 6 months after the initial start-up date. Include the information outlined in 40 CFR 60.665(l)(1) through (l)(7). [40 CFR 60.665(l)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	G01 (Ethane Cracking Furnaces)
☒	Group of Sources	Unit ID	
☐	Single Source	Scenario Name	
☐	Alternative Operating Scenario		
Citation No.	40 CFR Part 60 Subpart RRR		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☐	Monitoring	☐ Testing	☒ Reporting
☐	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)			
Monitoring Device Location			
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter.			
How will data be reported?			
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
SECTION E. REPORTING			
Describe what is to be reported and the frequency of reporting.			
Submit to the Administrator a process design description as part of the notification of initial startup required by 40 CFR 60.7(a)(3) documenting reactor process vent streams are routed to one or more distillation units subject to 40 CFR 60 Subpart NNN. This process design description must be retained for the life of the process. No other records or reports are required unless process changes are made. [40 CFR 60.705(r)].			
Reporting Start Date	As specified		

SECTION F. WORK PRACTICE STANDARD
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Describe any work practice standard(s).

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G02	Plan Approval 04-00740D [25 Pa. Code §127.12b]	HCHO emissions from each of the combustion turbines with duct burners shall not exceed 91 ppbvd @ 15% O ₂ .	The same limitation as the limitation associated with the citation is used for the source.
G02	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Visible emissions from each of the combustion turbines and duct burners stack shall not exceed 10% opacity at any time.	The same limitation as the limitation associated with the citation is used for the source.
G02	Plan Approval 04-00740D [25 Pa. Code §127.12b]	NO_x emissions from the combustion turbines with duct burners shall not exceed the following: • 2 ppmvd @ 15% O₂ from each turbine/duct burner on a 1-hour average, excluding periods of defined startup or shutdown. • 113 lb/hr from each turbine/duct burner during periods of startup or shutdown. • 70.4 tons from all turbines and duct burners combined in any consecutive 12-month period. For purposes of determining compliance with these NO_x limits, startup is defined as beginning when fuel is introduced into the turbine and ending when the SCR catalyst bed reaches its design operating temperature of 316° C. For purposes of determining compliance with these NO_x limits, shutdown is defined as beginning when the combustion turbine is transitioned out of low NO_x firing mode and ending upon removing all fuel from the turbine. Each shutdown event shall not exceed 30 minutes in duration. For purposes of determining compliance with these NO_x limits, low NO_x firing mode is defined as a lean premixed mode where air and fuel are mixed before entering the turbine combustor (versus the diffusion mode where fuel and air are injected into the combustor separately).	The same limitation as the limitation associated with the citation is used for the source.
G02	Plan Approval 04-00740D [25 Pa. Code §127.12b]	VOC emissions from each of the combustion turbines with duct burners shall not exceed 1 ppmvd @ 15% O ₂ on a 1-hour average.	The same limitation as the limitation associated with the citation is used for the source.

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G02	Plan Approval 04-00740D [25 Pa. Code §127.12b]	CO emissions from the combustion turbines with duct burners shall not exceed the following: • 2 ppmvd @ 15% O₂ from each turbine/duct burner on a 1-hour average, excluding periods of defined startup or shutdown. • 276 lb/hr from each turbine/duct burner during periods of startup or shutdown. • 45.0 tons from all turbines and duct burners combined in any consecutive 12-month period. For purposes of determining compliance with these CO limits, startup is defined as beginning upon commencement of ignition and ending when the combustion turbine reaches 55% of its baseload operating level. For purposes of determining compliance with these CO limits, shutdown is defined as beginning when the combustion turbine is transitioned out of low NO_x firing mode and ending upon removing all fuel from the turbine. Each shutdown event shall not exceed 30 minutes in duration. For purposes of determining compliance with these CO limits, low NO_x firing mode is defined as a lean premixed mode where air and fuel are mixed before entering the turbine combustor (versus the diffusion mode where fuel and air are injected into the combustor separately).	The same limitation as the limitation associated with the citation is used for the source.
G02	Plan Approval 04-00740D [25 Pa. Code §127.12b]	PM10 and PM2.5 emissions from each of the combustion turbines with duct burners shall not exceed 0.0066 lb/MMBtu.	The same limitation as the limitation associated with the citation is used for the source.
G02	Plan Approval 04-00740D [25 Pa. Code §127.12b]	GHG emissions from the combustion turbines with duct burners shall not exceed the following: • 1,030 lbs CO₂e/MWh from all turbines and duct burners combined on a daily 30-day rolling average. • 1,100,762 tons of CO₂e from all turbines and duct burners combined in any consecutive 12-month period. Compliance with these limits may be determined through CO₂ calculations in accordance with 40 CFR Part 75 Appendix G and multiplied by a factor of 1.0010.	The same limitation as the limitation associated with the citation is used for the source.
G02	Plan Approval 04-00740D [25 Pa. Code §127.12b]	NH ₃ emissions from each of the combustion turbines with duct burners shall not exceed 5 ppmvd at 15% O ₂ on a daily average.	The same limitation as the limitation associated with the citation is used for the source.
G02	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Comply with the applicable requirements of 40 CFR Part 97 Subpart AAAAA – TR NO _x Annual Trading Program for each of the three combustion turbines with heat recovery steam generators and duct burners.	The same limitation as the limitation associated with the citation is used for the source.

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G02	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Comply with the applicable requirements of 40 CFR Part 97 Subpart BBBB – TR NO _x Ozone Season Trading Program for each of the three combustion turbines with heat recovery steam generators and duct burners.	The same limitation as the limitation associated with the citation is used for the source.
G02	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Comply with the applicable requirements of 40 CFR Part 97 Subpart CCCC – TR SO ₂ Group 1 Trading Program for each of the three combustion turbines with heat recovery steam generators and duct burners.	The same limitation as the limitation associated with the citation is used for the source.
G02	40 CFR Part 60 Subpart KKKK §60.4320(a) and Table 1	NO _x ≤ 25 ppm at 15% O ₂ each OR ≤ 150 ng/J (1.2 lb/MWh) of useful output each. [Compliance with the LAER NO _x limit in Plan Approval 04-00740D will show compliance with this requirement.]	The same limitation as the limitation associated with the citation is used for the source.
G02	40 CFR Part 60 Subpart KKKK §60.4330(a)(2)	Fuel sulfur content results in SO ₂ ≤ 26 ng/J (0.060 lb/MMBtu) heat input each. [Compliance with the natural gas fuel sulfur limit in Plan Approval 04-00740D will show compliance with this requirement.]	The same limitation as the limitation associated with the citation is used for the source.
G02	40 CFR Part 72 Subpart A §72.6	The three combustion turbines with heat recovery steam generators and duct burners are classified as utility units and subject to the requirements of the Acid Rain Program as specified in 40 CFR 72.6(a).	The same limitation as the limitation associated with the citation is used for the source.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	G02 (Cogeneration Units)
☒	Group of Sources	Unit ID	
☐	Single Source	Scenario Name	
☐	Alternative Operating Scenario		
Citation No.	25 Pa. Code §123.51		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☐	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	CEMS		
Monitoring Device Location	Stack		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Install and operate NOx continuous monitoring systems to monitor NOx emissions from each combustion turbine in accordance with 25 Pa. Code §123.51.			
How will data be reported?	Annual emissions inventory; as requested by DEP		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
SECTION E. REPORTING			
Describe what is to be reported and the frequency of reporting.			
Reporting Start Date			
SECTION F. WORK PRACTICE STANDARD			
Describe any work practice standard(s).			



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DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	G02 (Cogeneration Units)
☒	Group of Sources	Unit ID	
☐	Single Source	Scenario Name	
☐	Alternative Operating Scenario		
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒	Testing
☒	Record Keeping	☐	Reporting
☒		☒	Work Practice Standard
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	CEMS/CMS		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Continuously monitor for ammonia slip from each combustion turbine with duct burner via in-situ tunable diode laser (TDL) (or equivalent monitor) as approved by the Department.			
Install and operate CO continuous monitoring systems to monitor CO emissions from each combustion turbine. The following sub-requirements shall be met and in compliance with 25 Pa. Code Chapter 139, Subchapter C:			
a. Other monitoring systems shall be installed and operated to convert data to required reporting units.			
b. Results shall be submitted on a regular schedule and in a format acceptable to the Department.			
c. Installed monitors shall meet the minimum data availability requirements.			
Continuously monitor and record the catalyst bed inlet temperature for each SCR system.			
How will data be reported?	Annual emissions inventory; as requested by DEP		

SECTION C. TESTING

Reference Test Method Description

Perform VOC, PM10, PM2.5, HCHO, NH3, Benzene, and Toluene emission testing upon each of the three combustion turbines with duct burners according to the requirements of 25 Pa. Code Chapter 139. Initial performance testing is required within 180 days of startup of the turbines or on an alternative schedule as approved by the Department. Subsequent performance testing is required at minimum of once every 5 years thereafter. Extension to the initial and subsequent performance testing deadlines may be granted by the Department in writing in response to a written request from the Owner/Operator and upon a satisfactory showing that an extension is justified. EPA Reference Method performance testing shall be conducted for the initial and subsequent performance tests.

Reference Test Method Citation As specified

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Maintain records of the hourly 4-hour rolling average of each combustion turbine's oxidation catalyst inlet temperature.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Continuously monitor and maintain the 4-hour rolling average of each combustion turbine's oxidation catalyst inlet temperature within its designed operating temperature range.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	G02 (Cogeneration Units)
☒	Group of Sources	Unit ID	
☐	Single Source	Scenario Name	
☐	Alternative Operating Scenario		
Citation No.	40 CFR Part 60 Subpart KKKK		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒ Testing	☒ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	CEMS		
Monitoring Device Location	Stack		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Nitrogen oxides monitored by CEM continuously as described in 40 CFR 60.4335(b) and 40 CFR 60.4345. [40 CFR 60.4340(b)(1)].			
Install, certify, maintain, and operate a CEMS consisting of a NO _x monitor and a diluent gas (oxygen (O ₂) or carbon dioxide (CO ₂)) monitor, to determine the hourly NO _x emission rate in parts per million (ppm) or pounds per million British thermal units (lb/MMBtu). [40 CFR 60.4335(b)].			
Each NO _x and diluent CEMS must be installed and certified according to Performance Specification 2 (PS 2) in 40 CFR 60 Appendix B, except the 7-day calibration drift is based on unit operating days, not calendar days. With state approval, Procedure 1 in 40 CFR 60 Appendix F is not required. Alternatively, a NO _x and diluent CEMS that is installed and certified according to 40 CFR 75 Appendix A is acceptable for use under 40 CFR 60 Subpart KKKK. The relative accuracy test audit (RATA) of the CEMS shall be performed on a lb/MMBtu basis. [40 CFR 60.4345(a)].			
As specified in 40 CFR 60.13(e)(2), during each full unit operating hour, both the NO _x monitor and the diluent monitor must complete a minimum of one cycle of operation (sampling, analyzing, and data recording) for each 15-minute quadrant of the hour, to validate the hour. For partial unit operating hours, at least one valid data point must be obtained with each monitor for each quadrant of the hour in which the unit operates. For unit operating hours in which required quality assurance and maintenance activities are performed on the CEMS, a minimum of two valid data points (one in each of two quadrants) are required for each monitor to validate the NO _x emission rate for the hour. [40 CFR 60.4345(b)].			
Develop and keep on-site a quality assurance (QA) plan for all of the continuous monitoring equipment described in 40 CFR 60.4345(a). [40 CFR 60.4345(e)].			
All CEMS data must be reduced to hourly averages as specified in 40 CFR 60.13(h). [40 CFR 63.4350(a)].			

For each unit operating hour in which a valid hourly average, as described in 40 CFR 60.4345(b), is obtained for both NO_x and diluent monitors, the data acquisition and handling system must calculate and record the hourly NO_x emission rate in units of ppm or lb/MMBtu, using the appropriate equation from method 19 in 40 CFR 60 Appendix A. For any hour in which the hourly average O₂ concentration exceeds 19.0 percent O₂ (or the hourly average CO₂ concentration is less than 1.0 percent CO₂), a diluent cap value of 19.0 percent O₂ or 1.0 percent CO₂ (as applicable) may be used in the emission calculations. [40 CFR 63.4350(b)].

Correction of measured NO_x concentrations to 15 percent O₂ is not allowed. [40 CFR 63.4350(c)].

If you have installed and certified a NO_x and diluent CEMS to meet the requirements of 40 CFR 75, states can approve that only quality assured data from the CEMS shall be used to identify excess emissions under 40 CFR 60 Subpart KKKK. Periods where the missing data substitution procedures in 40 CFR 75 Subpart D are applied are to be reported as monitor downtime in the excess emissions and monitoring performance report required under 40 CFR 60.7(c). [40 CFR 63.4350(d)].

Calculate the hourly average NO_x emission rates, in units of the emission standards under 40 CFR 60.4320, using ppm for units complying with the concentration limit. [40 CFR 63.4350(f)].

Determine compliance with the applicable NO_x emissions limits by measuring the emissions combined with the emissions from the other unit(s) utilizing the common heat recovery unit. [40 CFR 60.4333(b)(1)].

How will data be reported? See Section E. Reporting below.

SECTION C. TESTING

Reference Test Method Description

If you elect to install and certify a NO_x and diluent CEMS under 40 CFR 60.4345, then the initial performance test required under 40 CFR 60.8 may be performed in accordance with 40 CFR 60.4405(a)-(d). [40 CFR 60.4405].

Reference Test Method Citation As specified

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Maintain records of the fuel quality characteristics in a current, valid purchase contract, tariff sheet or transportation contract for the fuel, specifying that the maximum total sulfur content for natural gas is 20 grains of sulfur or less per 100 standard cubic feet or has potential sulfur emissions of less than less than 26 ng SO₂/J (0.060 lb SO₂/MMBtu) heat input. [40 CFR 60.4365(a)].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Submit excess emissions reports and monitor downtime, in accordance with 40 CFR 60.7(c). Report excess emissions for all periods of unit operation, including start-up, shutdown, and malfunction. [40 CFR 60.4375(a)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Operate and maintain the stationary combustion turbine, air pollution control equipment, and monitoring equipment in a manner consistent with good air pollution control practices for minimizing emissions at all times including during startup, shutdown, and malfunction. [40 CFR 63.4333(a)].

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G03	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Visible emissions from each diesel-fired emergency generator engine shall not exceed the following: a. Equal to or greater than 10% for a period or periods aggregating more than three (3) minutes in any one (1) hour; b. Greater than 20% during the acceleration mode; c. Greater than 15% during the lugging mode; and d. Equal to or greater than 30% at any time	The same limitation as the limitation associated with the citation is used for the source.
G03	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Visible emissions from each diesel-fired fire pump engine shall not exceed the following: a. Equal to or greater than 10% for a period or periods aggregating more than three (3) minutes in any one (1) hour; and b. Equal to or greater than 30% at any time.	The same limitation as the limitation associated with the citation is used for the source.
G03	Plan Approval 04-00740D [25 Pa. Code §127.12b]	The 103 bhp Parking Garage diesel-fired emergency generator engine shall be certified to meet the following NMHC + NOx emission standard, and CO and PM Tier 2 Emission Standards derived from Table 1 to Subpart B of Part 89: a. 2.37 g/bhp-hr of NMHC + NOx b. 0.50 g/bhp-hr of CO c. 0.06 g/bhp-hr of PM	The same limitation as the limitation associated with the citation is used for the source.
G03	40 CFR Part 60 Subpart IIII §60.4205(b), §60.4202(a)(2); Part 1039, Appendix I, Table 3, §1039.105	For Source ID 105 (GEN1): NOx+NMHC - 3.0 g/HP-hr CO - 3.7 g/HP-hr PM - 0.22 g/HP-hr	The same limitation as the limitation associated with the citation is used for the source.
G03	Plan Approval 04-00740D [25 Pa. Code §127.12b]	The 67 bhp Telecom Hut & Tower diesel-fired emergency generator engine shall be certified to meet the following emission standard for NMHC + NOx and Tier 2 Emission Standards for CO and PM: a. 2.83 g/bhp-hr of NMHC + NOx b. 0.67 g/bhp-hr of CO c. 0.22 g/bhp-hr of PM	The same limitation as the limitation associated with the citation is used for the source.
G03	40 CFR Part 60 Subpart IIII §60.4205(b), §60.4202(a)(2); Part 1039, Appendix I, Table 3, §1039.105	For Source ID 105 (GEN2): NOx+NMHC - 3.5 g/HP-hr CO - 3.7 g/HP-hr PM - 0.30 g/HP-hr	The same limitation as the limitation associated with the citation is used for the source.

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G03	40 CFR Part 60 Subpart IIII §60.4205(c) and Table 4	For Source ID 106 (FWP1 & FWP2): NMHC+NOx - 3.0 g/HP-hr CO - 2.6 g/HP-hr PM - 0.15 g/HP-hr	The same limitation as the limitation associated with the citation is used for the source.
G03	40 CFR Part 60 Subpart IIII §60.4207(b)	Use diesel fuel that meets the requirements of 40 CFR 1090.305 for nonroad diesel fuel.	The same limitation as the limitation associated with the citation is used for the source.
G03	40 CFR Part 60 Subpart IIII §60.4211(f)	Emergency stationary ICE may be operated for the purpose of maintenance checks and readiness testing, provided that the tests are recommended by Federal, State or local government, the manufacturer, the vendor, or the insurance company associated with the engine. Maintenance checks and readiness testing of such units is limited to 100 hours per year. There is no time limit on the use of emergency stationary ICE in emergency situations. The owner or operator may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner or operator maintains records indicating that Federal, State, or local standards require maintenance and testing of emergency ICE beyond 100 hours per year. Emergency stationary ICE may operate up to 50 hours per year in non-emergency situations, but those 50 hours are counted towards the 100 hours per year provided for maintenance and testing. The 50 hours per year for non-emergency situations cannot be used for peak shaving or to generate income for a facility to supply power to an electric grid or otherwise supply non-emergency power as part of a financial arrangement with another entity. For owners and operators of emergency engines, any operation other than emergency operation, maintenance and testing, and operation in non-emergency situations for 50 hours per year, as permitted in 40 CFR 60.4211, is prohibited.	The same limitation as the limitation associated with the citation is used for the source.
G03	40 CFR Part 63 Subpart ZZZZ §63.6590(c)(7)	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.	The same limitation as the limitation associated with the citation is used for the source.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	G03 (Diesel-Fired Emergency Generator/Fire Pump Engines)
☒	Group of Sources	Unit ID	
☐	Single Source	Scenario Name	
☐	Alternative Operating Scenario		
Citation No.	40 CFR Part 60 Subpart IIII		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒ Testing	☐ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	CMS		
Monitoring Device Location	Engine		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Operating time monitored by hour/time monitor continuously during operation. Install a non-resettable hour meter prior to startup of the engine. [40 CFR 60.4209(a)].			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Conduct performance tests according to 40 CFR 60.4212(a) through (e) as needed. [40 CFR 60.4212].			
Reference Test Method Citation	As specified		
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
Keep records of the operation of the engine in emergency and non-emergency service that are recorded through the non-resettable hour meter. Record the time of operation of the engine and the reason the engine was in operation during that time. [40 CFR 60.4214(b)].			
SECTION E. REPORTING			
Describe what is to be reported and the frequency of reporting.			
Reporting Start Date			

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Operate and maintain stationary CI ICE that achieve the emission standards as required in 40 CFR 60.4204 and 40 CFR 60.4205 over the entire life of the engine. [40 CFR 60.4206].

Operate and maintain the stationary CI internal combustion engine and control device according to the manufacturer's written instructions or procedures developed by the owner or operator that are approved by the engine manufacturer. In addition, only change those settings that are permitted by the manufacturer. Also, meet the requirements of 40 CFR 1068, as applicable. [40 CFR 60.4211(a)].

Ensure engine is certified to the emission standards in 40 CFR 60.4204(b), or 40 CFR 60.4205(b) or (c), as applicable, for the same model year and maximum (or in the case of fire pumps, NFPA nameplate) engine power. Install and configure according to the manufacturer's emissions-related specifications, except as permitted in 40 CFR 60.4211(g). [40 CFR 60.4211(c)].

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G04	40 CFR Part 63 Subpart YY §63.1103(e)(3), Table 7(f)	Comply with the requirements of 40 CFR 63.1103(e)(9) and 40 CFR 63 Subpart UU, except instead of complying with the pressure relief device requirements of 40 CFR 63.1030 of 40 CFR 63 Subpart UU, meet the requirements of 40 CFR 63.1107(h), and in lieu of the flare requirement of 40 CFR 63.1034(b)(2)(iii), comply with the requirements specified in 40 CFR 63.1103(e)(4).	The same limitation as the limitation associated with the citation is used for the source.
G04	40 CFR Part 63 Subpart FFFF §63.2480(a), Table 6(2)(a)(i)	Comply with the requirements in 40 CFR 63 Subpart UU and the requirements referenced therein, except as specified in 40 CFR 63.2480(b)(6) and (7), (e), and (f).	The same limitation as the limitation associated with the citation is used for the source.
G04	40 CFR Part 63 Subpart UU §63.1026(e)(1)(ii)	Pumps in light liquid service (dual mechanical seal system): Operate with the barrier fluid at a pressure that is at all times (except periods of startup, shutdown, or malfunction) greater than the pump stuffing box pressure; or equip with a barrier fluid degassing reservoir that is routed to a process or fuel gas system or connected by a closed-vent system to a control device that complies with the requirements of either 40 CFR 63.1034 or 63.1021(b); or equip with a closed-loop system that purges the barrier fluid into a process stream. Comply with this requirement in lieu of the requirements in 40 CFR 63.1026(b).	The same limitation as the limitation associated with the citation is used for the source.
G04	40 CFR Part 63 Subpart UU §63.1026(e)(1)(iii)	Pumps in light liquid service (dual mechanical seal system): Ensure that the barrier fluid is not in light liquid service. Comply with this requirement in lieu of the requirements in 40 CFR 63.1026(b).	The same limitation as the limitation associated with the citation is used for the source.
G04	40 CFR Part 63 Subpart UU §63.1026(e)(1)(iv)	Pumps in light liquid service (dual mechanical seal system): Equip barrier fluid system with a sensor that will detect failure of the seal system, the barrier fluid system, or both. Comply with this requirement in lieu of the requirements in 40 CFR 63.1026(b).	The same limitation as the limitation associated with the citation is used for the source.
G04	40 CFR Part 63 Subpart UU §63.1028(e)(1)(i)	Agitators in gas/vapor service and light liquid service (dual mechanical seal system): Operate with the barrier fluid at a pressure that is at all times (except during periods of startup, shutdown, or malfunction) greater than the agitator stuffing box pressure; or equip with a barrier fluid degassing reservoir that is routed to a process or fuel gas system or connected by a closed-vent system to a control device that meets the requirements of either 40 CFR 63.1034 or 63.1021(b); or equip with a closed-loop system that purges the barrier fluid into a process stream. Comply with this requirement in lieu of the requirements in 40 CFR 63.1028(c).	The same limitation as the limitation associated with the citation is used for the source.
G04	40 CFR Part 63 Subpart UU §63.1028(e)(1)(ii)	Agitators in gas/vapor service and light liquid service (dual mechanical seal system): Ensure that the barrier fluid is not in light liquid service. Comply with this requirement in lieu of the requirements in 40 CFR 63.1028(c).	The same limitation as the limitation associated with the citation is used for the source.

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G04	40 CFR Part 63 Subpart UU §63.1028(e)(1)(iii)	Agitators in gas/vapor service and light liquid service (dual mechanical seal system): Equip barrier fluid system with a sensor that will detect failure of the seal system, barrier fluid system, or both. Comply with this requirement in lieu of the requirements in 40 CFR 63.1028(c).	The same limitation as the limitation associated with the citation is used for the source.
G04	40 CFR Part 63 Subpart UU §63.1031(b)	Compressors: Equip with a seal system that includes a barrier fluid system and that prevents leakage of process fluid to the atmosphere, except as provided in 40 CFR 63.1021(b), 63.1036, 63.1037, and 63.1031(e) and (f).	The same limitation as the limitation associated with the citation is used for the source.
G04	40 CFR Part 63 Subpart UU §63.1031(b)	Compressors (seal system): Operate with the barrier fluid at a pressure that is greater than the compressor stuffing box pressure at all times (except during periods of startup, shutdown, or malfunction); or equip with a barrier fluid system degassing reservoir that is routed to a process or fuel gas system or connected by a closed-vent system to a control device that meets the requirements of either 40 CFR 63.1034 or 63.1021(b); or equip with a closed-loop system that purges the barrier fluid directly into a process stream.	The same limitation as the limitation associated with the citation is used for the source.
G04	40 CFR Part 63 Subpart UU §63.1031(c)	Compressors: Ensure that the barrier fluid is not in light liquid service.	The same limitation as the limitation associated with the citation is used for the source.
G04	40 CFR Part 63 Subpart UU §63.1031(c)	Compressors: Equip each barrier fluid system with a sensor that will detect failure of the seal system, barrier fluid system, or both.	The same limitation as the limitation associated with the citation is used for the source.
G04	40 CFR Part 63 Subpart UU §63.1031(e)	Compressors (routed to a process or fuel gas system or equipped with a closed-vent system): Equip with a system to capture and transport leakage from the compressor drive shaft seal to a process or a fuel gas system or to a closed-vent system that captures and transports leakage from the compressor to a control device meeting the requirements of either 40 CFR 63.1034 or 63.1021(b). Comply with this requirement in lieu of the requirements in 40 CFR 63.1031(b) through (d).	The same limitation as the limitation associated with the citation is used for the source.
G04	40 CFR Part 63 Subpart UU §63.1031(f)(1)	Compressors (operating with instrument reading of less than 500 ppm above background): Organic HAP < 500 ppm above background at all times, as demonstrated initially upon designation, annually, and at other times requested by DEP. Comply with this requirement in lieu of the requirements in 40 CFR 63.1031(b) through (d).	The same limitation as the limitation associated with the citation is used for the source.
G04	40 CFR Part 63 Subpart UU §63.1032	Sampling connection systems: Equip with a closed-purge, closed-loop, or closed-vent system, except as provided in 40 CFR 63.1021(b), 63.1036, 63.1037, or 63.1032(d). Operate the system as specified in 40 CFR 63.1032(c)(1) through (c)(5).	The same limitation as the limitation associated with the citation is used for the source.

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G04	40 CFR Part 63 Subpart UU §63.1033(b)	Open-ended valves or lines: Equip with a cap, blind flange, plug, or a second valve, except as provided in 40 CFR 63.1021(b), 63.1036, 63.1037, and 63.1033(c) and (d). Ensure that the cap, blind flange, plug, or second valve seals the open end at all times except during operations requiring process fluid flow through the open-ended valve or line, or during maintenance. Operate each open-ended valve or line equipped with a second valve in a manner such that the valve on the process fluid end is closed before the second valve is closed.	The same limitation as the limitation associated with the citation is used for the source.
G04	40 CFR Part 63 Subpart UU §63.1034(b)(1)	Comply with the provisions of 40 CFR 63 Subpart SS, except as provided in 40 CFR 63.1002(b), if routing emissions from equipment leaks to a fuel gas system or process.	The same limitation as the limitation associated with the citation is used for the source.
G04	40 CFR Part 63 Subpart UU §63.1034(b)(2)	Comply with the provisions of 40 CFR 63 Subpart SS, except as specified in 40 CFR 63.1002(b).	The same limitation as the limitation associated with the citation is used for the source.
G04	40 CFR Part 63 Subpart UU §63.1034(b)(2)(i)	Organic HAP $\geq$ 95% reduction, or exit concentration $\leq$ 20 ppmv, whichever is less stringent.	The same limitation as the limitation associated with the citation is used for the source.
G04	40 CFR Part 63 Subpart UU §63.1034(b)(2)(ii)	Organic HAP $\geq$ 95% reduction, or exit concentration $\leq$ 20 ppmv on a dry basis corrected to 3% oxygen, whichever is less stringent; or residence time $\geq$ 0.50 seconds at temperature $\geq$ 760°C (1400°F).	The same limitation as the limitation associated with the citation is used for the source.



COMMONWEALTH OF PENNSYLVANIA
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BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	G04
☒	Group of Sources	Unit ID	
☐	Single Source	Scenario Name	
☐	Alternative Operating Scenario		
Citation No.	40 CFR Part 63 Subpart UU		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	OVA Monitor		
Monitoring Device Location	NA		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Valves in gas/vapor service and light liquid service (the greater of 2 valves or 2% leaking): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 monthly to detect leaks. If a reading of 500 ppm or greater is recorded, a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.1025(d). [40 CFR 63.1025(b)(3)(i)].			
Valves in gas/vapor service and light liquid service (less than the greater of 2 valves or 2% leaking): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 quarterly to detect leaks, except as specified in 40 CFR 63.1025(b)(3)(iii) through (b)(3)(v). If a reading of 500 ppm or greater is recorded, a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.1025(d). [40 CFR 63.1025(b)(3)(ii)].			
Valves in gas/vapor service and light liquid service (less than 1% leaking): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 semiannually to detect leaks. If a reading of 500 ppm or greater is recorded, a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.1025(d). Alternative to quarterly monitoring in 40 CFR 63.1025(b)(3)(ii). [40 CFR 63.1025(b)(3)(iii)].			
Valves in gas/vapor service and light liquid service (less than 0.5% leaking): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 annually to detect leaks. If a reading of 500 ppm or greater is recorded, a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.1025(d). Alternative to quarterly monitoring in 40 CFR 63.1025(b)(3)(ii). [40 CFR 63.1025(b)(3)(iv)].			
Valves in gas/vapor service and light liquid service (less than 0.25% leaking): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 once every two years to detect leaks. If a reading of 500 ppm or greater is recorded, a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.1025(d). Alternative to quarterly monitoring in 40 CFR 63.1025(b)(3)(ii). [40 CFR 63.1025(b)(3)(v)].			
Valves in gas/vapor service and light liquid service: Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 within three months after repair of a leak to determine whether the valve has resumed leaking. [40 CFR 63.1025(d)(2)].			

Valves in gas/vapor service and light liquid service (unsafe-to-monitor): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 at the regulation's specified frequency to detect leaks. Monitor as frequently as practical during safe-to-monitor times, but not more frequently than the periodic monitoring schedule otherwise applicable. If a reading of 500 ppm or greater is recorded, a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.1024. Comply with this requirement in lieu of the requirements in 40 CFR 63.1025(b) and (d)(2). [40 CFR 63.1025(e)(1)].
Valves in gas/vapor service and light liquid service (difficult-to-monitor): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 annually to detect leaks. Monitor at least once per calendar year. If a reading of 500 ppm or greater is recorded, a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.1024. Comply with this requirement in lieu of the requirements in 40 CFR 63.1025(b). [40 CFR 63.1025(e)(2)].
Valves in gas/vapor service and light liquid service (fewer than 250 valves): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 quarterly to detect leaks. If a reading of 500 ppm or greater is recorded, a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.1024. Comply with this requirement in lieu of the monthly monitoring specified in 40 CFR 63.1025(b)(3)(i). [40 CFR 63.1025(e)(3)].
Pumps in light liquid service: Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 monthly to detect leaks. If a reading of 5,000 ppm (pumps handling polymerizing monomers), 2,000 ppm (pumps in food/medical service), or 1,000 ppm (all other pumps) or greater is recorded, a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.1026(d). Initiate repairs for pumps with a 1,000 ppm leak definition only when an instrument reading of 2,000 ppm or greater is detected. [40 CFR 63.1026(b)].
Pumps in light liquid service: Presence of a leak monitored by visual inspection/determination weekly (calendar). Monitor for indications of liquids dripping from the pump seal. If there are indications of liquids dripping from the pump seal, follow the procedure specified in 40 CFR 63.1026(b)(4)(i) or (b)(4)(ii). [40 CFR 63.1026(b)(4)].
Pumps in light liquid service (dual mechanical seal system): Presence of a leak monitored by visual inspection/determination weekly (calendar). Monitor for indications of liquids dripping from the pump seal. If there are indications of liquid dripping from the pump seal, follow the procedure specified in 40 CFR 63.1026(e)(1)(v)(A) or (e)(1)(v)(B) prior to the next required inspection. Comply with this requirement in lieu of the requirements in 40 CFR 63.1026(b). [40 CFR 63.1026(e)(1)(v)].
Pumps in light liquid service (dual mechanical seal system - sensor): Presence of a leak monitored by visual inspection/determination daily, or equip with an audible alarm unless the pump is located within the boundary of an unmanned plant site. If a leak is detected, initiate repair provisions specified in 40 CFR 63.1024. Comply with this requirement in lieu of the requirements in 40 CFR 63.1026(b). [40 CFR 63.1026(e)(1)(vii)].
Pumps in light liquid service (unsafe-to-monitor): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 at the regulation's specified frequency to detect leaks. Monitor as frequently as practical during safe-to-monitor times, but not more frequently than the periodic monitoring schedule otherwise applicable. If a reading of 5,000 ppm (pumps handling polymerizing monomers), 2,000 ppm (pumps in food/medical service), or 1,000 ppm (all other pumps) or greater is recorded, a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.1024. Comply with this requirement in lieu of the requirements of 40 CFR 63.1026(b) and the monitoring and inspection requirements of 40 CFR 63.1026(e)(1)(v) through (viii). [40 CFR 63.1026(e)(6)].
Connectors in gas/vapor service and light liquid service: Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 at the regulation's specified frequency. Monitor all connectors in each process unit initially for leaks by the later of either 12 months after the compliance date as specified in a referencing subpart or 12 months after initial startup. If an instrument reading of 500 ppm or greater is measured, a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.1027(d). [40 CFR 63.1027(a)].
Connectors in gas/vapor service and light liquid service (0.5% or greater leaking connectors): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 at the regulation's specified frequency. Monitor within 12 months after the initial monitoring specified in 40 CFR 63.1027(a). If a reading of 500 ppm is recorded, a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.1027(d). [40 CFR 63.1027(b)(3)(i)].
Connectors in gas/vapor service and light liquid service (greater than or equal to 0.25% but less than 0.5% leaking connectors): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 at the regulation's specified frequency. Monitor within 4 years after the initial monitoring specified in 40 CFR 63.1027(a). If a reading of 500 ppm is recorded, a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.1027(d). [40 CFR 63.1027(b)(3)(ii)].

Connectors in gas/vapor service and light liquid service (less than 0.25% leaking connectors): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 at the regulation's specified frequency. Monitor connectors as specified in 40 CFR 63.1027(b)(3)(iii)(A) and either 40 CFR 63.1027(b)(3)(iii)(B) or (b)(3)(iii)(C), as appropriate. If a reading of 500 ppm is recorded, a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.1027(d). [40 CFR 63.1027(b)(3)(iii)].

Connectors in gas/vapor service and light liquid service: Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 within 90 days after repair of a connector that is found to be leaking during the monitoring conducted pursuant to 40 CFR 63.1027(b)(3)(i) through (b)(3)(iii), to confirm that it is not leaking. [40 CFR 63.1027(b)(3)(iv)].

Connectors in gas/vapor service and light liquid service (unsafe-to-monitor): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 at the regulation's specified frequency to detect leaks. Monitor as frequently as practical during safe-to-monitor times, but not more frequently than the periodic monitoring schedule otherwise applicable. If a reading of 500 ppm or greater is recorded, a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.1024. Comply with this requirement in lieu of the requirements in 40 CFR 63.1027(a) and (b). [40 CFR 63.1027(e)(1)].

Agitators in gas/vapor service and light liquid service: Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 monthly to detect leaks, except as specified in 40 CFR 63.1021(b), 63.1036, 63.1037, or 63.1028(e). If a reading of 10,000 ppm or greater is recorded, a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.1028(d). [40 CFR 63.1028(c)(1)].

Agitators in gas/vapor service and light liquid service: Presence of a leak monitored by visual inspection/determination weekly (calendar) for indications of liquids dripping from the agitator seal. If there are indications of liquids dripping from the agitator seal, follow the procedures specified in 40 CFR 63.1028(c)(3)(ii)(A) or (c)(3)(ii)(B) prior to the next required inspection. [40 CFR 63.1028(c)(3)].

Agitators in gas/vapor service and light liquid service (dual mechanical seal system): Presence of a leak monitored by visual inspection/determination weekly (calendar) for indications of liquids dripping from the agitator seal. If there are indications of liquids dripping from the agitator seal, follow the procedures specified in 40 CFR 63.1028(e)(1)(iv)(A) or (e)(1)(iv)(B) prior to the next required inspection. Comply with this requirement in lieu of the requirements in 40 CFR 63.1028(c). [40 CFR 63.1028(e)(1)(iv)].

Agitators in gas/vapor service and light liquid service (dual mechanical seal system - sensor): Presence of a leak monitored by visual inspection/determination daily, or equip with an audible alarm unless the agitator seal is located within the boundary of an unmanned plant site. Comply with this requirement in lieu of the requirements in 40 CFR 63.1028(c). [40 CFR 63.1028(e)(1)(v)].

Agitators in gas/vapor service and light liquid service (difficult-to-monitor): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 at the regulation's specified frequency to detect leaks. Monitor at least once per calendar year. If a reading of 10,000 ppm or greater is recorded, a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.1024. Comply with this requirement in lieu of the requirements in 40 CFR 63.1028(c). [40 CFR 63.1028(e)(5)].

Agitators in gas/vapor service and light liquid service (unsafe-to-monitor): Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 at the regulation's specified frequency to detect leaks. Monitor as frequently as practical during safe-to-monitor times, but not more frequently than the periodic monitoring schedule otherwise applicable. If a reading of 10,000 ppm or greater is recorded, a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.1024. Comply with this requirement in lieu of the requirements in 40 CFR 63.1028(c). [40 CFR 63.1028(e)(7)].

Pumps, valves, connectors, and agitators in heavy liquid service; pressure relief devices in liquid service; and instrumentation systems: Organic HAP monitored by 40 CFR 60, Appendix A, Method 21 within 5 days (calendar) after evidence of a potential leak to the atmosphere is found by visual, audible, olfactory, or any other detection method, unless the potential leak is repaired as required in 40 CFR 63.1029(c). If an instrument reading of 10,000 ppm or greater (agitators), 5,000 ppm or greater (pumps handling polymerizing monomers), 2,000 ppm or greater (pumps in food and medical service, and all other pumps), or 500 ppm or greater (valves, connectors, instrumentation systems, and pressure relief devices) is measured, a leak is detected. If a leak is detected, repair pursuant to 40 CFR 63.1024, as applicable. [40 CFR 63.1029(b)].

Compressors (sensor): Presence of a leak monitored by visual inspection/determination daily, or equip with an alarm unless the compressor is located within the boundary of an unmanned plant site. [40 CFR 63.1031(c)].

How will data be reported?	See Section E. Reporting below.
SECTION C. TESTING	
Reference Test Method Description	
Reference Test Method Citation	
SECTION D. RECORD KEEPING	
Describe what parameters will be recorded and the frequency of recording.	
Unsafe- and difficult-to-monitor equipment: Equipment/operational data recordkeeping by electronic or hard copy once initially and upon change or revision. Record the identity of equipment designated as unsafe-to-monitor according to the provisions of 40 CFR 63.1022(c)(1) and the planned schedule for monitoring this equipment. Also record the identity of equipment designated as difficult-to-monitor according to the provisions of 40 CFR 63.1022(c)(2), the planned schedule for monitoring this equipment, and an explanation why the equipment is unsafe or difficult-to-monitor. Keep this record at the plant and make available for review by an inspector. [40 CFR 63.1022(c)(3)].	
Connectors (unsafe-to-repair): Equipment/operational data recordkeeping by electronic or hard copy once initially and upon change or revision. Record the identity of connectors designated as unsafe-to-repair and an explanation of why the connectors are unsafe-to-repair. [40 CFR 63.1022(d)(2)].	
Equipment in heavy liquid service: Retain information, data, and analyses used to determine that a piece of equipment is in heavy liquid service; or, when requested by DEP, demonstrate that the piece of equipment or process is in heavy liquid service. [40 CFR 63.1022(f)].	
Equipment/operational data recordkeeping by electronic or hard copy upon each occurrence of a leak. Record the information specified in 40 CFR 63.1024(f) when a leak is detected. Keep the records pursuant to the referencing subpart, except keep information for connectors complying with the 8-year monitoring period allowed under 40 CFR 63.1027(b)(3)(iii) for 5 years beyond the date of its last use. [40 CFR 63.1023(e)(2)].	
Equipment/operational data recordkeeping by electronic or hard copy upon each occurrence of delay of repair of a leak. Maintain a record of the facts that explain any delay of repairs and, where appropriate, why the repair was technically infeasible without a process unit shutdown. [40 CFR 63.1024(d)].	
Valves in gas/vapor service and light liquid service: Equipment/operational data recordkeeping by electronic or hard copy at the approved frequency. Keep a record of the monitoring schedule for each process unit. [40 CFR 63.1025(b)(3)(vi)].	
Pumps in light liquid service: Inspection records recordkeeping by electronic or hard copy weekly. Document that the leak inspection was conducted and the date of the inspection. [40 CFR 63.1026(b)(4)].	
Pumps in light liquid service (dual mechanical seal system): Equipment/operational data recordkeeping by electronic or hard copy once initially and upon change or revision. Keep records at the plant of the design criteria and an explanation of the design criteria; and any changes to these criteria and the reasons for the changes. Make records available for review by an inspector. Comply with this requirement in lieu of the requirements in 40 CFR 63.1026(b). [40 CFR 63.1026(e)(1)(i)].	
Pumps in light liquid service (dual mechanical seal system): Inspection records recordkeeping by electronic or hard copy weekly. Document that the leak inspection was conducted and the date of the inspection. Comply with this requirement in lieu of the requirements in 40 CFR 63.1026(b). [40 CFR 63.1026(e)(1)(v)].	
Connectors in gas/vapor service and light liquid service: Equipment/operational data recordkeeping by electronic or hard copy at the approved frequency. Keep a record of the start date and end date of each monitoring period under 40 CFR 63.1027 for each process unit. [40 CFR 63.1027(b)(3)(v)].	
Agitators in gas/vapor service and light liquid service: Inspection records recordkeeping by electronic or hard copy weekly. Document that the leak inspection was conducted and the date of the inspection. [40 CFR 63.1028(c)(3)].	

Agitators in gas/vapor service and light liquid service (dual mechanical seal system): Equipment/operational data recordkeeping by electronic or hard copy once initially and upon change or revision. Keep records of the design criteria and an explanation of the design criteria; and any changes to these criteria and the reasons for the changes. Comply with this requirement in lieu of the requirements in 40 CFR 63.1028(c). [40 CFR 63.1028(e)(1)(vi)(B)].

Compressors: Equipment/operational data recordkeeping by electronic or hard copy once initially and upon change or revision. Keep records of the design criteria and an explanation of the design criteria; and any changes to these criteria and the reasons for the changes. [40 CFR 63.1031(d)(2)].

Compressors (operating with instrument reading of less than 500 ppm above background): Equipment/operational data recordkeeping by electronic or hard copy upon each occurrence of a compliance test. Record the dates and results of each compliance test including the background level measured and the maximum instrument reading measured during each compliance test. Comply with this requirement in lieu of the requirements in 40 CFR 63.1031(b) through (d). [40 CFR 63.1031(f)(2)].

Keep the records specified in 40 CFR 63.1038(b) and (c). [40 CFR 63.1038].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Submit Initial Compliance Status Report: Due according to the procedures in the referencing subpart. Include the information listed in 40 CFR 63.1039(a)(1) through (a)(3), as applicable. [40 CFR 63.1039(a)].

Submit Periodic Reports: Due according to the procedures in the referencing subpart. Include the information listed in 40 CFR 63.1039(b)(1) through (b)(8), as applicable. [40 CFR 63.1039(b)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Identify equipment subject to 40 CFR 63 Subpart UU as specified in 40 CFR 63.1022(a) through (f), as applicable. [40 CFR 63.1022].

Unsafe-to-monitor equipment: Have a written plan that requires monitoring of the equipment as frequently as practical during safe-to-monitor times, but not more frequently than the periodic monitoring schedule otherwise applicable, and repair of the equipment according to the procedures in 40 CFR 63.1024 if a leak is detected. Comply with this requirement in lieu of the requirements in 40 CFR 63.1025(b) and (d)(2) for valves, 40 CFR 63.1026(b) and the monitoring and inspection requirements of 40 CFR 63.1026(e)(1)(v) through (viii) for pumps, 40 CFR 63.1027(a) and (b) for connectors, and 40 CFR 63.1028(c) for agitators. [40 CFR 63.1022(c)(4)(i)].

Difficult-to-monitor equipment: Have a written plan that requires monitoring of the equipment at least once per calendar year and repair of the equipment according to the procedures in 40 CFR 63.1024 if a leak is detected. Comply with this requirement in lieu of the requirements in 40 CFR 63.1025(b) for valves, and 40 CFR 63.1028(c) for agitators. [40 CFR 63.1022(c)(4)(ii)].

Attach a weatherproof and readily visible identification to leaking equipment, when a leak is detected pursuant to the monitoring specified in 40 CFR 63.1023(a). [40 CFR 63.1023(e)(1)].

Repair each leak detected as soon as practical, but not later than 15 calendar days after it is detected, except as specified in 40 CFR 63.1024(d) and (e). Make a first attempt at repair no later than 5 calendar days after the leak is detected. [40 CFR 63.1024(a)].

Valves in gas/vapor service and light liquid service: Calculate the percent leaking valves for each monitoring period for each process unit or valve subgroup using the equation in 40 CFR 63.1025(c)(1)(ii). [40 CFR 63.1025(c)(1)(ii)].

Pumps in light liquid service: Implement a quality improvement program that complies with 40 CFR 63.1035 if, when calculated on a 6-month rolling average, at least the greater of either 10 percent of the pumps in a process unit or three pumps in a process unit leak. [40 CFR 63.1026(c)(2)].

Pumps in light liquid service: Determine percent leaking pumps using the equation specified in 40 CFR 63.1026(c)(4). [40 CFR 63.1026(c)(4)].

Pumps in light liquid service (dual mechanical seal system): Determine, based on design considerations and operating experience, criteria applicable to the presence and frequency of drips and to the sensor that indicates failure of the seal system, the barrier fluid system, or both. Comply with this requirement in lieu of the requirements in 40 CFR 63.1026(b). [40 CFR 63.1026(e)(1)(i)].

Connectors in gas/vapor service and light liquid service: Calculate percent leaking connectors using the equation in 40 CFR 63.1027(c). [40 CFR 63.1027(c)].

Connectors in gas/vapor service and light liquid service (inaccessible, ceramic, or ceramic-lined): Eliminate the visual, audible, olfactory, or other indications of a leak to the atmosphere as soon as practical, if connector is observed by visual, audible, olfactory, or other means to be leaking. Comply with this requirement in lieu of the monitoring requirements of 40 CFR 63.1027(a) and (b), and the recordkeeping and reporting requirements of 40 CFR 63.1038 and 63.1039. [40 CFR 63.1027(e)(2)(ii)].

Agitators in gas/vapor service and light liquid service (dual mechanical seal system): Determine, based on design considerations and operating experience, criteria that indicates failure of the seal system, the barrier fluid system, or both and applicable to the presence and frequency of drips. If indications of liquids dripping from the agitator seal exceed the criteria, or if, based on the criteria the sensor indicates a failure of the seal system, the barrier fluid system, or both, a leak is detected. If a leak is detected, repair pursuant to 40 CFR 63.1024, as applicable. Comply with this requirement in lieu of the requirements in 40 CFR 63.1028(c). [40 CFR 63.1028(e)(1)(vi)(A)].

Compressors (sensor): Determine, based on design considerations and operating experience, a criterion that indicates failure of the seal system, the barrier fluid system, or both. If the sensor indicates failure of the seal system, the barrier fluid system, or both based on the criterion, a leak is detected. If a leak is detected, initiate repair provisions specified in 40 CFR 63.1024, as applicable. [40 CFR 63.1031(d)(1)].

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G05	40 CFR Part 63 Subpart YY §63.1103(e)(3)	For the ethylene manufacturing line, comply with all applicable storage vessel, ethylene process vent, transfer rack, equipment leak, waste stream, heat exchange system, and ethylene cracking furnace and associated decoking operations requirements under 40 CFR 63 Subpart YY.	The same limitation as the limitation associated with the citation is used for the source.
G05	40 CFR Part 63 Subpart YY §63.1103(e)(3), Table 7(b)(1)(iii)(C)	Storage tanks: (Primary Control) Reduce emissions of total organic HAP by 98 wt% by venting emissions through a closed vent system to any combination of non-flare control devices and meet the requirements specified in 40 CFR 63.982(c)(1) and 40 CFR 63.1103(e)(9).	The same limitation as the limitation associated with the citation is used for the source.
G05	40 CFR Part 63 Subpart YY §63.1103(e)(3), Table 7(b)(1)(iii)(B)	Storage tanks: (Secondary Control) Reduce emissions of total organic HAP by 98 wt% by venting emissions through a closed vent system to a flare and meet the requirements of 40 CFR 63.983 and 40 CFR 63.1103(e)(4) and (9).	The same limitation as the limitation associated with the citation is used for the source.
G05	40 CFR Part 63 Subpart YY §63.1103(e)(3), Table 7(b)(1)(iii)(D)	Blended Pitch Drum: Reduce emissions of total organic HAP by 98 wt% by routing emissions to a fuel gas system or process and meet the requirements specified in 40 CFR 63.982(d) and 40 CFR 63.1103(e)(9).	The same limitation as the limitation associated with the citation is used for the source.
G05	40 CFR Part 63 Subpart YY §63.1103(e)(3), Table 7(d)(1)(ii)(A)	Ethylene process vents: Reduce emissions of organic HAP by 98 wt%; or reduce organic HAP or TOC to a concentration of 20 ppmvd corrected to 3% oxygen; whichever is less stringent, by venting emissions through a closed vent system to a flare and meet the requirements of 40 CFR 63.983 and 40 CFR 63.1103(e)(4) and (9).	The same limitation as the limitation associated with the citation is used for the source.
G05	40 CFR Part 63 Subpart YY §63.1103(e)(3), Table 7(e)(1)	Transfer racks: Equip with one of the control options listed in 40 CFR 63.1105(a)(2) through (a)(5).	The same limitation as the limitation associated with the citation is used for the source.
G05	40 CFR Part 63 Subpart YY §63.1105(a)(5)	Comply with the requirements specified in 40 CFR 63.1103(e)(4) instead of the requirements in 40 CFR 63.987 and the provisions regarding flare compliance assessments at 40 CFR 63.997(a) through (c).	The same limitation as the limitation associated with the citation is used for the source.
G05	40 CFR Part 63 Subpart YY §63.1105(b)	Operate in such a manner that emissions are routed through the equipment specified in 40 CFR 63.1105(a).	The same limitation as the limitation associated with the citation is used for the source.
G05	40 CFR Part 63 Subpart YY §63.1105(c)	Ensure that the control device is operating whenever HAP emissions are vented.	The same limitation as the limitation associated with the citation is used for the source.

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G05	40 CFR Part 63 Subpart YY §63.1105(d)	Load HAP-containing materials only into tank trucks and railcars that meet the requirement in 40 CFR 63.1105(d)(1) or (2).	The same limitation as the limitation associated with the citation is used for the source.
G05	40 CFR Part 63 Subpart YY §63.1105(e)	Ensure that no pressure relief device in the loading equipment of each tank truck or railcar begins to open to the atmosphere during loading.	The same limitation as the limitation associated with the citation is used for the source.
G05	40 CFR Part 63 Subpart YY §63.1105(f)	Load HAP-containing materials only to tank trucks or railcars equipped with a vapor collection system that is compatible with the transfer rack's closed vent system or process piping.	The same limitation as the limitation associated with the citation is used for the source.
G05	40 CFR Part 63 Subpart YY §63.1105(g)	Load HAP-containing material only to tank trucks or railcars whose collection systems are connected to the transfer rack's closed vent system or process piping.	The same limitation as the limitation associated with the citation is used for the source.
G05	40 CFR Part 63 Subpart YY §63.1103(e)(3), Table 7(f)	Comply with the requirements of 40 CFR 63.1103(e)(9) and 40 CFR 63 Subpart UU, except instead of complying with the pressure relief device requirements of 40 CFR 63.1030 of 40 CFR 63 Subpart UU, meet the requirements of 40 CFR 63.1107(h), and in lieu of the flare requirement of 40 CFR 63.1034(b)(2)(iii), comply with the requirements specified in 40 CFR 63.1103(e)(4).	The same limitation as the limitation associated with the citation is used for the source.
G05	40 CFR Part 63 Subpart YY §63.1107(h)(1)	Releases and potential leaks from a pressure relief device not routed through a closed vent system to a control device, back into the process, a fuel gas system, or drain system: Except during a pressure release, operate each pressure relief device in organic HAP gas or vapor service with an instrument reading of less than 500 ppm above background as measured by the method in 40 CFR 63.1023(b).	The same limitation as the limitation associated with the citation is used for the source.

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G05	40 CFR Part 63 Subpart YY §63.1107(h)(2)	Releases and potential leaks from a pressure relief device not routed through a closed vent system to a control device, back into the process, a fuel gas system, or drain system: For pressure relief devices in organic HAP gas or vapor service, comply with the applicable requirements in 40 CFR 63.1107(h)(2)(i) through (iii) of this section following a pressure release: (i) If the pressure relief device does not consist of or include a rupture disk, conduct instrument monitoring, as specified in 40 CFR 63.1023(b), no later than 5 calendar days after the pressure relief device returns to organic HAP gas or vapor service following a pressure release to verify that the pressure relief device is operating with an instrument reading of less than 500 ppm. (ii) If the pressure relief device includes a rupture disk, either comply with 40 CFR 63.1107(h)(2)(i) (and do not replace the rupture disk) or install a replacement disk as soon as practicable after a pressure release, but no later than 5 calendar days after the pressure release. (iii) If the pressure relief device consists only of a rupture disk, install a replacement disk as soon as practicable after a pressure release, but no later than 5 calendar days after the pressure release. The owner or operator must not initiate startup of the equipment served by the rupture disk until the rupture disc is replaced.	The same limitation as the limitation associated with the citation is used for the source.
G05	40 CFR Part 63 Subpart YY §63.1107(h)(3)	Releases and potential leaks from a pressure relief device not routed through a closed vent system to a control device, back into the process, a fuel gas system, or drain system: Comply with the requirements specified in 40 CFR 63.1107(h)(3)(i) through (v) for all pressure relief devices in organic HAP service.	The same limitation as the limitation associated with the citation is used for the source.
G05	40 CFR Part 63 Subpart YY §63.1107(h)(4)	Pressure relief devices routed to a control device, process, fuel gas system, or drain system: Both the closed vent system and control device (if applicable) must meet the applicable requirements specified in 40 CFR 63.982(c)(2), 63.983, and 63.1103(e)(4). For purposes of compliance with this paragraph, the phrase "Except for equipment needed for safety purposes such as pressure relief devices" in 40 CFR 63.983(a)(3) does not apply. The drain system (if applicable) must meet the applicable requirements specified in 40 CFR 61.346 or 63.136.	The same limitation as the limitation associated with the citation is used for the source.

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G05	40 CFR Part 63 Subpart YY §63.1107(h)(8)	For affected ethylene production units that commenced construction or reconstruction on or before October 9, 2019, owners or operators are prohibited from installing a flowing pilot-operated pressure relief device or replacing any pressure relief device with a flowing pilot-operated pressure relief device after July 6, 2023. For affected ethylene production units that commenced construction or reconstruction after October 9, 2019, owners or operators are prohibited from installing and operating flowing pilot-operated pressure relief devices. A flowing pilot-operated pressure relief device means the type of pilot-operated pressure relief device where the pilot discharge vent continuously releases emissions to the atmosphere when the pressure relief device is actuated.	The same limitation as the limitation associated with the citation is used for the source.
G05	40 CFR Part 63 Subpart YY §63.1103(e)(3), Table 7(g)(1)	Waste management units: Comply with the requirements of 40 CFR 63 Subpart XX for waste streams.	The same limitation as the limitation associated with the citation is used for the source.
G05	40 CFR Part 63 Subpart YY §63.1103(e)(3), Table 7(h)	Heat exchange systems: Comply with the heat exchange system requirements of 40 CFR 63 Subpart XX.	The same limitation as the limitation associated with the citation is used for the source.
G05	40 CFR Part 63 Subpart YY §63.1103(e)(3), Table 7(i)	CVS bypass lines: Comply with the requirements specified in 40 CFR 63.1103(e)(6) and (9) for bypass lines that could divert a vent stream directly to the atmosphere or to a control device not meeting the requirements in Table 7 of 40 CFR 63.1103.	The same limitation as the limitation associated with the citation is used for the source.
G05	40 CFR Part 63 Subpart YY §63.1103(e)(3), Table 7(j)	Comply with the requirements specified in 40 CFR 63.1103(e)(7) and (8) for any decoking operation associated with an ethylene cracking furnace.	The same limitation as the limitation associated with the citation is used for the source.
G05	40 CFR Part 63 Subpart YY §63.1103(e)(4)	Meet the applicable requirements for flares as specified in 40 CFR 63.670 and 63.671, including the provisions in Tables 12 and 13 to 40 CFR 63 Subpart CC, except as specified in 40 CFR 63.1103(e)(4)(i) through (xiv).	The same limitation as the limitation associated with the citation is used for the source.
G05	40 CFR Part 63 Subpart YY §63.1103(e)(4)(i)	An owner or operator may request approval from the Administrator for site-specific operating limits that shall apply specifically to a selected flare. Site-specific operating limits include alternative threshold values for the parameters specified in 40 CFR 63.670(d) through (f) as well as threshold values for operating parameters other than those specified in 40 CFR 63.670(d) through (f). The owner or operator must demonstrate that the flare achieves 96.5% combustion efficiency (or 98% destruction efficiency) using the site-specific operating limits based on a performance evaluation as described in 40 CFR 63.670(r)(1). The request shall include information as described in 40 CFR 63.670(r)(2). The request shall be submitted and followed as described in 40 CFR 63.1113.	The same limitation as the limitation associated with the citation is used for the source.

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G05	40 CFR Part 63 Subpart YY §63.1103(e)(4)(vii) (D)	Instead of complying with 40 CFR 63.670(b) and (g), if a pressure-assisted multi-point flare uses cross-lighting on a stage of burners rather than having an individual pilot flame on each burner, operate each stage of the pressure-assisted multi-point flare with a flame present at all times when regulated material is routed to that stage of burners. Each stage of burners that cross-lights in the pressure-assisted multi-point flare must have at least two pilots with at least one continuously lit and capable of igniting all regulated material that is routed to that stage of burners. Each 15-minute block during which there is at least one minute where no pilot flame is present on a stage of burners when regulated material is routed to that stage is a deviation of the standard. Deviations in different 15-minute blocks from the same event are considered separate deviations. The pilot flame(s) on each stage of burners that use cross-lighting must be continuously monitored by a thermocouple or any other equivalent device used to detect the presence of a flame.	The same limitation as the limitation associated with the citation is used for the source.
G05	40 CFR Part 63 Subpart YY §63.1103(e)(4)(vii) (E)	Ensure that if a stage of burners on a pressure-assisted multi-point flare uses cross-lighting, that the distance between any two burners in series on that stage is no more than 6 feet when measured from the center of one burner to the next burner. A distance greater than 6 feet between any two burners in series may be used provided the owner or operator conducts a performance demonstration that confirms the pressure-assisted multi-point flare will cross-light a minimum of three burners and the spacing between the burners and location of the pilot flame must be representative of the projected installation.	The same limitation as the limitation associated with the citation is used for the source.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	G05
☒	Group of Sources	Unit ID	
☐	Single Source	Scenario Name	
☐	Alternative Operating Scenario		
Citation No.	40 CFR Part 63 Subpart YY		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒	Testing
☒	Record Keeping	☒	Work Practice Standard
☒		☒	Reporting
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	CMS		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Determine the net heating value of the flare vent gas (NHVvg) based on the composition monitoring data specified in 40 CFR 63.670(j) on a 15-minute block average basis according to the requirements in 40 CFR 63.670(l)(5)(ii). [40 CFR 63.1103(e)(4)(vii)(C)].			
Install and operate pressure monitor(s) on the main flare header, as well as a valve position indicator monitoring system for each staging valve to ensure that the pressure-assisted multi-point flare operates within the proper range of conditions as specified by the manufacturer. The pressure monitor must meet the requirements in Table 13 to 40 CFR Part 63 Subpart CC. [40 CFR 63.1103(e)(4)(vii)(F)].			
When determining compliance with the flare tip velocity and combustion zone operating limits specified in 40 CFR 63.670(d) and (e), the requirement effectively applies starting with the 15-minute block that includes a full 15 minutes of the flaring event. The owner or operator is required to demonstrate compliance with the velocity and NHVcz requirements starting with the block that contains the fifteenth minute of a flaring event. The owner or operator is not required to demonstrate compliance for the previous 15-minute block in which the event started and contained only a fraction of flow. [40 CFR 63.1103(e)(4)(xiii)].			

During normal operations, conduct daily inspections of the firebox burners and repair all burners that are impinging on the radiant tube(s) as soon as practical, but not later than 1 calendar day after the flame impingement is found. The owner or operator may delay burner repair beyond 1 calendar day provided the repair cannot be completed during normal operations, the burner cannot be shutdown without significantly impacting the furnace heat distribution and firing rate, and action is taken to reduce flame impingement as much as possible during continued operation. If a delay of repair is required to fully resolve burner flame impingement, repair must be completed following the next planned decoking operation (and before returning the ethylene cracking furnace back to normal operations) or during the next ethylene cracking furnace complete shutdown (when the ethylene cracking furnace firebox is taken completely offline), whichever is earlier. An inspection may include, but is not limited to: visual inspection of the radiant tube(s) for localized bright spots (this may be confirmed with a temperature gun), use of luminescent powders injected into the burner to illuminate the flame pattern, or identifying continued localized coke buildup that causes short runtimes between decoking cycles. A repair may include, but is not limited to: Taking the burner out of service, replacing the burner, adjusting the alignment of the burner, adjusting burner configuration, making burner air corrections, repairing a malfunction of the fuel liquid removal equipment, or adding insulation around the radiant tube(s). [40 CFR 63.1103(e)(7)(i)].

During decoking operations, continuously monitor the temperature at the radiant tube(s) outlet when air is being introduced to ensure the coke combustion occurring inside the radiant tube(s) is not so aggressive (i.e., too hot) that it damages either the radiant tube(s) or ethylene cracking furnace isolation valve(s). The owner or operator must immediately initiate procedures to reduce the temperature at the radiant tube(s) outlet once the temperature reaches a level that indicates combustion of coke inside the radiant tube(s) is too aggressive. [40 CFR 63.1103(e)(7)(iii)].

After decoking, but before returning the ethylene cracking furnace back to normal operations, verify that decoke air is no longer being added. [40 CFR 63.1103(e)(7)(iv)].

Prior to decoking operation, inspect the applicable ethylene cracking furnace isolation valve(s) to confirm that the radiant tube(s) being decoked is completely isolated from the ethylene production process so that no emissions generated from decoking operations are sent to the ethylene production process. If poor isolation is identified, then the owner or operator must rectify the isolation issue prior to continuing decoking operations to prevent leaks into the ethylene production process, unless the owner or operator determines that damage to the radiant tube(s) or ethylene cracking furnace could occur if the repair was attempted prior to completing a decoking operation and/or prior to the ethylene cracking furnace being shut down. [40 CFR 63.1103(e)(8)(i)].

Prior to returning the ethylene cracking furnace to normal operations after a decoking operation, inspect the applicable ethylene cracking furnace isolation valve(s) to confirm that the radiant tube(s) that was decoked is completely isolated from the decoking pot or furnace firebox such that no emissions are sent from the radiant tube(s) to the decoking pot or furnace firebox once the ethylene cracking furnace returns to normal operation. If poor isolation is identified, then the owner or operator must rectify the isolation issue prior to continuing normal operations to prevent product from escaping to the atmosphere through the decoking pot or furnace firebox. [40 CFR 63.1103(e)(8)(ii)].

How will data be reported? See Section E. Reporting below.

SECTION C. TESTING

Reference Test Method Description

For the purposes of demonstrating vapor tightness to determine compliance with 40 CFR 63.1105(d)(2), the following procedures and equipment specified shall be used: pressure test procedures specified in Method 27 of Appendix A to 40 CFR 60 and pressure measurement device that has a precision of +/- 2.5 millimeters of mercury or better and that is capable of measuring above the pressure at which the tank truck or railcar is to be tested for vapor tightness. [40 CFR 63.1105(h)].

Reference Test Method Citation As specified

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Keep copies of notifications, reports and records required by 40 CFR 63 Subpart YY and subparts referenced by the subpart for at least 5 years, unless otherwise specified, except as provided in 40 CFR 63.1109(b). [40 CFR 63.1109(a)].

Maintain all records required to be maintained by 40 CFR 63 Subpart YY or a subpart referenced by the subpart in such a manner that they can be readily accessed and are suitable for inspection. Retain the most recent 2 years of records onsite or make accessible to an inspector while onsite. The records of the remaining 3 years, where required, may be retained offsite. [40 CFR 63.1109(c)].

Maintain all records required by 40 CFR 61 Subpart FF, except retain all notices of offsite waste transfer pursuant to 40 CFR 63.1096(a) instead of 40 CFR 61.342(f). Maintain all required records, reports, and notifications for at least 5 years (2 years on site). [40 CFR 63.1109 (a), (c)].

Equipment/operational data recordkeeping by electronic or hard copy as needed. Maintain records containing information developed and used to assess control applicability under 40 CFR 63.1103 (e.g., combined total annual emissions of regulated organic HAP). [40 CFR 63.1109(d)].

Keep the records specified in 40 CFR 63.1109(e)(1) through (15). [40 CFR 63.1109(e)].

Keep the flare monitoring records specified in 40 CFR 63.1109(e) instead of complying with 40 CFR 63.670(p). [40 CFR 63.1103(e)(4)(x)].

Equipment/operational data recordkeeping by electronic or hard copy at the approved frequency. Record that the verification of DOT tank certification or 40 CFR 60 Appendix A, Test Method 27 testing required in 40 CFR 63.84(c) has been performed. [40 CFR 63.1105(i)].

Keep the following records: (i) the date, time, and duration of each time the affected sources fails to meet an applicable standard; (ii) for each failure to meet an applicable standard, record and retain a list of the affected sources or equipment, an estimate of the quantity of each regulated pollutant emitted over any emission limit, and a description of the method used to estimate the emissions; and (iii) record actions taken to minimize emissions in accordance with 40 CFR 63.1108(a)(4)(ii), and any corrective actions taken to return the affected unit to its normal or usual manner of operation. [40 CFR 63.1111(c)].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Submit the flare management plan to the Administrator as described in 40 CFR 63.670(o)(2)(ii) through (iii). If required to develop a flare management plan and submit it to the Administrator, then the owner or operator must also submit all versions of the plan in portable document format (PDF) to the EPA following the procedure specified in 40 CFR 63.9(k), except any medium submitted through U.S. mail must be sent to the attention of the Ethylene Production Sector Lead. [40 CFR 63.1100(e)(4)(ii) & (iii)].

Comply with the reporting requirements specified in 40 CFR 63.1110(d) and (e)(4) instead of complying with 40 CFR 63.670(q). [40 CFR 63.1103(e)(4)(xi)].

Submit the reports listed in 40 CFR 63.1110(a)(1) through (8) and (a)(10), as applicable. [40 CFR 63.1110(a)].

Submit the information required in 40 CFR 61.357(a) as part of the Initial Notification required in 40 CFR 63.1110(c). Submit the information in 40 CFR 61.357(d)(1) and (d)(2) as part of the Notification of Compliance Status required in 40 CFR 63.1110(d). Submit Periodic reports if required pursuant to 40 CFR 63.1110(e). [40 CFR 63.1110(c), (d), (e)].

Submit a Notification of Compliance Status for each affected source subject to 40 CFR 63 Subpart YY containing the information specified in 40 CFR 63.1110(d)(1)(i) and (ii). Submit the information listed in 40 CFR 63.1110(d)(1)(iv) in a supplement to the Notification of Compliance Status within 150 days after the first applicable compliance date for flare monitoring. [40 CFR 63.1110(d)].

Submit a periodic report, due no later than 60 days after the end of each six-month period, that includes the items specified in 40 CFR 63.1110(e)(4)(i) through (vi). [40 CFR 63.1110(e)(4)].

If a source fails to meet an applicable standard, report such events in the Periodic Report. Report the number of failures to meet an applicable standard. For each instance, report the date, time and duration of each failure. For each failure, the report must include a list of the affected sources or equipment, an estimate of the quantity of each regulated pollutant emitted over any emission limit, and a description of the method used to estimate the emissions. [40 CFR 63.1111(c)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

A root cause analysis and corrective action analysis must be completed as soon as possible, but no later than 45 days after a release event. Special circumstances affecting the number of root cause analyses and/or corrective action analyses are provided in 40 CFR 63.1107(h)(6)(i) through (iii). [40 CFR 63.1107(h)(6)].

Each owner or operator required to conduct a root cause analysis and corrective action analysis as specified in 40 CFR 63.1107(h)(3)(iii) and (h)(6) must implement the corrective action(s) identified in the corrective action analysis in accordance with the applicable requirements in 40 CFR 63.1107(h)(7)(i) through (iii). [40 CFR 63.1107(h)(7)].

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G06	40 CFR Part 63 Subpart XX §63.1095(b)(2)	Comply with 40 CFR 61 Subpart FF (National Emission Standards for Benzene Waste Operations) requirements applicable to a facility with a total annual benzene quantity that is greater than or equal to 10 Mg/yr, as determined according to 40 CFR 61.342(a). Facility does not have any continuous butadiene waste streams.	The same limitation as the limitation associated with the citation is used for the source.
G06	40 CFR Part 63 Subpart XX §63.1095(b)(2)	Manage and treat facility waste as described in 40 CFR 61.342(e).	The same limitation as the limitation associated with the citation is used for the source.
G06	40 CFR Part 63 Subpart XX §63.1085	Comply with the applicable ethylene manufacturing line heat exchange system requirements specified in 40 CFR 63.1085.	The same limitation as the limitation associated with the citation is used for the source.



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DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	G06
☒	Group of Sources	Unit ID	
☐	Single Source	Scenario Name	
☐	Alternative Operating Scenario		
Citation No.	40 CFR Part 63 Subpart XX		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Monitor the cooling water for the presence of total strippable hydrocarbons that indicate a leak according to 40 CFR 63.1086(e). [40 CFR 63.1085(e)].			
Perform monitoring to identify leaks of total strippable hydrocarbons from each heat exchange system subject to the requirements of this subpart according to the procedures in 40 CFR 63.1086(e)(1) through (5). [40 CFR 63.1086(e)].			
If a leak is detected when monitoring a cooling tower return line according to 40 CFR 63.1086(e)(1)(i), permittee may conduct additional monitoring of each heat exchanger or group of heat exchangers associated with the heat exchange system for which the leak was detected, as provided in 40 CFR 63.1086(e)(1)(ii). If no leaks are detected when monitoring according to the requirements of 40 CFR 63.1086(e)(1)(ii), the heat exchange system is considered to have met the repair requirements through re-monitoring of the heat exchange system, as provided in 40 CFR 63.1087(c). [40 CFR 63.1087(d)].			
How will data be reported?	See Section E. Reporting below.		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
Equipment/operational data recordkeeping by electronic or hard copy at the regulation's specified frequency. Keep records of the information specified in 40 CFR 63.1089(a) through (d), according to the requirements of 40 CFR 63.1109(c). [40 CFR 63.1089].			

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Waste transferees will submit written certification that the transferee will manage and treat any waste stream received from a source subject to the requirements pursuant to 40 CFR 63.1096(b). [40 CFR 63.1096(b)].

Report any delay of repair in the semiannual report required by 40 CFR 63.1110(e). If the leak remains unrepaired, continue to report the delay of repair in semiannual reports until the leak is repaired. Include the information in 40 CFR 63.1090(f) in the semiannual report. [40 CFR 63.1090].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Repair leaks according to 40 CFR 63.1087(c) and (d), unless repair is delayed according to 40 CFR 63.1088(d). [40 CFR 63.1085(f)].

If a leak is detected using the methods described in 40 CFR 63.1086(e), permittee must repair the leak to reduce the concentration or mass emissions rate to below the applicable leak action level as soon as practicable, but no later than 45 days after identifying the leak, except as specified in 40 CFR 63.1088(d). Repair must include re-monitoring at the monitoring location where the leak was identified according to the method specified in 40 CFR 63.1086(e)(3) to verify that the total strippable hydrocarbon concentration or total hydrocarbon mass emissions rate is below the applicable leak action level. Repair may also include performing the additional monitoring in 40 CFR 63.1087(d) to verify that the total strippable hydrocarbon concentration is below the applicable leak action level. Actions that can be taken to achieve repair include but are not limited to: (1) Physical modifications to the leaking heat exchanger, such as welding the leak or replacing a tube; (2) Blocking the leaking tube within the heat exchanger; (3) Changing the pressure so that water flows into the process fluid; (4) Replacing the heat exchanger or heat exchanger bundle; or (5) Isolating, bypassing, or otherwise removing the leaking heat exchanger from service until it is otherwise repaired. [40 CFR 63.1087(c)].

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G07	40 CFR Part 63 Subpart YY §63.1100(g)(4)(iii), §63.1103(e)(3), Table 7(f)	An affected source with equipment subject to the requirements of 40 CFR 60 Subpart VVa is required only to comply with the equipment leak requirements of 40 CFR 63 Subpart YY, except the owner or operator must also comply with the calibration drift assessment requirements specified at 40 CFR 60.485a(b)(2) if they are required to do so in 40 CFR 60 Subpart VVa. When complying with the calibration drift assessment requirements at 40 CFR 60.485a(b)(2), the requirement at 40 CFR 60.486a(e)(8)(v) to record the instrument reading for each scale used applies. Accordingly, SPM has elected to comply only with the requirements of 40 CFR 63 Subpart YY for such equipment, which requires compliance with the requirements in 40 CFR 63 Subpart UU and the requirements referenced therein, except instead of complying with the pressure relief device requirements of 40 CFR 63.1030 of 40 CFR 63 Subpart UU, meet the requirements of 40 CFR 63.1107(h), and in lieu of the flare requirement of 40 CFR 63.1034(b)(2)(iii), comply with the requirements specified in 40 CFR 63.1103(e)(4).	The same limitation as the limitation associated with the citation is used for the source.

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G08	40 CFR Part 63 Subpart SS §63.982(c)	For emissions routed through a closed vent system to a nonflare control device, meet the requirements in 40 CFR 63.983 for closed vent systems, the applicable recordkeeping and reporting requirements of 40 CFR 63.998 and 63.999, and the applicable requirements listed in 40 CFR 63.982(c)(1) through (3).	The same limitation as the limitation associated with the citation is used for the source.
G08	40 CFR Part 63 Subpart SS §63.982(c)(1)	Meet the requirements in 40 CFR 63.985 for nonflare control devices and the monitoring, recordkeeping, and reporting requirements referenced therein.	The same limitation as the limitation associated with the citation is used for the source.
G08	40 CFR Part 63 Subpart SS §63.982(c)(2)	Meet the applicable requirements in 40 CFR 63.988 for nonflare control devices, the applicable general monitoring requirements of 40 CFR 63.996 and the applicable performance test requirements and procedures of 40 CFR 63.997; and the monitoring, recordkeeping and reporting requirements referenced therein.	The same limitation as the limitation associated with the citation is used for the source.
G08	40 CFR Part 63 Subpart SS §63.982(c)(3)	Meet the requirements in 40 CFR 63.986 for nonflare control devices and the monitoring, recordkeeping, and reporting requirements referenced therein.	The same limitation as the limitation associated with the citation is used for the source.
G08	40 CFR Part 63 Subpart SS §63.983(a)(1)	Closed-vent systems: Ensure that each closed-vent system is designed and operated to collect the regulated material vapors from the emission point, and to route the collected vapors to a control device.	The same limitation as the limitation associated with the citation is used for the source.
G08	40 CFR Part 63 Subpart SS §63.983(a)(2)	Closed-vent systems: Operate at all times when emissions are vented to, or collected by, them.	The same limitation as the limitation associated with the citation is used for the source.
G08	40 CFR Part 63 Subpart SS §63.983(a)(4)	Closed-vent systems: Ensure that each closed-vent system is designed and operated so that the regulated material vapors collected at one loading arm will not pass through another loading arm in the rack to the atmosphere.	The same limitation as the limitation associated with the citation is used for the source.
G08	40 CFR Part 63 Subpart SS §63.985(a)	Operate and maintain the nonflare control device so that the monitored parameters defined as required in 40 CFR 63.985(c) remain within the ranges specified in the Notification of Compliance Status whenever emissions of regulated material are routed to the control device.	The same limitation as the limitation associated with the citation is used for the source.



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	G08
☒	Group of Sources	Unit ID	
☐	Single Source	Scenario Name	
☐	Alternative Operating Scenario		
Citation No.	40 CFR Part 63 Subpart SS		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒	Testing
☒	Record Keeping	☒	Reporting
☐	Work Practice Standard		
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Closed-vent systems (hard-piping): VOC, Total monitored by 40 CFR 60, Appendix A, Method 21 once initially. If an instrument reading of 500 ppmv above background is measured, a leak is detected. If a leak is detected, initiate repair provisions in 40 CFR 63.983(d)(2). [40 CFR 63.983(b)(1)(i)(A)].			
Closed-vent systems (hard-piping): Presence of a leak monitored by visual, audible, and/or olfactory annually. [40 CFR 63.983(b)(1)(i)(B)].			
Closed-vent systems (unsafe-to-monitor): VOC, Total monitored by 40 CFR 60, Appendix A, Method 21 at the regulation's specified frequency. Maintain a written plan that requires inspection of the equipment as frequently as practical during safe-to-inspect times, at least once annually. Comply with this requirement instead of the requirements in 40 CFR 63.983(b)(1). [40 CFR 63.983(b)(2)(ii)].			
Closed-vent systems (difficult-to-monitor): VOC, Total monitored by 40 CFR 60, Appendix A, Method 21 at the regulation's specified frequency. Maintain a written plan that requires inspection of the equipment at least once every 5 years. Comply with this requirement instead of the requirements in 40 CFR 63.983(b)(1). [40 CFR 63.983(b)(3)(ii)].			
Monitor the parameters specified in the Notification of Compliance Status or in the operating permit application or amendment. [40 CFR 63.985(c)(2)].			
How will data be reported?	See Section E. Reporting below.		

SECTION C. TESTING

Reference Test Method Description

Perform VOC destruction efficiency testing in accordance with 40 CFR 63.985(b)(1)(ii). Initial performance testing is required within 180 days of startup or on an alternative schedule as approved by the Department. Subsequent performance testing is required at a minimum of once every 5 years thereafter. [40 CFR 63.985(b)(1)(ii)].

Reference Test Method Citation As specified

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Records shall be generated as specified in 40 CFR 63.998(d)(2)(i). [40 CFR 63.985(c)(2)].

Closed-vent systems: Equipment/operational data recordkeeping by electronic or hard copy at the regulation's specified frequency. Keep records of the information specified in 40 CFR 63.998(a) through (d), as applicable. [40 CFR 63.998].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Prepare and submit with the Notification of Compliance Status, as specified in 40 CFR 63.999(b)(2), the results of the performance test as described in 40 CFR 63.985(b)(1)(ii). [40 CFR 63.985(b)(1)].

Submit with the Notification of Compliance Status, a monitoring plan containing the information specified in 40 CFR 63.999(b)(2)(i) and (ii) to identify the parameters that will be monitored to assure proper operation of the control device. [40 CFR 63.985(c)(1)].

Closed-vent systems: Submit Periodic Report: Due as specified in the referencing subpart. Include the information specified in 40 CFR 63.999(c)(1) through (c)(7), as applicable. [40 CFR 63.999(c)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Closed-vent systems (unsafe-to-monitor): Determine that the equipment is unsafe-to-inspect because inspecting personnel would be exposed to an imminent or potential danger as a consequence of complying with 40 CFR 63.983(b)(1). Comply with this requirement instead of the requirements in 40 CFR 63.983(b)(1). [40 CFR 63.983(b)(2)(i)].

Closed-vent systems (difficult-to-monitor): Determine that the equipment cannot be inspected without elevating the inspecting personnel more than 2 meters (7 feet) above a support surface. Comply with this requirement instead of the requirements in 40 CFR 63.983(b)(1). [40 CFR 63.983(b)(3)(i)].

Closed-vent systems (hard piping): Eliminate leak, or monitor according to the procedures in 40 CFR 63.983(c), if there are visible, audible, or olfactory indications of leaks at the time of the annual visual inspections required by 40 CFR 63.983(b)(1)(i)(B). [40 CFR 63.983(d)(1)].

Closed-vent systems: Repair leaks as soon as practical, except as provided in 40 CFR 63.983(d)(3). Make a first attempt at repair no later than 5 days after the leak is detected, and complete repairs no later than 15 days after the leak is detected or at the beginning of the next introduction of vapors to the system, whichever is later. [40 CFR 63.983(d)(2)].

Closed-vent systems (delay of repair allowed): Repair equipment as soon as practical, but not later than the end of the next closed-vent system shutdown. [40 CFR 63.983(d)(3)].

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G09	40 CFR Part 63 Subpart FFFF §§63.2455, 63.2460, 63.2465, 63.2470, 63.2475, and 63.2480	For the polyethylene manufacturing lines, comply with all applicable continuous and batch process vent, metal HAP process vent, storage tank, transfer rack, and equipment leak requirements under 40 CFR 63 Subpart FFFF. The polyethylene manufacturing lines are not subject to wastewater and heat exchange system requirements under 40 CFR 63 Subpart FFFF.	The same limitation as the limitation associated with the citation is used for the source.
G09	40 CFR Part 63 Subpart FFFF §63.2455(a), Table 1(1)(a)(i)	Organic HAP $\geq$ 98 % reduction by weight, or OHAP or TOC $\leq$ 20 ppmv, by venting emissions through a closed-vent system to any combination of control devices (except a flare).	The same limitation as the limitation associated with the citation is used for the source.
G09	40 CFR Part 63 Subpart FFFF §63.2455(a), Table 1(1)(a)(ii)	Reduce organic HAP emissions by venting emissions through closed-vent system to a flare.	The same limitation as the limitation associated with the citation is used for the source.
G09	40 CFR Part 63 Subpart FFFF §63.2460(a), Table 2(1)(c)	Reduce uncontrolled organic HAP emissions by venting through a closed-vent system to a flare.	The same limitation as the limitation associated with the citation is used for the source.
G09	40 CFR Part 63 Subpart FFFF §63.2465(a), Table 3(2)	HAP metals $\geq$ 97 % reduction by weight.	The same limitation as the limitation associated with the citation is used for the source.
G09	40 CFR Part 63 Subpart FFFF §63.2480(a), Table 6(2)(a)(i)	Comply with the requirements in 40 CFR 63 Subpart UU and the requirements referenced therein, except as specified in 40 CFR 63.2480(b)(6) and (7), (e), and (f).	The same limitation as the limitation associated with the citation is used for the source.
G09	40 CFR Part 63 Subpart FFFF §63.2480(e)(1)	Releases and potential leaks from a pressure relief device not routed through a closed vent system to a control device, back into the process, a fuel gas system, or drain system: Except during a pressure release, operate each pressure relief device in organic HAP gas or vapor service with an instrument reading of less than 500 ppm above background as measured by the method in 40 CFR 63.1023(b).	The same limitation as the limitation associated with the citation is used for the source.

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G09	40 CFR Part 63 Subpart FFFF §63.2480(e)(2)	Releases and potential leaks from a pressure relief device not routed through a closed vent system to a control device, back into the process, a fuel gas system, or drain system: For pressure relief devices in organic HAP gas or vapor service, comply with the applicable requirements in 40 CFR 63.2480(e)(2)(i) through (iii) of this section following a pressure release: (i) If the pressure relief device does not consist of or include a rupture disk, conduct instrument monitoring, as specified in 40 CFR 63.1023(b), no later than 5 calendar days after the pressure relief device returns to organic HAP gas or vapor service following a pressure release to verify that the pressure relief device is operating with an instrument reading of less than 500 ppm. (ii) If the pressure relief device includes a rupture disk, either comply with 40 CFR 63.2480(e)(2)(i) (and do not replace the rupture disk) or install a replacement disk as soon as practicable after a pressure release, but no later than 5 calendar days after the pressure release. (iii) If the pressure relief device consists only of a rupture disk, install a replacement disk as soon as practicable after a pressure release, but no later than 5 calendar days after the pressure release. The owner or operator must not initiate startup of the equipment served by the rupture disk until the rupture disc is replaced.	The same limitation as the limitation associated with the citation is used for the source.
G09	40 CFR Part 63 Subpart FFFF §63.2480(e)(3)	Releases and potential leaks from a pressure relief device not routed through a closed vent system to a control device, back into the process, a fuel gas system, or drain system: Comply with the requirements specified in 40 CFR 63.2480(e)(3)(i) through (v) for all pressure relief devices in organic HAP service.	The same limitation as the limitation associated with the citation is used for the source.
G09	40 CFR Part 63 Subpart FFFF §63.2480(e)(4)	Pressure relief devices routed to a control device, process, fuel gas system, or drain system: Both the closed vent system and control device (if applicable) must meet the applicable requirements specified in 40 CFR 63.982(c)(2), 63.983, and 63.2450(e)(4) through (6). The drain system (if applicable) must meet the applicable requirements specified in 40 CFR 63.2485(e).	The same limitation as the limitation associated with the citation is used for the source.

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G09	40 CFR Part 63 Subpart FFFF §63.2480(e)(8)	For affected sources that commenced construction or reconstruction on or before December 17, 2019, owners or operators are prohibited from installing a flowing pilot-operated pressure relief device or replacing any pressure relief device with a flowing pilot-operated pressure relief device after August 12, 2023. For affected sources that commenced construction or reconstruction after December 17, 2019, owners or operators are prohibited from installing and operating flowing pilot-operated pressure relief devices. A flowing pilot-operated pressure relief device means the type of pilot-operated pressure relief device where the pilot discharge vent continuously releases emissions to the atmosphere when the pressure relief device is actuated.	The same limitation as the limitation associated with the citation is used for the source.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	G09
☒	Group of Sources	Unit ID	
☐	Single Source	Scenario Name	
☐	Alternative Operating Scenario		
Citation No.	40 CFR Part 63 Subpart FFFF		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒ Testing	☒ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	CMS		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Determine the net heating value of the flare vent gas (NHVvg) based on the composition monitoring data specified in 40 CFR 63.670(j) on a 15-minute block average basis according to the requirements in 40 CFR 63.670(l)(5)(ii). [40 CFR 63.2450(e)(5)(viii)(C)].			
Install and operate pressure monitor(s) on the main flare header, as well as a valve position indicator monitoring system for each staging valve to ensure that the pressure-assisted multi-point flare operates within the proper range of conditions as specified by the manufacturer. The pressure monitor must meet the requirements in Table 13 to 40 CFR 63 Subpart CC. [40 CFR 63.2450(e)(5)(viii)(F)].			
When determining compliance with the flare tip velocity and combustion zone operating limits specified in 40 CFR 63.670(d) and (e), the requirement effectively applies starting with the 15-minute block that includes a full 15 minutes of the flaring event. The owner or operator is required to demonstrate compliance with the velocity and NHVcz requirements starting with the block that contains the fifteenth minute of a flaring event. The owner or operator is not required to demonstrate compliance for the previous 15-minute block in which the event started and contained only a fraction of flow. [40 CFR 63.2450(e)(5)(ii)].			
Comply with the monitoring requirements specified in 40 CFR 63.1366(b)(1)(xi) of 40 CFR 63 Subpart MMM for each fabric filter used to control HAP metals. [40 CFR 63.2465(d)(3)].			
How will data be reported?	See Section E. Reporting below.		

SECTION C. TESTING

Reference Test Method Description

Demonstrate compliance with the emission limit in 40 CFR 63 Subpart FFFF Table 3 for HAP metals at a new source using the methods and procedures specified in 40 CFR 63.2465(d)(1) through (d)(3), as applicable. [40 CFR 63.2465(d)].

Reference Test Method Citation

As specified

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Equipment/operational data recordkeeping by electronic or hard copy at the regulation's specified frequency. Keep records of the information specified in 40 CFR 63.2525(a) through (u), as applicable. [40 CFR 63.2525].

Keep the records specified in 40 CFR 63.2525(m)(1) through (14). [40 CFR 63.2525(m)].

Keep the flare monitoring records specified in 40 CFR 63.2525(m) instead of complying with 40 CFR 63.670(p). [40 CFR 63.2450(e)(5)(xii)].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Submit all of the notifications in 40 CFR 63.6(h)(4) and (h)(5), 63.7(b) and (c), 63.8(e), (f)(4) and (f)(6), and 63.9(b) through (h) by the dates specified, as applicable. [40 CFR 63.2515(a)].

Submit notification of intent to conduct a performance test: Due at least 60 calendar days before the performance test is scheduled to begin as required in 40 CFR 63.7(b)(1), if required to conduct a performance test. [40 CFR 63.2515(c)].

Submit Precompliance Report: Due at least six months prior to the compliance date. Include the information specified in 40 CFR 63.2520(c)(1) through (c)(8), as applicable. [40 CFR 63.2520(a) and (c)].

Submit Notification of Compliance Status Report: Due no later than 150 days after the compliance date specified in 40 CFR 63.2445. Include the information specified in 40 CFR 63.2520(d)(2) through (d)(6), as applicable. [40 CFR 63.2520(a) and (d)].

Submit Compliance Report: Due semiannually by August 31 and February 28. Include the information specified in 40 CFR 63.2520(e)(1) through (e)(17), as applicable. [40 CFR 63.2520(a) and (e)].

Comply with the reporting requirements specified in 40 CFR 63.2520(d)(3) and (e)(11) instead of complying with 40 CFR 63.670(q). [40 CFR 63.2450(e)(5)(xi)].

Reporting Start Date

As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

A root cause analysis and corrective action analysis must be completed as soon as possible, but no later than 45 days after a release event. Special circumstances affecting the number of root cause analyses and/or corrective action analyses are provided in 40 CFR 63.2480(e)(6)(i) through (iii). [40 CFR 63.2480(e)(6)].

Each owner or operator required to conduct a root cause analysis and corrective action analysis as specified in 40 CFR 63.2480(e)(3)(iii) and (e)(6), must implement the corrective action(s) identified in the corrective action analysis in accordance with the applicable requirements in 40 CFR 63.2480(e)(7)(i) through (iii). [40 CFR 63.2480(e)(7)].

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G10	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Vapor recovery systems and control devices shall be operated at all times while liquids are being loaded to, or vapors being purged from, loadout storage tanks.	The same limitation as the limitation associated with the citation is used for the source.
G10	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Atmospheric pressure liquid loadout storage tanks shall be filled by submerged loading and utilize preset stop-fill devices during loading.	The same limitation as the limitation associated with the citation is used for the source.
G10	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Liquid loadout hoses shall be equipped with low-leak couplings designed to close off the loading hose at the coupling prior to disconnect and operated in accordance with the manufacturer's specifications.	The same limitation as the limitation associated with the citation is used for the source.
G10	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Pre-transfer leak checks shall be performed on hoses and fittings by pressuring with nitrogen. Any leaks detected shall be repaired prior to introducing hydrocarbons into a transfer hose.	The same limitation as the limitation associated with the citation is used for the source.



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BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	G10
☒	Group of Sources	Unit ID	
☐	Single Source	Scenario Name	
☐	Alternative Operating Scenario		
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☐	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	NA		
Monitoring Device Location	Tank		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Monitor liquid level within loadout storage tanks during loading to avoid overfilling and fugitive emission releases from pressure relief devices.			
Monitor for pressure relief valve releases during liquid loading operations. Records of any pressure relief event shall be maintained on site and include the following details at a minimum:			
a. Date and time of the pressure relief event;			
b. Name and title of the observer;			
c. Duration of the event;			
d. Estimated emission rate during the event; and,			
e. Corrective action taken as a result of the event.			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD
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Describe any work practice standard(s).

Take any and all reasonable actions to avoid excess drainage of liquids or the emission of excess vapors during the disconnection of hoses after loading of a storage tank.

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G11	25 Pa. Code §129.56	Storage tanks greater than 40,000 gallons capacity containing VOCs. a. No person may permit the placing, storing or holding in a stationary tank, reservoir or other container with a capacity greater than 40,000 gallons of volatile organic compounds with a vapor pressure greater than 1.5 psia (10.5 kilopascals) under actual storage conditions unless the tank, reservoir or other container is a pressure tank capable of maintaining working pressures sufficient at all times to prevent vapor or gas loss to the atmosphere or is designed and equipped with one of the following vapor loss control devices: 1) An external or an internal floating roof. This control equipment may not be permitted if the volatile organic compounds have a vapor pressure of 11 psia (76 kilopascals) or greater under actual storage conditions. 2) Vapor recovery system. A vapor recovery system, consisting of a vapor gathering system capable of collecting the volatile organic compound vapors and gases discharged and a vapor disposal system capable of processing such volatile organic vapors and gases so as to prevent their emission to the atmosphere. Tank gauging and sampling devices shall be gastight except when gauging or sampling is taking place. The vapor recovery system shall be maintained in good working order and recover at least 80% of the vapors emitted by such tank. b. [Not applicable] c. An internal floating roof shall be fitted with a primary seal and shall comply with the following equipment requirements: 1) A closure seal or seals, to close the space between the roof edge and tank wall is used. 2) There are no holes, tears or other openings in the seal or a seal fabric or materials. 3) Openings except stub drains are equipped with covers, lids or seals such that: i. The cover, lid or seal is in the closed position at all times except when in actual use. ii. Automatic bleeder vents are closed at all times except when the roof is floated off or landed on the roof leg supports. iii. Rim vents, if provided are set to open when the roof is being floated off the roof leg supports or at the recommended setting of the manufacturer.	The same limitation as the limitation associated with the citation is used for the source.

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G11	25 Pa. Code §129.56 (cont'd)	d. This section does not apply to petroleum liquid storage vessels which: 1) Are used to store waxy, heavy pour crude oil. 2) Have capacities less than 420,000 gallons and are used to store produced crude oil and condensate prior to lease custody transfer. e. For the purposes of this section, the petroleum liquid storage vessels listed in this subsection comply with the equipment requirements of this section. These tanks shall comply with the maintenance, inspection and reporting requirements of this section. These petroleum liquid storage vessels are those: 1) Which contain a petroleum liquid with a true vapor pressure less than 4 psia (27.6 kilopascals) and which are of welded construction and which presently possess a metallic-type shoe seal, a liquid-mounted foam seal, a liquid-mounted liquid filled type seal or other closure device of demonstrated equivalence approved by the Department. 2) Which are of welded construction, equipped with a metallic-type shoe primary seal and has a secondary seal from the top of the shoe seal to the tank wall (shoe-mounted secondary seal). f. The owner or operator of a petroleum liquid storage vessel with a floating roof subject to this regulation shall: 1) Perform routine inspections annually in order to insure compliance with subsection (b) or (c). The inspection shall include a visual inspection of the secondary seal gap when inspecting external floating roof tanks. 2) For external floating roof tanks, measure the secondary seal gap annually in accordance with subsection (b)(1)(iii) when the floating roof is equipped with a vapor-mounted primary seal. 3) Maintain records of the types of volatile petroleum liquids stored, the maximum true vapor pressure of the liquid as stored, and the results of the inspections performed in subsection (f)(1) and (2). Copies of the records shall be retained by the owner or operator for a period of 2 years after the date on which the record was made and shall be made available to the Department upon written or verbal request at a reasonable time.	The same limitation as the limitation associated with the citation is used for the source.

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G11	25 Pa. Code §129.56 (cont'd)	g. For volatile organic compounds whose storage temperature is governed by ambient weather conditions, the vapor pressure under actual storage conditions shall be determined using a temperature which is representative of the average storage temperature for the hottest month of the year in which the storage takes place. h. If a failure is detected during inspections required in this section, the owner or operator, or both, shall repair the items or empty and remove the storage vessel from service within 45 days. If this failure cannot be repaired within 45 days and if the vessel cannot be emptied within 45 days, a 30-day extension may be requested from the Department. A request for an extension shall document that alternate storage capacity is unavailable and specify a schedule of actions the owner or operator will take that will assure that the equipment will be repaired or the vessel will be emptied as soon as possible but within the additional 30-day time requested.	The same limitation as the limitation associated with the citation is used for the source.
G11	25 Pa. Code §129.57	Storage tanks less than or equal to 40,000 gallons capacity containing VOCs. The provisions of this section shall apply to above ground stationary storage tanks with a capacity equal to or greater than 2,000 gallons which contain volatile organic compounds with vapor pressure greater than 1.5 psia (10.5 kilopascals) under actual storage conditions. Storage tanks covered under this section shall have pressure relief valves which are maintained in good operating condition and which are set to release at no less than .7 psig (4.8 kilopascals) of pressure or .3 psig (2.1 kilopascals) of vacuum or the highest possible pressure and vacuum in accordance with state or local fire codes or the National Fire Prevention Association guidelines or other national consensus standards acceptable to the Department. Section 129.56(g) (relating to storage tanks greater than 40,000 gallons capacity containing volatile organic compounds) applies to this section. Petroleum liquid storage vessels which are used to store produced crude oil and condensate prior to lease custody transfer shall be exempt from the requirements of this section.	The same limitation as the limitation associated with the citation is used for the source.

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G12	40 CFR Part 60 Subpart DDD §60.562-2, 40 CFR Part 63 Subpart FFFF §63.2535(k)	Affected facilities that are subject to 40 CFR 60 Subpart DDD are required to comply with the requirements specified in 40 CFR 60.482-1 through 40 CFR 60.482-10 in 40 CFR 60 Subpart VV as soon as practicable but no later than 180 days after initial startup. However, an affected source with equipment subject to the requirements of 40 CFR 60 Subpart VV may elect to apply 40 CFR 63 Subpart FFFF to all such equipment provided that all total organic compounds, minus methane and ethane, in such equipment for purposes of compliance with 40 CFR 63 Subpart FFFF, must be considered as if they were organic HAP. Accordingly, SPM has elected to comply only with the requirements of 40 CFR 63 Subpart FFFF for such equipment.	The same limitation as the limitation associated with the citation is used for the source.
G12	40 CFR Part 63 Subpart FFFF §63.2480(a), Table 6(2)(a)(i)	Comply with the requirements in 40 CFR 63 Subpart UU and the requirements referenced therein, except as specified in 40 CFR 63.2480(b)(6) and (7), (e), and (f).	The same limitation as the limitation associated with the citation is used for the source.

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G13	40 CFR Part 60 Subpart TTTT §60.5520(d), Table 2	Carbon dioxide <= 120 lb/MMBtu heat input.	The same limitation as the limitation associated with the citation is used for the source.



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DEPARTMENT OF ENVIRONMENTAL PROTECTION
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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	G13
☒	Group of Sources	Unit ID	
☐	Single Source	Scenario Name	
☐	Alternative Operating Scenario		
Citation No.	40 CFR Part 60 Subpart TTTT		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☐	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)			
Monitoring Device Location			
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter.			
How will data be reported?			
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
Maintain purchase records for permitted fuels (i.e. natural gas). [40 CFR 60.5520(d)(1)].			
For affected EGUs subject to the Acid Rain Program, follow the applicable recordkeeping requirements and maintain records as required under 40 CFR 75 Subpart F. [40 CFR 60.5560(b)(1)].			

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Prepare and submit the notifications specified in 40 CFR 60.7(a)(1) and (3) and 40 CFR 60.19, as applicable to your affected EGU(s) (see Table 3 of 40 CFR 60 Subpart TTTT). 40 CFR 60.7(a)(1) requires a notification of construction commencement to be postmarked no later than 30 days after such date. 40 CFR 60.7(a)(3) requires a notification of the actual date of initial startup of an affected facility to be postmarked within 15 days after such date. [40 CFR 60.5550(a)].

For affected EGUs under 40 CFR 60 Subpart TTTT that are also subject to the Acid Rain Program, meet all applicable reporting requirements and submit reports as required under 40 CFR 75 Subpart G. [40 CFR 60.5555(c)(1)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

4.2 Applicable Requirements for Source Groups

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group No.	Citation No.	Citation Limitation	Limitation Used
G14	40 CFR Part 63 Subpart YYYY §60.6100 and Table 1	Formaldehyde $\leq$ 91 ppb _v at 15% oxygen each, except during turbine startup. The period of time for turbine startup is subject to the limits specified in the definition of startup in 40 CFR 63.6175.	The same limitation as the limitation associated with the citation is used for the source.
G14	40 CFR Part 63 Subpart YYYY §60.6100 and Table 2	Maintain the 4-hour rolling average of the catalyst inlet temperature within the range suggested by the catalyst manufacturer. You are not required to use the catalyst inlet temperature data that is recorded during engine startup in the calculations of the 4-hour rolling average catalyst inlet temperature.	The same limitation as the limitation associated with the citation is used for the source.



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	G14
☒	Group of Sources	Unit ID	
☐	Single Source	Scenario Name	
☐	Alternative Operating Scenario		
Citation No.	40 CFR Part 63 Subpart YYYY		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒	Testing
☒	Record Keeping	☒	Work Practice Standard
☒		☒	Reporting
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	CMS		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Temperature monitored by temperature monitoring device continuously, as specified in 40 CFR 63 Subpart YYYY Table 5. Monitor the catalyst inlet temperature. [40 CFR 63.6125(a)].			
Develop and implement a CMS quality control program that includes written procedures for CMS according to 40 CFR 63.8(d)(1) through (2). Keep these written procedures on record for the life of the affected source or until the affected source is no longer subject to the provisions of this part, to be made available for inspection, upon request, by the Administrator. If the performance evaluation plan is revised, keep previous (i.e., superseded) versions of the performance evaluation plan on record to be made available for inspection, upon request, by the Administrator, for a period of 5 years after each revision to the plan. The program of corrective action should be included in the plan required under 40 CFR 63.8(d)(2). [40 CFR 63.6125(e)].			
Except for monitor malfunctions, associated repairs, and required quality assurance or quality control activities (including, as applicable, calibration checks and required zero and span adjustments of the monitoring system), you must conduct all parametric monitoring at all times the stationary combustion turbine is operating. [40 CFR 63.6135(a)].			
Do not use data recorded during monitor malfunctions, associated repairs, and required quality assurance or quality control activities for meeting the requirements of this subpart, including data averages and calculations. All the data collected during all other periods must be used in assessing the performance of the control device or in assessing emissions from the stationary combustion turbine. [40 CFR 63.6135(b)].			
How will data be reported?	See Section E. Reporting below.		

SECTION C. TESTING

Reference Test Method Description

Conduct performance tests annually as specified in 40 CFR 63 Subpart YYYY Table 3 and 40 CFR 63.6120(b) through (g), as applicable. [40 CFR 63.6115].

Performance tests must be conducted at high load, defined as 100 percent plus or minus 10 percent. Performance tests shall be conducted under such conditions based on representative performance of the affected source for the period being tested. Representative conditions exclude periods of startup, shutdown, and periods of malfunction. Record the process information that is necessary to document operating conditions during the test and include in such record an explanation to support that such conditions represent normal operation. Upon request, the owner or operator shall make available to the Administrator such records as may be necessary to determine the conditions of performance tests. [40 CFR 63.6120(c)].

Conduct three separate test runs for each performance test, and each test run must last at least 1 hour. [40 CFR 63.6120(d)].

Reference Test Method Citation As specified

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Keep records of the information specified in 40 CFR 63.6155(a) and (c). [40 CFR 63.6155].

Maintain all applicable records in such a manner that they can be readily accessed and are suitable for inspection according to 40 CFR 63.10(b)(1). Keep each record for 5 years following the date of each occurrence, measurement, maintenance, corrective action, report, or record. Retain records of the most recent 2 years on site or make records accessible on site. The remaining 3 years may be retained off site. [40 CFR 63.6160].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Report each instance in which each emission limitation or operating limitation and any applicable requirements in 40 CFR 63 Subpart YYYY Table 7 were not met according to the requirements in 40 CFR 63.6150. [40 CFR 63.6140(b)].

Submit all of the notifications in 40 CFR 63.7(b) and (c), 63.8(e), 63.8(f)(4), and 63.9(b) and (h) by the dates specified, as applicable. [40 CFR 63.6145(a)].

Submit Notification of Compliance Status: Due before the close of business on the 60th calendar day following the completion of a performance test. Include the performance test results. [40 CFR 63.6145(f)].

Submit compliance status report: Due semiannually, by the 31st of January and July as specified in 40 CFR 63.6150(b)(1) through (b)(5) and 40 CFR 63 Subpart YYYY Table 6. Include the information described in 40 CFR 63.6150(a)(1) through (a)(4). [40 CFR 63.6150(a)].

Within 60 days after the date of completing each performance test required by this subpart, submit the results of the performance test (as specified in 40 CFR 63.6145(f)) following the procedures specified in 40 CFR 63.6150 (f)(1) through (3). [40 CFR 63.6150(f)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

At all times, the owner or operator must operate and maintain any affected source, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions. The general duty to minimize emissions does not require the owner or operator to make any further efforts to reduce emissions if levels required by the applicable standard have been achieved. Determination of whether a source is operating in compliance with operation and maintenance requirements will be based on information available to the Administrator which may include, but is not limited to, monitoring results, review of operation and maintenance procedures, review of operation and maintenance records, and inspection of the source. [40 CFR 63.6105(c)].

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Source ID: 031 b. Source Name: Ethane Cracking Furnace #1

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: Linde e. Model Number: NA

f. Source Description: Tail gas/natural gas-fired ethane cracking furnace

g. Rated Heat Input/Throughput: 620 MMBtu/hr (HHV) h. Installation Date: 9/2022

i. Rated Power/Electric Output: NA

j. Exhaust Temperature: 253.6 Units °F k. Exhaust % Moisture: NA l. Exhaust Flow Volume: 101,254 SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

Yes No

- ☒ ☐ Emissions unit uses a control device to achieve compliance.
- ☒ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
031	Ethane Cracking Furnace #1	C031	SCR (Ethane Cracking Furnace #1)	100%
C031	SCR (Ethane Cracking Furnace #1)	S031	Stack (Ethane Cracking Furnace #1)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Tail gas	30119741	620 MMBtu/hr (HHV) tail gas and natural gas	Sequentially/simultaneously
Natural gas	30119741	620 MMBtu/hr (HHV) tail gas and natural gas	Sequentially/simultaneously

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Tail gas	NA	0%	0%	NA
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G01 and G05 in Section 4.2 for requirements that may be applicable to the source.			



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	031
Control Type	SCR	AIRS Code No.	Pollutant NOx
Control Make	NA	Control Model No.	NA
		Control Efficiency	≥90%
Control I.D.	C031	Source or Emission Unit Name	Ethane Cracking Furnace #1

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No																
☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.															
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.															
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act															
☐	☒	Approved under an emissions trading program.															
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).															
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor															
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:															
		<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Yes</th> <th style="width: 10%;">No</th> <th></th> </tr> </thead> <tbody> <tr> <td>☐</td> <td>☐</td> <td>Is owned by a municipality and</td> </tr> <tr> <td>☐</td> <td>☐</td> <td>Is exempt from all Part 75 monitoring requirements</td> </tr> <tr> <td>☐</td> <td>☐</td> <td>Is operated solely for providing power during peak electrical demand or emergency situations</td> </tr> <tr> <td>☐</td> <td>☐</td> <td>Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %</td> </tr> </tbody> </table>	Yes	No		☐	☐	Is owned by a municipality and	☐	☐	Is exempt from all Part 75 monitoring requirements	☐	☐	Is operated solely for providing power during peak electrical demand or emergency situations	☐	☐	Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %
Yes	No																
☐	☐	Is owned by a municipality and															
☐	☐	Is exempt from all Part 75 monitoring requirements															
☐	☐	Is operated solely for providing power during peak electrical demand or emergency situations															
☐	☐	Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %															

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Source ID: 032 b. Source Name: Ethane Cracking Furnace #2

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: Linde e. Model Number: NA

f. Source Description: Tail gas/natural gas-fired ethane cracking furnace

g. Rated Heat Input/Throughput: 620 MMBtu/hr (HHV) h. Installation Date: 9/2022

i. Rated Power/Electric Output: NA

j. Exhaust Temperature: 253.6 Units °F k. Exhaust % Moisture: NA l. Exhaust Flow Volume: 101,254 SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

Yes No

☒ ☐ Emissions unit uses a control device to achieve compliance.

☒ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
032	Ethane Cracking Furnace #2	C032	SCR (Ethane Cracking Furnace #2)	100%
C032	SCR (Ethane Cracking Furnace #2)	S032	Stack (Ethane Cracking Furnace #2)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Tail gas	30119741	620 MMBtu/hr (HHV) tail gas and natural gas	Sequentially/simultaneously
Natural gas	30119741	620 MMBtu/hr (HHV) tail gas and natural gas	Sequentially/simultaneously

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Tail gas	NA	0%	0%	NA
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G01 and G05 in Section 4.2 for requirements that may be applicable to the source.			



COMMONWEALTH OF PENNSYLVANIA
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BUREAU OF AIR QUALITY

ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	032
Control Type	SCR	AIRS Code No.	Pollutant NOx
Control Make	NA	Control Model No.	NA
		Control Efficiency	≥90%
Control I.D.	C032	Source or Emission Unit Name	Ethane Cracking Furnace #2

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No		
☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.	
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.	
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act	
☐	☒	Approved under an emissions trading program.	
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).	
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor	
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:	
	Yes	No	
	☐	☐	Is owned by a municipality and
	☐	☐	Is exempt from all Part 75 monitoring requirements
	☐	☐	Is operated solely for providing power during peak electrical demand or emergency situations
	☐	☐	Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Source ID: 033 b. Source Name: Ethane Cracking Furnace #3

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: Linde e. Model Number: NA

f. Source Description: Tail gas/natural gas-fired ethane cracking furnace

g. Rated Heat Input/Throughput: 620 MMBtu/hr (HHV) h. Installation Date: 9/2022

i. Rated Power/Electric Output: NA

j. Exhaust Temperature: 253.6 Units °F k. Exhaust % Moisture: NA l. Exhaust Flow Volume: 101,254 SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

Yes No

☒ ☐ Emissions unit uses a control device to achieve compliance.

☒ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
033	Ethane Cracking Furnace #3	C033	SCR (Ethane Cracking Furnace #3)	100%
C033	SCR (Ethane Cracking Furnace #3)	S033	Stack (Ethane Cracking Furnace #3)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Tail gas	30119741	620 MMBtu/hr (HHV) tail gas and natural gas	Sequentially/simultaneously
Natural gas	30119741	620 MMBtu/hr (HHV) tail gas and natural gas	Sequentially/simultaneously

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Tail gas	NA	0%	0%	NA
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G01 and G05 in Section 4.2 for requirements that may be applicable to the source.			



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BUREAU OF AIR QUALITY

ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	033
Control Type	SCR	AIRS Code No.	Pollutant NOx
Control Make	NA	Control Model No.	NA
		Control Efficiency	≥90%
Control I.D.	C033	Source or Emission Unit Name	Ethane Cracking Furnace #3

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No	
☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act
☐	☒	Approved under an emissions trading program.
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:
	Yes	No
	☐	☐
		Is owned by a municipality and
	☐	☐
		Is exempt from all Part 75 monitoring requirements
	☐	☐
		Is operated solely for providing power during peak electrical demand or emergency situations
	☐	☐
		Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Source ID: 034 b. Source Name: Ethane Cracking Furnace #4

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: Linde e. Model Number: NA

f. Source Description: Tail gas/natural gas-fired ethane cracking furnace

g. Rated Heat Input/Throughput: 620 MMBtu/hr (HHV) h. Installation Date: 9/2022

i. Rated Power/Electric Output: NA

j. Exhaust Temperature: 253.6 Units °F k. Exhaust % Moisture: NA l. Exhaust Flow Volume: 101,254 SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

Yes No

- ☒ ☐ Emissions unit uses a control device to achieve compliance.
- ☒ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
034	Ethane Cracking Furnace #4	C034	SCR (Ethane Cracking Furnace #4)	100%
C034	SCR (Ethane Cracking Furnace #4)	S034	Stack (Ethane Cracking Furnace #4)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Tail gas	30119741	620 MMBtu/hr (HHV) tail gas and natural gas	Sequentially/simultaneously
Natural gas	30119741	620 MMBtu/hr (HHV) tail gas and natural gas	Sequentially/simultaneously

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Tail gas	NA	0%	0%	NA
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G01 and G05 in Section 4.2 for requirements that may be applicable to the source.			



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SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	034
Control Type	SCR	AIRS Code No.	Pollutant NOx
Control Make	NA	Control Model No.	NA
		Control Efficiency	≥90%
Control I.D.	C034	Source or Emission Unit Name	Ethane Cracking Furnace #4

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No		
☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.	
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.	
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act	
☐	☒	Approved under an emissions trading program.	
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).	
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor	
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:	
	Yes	No	
	☐	☐	Is owned by a municipality and
	☐	☐	Is exempt from all Part 75 monitoring requirements
	☐	☐	Is operated solely for providing power during peak electrical demand or emergency situations
	☐	☐	Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Source ID: 035 b. Source Name: Ethane Cracking Furnace #5

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: Linde e. Model Number: NA

f. Source Description: Tail gas/natural gas-fired ethane cracking furnace

g. Rated Heat Input/Throughput: 620 MMBtu/hr (HHV) h. Installation Date: 9/2022

i. Rated Power/Electric Output: NA

j. Exhaust Temperature: 253.6 Units °F k. Exhaust % Moisture: NA l. Exhaust Flow Volume: 101,254 SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

Yes No

☒ ☐ Emissions unit uses a control device to achieve compliance.

☒ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
035	Ethane Cracking Furnace #5	C035	SCR (Ethane Cracking Furnace #5)	100%
C035	SCR (Ethane Cracking Furnace #5)	S035	Stack (Ethane Cracking Furnace #5)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Tail gas	30119741	620 MMBtu/hr (HHV) tail gas and natural gas	Sequentially/simultaneously
Natural gas	30119741	620 MMBtu/hr (HHV) tail gas and natural gas	Sequentially/simultaneously

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Tail gas	NA	0%	0%	NA
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G01 and G05 in Section 4.2 for requirements that may be applicable to the source.			



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SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	035
Control Type	SCR	AIRS Code No.	Pollutant NOx
Control Make	NA	Control Model No.	NA
		Control Efficiency	≥90%
Control I.D.	C035	Source or Emission Unit Name	Ethane Cracking Furnace #5

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No	
☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act
☐	☒	Approved under an emissions trading program.
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:
	Yes	No
	☐	☐
		Is owned by a municipality and
	☐	☐
		Is exempt from all Part 75 monitoring requirements
	☐	☐
		Is operated solely for providing power during peak electrical demand or emergency situations
	☐	☐
		Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Source ID: 036 b. Source Name: Ethane Cracking Furnace #6

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: Linde e. Model Number: NA

f. Source Description: Tail gas/natural gas-fired ethane cracking furnace

g. Rated Heat Input/Throughput: 620 MMBtu/hr (HHV) h. Installation Date: 9/2022

i. Rated Power/Electric Output: NA

j. Exhaust Temperature: 253.6 Units °F k. Exhaust % Moisture: NA l. Exhaust Flow Volume: 101,254 SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

Yes No

- ☒ ☐ Emissions unit uses a control device to achieve compliance.
- ☒ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
036	Ethane Cracking Furnace #6	C036	SCR (Ethane Cracking Furnace #6)	100%
C036	SCR (Ethane Cracking Furnace #6)	S036	Stack (Ethane Cracking Furnace #6)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Tail gas	30119741	620 MMBtu/hr (HHV) tail gas and natural gas	Sequentially/simultaneously
Natural gas	30119741	620 MMBtu/hr (HHV) tail gas and natural gas	Sequentially/simultaneously

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Tail gas	NA	0%	0%	NA
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G01 and G05 in Section 4.2 for requirements that may be applicable to the source.			



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	036
Control Type	SCR	AIRS Code No.	Pollutant NOx
Control Make	NA	Control Model No.	NA
		Control Efficiency	≥90%
Control I.D.	C036	Source or Emission Unit Name	Ethane Cracking Furnace #6

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No		
☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.	
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.	
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act	
☐	☒	Approved under an emissions trading program.	
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).	
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor	
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:	
	Yes	No	
	☐	☐	Is owned by a municipality and
	☐	☐	Is exempt from all Part 75 monitoring requirements
	☐	☐	Is operated solely for providing power during peak electrical demand or emergency situations
	☐	☐	Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Source ID: 037 b. Source Name: Ethane Cracking Furnace #7

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: Linde e. Model Number: NA

f. Source Description: Tail gas/natural gas-fired ethane cracking furnace

g. Rated Heat Input/Throughput: 620 MMBtu/hr (HHV) h. Installation Date: 9/2022

i. Rated Power/Electric Output: NA

j. Exhaust Temperature: 253.6 Units °F k. Exhaust % Moisture: NA l. Exhaust Flow Volume: 101,254 SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

Yes No

- ☒ ☐ Emissions unit uses a control device to achieve compliance.
- ☒ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
037	Ethane Cracking Furnace #7	C037	SCR (Ethane Cracking Furnace #7)	100%
C037	SCR (Ethane Cracking Furnace #7)	S037	Stack (Ethane Cracking Furnace #7)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Tail gas	30119741	620 MMBtu/hr (HHV) tail gas and natural gas	Sequentially/simultaneously
Natural gas	30119741	620 MMBtu/hr (HHV) tail gas and natural gas	Sequentially/simultaneously

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Tail gas	NA	0%	0%	NA
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G01 and G05 in Section 4.2 for requirements that may be applicable to the source.			



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	037
Control Type	SCR	AIRS Code No.	Pollutant NOx
Control Make	NA	Control Model No.	NA
		Control Efficiency	≥90%
Control I.D.	C037	Source or Emission Unit Name	Ethane Cracking Furnace #7

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No	
☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act
☐	☒	Approved under an emissions trading program.
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:
	Yes	No
	☐	☐
		Is owned by a municipality and
	☐	☐
		Is exempt from all Part 75 monitoring requirements
	☐	☐
		Is operated solely for providing power during peak electrical demand or emergency situations
	☐	☐
		Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Source ID: 101 b. Source Name: Combustion Turbine/Duct Burner Unit #1

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: GE e. Model Number: GE Frame 6B

f. Source Description: Natural gas-fired combustion turbine equipped with natural-gas fired duct burner that in combination generate electricity and steam

g. Rated Heat Input/Throughput: 715.4 MMBtu/hr (HHV) h. Installation Date: 3/2020
(total for combustion turbine and duct burner)

i. Rated Power/Electric Output: 41.5 MWe (combustion turbine electric generator only)

j. Exhaust Temperature: 311 Units °F k. Exhaust % Moisture: NA l. Exhaust Flow Volume: 254,896 SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

Yes No

☒ ☐ Emissions unit uses a control device to achieve compliance.

☒ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
101	Combustion Turbine/Duct Burner Unit #1	C101	SCR (Unit #1)	100%
C101	SCR (Unit #1)	C101A	Oxidation Catalyst (Unit #1)	100%
C101A	Oxidation Catalyst (Unit #1)	S101	Stack (Unit #1)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Natural gas	20200203	715.4 MMBtu/hr (HHV) (total for combustion turbine and duct burners)	NA

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G02, G13, and G14 in Section 4.2 for requirements that may be applicable to the source.			



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	101
Control Type	SCR	AIRS Code No.	Pollutant NOx
Control Make	NA	Control Model No.	NA
		Control Efficiency	≥80%
Control I.D.	C101	Source or Emission Unit Name	Combustion Turbine/Duct Burner Unit #1

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No	
☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act
☐	☒	Approved under an emissions trading program.
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:
	Yes	No
	☐	☐ Is owned by a municipality and
	☐	☐ Is exempt from all Part 75 monitoring requirements
	☐	☐ Is operated solely for providing power during peak electrical demand or emergency situations
	☐	☐ Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

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Plant Code	1	Source I.D.	101																																														
Control Type	Oxidation Catalyst	AIRS Code No.		Pollutant	CO																																												
Control Make	NA	Control Model No.	NA	Control Efficiency	≥90%																																												
Control I.D.	C101A	Source or Emission Unit Name	Combustion Turbine/Duct Burner Unit #1																																														
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The emissions unit is exempted from CAM because the emission limitations or standards are: <table style="width: 100%; border: none;"> <thead> <tr> <th style="width: 10%;">Yes</th> <th style="width: 10%;">No</th> <th style="width: 80%;"></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">☐</td> <td style="text-align: center;">☒</td> <td>Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.</td> </tr> <tr> <td style="text-align: center;">☐</td> <td style="text-align: center;">☒</td> <td>Stratospheric ozone protection requirements under Title VI of the Act.</td> </tr> <tr> <td style="text-align: center;">☐</td> <td style="text-align: center;">☒</td> <td>Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act</td> </tr> <tr> <td style="text-align: center;">☐</td> <td style="text-align: center;">☒</td> <td>Approved under an emissions trading program.</td> </tr> <tr> <td style="text-align: center;">☐</td> <td style="text-align: center;">☒</td> <td>An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).</td> </tr> <tr> <td style="text-align: center;">☒</td> <td style="text-align: center;">☐</td> <td>Determined by a continuous compliance method that does not use an assumed control factor</td> </tr> <tr> <td style="text-align: center;">☐</td> <td style="text-align: center;">☒</td> <td>Requirements for a backup utility power emissions unit as defined in § 72.2 which:</td> </tr> <tr> <td></td> <td style="text-align: center;">Yes</td> <td style="text-align: center;">No</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">☐</td> <td style="text-align: center;">☐</td> <td>Is owned by a municipality and</td> </tr> <tr> <td></td> <td style="text-align: center;">☐</td> <td style="text-align: center;">☐</td> <td>Is exempt from all Part 75 monitoring requirements</td> </tr> <tr> <td></td> <td style="text-align: center;">☐</td> <td style="text-align: center;">☐</td> <td>Is operated solely for providing power during peak electrical demand or emergency situations</td> </tr> <tr> <td></td> <td style="text-align: center;">☐</td> <td style="text-align: center;">☐</td> <td>Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %</td> </tr> </tbody> </table>						Yes	No		☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.	☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.	☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act	☐	☒	Approved under an emissions trading program.	☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).	☒	☐	Determined by a continuous compliance method that does not use an assumed control factor	☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:		Yes	No			☐	☐	Is owned by a municipality and		☐	☐	Is exempt from all Part 75 monitoring requirements		☐	☐	Is operated solely for providing power during peak electrical demand or emergency situations		☐	☐	Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %
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☐	☐	CAM Plan is attached or has been submitted																																															
☐	☐	An Implementation Plan is attached																																															

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Source ID: 102 b. Source Name: Combustion Turbine/Duct Burner Unit #2

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: GE e. Model Number: GE Frame 6B

f. Source Description: Natural gas-fired combustion turbine equipped with natural-gas fired duct burner that in combination generate electricity and steam

g. Rated Heat Input/Throughput: 715.4 MMBtu/hr (HHV) h. Installation Date: 3/2020
(total for combustion turbine and duct burner)

i. Rated Power/Electric Output: 41.5 MWe (combustion turbine electric generator only)

j. Exhaust Temperature: 311 Units °F k. Exhaust % Moisture: NA l. Exhaust Flow Volume: 254,896 SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

Yes No

☒ ☐ Emissions unit uses a control device to achieve compliance.

☒ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
102	Combustion Turbine/Duct Burner Unit #2	C102	SCR (Unit #2)	100%
C102	SCR (Unit #2)	C102A	Oxidation Catalyst (Unit #2)	100%
C102A	Oxidation Catalyst (Unit #2)	S102	Stack (Unit #2)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Natural gas	20200203	715.4 MMBtu/hr (HHV) (total for combustion turbine and duct burners)	NA

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G02, G13, and G14 in Section 4.2 for requirements that may be applicable to the source.			



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	102
Control Type	SCR	AIRS Code No.	Pollutant NOx
Control Make	NA	Control Model No.	NA
		Control Efficiency	≥80%
Control I.D.	C102	Source or Emission Unit Name	Combustion Turbine/Duct Burner Unit #2

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No		
☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.	
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.	
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act	
☐	☒	Approved under an emissions trading program.	
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).	
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor	
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:	
	Yes	No	
	☐	☐	Is owned by a municipality and
	☐	☐	Is exempt from all Part 75 monitoring requirements
	☐	☐	Is operated solely for providing power during peak electrical demand or emergency situations
	☐	☐	Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	102
Control Type	Oxidation Catalyst	AIRS Code No.	Pollutant CO
Control Make	NA	Control Model No.	NA
		Control Efficiency	≥90%
Control I.D.	C102A	Source or Emission Unit Name	Combustion Turbine/Duct Burner Unit #2

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No	
☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act
☐	☒	Approved under an emissions trading program.
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:
	Yes No	
	☐	☐
		Is owned by a municipality and
	☐	☐
		Is exempt from all Part 75 monitoring requirements
	☐	☐
		Is operated solely for providing power during peak electrical demand or emergency situations
	☐	☐
		Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Source ID: 103 b. Source Name: Combustion Turbine/Duct Burner Unit #3

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: GE e. Model Number: GE Frame 6B

f. Source Description: Natural gas-fired combustion turbine equipped with natural-gas fired duct burner that in combination generate electricity and steam

g. Rated Heat Input/Throughput: 715.4 MMBtu/hr (HHV) h. Installation Date: 3/2020
(total for combustion turbine and duct burner)

i. Rated Power/Electric Output: 41.5 MWe (combustion turbine electric generator only)

j. Exhaust Temperature: 311 Units °F k. Exhaust % Moisture: NA l. Exhaust Flow Volume: 254,896 SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

Yes No

☒ ☐ Emissions unit uses a control device to achieve compliance.

☒ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
103	Combustion Turbine/Duct Burner Unit #3	C103	SCR (Unit #3)	100%
C103	SCR (Unit #3)	C103A	Oxidation Catalyst (Unit #3)	100%
C103A	Oxidation Catalyst (Unit #3)	S103	Stack (Unit #3)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Natural gas	20200203	715.4 MMBtu/hr (HHV) (total for combustion turbine and duct burners)	NA

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G02, G13, and G14 in Section 4.2 for requirements that may be applicable to the source.			



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
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ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	103
Control Type	SCR	AIRS Code No.	Pollutant NOx
Control Make	NA	Control Model No.	NA
		Control Efficiency	≥80%
Control I.D.	C103	Source or Emission Unit Name	Combustion Turbine/Duct Burner Unit #3

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No	
☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act
☐	☒	Approved under an emissions trading program.
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:
	Yes	No
	☐	☐ Is owned by a municipality and
	☐	☐ Is exempt from all Part 75 monitoring requirements
	☐	☐ Is operated solely for providing power during peak electrical demand or emergency situations
	☐	☐ Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION					
Federal Tax ID	46-1624986				
Firm Name	Shell Chemical Appalachia LLC				
Plant Code	1	Source I.D.	103		
Control Type	Oxidation Catalyst	AIRS Code No.		Pollutant	CO
Control Make	NA	Control Model No.	NA	Control Efficiency	≥90%
Control I.D.	C103A	Source or Emission Unit Name	Combustion Turbine/Duct Burner Unit #3		
SECTION B. MONITORING					
The emissions unit is exempted from CAM because the emission limitations or standards are:					
Yes	No				
☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.			
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.			
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act			
☐	☒	Approved under an emissions trading program.			
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).			
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor			
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:			
	Yes	No			
	☐	☐	Is owned by a municipality and		
	☐	☐	Is exempt from all Part 75 monitoring requirements		
	☐	☐	Is operated solely for providing power during peak electrical demand or emergency situations		
	☐	☐	Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %		
SECTION C. CAM STATUS					
Yes	No				
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)			
☐	☐	CAM Plan is attached or has been submitted			
☐	☐	An Implementation Plan is attached			

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Source ID: 105 (GEN1) b. Source Name: Diesel-Fired Emergency Generator Engines (2); Generator 1 - Parking Garage

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: Cummins e. Model Number: QSB5-G3

f. Source Description: Diesel-fired emergency generator engine

g. Rated Heat Input/Throughput: 0.72 MMBtu/hr (HHV) h. Installation Date: 3/2017

i. Rated Power/Electric Output: 103 bhp

j. Exhaust Temperature: 778 Units °F k. Exhaust % Moisture: NA l. Exhaust Flow Volume: 284 SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

Yes No

☐ ☒ Emissions unit uses a control device to achieve compliance.

☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
105	Diesel-Fired Emergency Generator Engines (2)	S105	Stacks (Diesel-Fired Emergency Generator Engines)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Diesel	20100102	0.72 MMBtu/hr (HHV)	NA

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Diesel	NA	0.0015%	0.01%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: 100 (no limit on the hours of emergency use)

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
Diesel	NA	NA	NA	100	0.72 MMBtu/hr (HHV)	Annual

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Diesel	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Non-emergency operation of the diesel-fired emergency generator engine shall not exceed 100 hours in any consecutive 12-month period.	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group No. G03 in Section 4.2 for additional requirements that may be applicable to the source.

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Source ID: 105 (GEN2) b. Source Name: Diesel-Fired Emergency Generator Engines (2); Generator 2 - Telecom Hut

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: Kohler e. Model Number: KDI 3404TM

f. Source Description: Diesel-fired emergency generator engine

g. Rated Heat Input/Throughput: 0.47 MMBtu/hr (HHV) h. Installation Date: 4/2017

i. Rated Power/Electric Output: 67 bhp

j. Exhaust Temperature: 914 Units °F k. Exhaust % Moisture: NA l. Exhaust Flow Volume: 110 SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

Yes No

☐ ☒ Emissions unit uses a control device to achieve compliance.

☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
105	Diesel-Fired Emergency Generator Engines (2)	S105	Stacks (Diesel-Fired Emergency Generator Engines)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Diesel	20100102	0.47 MMBtu/hr (HHV)	NA

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Diesel	NA	0.0015%	0.01%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: 100 (no limit on the hours of emergency use)

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
Diesel	NA	NA	NA	100	0.47 MMBtu/hr (HHV)	Annual

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Diesel	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Non-emergency operation of the diesel-fired emergency generator engine shall not exceed 100 hours in any consecutive 12-month period.	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group No. G03 in Section 4.2 for additional requirements that may be applicable to the source.

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Source ID: 106 (FWP1) b. Source Name: Fire Pump Engines (2); Firewater Pump 1

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: Cummins e. Model Number: CFP15E-F10

f. Source Description: Diesel-fired emergency firewater pump engine

g. Rated Heat Input/Throughput: 3.42 MMBtu/hr (HHV) h. Installation Date: 10/2020

i. Rated Power/Electric Output: 488 bhp

j. Exhaust Temperature: 787 Units °F k. Exhaust % Moisture: NA l. Exhaust Flow Volume: 2,413 SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

Yes No

☐ ☒ Emissions unit uses a control device to achieve compliance.

☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
106	Fire Pump Engines (2)	S106	Stacks (Fire Pump Engines)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Diesel	20200102	3.42 MMBtu/hr (HHV)	NA

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Diesel	NA	0.0015%	0.01%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: 100 (no limit on the hours of emergency use)

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
Diesel	NA	NA	NA	100	3.42 MMBtu/hr (HHV)	Annual

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group No. G03 in Section 4.2 for requirements that may be applicable to the source.			

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Source ID: 106 (FWP2) b. Source Name: Fire Pump Engines (2); Firewater Pump 2

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: Cummins e. Model Number: CFP15E-F10

f. Source Description: Diesel-fired emergency firewater pump engine

g. Rated Heat Input/Throughput: 3.42 MMBtu/hr (HHV) h. Installation Date: 10/2020

i. Rated Power/Electric Output: 488 bhp

j. Exhaust Temperature: 787 Units °F k. Exhaust % Moisture: NA l. Exhaust Flow Volume: 2,413 SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

Yes No

☐ ☒ Emissions unit uses a control device to achieve compliance.

☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
106	Fire Pump Engines (2)	S106	Stacks (Fire Pump Engines)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Diesel	20200102	3.42 MMBtu/hr (HHV)	NA

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Diesel	NA	0.0015%	0.01%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: 100 (no limit on the hours of emergency use)

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
Diesel	NA	NA	NA	100	3.42 MMBtu/hr (HHV)	Annual

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group No. G03 in Section 4.2 for requirements that may be applicable to the source.			

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Source ID: 107 (GEN3) b. Source Name: Natural Gas-Fired Emergency Generator Engines (2); Generator 3 - Lift Station

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: GM e. Model Number: Vortec 5.7L

f. Source Description: Natural gas-fired emergency generator engine

g. Rated Heat Input/Throughput: 1.42 MMBtu/hr (HHV) h. Installation Date: 2/2017

i. Rated Power/Electric Output: 158 bhp

j. Exhaust Temperature: 1,250 Units °F k. Exhaust % Moisture: NA l. Exhaust Flow Volume: 389 SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

Yes No

☐ ☒ Emissions unit uses a control device to achieve compliance.

☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
107	Natural Gas-Fired Emergency Generator Engines (2)	S107	Stacks (Nat Gas-Fired Emergency Generator Engines)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Natural gas	20100202	1.42 MMBtu/hr (HHV)	NA

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: 100 (no limit on the hours of emergency use)

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
Natural gas	NA	NA	NA	100	1.42 MMBtu/hr (HHV)	Annual

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Natural gas	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Visible emissions from the natural gas-fired emergency generator engine shall not exceed the following: a. Equal to or greater than 10% for a period or periods aggregating more than three (3) minutes in any one (1) hour; and b. Equal to or greater than 30% at any time.	The same limitation as the limitation associated with the citation is used for the source.
Natural gas	Plan Approval 04-00740D [25 Pa. Code §127.12b]	The natural gas-fired emergency generator engine shall be certified to meet the following NOx, VOC, and CO emission standards: (Additional authority for this condition is derived from 40 CFR 60.4233) NOx: 2.0 g/HP-hr VOC: 1.0 g/HP-hr CO: 4.0 g/HP-hr	The same limitation as the limitation associated with the citation is used for the source.
Natural gas	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Non-emergency operation of the natural gas-fired emergency generator engine shall not exceed 100 hours in any consecutive 12-month period.	The same limitation as the limitation associated with the citation is used for the source.
Natural gas	40 CFR Part 60 Subpart JJJJ §60.4233(e), Table 1	NOx: 2.0 g/HP-hr VOC: 1.0 g/HP-hr CO: 4.0 g/HP-hr	The same limitation as the limitation associated with the citation is used for the source.

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Natural gas	40 CFR Part 60 Subpart JJJJ §60.4243(d)	Emergency stationary ICE may be operated for the purpose of maintenance checks and readiness testing, provided that the tests are recommended by Federal, State or local government, the manufacturer, the vendor, or the insurance company associated with the engine. Maintenance checks and readiness testing of such units is limited to 100 hours per year. There is no time limit on the use of emergency stationary ICE in emergency situations. The owner or operator may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner or operator maintains records indicating that Federal, State, or local standards require maintenance and testing of emergency ICE beyond 100 hours per year. Emergency stationary ICE may operate up to 50 hours per year in non-emergency situations, but those 50 hours are counted towards the 100 hours per year provided for maintenance and testing. The 50 hours per year for non-emergency situations cannot be used for peak shaving or to generate income for a facility to supply power to an electric grid or otherwise supply power as part of a financial arrangement with another entity. For owners and operators of emergency engines, any operation other than emergency operation, maintenance and testing, and operation in non-emergency situations for 50 hours per year, as permitted in 40 CFR 60.4243, is prohibited.	The same limitation as the limitation associated with the citation is used for the source.
Natural gas	40 CFR Part 63 Subpart ZZZZ §63.6590(c)(6)	Meet the requirements of 40 CFR 63 Subpart ZZZZ by meeting the requirements of 40 CFR 60 Subpart JJJJ. No further requirements apply for such engines under 40 CFR 63 Subpart ZZZZ.	The same limitation as the limitation associated with the citation is used for the source.

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Refer to Applicable Requirements for the Entire Site in Section 2 for additional requirements that may be applicable to the source.			



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	
☐	Group of Sources	Unit ID	
☒	Single Source		107 (Natural Gas-Fired Emergency Generator Engines (2))
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart JJJJ		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	CMS		
Monitoring Device Location	Engine		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Operating time monitored by hour/time monitor continuously during operation. Install a non-resettable hour meter prior to startup of the engine. [40 CFR 60.4237(b) and (c)].			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording. Keep records of the information in 40 CFR 60.4245(a)(1)-(4). [40 CFR 60.4245(a)].			
Keep records of the hours of operation of the engine that is recorded through the non-resettable hour meter. Document how many hours are spent for emergency operation, including what classified the operation as emergency and how many hours are spent for non-emergency operation. [40 CFR 60.4245(b)].			
SECTION E. REPORTING			
Describe what is to be reported and the frequency of reporting.			
Reporting Start Date			

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Operate and maintain stationary SI ICE that achieve the emission standards as required in 40 CFR 60.4233 over the entire life of the engine. [40 CFR 60.4234].

Operate and maintain the certified stationary SI internal combustion engine and control device according to the manufacturer's emission-related written instructions and keep records of conducted maintenance to demonstrate compliance. No performance testing is required. [40 CFR 60.4243(a)(1)].

Meet the requirements as specified in 40 CFR 1068 Subparts A through D, as applicable. If the engine settings are adjusted, adjust according to and consistent with the manufacturer's instructions. [40 CFR 60.4243(a)(1)].

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Source ID: 107 (GEN4) b. Source Name: Natural Gas-Fired Emergency Generator Engines (2); Generator 4 - Lift Station

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: GM e. Model Number: Vortec 3.0L

f. Source Description: Natural gas-fired emergency generator engine

g. Rated Heat Input/Throughput: 0.37 MMBtu/hr (HHV) h. Installation Date: 8/2016

i. Rated Power/Electric Output: 50 bhp

j. Exhaust Temperature: 1,270 Units °F k. Exhaust % Moisture: NA l. Exhaust Flow Volume: 76 SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

Yes No

☐ ☒ Emissions unit uses a control device to achieve compliance.

☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
107	Natural Gas-Fired Emergency Generator Engines (2)	S107	Stacks (Nat Gas-Fired Emergency Generator Engines)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Natural gas	20100202	0.37 MMBtu/hr (HHV)	NA

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: 100 (no limit on the hours of emergency use)

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
Natural gas	NA	NA	NA	100	0.37 MMBtu/hr (HHV)	Annual

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Natural gas	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Visible emissions from the natural gas-fired emergency generator engine shall not exceed the following: a. Equal to or greater than 10% for a period or periods aggregating more than three (3) minutes in any one (1) hour; and b. Equal to or greater than 30% at any time.	The same limitation as the limitation associated with the citation is used for the source.
Natural gas	Plan Approval 04-00740D [25 Pa. Code §127.12b]	The natural gas-fired emergency generator engine shall be certified to meet the following NO _x , VOC, and CO emission standards: (Additional authority for this condition is derived from 40 CFR 60.4233) NO _x : 5.39 g/HP-hr* CO: 387 g/HP-hr * The emission standard is in terms of NO _x + VOC.	The same limitation as the limitation associated with the citation is used for the source.
Natural gas	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Non-emergency operation of the natural gas-fired emergency generator engine shall not exceed 100 hours in any consecutive 12-month period.	The same limitation as the limitation associated with the citation is used for the source.
Natural gas	40 CFR Part 60 Subpart JJJJ §60.4233(d), Table 1	NO _x + HC: 10 g/HP-hr CO: 387 g/HP-hr	The same limitation as the limitation associated with the citation is used for the source.

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Natural gas	40 CFR Part 60 Subpart JJJJ §60.4243(d)	Emergency stationary ICE may be operated for the purpose of maintenance checks and readiness testing, provided that the tests are recommended by Federal, State or local government, the manufacturer, the vendor, or the insurance company associated with the engine. Maintenance checks and readiness testing of such units is limited to 100 hours per year. There is no time limit on the use of emergency stationary ICE in emergency situations. The owner or operator may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner or operator maintains records indicating that Federal, State, or local standards require maintenance and testing of emergency ICE beyond 100 hours per year. Emergency stationary ICE may operate up to 50 hours per year in non-emergency situations, but those 50 hours are counted towards the 100 hours per year provided for maintenance and testing. The 50 hours per year for non-emergency situations cannot be used for peak shaving or to generate income for a facility to supply power to an electric grid or otherwise supply power as part of a financial arrangement with another entity. For owners and operators of emergency engines, any operation other than emergency operation, maintenance and testing, and operation in non-emergency situations for 50 hours per year, as permitted in 40 CFR 60.4243, is prohibited.	The same limitation as the limitation associated with the citation is used for the source.
Natural gas	40 CFR Part 63 Subpart ZZZZ §63.6590(c)(6)	Meet the requirements of 40 CFR 63 Subpart ZZZZ by meeting the requirements of 40 CFR 60 Subpart JJJJ. No further requirements apply for such engines under 40 CFR 63 Subpart ZZZZ.	The same limitation as the limitation associated with the citation is used for the source.

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Refer to Applicable Requirements for the Entire Site in Section 2 for additional requirements that may be applicable to the source.			



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	
☐	Group of Sources	Unit ID	
☒	Single Source		107 (Natural Gas-Fired Emergency Generator Engines (2))
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart JJJJ		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	CMS		
Monitoring Device Location	Engine		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Operating time monitored by hour/time monitor continuously during operation. Install a non-resettable hour meter prior to startup of the engine. [40 CFR 60.4237(b) and (c)].			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording. Keep records of the information in 40 CFR 60.4245(a)(1)-(4). [40 CFR 60.4245(a)].			
Keep records of the hours of operation of the engine that is recorded through the non-resettable hour meter. Document how many hours are spent for emergency operation, including what classified the operation as emergency and how many hours are spent for non-emergency operation. [40 CFR 60.4245(b)].			
SECTION E. REPORTING			
Describe what is to be reported and the frequency of reporting.			
Reporting Start Date			

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Operate and maintain stationary SI ICE that achieve the emission standards as required in 40 CFR 60.4233 over the entire life of the engine. [40 CFR 60.4234].

Operate and maintain the certified stationary SI internal combustion engine and control device according to the manufacturer's emission-related written instructions and keep records of conducted maintenance to demonstrate compliance. No performance testing is required. [40 CFR 60.4243(a)(1)].

Meet the requirements as specified in 40 CFR 1068 Subparts A through D, as applicable. If the engine settings are adjusted, adjust according to and consistent with the manufacturer's instructions. [40 CFR 60.4243(a)(1)].

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Source ID: C204 b. Source Name: CVTO

c. Plan Approval or Operating Permit Number: PA-04-00740A and PA-04-00740C (included under LP Incinerator (Source ID C204A) in those plan approvals) and PA-04-00740D

d. Manufacturer: John Zink e. Model Number: NA

f. Source Description: Thermal oxidizer used to control VOC and organic HAP emissions

g. Rated Heat Input/Throughput: 200 MMBtu/hr (HHV) h. Installation Date: 9/2022

i. Rated Power/Electric Output: NA

j. Exhaust Temperature: 1,600 Units °F k. Exhaust % Moisture: NA l. Exhaust Flow Volume: 45,524 SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

Yes No

☐ ☒ Emissions unit uses a control device to achieve compliance.

☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
C204	CVTO	S204	Stack (CVTO)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Natural gas / Waste gas	30190013	199.1 MMBtu/hr (HHV)	NA

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190013	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Visible emissions from the CVTO shall not exceed 0% except for a total of five minutes during any consecutive two-hour period.	The same limitation as the limitation associated with the citation is used for the source.
30190013	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Emissions from the CVTO shall not exceed the following: a. NO _x - 0.06 lb/MMBtu b. CO - 0.0824 lb/MMBtu c. PM ₁₀ - 0.0075 lb/MMBtu d. PM _{2.5} - 0.0075 lb/MMBtu	The same limitation as the limitation associated with the citation is used for the source.
30190013	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	The CVTO shall be designed and operated to reduce collected VOC emissions by a minimum of 99.9%.	The same limitation as the limitation associated with the citation is used for the source.
30190013	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	The CVTO shall, at all times that vapors are being collected by the CVTO Header System and routed to the CVTO, be operated at or above the minimum temperature at which at least 99.9% destruction efficiency is guaranteed by the manufacturer or demonstrated during performance testing.	The same limitation as the limitation associated with the citation is used for the source.
30190013	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Vent gas from the CVTO Header shall be captured and routed to the MPGF CVTO Trip Header when the CVTO is not available and during abnormal CVTO system operating conditions, such as high CVTO Header System pressure, high CVTO temperature, high CVTO combustion zone temperature, and low CVTO combustion air pressure.	The same limitation as the limitation associated with the citation is used for the source.
30190013	40 CFR Part 60 Subpart Kb §60.112b(a)(3)(ii)	VOC, Total >= 95 % reduction efficiency.	The same limitation as the limitation associated with the citation is used for the source.
30190013	40 CFR Part 60 Subpart Kb §60.113b(c)(2)	Operate the closed vent system and control device in accordance with the operating plan submitted to DEP in accordance with 40 CFR 60.113b(c)(1), unless the plan was modified by DEP during the review process. In this case, the modified plan applies.	The same limitation as the limitation associated with the citation is used for the source.

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190013	40 CFR Part 63 Subpart FFFF §63.2450(e)(1)	Reduce organic HAP emissions by venting emissions through a closed-vent system to any combination of control devices (except a flare) or recovery devices and meet the requirements of 40 CFR 63.2450(e)(4) and 40 CFR 63.982(c).	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G05, G08, and G09 in Section 4.2 for additional requirements that may be applicable to the source.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	
☐	Group of Sources	Unit ID	204 (CVTO Header System) / C204 (CVTO)
☒	Single Source	Scenario Name	
☐	Alternative Operating Scenario		
Citation No.	PA-04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒	Testing
☒	Record Keeping	☐	Work Practice Standard
☐		☐	Reporting
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Monitoring for compliance with the 99.9% destruction efficiency requirement for the CVTO shall be performed in accordance with 40 CFR 63.985(c). Operating parameter monitoring shall include combustion temperature at a minimum.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the flow rate in the vent gas header to the CVTO at a minimum of once every 15 minutes.			
Utilize a gas chromatograph (or equivalent monitor) to measure, calculate, and record VOC and GHG content at the CVTO Header at a minimum of once every 15 minutes.			
How will data be reported?	NA		

SECTION C. TESTING

Reference Test Method Description

Perform NO_x, CO, PM₁₀, PM_{2.5}, and n-Hexane emission testing upon the CVTO according to the requirements of 25 Pa. Code Chapter 139. Initial performance testing is required within 180 days of startup of the CVTO or on an alternative schedule as approved by the Department. Subsequent performance testing is required at minimum of once every 5 years thereafter. Extension to the initial and subsequent performance testing deadlines may be granted by the Department in writing in response to a written request and upon a satisfactory showing that an extension is justified. EPA Reference Method performance testing shall be conducted for the initial and subsequent performance tests.

Perform VOC destruction efficiency testing upon the CVTO in accordance with 40 CFR 63.985(b)(1)(ii). Initial performance testing is required within 180 days of startup of the CVTO or on an alternative schedule as approved by the Department. Subsequent performance testing is required at a minimum of once every 5 years thereafter. Extension of the initial and subsequent performance testing deadlines may be granted by the Department in writing in response to a written request and upon a satisfactory showing that an extension is justified.

Reference Test Method Citation As specified

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Maintain records of the flow rate in the vent gas header to the CVTO on a daily basis.

VOC and GHG content measured by a gas chromatograph (or equivalent monitor) shall be used to calculate 12-month rolling total VOC and GHG emissions for the CVTO.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	204 (CVTO Header System) / C204 (CVTO)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	25 Pa. Code §127.441(b)		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒	Testing
☒	Record Keeping	☐	Work Practice Standard
☐	Reporting		
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Monitoring for compliance with the 99.9% destruction efficiency requirement for the CVTO shall be performed in accordance with 40 CFR 63.985(c). Operating parameter monitoring shall include combustion temperature at a minimum.			
Utilize a gas chromatograph (or equivalent monitor) to measure, calculate, and record VOC content at the CVTO Header at a minimum of once every 15 minutes.			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Perform VOC destruction efficiency testing upon the CVTO in accordance with 40 CFR 63.985(b)(1)(ii). Initial performance testing is required within 180 days of startup of the CVTO or on an alternative schedule as approved by the Department. Subsequent performance testing is required at a minimum of once every 5 years thereafter. Extension of the initial and subsequent performance testing deadlines may be granted by the Department in writing in response to a written request and upon a satisfactory showing that an extension is justified.			
Reference Test Method Citation	As specified		
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
VOC content measured by a gas chromatograph (or equivalent monitor) shall be used to calculate 12-month rolling total VOC emissions for the CVTO.			

SECTION E. REPORTING
Describe what is to be reported and the frequency of reporting.
Reporting Start Date
SECTION F. WORK PRACTICE STANDARD
Describe any work practice standard(s).



COMMONWEALTH OF PENNSYLVANIA
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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	204 (CVTO Header System) / C204 (CVTO)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart Kb		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	NA		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Monitor the parameters of the control device in accordance with the operating plan submitted to the Department in accordance with 40 CFR 60.113b(c)(1), unless the plan was modified by Department during the review process. In this case, the modified plan applies. [40 CFR 60.113b(c)(2)].			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording. Operating plan recordkeeping by electronic or hard copy at the approved frequency. Keep copies of all records for the life of the control equipment. [40 CFR 60.115b(c)(1)].			
Monitoring data recordkeeping by electronic or hard copy upon measurement in accordance with the operating plan of 40 CFR 60.113b(c)(2). Keep copies of all records for at least two years. [40 CFR 60.115b(c)(2)].			

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Submit an operating plan as an attachment to the notification required by 40 CFR 60.7(a)(1) for approval by the Department. The operating plan shall contain the information listed in 40 CFR 60.113b(c)(1)(i) and (ii). [40 CFR 60.113b(c)(1)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

- a. Source ID: C205A b. Source Name: Totally Enclosed Ground Flare (TEGF) A
- c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D
- d. Manufacturer: Zeeco e. Model Number: NA
- f. Source Description: Enclosed pressure-assisted multi-point ground flare used to control VOC and organic HAP emissions
- g. Rated Heat Input/Throughput: 13,257 MMBtu/hr (HHV) total for TEGF A and TEGF B h. Installation Date: 9/2022
- i. Rated Power/Electric Output: NA
- j. Exhaust Temperature: NA Units k. Exhaust % Moisture: NA l. Exhaust Flow Volume: NA SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

- Yes No
- ☐ ☒ Emissions unit uses a control device to achieve compliance.
- ☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
C205A	TEGF A	S205A	Stack (TEGF A)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Natural gas / Waste gas	30190023	7,800 MMBtu/hr (HHV) total for TEGF A and TEGF B	NA

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Visible emissions from the TEGFs shall not exceed 0% except for a total of five minutes during any consecutive two-hour period.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	The TEGFs shall be designed and operated to reduce collected VOC emissions by a minimum of 98%.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	Vapors collected by the HP Header System shall only be routed to the HP Elevated Flare in the event that the combined capacity of the TEGFs is exceeded due to malfunction or emergency, or due to maintenance of the TEGFs.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	The TEGFs shall be equipped with automated controls for control of the supplemental gas flow rate to the flares.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR Part 63 Subpart YY, 40 CFR Part 63 Subpart FFFF, 40 CFR 63.670, and 40 CFR 63.671.	The same limitation as the limitation associated with the citation is used for the source.
30190023	25 Pa. Code §127.441(b)	Net heating value of the combustion zone gas at the HP Header shall equal or exceed 500 Btu/scf on a three-hour rolling average, calculated every 15 minutes.	The same limitation as the limitation associated with the citation is used for the source.
30190023	25 Pa. Code §127.441(b)	Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 60.18(c) through (f) and 40 CFR 63.11(b).	The same limitation as the limitation associated with the citation is used for the source.

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	40 CFR Part 60 Subpart DDD §60.562-1(a)(1)(i)(C)	Meet the conditions specified in 40 CFR 60.18 at all times.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 60 Subpart NNN §60.662(b)	Meet the requirements of 40 CFR 60.18.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart FFFF §63.2535(m)(1)	Flares that are subject to the provisions of 40 CFR 60.18 or 63.11 and must comply with the requirements in 40 CFR 63.2450(e)(5) are required to comply only with the provisions specified in 40 CFR 63 Subpart FFFF.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart YY §63.1100(g)(7)(i)	Flares that are subject to 40 CFR 60.18 or 40 CFR 63.11 and used as a control device for an emission point subject to the requirements in Table 7 to 40 CFR 63.1103(e) are required to comply only with 40 CFR 63.1103(e)(4).	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart FFFF §63.2450(e)(5)	Reduce organic HAP emissions by venting emissions through a closed-vent system to a steam-assisted, air-assisted, non-assisted, or pressure-assisted multi-point flare and meet the applicable requirements for flares as specified in 40 CFR 63.670 and 63.671 of 40 CFR 63 Subpart CC, including the provisions in Tables 12 and 13 to 40 CFR 63 Subpart CC, except as specified in 40 CFR 63.1103(e)(5)(i) through (xiii).	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(c)	Specify the smokeless design capacity of the flare and operate with no visible emissions, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours, when regulated material is routed to the flare.	The same limitation as the limitation associated with the citation is used for the source.

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	40 CFR Part 63 Subpart CC §63.670(e)(2)	Operate each pressure-assisted flare to maintain the net heating value of flare combustion zone gas (NHVcz) at or above 800 Btu/scf determined on a 15-minute block period basis when regulated material is routed to the flare for at least 15-minutes. Monitor and calculate NHVcz as specified in 40 CFR 63.670(m).	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(o)	Comply with the provisions in 40 CFR 63.670(o)(1) through (8) for any flare that has the potential to operate above its smokeless capacity under any circumstance.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(r)	An owner or operator may request approval from the Administrator for site-specific operating limits that shall apply specifically to a selected flare. Site-specific operating limits include alternative threshold values for the parameters specified in 40 CFR 63.670(d) through (f) as well as threshold values for operating parameters other than those specified in 40 CFR 63.670(d) through (f). The owner or operator must demonstrate that the flare achieves 96.5% combustion efficiency (or 98% destruction efficiency) using the site-specific operating limits based on a performance evaluation as described in 40 CFR 63.670(r)(1). The request shall include information as described in 40 CFR 63.670(r)(2).	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G05 and G09 in Section 4.2 for additional requirements that may be applicable to the source.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	205 (HP Header System) / C205A and C205B (TEGF A and TEGF B)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Net heating value of the combustion zone gas at the HP Header shall be measured and recorded at a minimum of once every 15 minutes. An adjusted net heating value of hydrogen of 1,212 Btu/scf may be used for this calculation.			
Monitoring for compliance with the 98% destruction efficiency requirement for the TEGF A and TEGF B shall be performed in accordance with 40 CFR 63 Subpart YY, 40 CFR 63 Subpart FFFF, 40 CFR 63.670, and 40 CFR 63.671.			
Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 63 Subpart YY, 40 CFR 63 Subpart FFFF, 40 CFR 63.670, and 40 CFR 63.671.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the HP Header as well as any flare supplemental gas used.			
Utilize a gas chromatograph (or equivalent monitor) to measure, calculate, and record VOC and GHG content at the HP Header at a minimum of once every 15 minutes.			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

VOC and GHG content measured by the gas chromatograph (or equivalent monitor) shall be used to calculate 12-month rolling total VOC and GHG emissions for the TEGF A, TEGF B, and HP Elevated Flare.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Minimize flaring resulting from startups, shutdowns, and unforeseeable events by operating the HP Flare System at all times in accordance with an approved flare minimization plan. The plan shall include the following:

- a. Procedures for operating and maintaining the HP Flare System during periods of process unit startup, shutdown, and unforeseeable events.
- b. A program of corrective action for malfunctioning process equipment.
- c. Procedures to minimize discharges either directly to the atmosphere or to the HP Flare System during the planned and unplanned startup or shutdown of process unit and air pollution control equipment, including an evaluation of flaring that has occurred or may reasonably be expected to occur during planned maintenance activities, including startup and shutdown, that considers the feasibility of performing these activities without flaring.
- d. Procedures for conducting root cause analyses.
- e. Procedures for taking identified corrective actions.
- f. The baseline flow to the HP Flare System determined in accordance with the provisions of 40 CFR 60.103a(a)(4).

Conduct a root cause analysis within 45 days after any startup flaring event, shutdown flaring event, or unforeseeable flaring event at the HP Flare System. Flaring event shall be defined as an event that exceeds the baseline by 500,000 scf within a 24-hour period. The analysis shall address the following:

- a. The date and time that the flaring event started and ended.
- b. The total quantity of gas flared during each event.
- c. An estimate of the quantity of VOC that was emitted and the calculations used to determine the quantities.
- d. The steps taken to limit the duration of the flaring event or the quantity of emissions associated with the event.
- e. A detailed analysis that sets forth the root cause and all significant contributing causes of the flaring event to the extent determinable.
- f. An analysis of the measures that are available to reduce the likelihood of a recurrence of a flaring event resulting from the same root cause or significant contributing causes in the future. The analysis of prevention measures must consider the adequacy of existing maintenance schedules and protocols for equipment contributing to the flaring event.
- g. A demonstration that the actions taken during the flaring event are consistent with the procedures specified in the flare minimization plan.
- h. In response to a flaring event, the Owner/Operator shall implement, as expeditiously as practicable, such interim and/or long-term corrective actions as are consistent with good engineering practice to minimize the likelihood of a recurrence of the root cause and all significant contributing causes of that flaring event.
- i. If any items required to be addressed in this analysis are still under investigation 45 days after the flaring event, the Owner/Operator shall include a statement of the anticipated date by which a follow-up report fully conforming to the requirements of this Condition shall be completed.

Site-specific flare guidelines, included in the flare minimization and management plan as an Appendix, shall be followed which ensures the stage sequencing and parameters at which stages open or close for the TEGFs in accordance with manufacturer's recommendations.



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	205 (HP Header System) / C205A and C205B (TEGF A and TEGF B)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	25 Pa. Code §127.441(b)		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Net heating value of the combustion zone gas at the HP Header shall be measured and recorded at a minimum of once every 15 minutes. An adjusted net heating value of hydrogen of 1,212 Btu/scf may be used for this calculation.			
Monitoring for compliance with the 98% destruction efficiency requirement for the TEGF A and TEGF B shall be performed in accordance with 40 CFR 63.987(c). Operating parameter monitoring shall include flame detection at a minimum.			
Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 60.18(c) through (f) and 40 CFR 63.11(b).			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the HP Header as well as any flare supplemental gas used.			
Utilize a gas chromatograph (or equivalent monitor) to measure, calculate, and record VOC content at the HP Header at a minimum of once every 15 minutes.			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

VOC content measured by the gas chromatograph (or equivalent monitor) shall be used to calculate 12-month rolling total VOC emissions for the TEGF A, TEGF B, and HP Elevated Flare.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Minimize flaring resulting from startups, shutdowns, and unforeseeable events by operating the HP Flare System at all times in accordance with an approved flare minimization plan. The plan shall include the following:

- a. Procedures for operating and maintaining the HP Flare System during periods of process unit startup, shutdown, and unforeseeable events.
- b. A program of corrective action for malfunctioning process equipment.
- c. Procedures to minimize discharges either directly to the atmosphere or to the HP Flare System during the planned and unplanned startup or shutdown of process unit and air pollution control equipment.
- d. Procedures for conducting root cause analyses.
- e. Procedures for taking identified corrective actions.
- f. The baseline flow to the HP Flare System determined in accordance with the provisions of 40 CFR 60.103a(a)(4).

Conduct a root cause analysis within 45 days after any startup flaring event, shutdown flaring event, or unforeseeable flaring event at the HP Flare System. Flaring event shall be defined as an event that exceeds the baseline by 500,000 scf within a 24-hour period. The analysis shall address the following:

- a. The date and time that the flaring event started and ended.
- b. The total quantity of gas flared during each event.
- c. An estimate of the quantity of VOC that was emitted and the calculations used to determine the quantities.
- d. The steps taken to limit the duration of the flaring event or the quantity of emissions associated with the event.
- e. A detailed analysis that sets forth the root cause and all significant contributing causes of the flaring event to the extent determinable.
- f. An analysis of the measures that are available to reduce the likelihood of a recurrence of a flaring event resulting from the same root cause or significant contributing causes in the future.
- g. A demonstration that the actions taken during the flaring event are consistent with the procedures specified in the flare minimization plan.
- h. In response to a flaring event, implement, as expeditiously as practicable, such interim and/or long-term corrective actions as are consistent with good engineering practice to minimize the likelihood of a recurrence of the root cause and all significant contributing causes of that flaring event.
- i. If any items required to be addressed in this analysis are still under investigation 45 days after the flaring event, include a statement of the anticipated date by which a follow-up report fully conforming to the requirements of this Condition shall be completed.



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	205 (HP Header System) / C205A and C205B (TEGF A and TEGF B)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart NNN		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	CMS		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Presence of a flame monitored by heat sensing device continuously. Use a heat sensing device, such as an ultra-violet beam sensor or thermocouple, at the pilot light to monitor the continuous presence of a flame. [40 CFR 60.663(b)(1)].			
Flow monitored by flow indicator hourly. Monitor the vent stream flow to the flare. Install the flow indicator in the vent stream from each affected facility at a point closest to the flare and before being joined with any other vent stream. [40 CFR 60.663(b)(2)].			
How will data be reported? See Section E. Reporting below.			
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Flow recordkeeping by electronic or hard copy hourly. Record the vent stream flow to the flare at least once every hour for each affected facility. Make records readily available for inspection. [40 CFR 60.665(d)].

Maintain up-to-date, readily accessible records of all periods when the vent stream is diverted from the control device or has no flow rate. [40 CFR 60.665(d)].

Flare pilot flame recordkeeping by electronic or hard copy continuously. Make records readily available for inspection. [40 CFR 60.665(f)].

Maintain up-to-date, readily accessible records of all periods of operations in which the pilot flame is absent. [40 CFR 60.665(f)].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Notify the Department with the specific provisions of 40 CFR 60.662 (40 CFR 60.662(a), (b), or (c)) with which the facility operator has elected to comply. Submit the notification with the notification of initial start-up required in 40 CFR 60.7(a)(3). [40 CFR 60.665(a)].

Notify the Department 90 days before implementing any change in the provision of 40 CFR 60.662 with which the operator elects to comply. [40 CFR 60.665(a)].

Submit report: Due semiannually. Submit initial report within 6 months after the initial start-up date. Include the information outlined in 40 CFR 60.665(l)(1) through (l)(7). [40 CFR 60.665(l)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	205 (HP Header System) / C205A and C205B (TEGF A and TEGF B)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 63 Subpart CC		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Continuously monitor the presence of the pilot flame or flare flame(s) using a device (including, but not limited to, a thermocouple, ultraviolet beam sensor, or infrared sensor) capable of detecting that the pilot flame or flare flame(s) is present. [40 CFR 63.670(g)].			
Monitor visible emissions while regulated materials are vented to the flare. An initial visible emissions demonstration must be conducted using an observation period of 2 hours using Method 22 at 40 CFR 60, Appendix A-7. Subsequent visible emissions observations must be conducted using either the methods in 40 CFR 63.670(h)(1) or, alternatively, the methods in 40 CFR 63.670(h)(2). [40 CFR 63.670(h)].			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the flare header or headers that feed the flare as well as any supplemental natural gas used. Different flow monitoring methods may be used to measure different gaseous streams that make up the flare vent gas provided that the flow rates of all gas streams that contribute to the flare vent gas are determined. If assist air or assist steam is used, the owner or operator shall install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist air and/or assist steam used with the flare. [40 CFR 63.670(i)].			
Determine the concentration of individual components in the flare vent gas using either the methods provided in 40 CFR 63.670(j)(1) or (2), to assess compliance with the operating limits in 40 CFR 63.670(e) and, if applicable, 40 CFR 63.670(d) and (f). Alternatively, the owner or operator may elect to directly monitor the net heating value of the flare vent gas following the methods provided in 40 CFR 63.670(j)(3) and, if desired, may directly measure the hydrogen concentration in the flare vent gas following the methods provided in 40 CFR 63.670(j)(4). The owner or operator may elect to use different monitoring methods for different gaseous streams that make up the flare vent gas using different methods provided the composition or net heating value of all gas streams that contribute to the flare vent gas are determined. [40 CFR 63.670(j)].			

When calculating NHVvg for a specific 15-minute block:

- (A) If the results from the first sample collected during an event (for periodic flare vent gas flow events) are not available until after the second 15-minute block starts, use the results from the first sample collected during an event for the first 15-minute block associated with that event.
- (B) For all other cases, use the arithmetic average of all NHVvg measurement data results that become available during a 15-minute block to calculate the 15-minute block average for that period. For the purpose of this requirement, use the time that the results become available rather than the time the sample was collected. For example, if a sample is collected at 12:25 a.m. and the analysis is completed at 12:38 a.m., the results are available at 12:38 a.m. and these results would be used to determine compliance during the 15-minute block period from 12:30 a.m. to 12:45 a.m. [40 CFR 63.670(l)(5)(ii)].

Determine the net heating value of the combustion zone gas (NHVcz) as specified in 40 CFR 63.670(m)(1) or (2), as applicable. [40 CFR 63.670(m)].

Except as specified in 40 CFR 63.670(m)(2), determine the 15-minute block average NHVcz based on the 15-minute block average vent gas and assist gas flow rates using the equation listed in 40 CFR 63.670(m)(1). For periods when there is no assist steam flow or premix assist air flow, $NHVcz = NHVvg$. [40 CFR 63.670(m)(1)].

Owners and operators of flares that use the feed-forward calculation methodology in 40 CFR 63.670(l)(5)(i) and that monitor gas composition or net heating value in a location representative of the cumulative vent gas stream and that directly monitor supplemental natural gas flow additions to the flare must determine the 15-minute block average NHVcz using equation listed in 40 CFR 63.670(m)(2). [40 CFR 63.670(m)(2)].

For each CPMS installed to comply with applicable provisions in 40 CFR 63.670, install, operate, calibrate, and maintain the CPMS as specified in 40 CFR 63.671(a)(1) through (8). [40 CFR 63.671(a)].

All monitoring equipment, except for CPMS installed for pilot flame monitoring, must meet the applicable minimum accuracy, calibration and quality control requirements specified in table 13 of 40 CFR 63 Subpart CC. [40 CFR 63.671(a)(1)].

Ensure the readout (that portion of the CPMS that provides a visual display or record) or other indication of the monitored operating parameter from any CPMS required for compliance is readily accessible onsite for operational control or inspection by the operator of the source. [40 CFR 63.671(a)(2)].

All CPMS must complete a minimum of one cycle of operation (sampling, analyzing and data recording) for each successive 15-minute period. [40 CFR 63.671(a)(3)].

Except for periods of monitoring system malfunctions, repairs associated with monitoring system malfunctions, and required monitoring system quality assurance or quality control activities (including, as applicable, calibration checks and required zero and span adjustments), the owner or operator shall operate all CPMS and collect data continuously at all times when regulated emissions are routed to the flare. [40 CFR 63.671(a)(4)].

Operate, maintain, and calibrate each CPMS according to the CPMS monitoring plan specified in 40 CFR 63.671(b). [40 CFR 63.671(a)(5)].

The CPMS must be capable of measuring the appropriate parameter over the range of values expected for that measurement location. The data recording system associated with each CPMS must have a resolution that is equal to or better than the required system accuracy. [40 CFR 63.671(a)(8)].

Develop and implement a CPMS quality control program documented in a CPMS monitoring plan that covers each flare subject to the provisions in 40 CFR 63.670 and each CPMS installed to comply with applicable provisions in 40 CFR 63.670. The CPMS monitoring plan must contain the information listed in 40 CFR 63.671(b)(1) through (5). [40 CFR 63.671(b)].

For each CPMS installed to comply with applicable provisions in 40 CFR 63.670 except for CPMS installed for pilot flame monitoring, the owner or operator shall comply with the out-of-control procedures described in 40 CFR 63.671(c)(1) and (2). [40 CFR 63.671(c)].

Reduce data from a CPMS installed to comply with applicable provisions in 40 CFR 63.670 as specified in 40 CFR 63.671(d)(1) through (3). [40 CFR 63.671(d)].

For monitors used to determine compositional analysis for net heating value per 40 CFR 63.670(j)(1), the gas chromatograph must also meet the requirements of 40 CFR 63.671(e)(1) through (3). [40 CFR 63.671(e)].

How will data be reported?	See Section E. Reporting below.
SECTION C. TESTING	
Reference Test Method Description	
Reference Test Method Citation	
SECTION D. RECORD KEEPING	
Describe what parameters will be recorded and the frequency of recording. Maintain a copy of the CPMS monitoring plan readily available on-site at all times. [40 CFR 63.671(b)].	
SECTION E. REPORTING	
Describe what is to be reported and the frequency of reporting. Record and report any instances where visible emissions are observed for more than 5 minutes during any 2 consecutive hours as specified in 40 CFR 63.655(g)(11)(ii). [40 CFR 63.670(h)].	
Submit a copy of the CPMS monitoring plan to the Administrator upon request by the Administrator. [40 CFR 63.671(b)].	
Reporting Start Date	As specified
SECTION F. WORK PRACTICE STANDARD	
Describe any work practice standard(s).	

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

- a. Source ID: C205B b. Source Name: Totally Enclosed Ground Flare (TEGF) B
- c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D
- d. Manufacturer: Zeeco e. Model Number: NA
- f. Source Description: Enclosed pressure-assisted multi-point ground flare used to control VOC and organic HAP emissions
- g. Rated Heat Input/Throughput: 13,257 MMBtu/hr (HHV) total for TEGF A and TEGF B h. Installation Date: 9/2022
- i. Rated Power/Electric Output: NA
- j. Exhaust Temperature: NA Units k. Exhaust % Moisture: NA l. Exhaust Flow Volume: NA SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

- Yes No
- ☐ ☒ Emissions unit uses a control device to achieve compliance.
- ☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
C205B	TEGF B	S205B	Stack (TEGF B)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Natural gas / Waste gas	30190023	7,800 MMBtu/hr (HHV) total for TEGF A and TEGF B	NA

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Visible emissions from the TEGFs shall not exceed 0% except for a total of five minutes during any consecutive two-hour period.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	The TEGFs shall be designed and operated to reduce collected VOC emissions by a minimum of 98%.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	Vapors collected by the HP Header System shall only be routed to the HP Elevated Flare in the event that the combined capacity of the TEGFs is exceeded due to malfunction or emergency, or due to maintenance of the TEGFs.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	The TEGFs shall be equipped with automated controls for control of the supplemental gas flow rate to the flares.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR Part 63 Subpart YY, 40 CFR Part 63 Subpart FFFF, 40 CFR 63.670, and 40 CFR 63.671.	The same limitation as the limitation associated with the citation is used for the source.
30190023	25 Pa. Code §127.441(b)	Net heating value of the combustion zone gas at the HP Header shall equal or exceed 500 Btu/scf on a three-hour rolling average, calculated every 15 minutes.	The same limitation as the limitation associated with the citation is used for the source.
30190023	25 Pa. Code §127.441(b)	Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 60.18(c) through (f) and 40 CFR 63.11(b).	The same limitation as the limitation associated with the citation is used for the source.

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	40 CFR Part 60 Subpart DDD §60.562-1(a)(1)(i)(C)	Meet the conditions specified in 40 CFR 60.18 at all times.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 60 Subpart NNN §60.662(b)	Meet the requirements of 40 CFR 60.18.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart FFFF §63.2535(m)(1)	Flares that are subject to the provisions of 40 CFR 60.18 or 63.11 and must comply with the requirements in 40 CFR 63.2450(e)(5) are required to comply only with the provisions specified in 40 CFR 63 Subpart FFFF.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart YY §63.1100(g)(7)(i)	Flares that are subject to 40 CFR 60.18 or 40 CFR 63.11 and used as a control device for an emission point subject to the requirements in Table 7 to 40 CFR 63.1103(e) are required to comply only with 40 CFR 63.1103(e)(4).	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart FFFF §63.2450(e)(5)	Reduce organic HAP emissions by venting emissions through a closed-vent system to a steam-assisted, air-assisted, non-assisted, or pressure-assisted multi-point flare and meet the applicable requirements for flares as specified in 40 CFR 63.670 and 63.671 of 40 CFR 63 Subpart CC, including the provisions in Tables 12 and 13 to 40 CFR 63 Subpart CC, except as specified in 40 CFR 63.1103(e)(5)(i) through (xiii).	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(c)	Specify the smokeless design capacity of the flare and operate with no visible emissions, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours, when regulated material is routed to the flare.	The same limitation as the limitation associated with the citation is used for the source.

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	40 CFR Part 63 Subpart CC §63.670(e)(2)	Operate each pressure-assisted flare to maintain the net heating value of flare combustion zone gas (NHVcz) at or above 800 Btu/scf determined on a 15-minute block period basis when regulated material is routed to the flare for at least 15-minutes. Monitor and calculate NHVcz as specified in 40 CFR 63.670(m).	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(o)	Comply with the provisions in 40 CFR 63.670(o)(1) through (8) for any flare that has the potential to operate above its smokeless capacity under any circumstance.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(r)	An owner or operator may request approval from the Administrator for site-specific operating limits that shall apply specifically to a selected flare. Site-specific operating limits include alternative threshold values for the parameters specified in 40 CFR 63.670(d) through (f) as well as threshold values for operating parameters other than those specified in 40 CFR 63.670(d) through (f). The owner or operator must demonstrate that the flare achieves 96.5% combustion efficiency (or 98% destruction efficiency) using the site-specific operating limits based on a performance evaluation as described in 40 CFR 63.670(r)(1). The request shall include information as described in 40 CFR 63.670(r)(2).	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G05 and G09 in Section 4.2 for additional requirements that may be applicable to the source.



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	205 (HP Header System) / C205A and C205B (TEGF A and TEGF B)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Net heating value of the combustion zone gas at the HP Header shall be measured and recorded at a minimum of once every 15 minutes. An adjusted net heating value of hydrogen of 1,212 Btu/scf may be used for this calculation.			
Monitoring for compliance with the 98% destruction efficiency requirement for the TEGF A and TEGF B shall be performed in accordance with 40 CFR 63 Subpart YY, 40 CFR 63 Subpart FFFF, 40 CFR 63.670, and 40 CFR 63.671.			
Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 63 Subpart YY, 40 CFR 63 Subpart FFFF, 40 CFR 63.670, and 40 CFR 63.671.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the HP Header as well as any flare supplemental gas used.			
Utilize a gas chromatograph (or equivalent monitor) to measure, calculate, and record VOC and GHG content at the HP Header at a minimum of once every 15 minutes.			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

VOC and GHG content measured by the gas chromatograph (or equivalent monitor) shall be used to calculate 12-month rolling total VOC and GHG emissions for the TEGF A, TEGF B, and HP Elevated Flare.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Minimize flaring resulting from startups, shutdowns, and unforeseeable events by operating the HP Flare System at all times in accordance with an approved flare minimization plan. The plan shall include the following:

- a. Procedures for operating and maintaining the HP Flare System during periods of process unit startup, shutdown, and unforeseeable events.
- b. A program of corrective action for malfunctioning process equipment.
- c. Procedures to minimize discharges either directly to the atmosphere or to the HP Flare System during the planned and unplanned startup or shutdown of process unit and air pollution control equipment, including an evaluation of flaring that has occurred or may reasonably be expected to occur during planned maintenance activities, including startup and shutdown, that considers the feasibility of performing these activities without flaring.
- d. Procedures for conducting root cause analyses.
- e. Procedures for taking identified corrective actions.
- f. The baseline flow to the HP Flare System determined in accordance with the provisions of 40 CFR 60.103a(a)(4).

Conduct a root cause analysis within 45 days after any startup flaring event, shutdown flaring event, or unforeseeable flaring event at the HP Flare System. Flaring event shall be defined as an event that exceeds the baseline by 500,000 scf within a 24-hour period. The analysis shall address the following:

- a. The date and time that the flaring event started and ended.
- b. The total quantity of gas flared during each event.
- c. An estimate of the quantity of VOC that was emitted and the calculations used to determine the quantities.
- d. The steps taken to limit the duration of the flaring event or the quantity of emissions associated with the event.
- e. A detailed analysis that sets forth the root cause and all significant contributing causes of the flaring event to the extent determinable.
- f. An analysis of the measures that are available to reduce the likelihood of a recurrence of a flaring event resulting from the same root cause or significant contributing causes in the future. The analysis of prevention measures must consider the adequacy of existing maintenance schedules and protocols for equipment contributing to the flaring event.
- g. A demonstration that the actions taken during the flaring event are consistent with the procedures specified in the flare minimization plan.
- h. In response to a flaring event, the Owner/Operator shall implement, as expeditiously as practicable, such interim and/or long-term corrective actions as are consistent with good engineering practice to minimize the likelihood of a recurrence of the root cause and all significant contributing causes of that flaring event.
- i. If any items required to be addressed in this analysis are still under investigation 45 days after the flaring event, the Owner/Operator shall include a statement of the anticipated date by which a follow-up report fully conforming to the requirements of this Condition shall be completed.

Site-specific flare guidelines, included in the flare minimization and management plan as an Appendix, shall be followed which ensures the stage sequencing and parameters at which stages open or close for the TEGFs in accordance with manufacturer's recommendations.



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	205 (HP Header System) / C205A and C205B (TEGF A and TEGF B)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	25 Pa. Code §127.441(b)		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Net heating value of the combustion zone gas at the HP Header shall be measured and recorded at a minimum of once every 15 minutes. An adjusted net heating value of hydrogen of 1,212 Btu/scf may be used for this calculation.			
Monitoring for compliance with the 98% destruction efficiency requirement for the TEGF A and TEGF B shall be performed in accordance with 40 CFR 63.987(c). Operating parameter monitoring shall include flame detection at a minimum.			
Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 60.18(c) through (f) and 40 CFR 63.11(b).			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the HP Header as well as any flare supplemental gas used.			
Utilize a gas chromatograph (or equivalent monitor) to measure, calculate, and record VOC content at the HP Header at a minimum of once every 15 minutes.			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

VOC content measured by the gas chromatograph (or equivalent monitor) shall be used to calculate 12-month rolling total VOC emissions for the TEGF A, TEGF B, and HP Elevated Flare.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Minimize flaring resulting from startups, shutdowns, and unforeseeable events by operating the HP Flare System at all times in accordance with an approved flare minimization plan. The plan shall include the following:

- a. Procedures for operating and maintaining the HP Flare System during periods of process unit startup, shutdown, and unforeseeable events.
- b. A program of corrective action for malfunctioning process equipment.
- c. Procedures to minimize discharges either directly to the atmosphere or to the HP Flare System during the planned and unplanned startup or shutdown of process unit and air pollution control equipment.
- d. Procedures for conducting root cause analyses.
- e. Procedures for taking identified corrective actions.
- f. The baseline flow to the HP Flare System determined in accordance with the provisions of 40 CFR 60.103a(a)(4).

Conduct a root cause analysis within 45 days after any startup flaring event, shutdown flaring event, or unforeseeable flaring event at the HP Flare System. Flaring event shall be defined as an event that exceeds the baseline by 500,000 scf within a 24-hour period. The analysis shall address the following:

- a. The date and time that the flaring event started and ended.
- b. The total quantity of gas flared during each event.
- c. An estimate of the quantity of VOC that was emitted and the calculations used to determine the quantities.
- d. The steps taken to limit the duration of the flaring event or the quantity of emissions associated with the event.
- e. A detailed analysis that sets forth the root cause and all significant contributing causes of the flaring event to the extent determinable.
- f. An analysis of the measures that are available to reduce the likelihood of a recurrence of a flaring event resulting from the same root cause or significant contributing causes in the future.
- g. A demonstration that the actions taken during the flaring event are consistent with the procedures specified in the flare minimization plan.
- h. In response to a flaring event, implement, as expeditiously as practicable, such interim and/or long-term corrective actions as are consistent with good engineering practice to minimize the likelihood of a recurrence of the root cause and all significant contributing causes of that flaring event.
- i. If any items required to be addressed in this analysis are still under investigation 45 days after the flaring event, include a statement of the anticipated date by which a follow-up report fully conforming to the requirements of this Condition shall be completed.



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	205 (HP Header System) / C205A and C205B (TEGF A and TEGF B)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart NNN		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	CMS		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Presence of a flame monitored by heat sensing device continuously. Use a heat sensing device, such as an ultra-violet beam sensor or thermocouple, at the pilot light to monitor the continuous presence of a flame. [40 CFR 60.663(b)(1)].			
Flow monitored by flow indicator hourly. Monitor the vent stream flow to the flare. Install the flow indicator in the vent stream from each affected facility at a point closest to the flare and before being joined with any other vent stream. [40 CFR 60.663(b)(2)].			
How will data be reported? See Section E. Reporting below.			
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Flow recordkeeping by electronic or hard copy hourly. Record the vent stream flow to the flare at least once every hour for each affected facility. Make records readily available for inspection. [40 CFR 60.665(d)].

Maintain up-to-date, readily accessible records of all periods when the vent stream is diverted from the control device or has no flow rate. [40 CFR 60.665(d)].

Flare pilot flame recordkeeping by electronic or hard copy continuously. Make records readily available for inspection. [40 CFR 60.665(f)].

Maintain up-to-date, readily accessible records of all periods of operations in which the pilot flame is absent. [40 CFR 60.665(f)].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Notify the Department with the specific provisions of 40 CFR 60.662 (40 CFR 60.662(a), (b), or (c)) with which the facility operator has elected to comply. Submit the notification with the notification of initial start-up required in 40 CFR 60.7(a)(3). [40 CFR 60.665(a)].

Notify the Department 90 days before implementing any change in the provision of 40 CFR 60.662 with which the operator elects to comply. [40 CFR 60.665(a)].

Submit report: Due semiannually. Submit initial report within 6 months after the initial start-up date. Include the information outlined in 40 CFR 60.665(l)(1) through (l)(7). [40 CFR 60.665(l)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	205 (HP Header System) / C205A and C205B (TEGF A and TEGF B)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 63 Subpart CC		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Continuously monitor the presence of the pilot flame or flare flame(s) using a device (including, but not limited to, a thermocouple, ultraviolet beam sensor, or infrared sensor) capable of detecting that the pilot flame or flare flame(s) is present. [40 CFR 63.670(g)].			
Monitor visible emissions while regulated materials are vented to the flare. An initial visible emissions demonstration must be conducted using an observation period of 2 hours using Method 22 at 40 CFR 60, Appendix A-7. Subsequent visible emissions observations must be conducted using either the methods in 40 CFR 63.670(h)(1) or, alternatively, the methods in 40 CFR 63.670(h)(2). [40 CFR 63.670(h)].			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the flare header or headers that feed the flare as well as any supplemental natural gas used. Different flow monitoring methods may be used to measure different gaseous streams that make up the flare vent gas provided that the flow rates of all gas streams that contribute to the flare vent gas are determined. If assist air or assist steam is used, the owner or operator shall install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist air and/or assist steam used with the flare. [40 CFR 63.670(i)].			
Determine the concentration of individual components in the flare vent gas using either the methods provided in 40 CFR 63.670(j)(1) or (2), to assess compliance with the operating limits in 40 CFR 63.670(e) and, if applicable, 40 CFR 63.670(d) and (f). Alternatively, the owner or operator may elect to directly monitor the net heating value of the flare vent gas following the methods provided in 40 CFR 63.670(j)(3) and, if desired, may directly measure the hydrogen concentration in the flare vent gas following the methods provided in 40 CFR 63.670(j)(4). The owner or operator may elect to use different monitoring methods for different gaseous streams that make up the flare vent gas using different methods provided the composition or net heating value of all gas streams that contribute to the flare vent gas are determined. [40 CFR 63.670(j)].			

When calculating NHVvg for a specific 15-minute block:

- (A) If the results from the first sample collected during an event (for periodic flare vent gas flow events) are not available until after the second 15-minute block starts, use the results from the first sample collected during an event for the first 15-minute block associated with that event.
- (B) For all other cases, use the arithmetic average of all NHVvg measurement data results that become available during a 15-minute block to calculate the 15-minute block average for that period. For the purpose of this requirement, use the time that the results become available rather than the time the sample was collected. For example, if a sample is collected at 12:25 a.m. and the analysis is completed at 12:38 a.m., the results are available at 12:38 a.m. and these results would be used to determine compliance during the 15-minute block period from 12:30 a.m. to 12:45 a.m. [40 CFR 63.670(l)(5)(ii)].

Determine the net heating value of the combustion zone gas (NHVcz) as specified in 40 CFR 63.670(m)(1) or (2), as applicable. [40 CFR 63.670(m)].

Except as specified in 40 CFR 63.670(m)(2), determine the 15-minute block average NHVcz based on the 15-minute block average vent gas and assist gas flow rates using the equation listed in 40 CFR 63.670(m)(1). For periods when there is no assist steam flow or premix assist air flow, $NHVcz = NHVvg$. [40 CFR 63.670(m)(1)].

Owners and operators of flares that use the feed-forward calculation methodology in 40 CFR 63.670(l)(5)(i) and that monitor gas composition or net heating value in a location representative of the cumulative vent gas stream and that directly monitor supplemental natural gas flow additions to the flare must determine the 15-minute block average NHVcz using equation listed in 40 CFR 63.670(m)(2). [40 CFR 63.670(m)(2)].

For each CPMS installed to comply with applicable provisions in 40 CFR 63.670, install, operate, calibrate, and maintain the CPMS as specified in 40 CFR 63.671(a)(1) through (8). [40 CFR 63.671(a)].

All monitoring equipment, except for CPMS installed for pilot flame monitoring, must meet the applicable minimum accuracy, calibration and quality control requirements specified in table 13 of 40 CFR 63 Subpart CC. [40 CFR 63.671(a)(1)].

Ensure the readout (that portion of the CPMS that provides a visual display or record) or other indication of the monitored operating parameter from any CPMS required for compliance is readily accessible onsite for operational control or inspection by the operator of the source. [40 CFR 63.671(a)(2)].

All CPMS must complete a minimum of one cycle of operation (sampling, analyzing and data recording) for each successive 15-minute period. [40 CFR 63.671(a)(3)].

Except for periods of monitoring system malfunctions, repairs associated with monitoring system malfunctions, and required monitoring system quality assurance or quality control activities (including, as applicable, calibration checks and required zero and span adjustments), the owner or operator shall operate all CPMS and collect data continuously at all times when regulated emissions are routed to the flare. [40 CFR 63.671(a)(4)].

Operate, maintain, and calibrate each CPMS according to the CPMS monitoring plan specified in 40 CFR 63.671(b). [40 CFR 63.671(a)(5)].

The CPMS must be capable of measuring the appropriate parameter over the range of values expected for that measurement location. The data recording system associated with each CPMS must have a resolution that is equal to or better than the required system accuracy. [40 CFR 63.671(a)(8)].

Develop and implement a CPMS quality control program documented in a CPMS monitoring plan that covers each flare subject to the provisions in 40 CFR 63.670 and each CPMS installed to comply with applicable provisions in 40 CFR 63.670. The CPMS monitoring plan must contain the information listed in 40 CFR 63.671(b)(1) through (5). [40 CFR 63.671(b)].

For each CPMS installed to comply with applicable provisions in 40 CFR 63.670 except for CPMS installed for pilot flame monitoring, the owner or operator shall comply with the out-of-control procedures described in 40 CFR 63.671(c)(1) and (2). [40 CFR 63.671(c)].

Reduce data from a CPMS installed to comply with applicable provisions in 40 CFR 63.670 as specified in 40 CFR 63.671(d)(1) through (3). [40 CFR 63.671(d)].

For monitors used to determine compositional analysis for net heating value per 40 CFR 63.670(j)(1), the gas chromatograph must also meet the requirements of 40 CFR 63.671(e)(1) through (3). [40 CFR 63.671(e)].

How will data be reported?	See Section E. Reporting below.
SECTION C. TESTING	
Reference Test Method Description	
Reference Test Method Citation	
SECTION D. RECORD KEEPING	
Describe what parameters will be recorded and the frequency of recording. Maintain a copy of the CPMS monitoring plan readily available on-site at all times. [40 CFR 63.671(b)].	
SECTION E. REPORTING	
Describe what is to be reported and the frequency of reporting. Record and report any instances where visible emissions are observed for more than 5 minutes during any 2 consecutive hours as specified in 40 CFR 63.655(g)(11)(ii). [40 CFR 63.670(h)].	
Submit a copy of the CPMS monitoring plan to the Administrator upon request by the Administrator. [40 CFR 63.671(b)].	
Reporting Start Date	As specified
SECTION F. WORK PRACTICE STANDARD	
Describe any work practice standard(s).	

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Source ID: C205C b. Source Name: HP Elevated Flare

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: Zeeco e. Model Number: NA

f. Source Description: Steam-assisted elevated flare used to control VOC and organic HAP emissions

g. Rated Heat Input/Throughput: 59,659 MMBtu/hr (HHV) h. Installation Date: 9/2022

i. Rated Power/Electric Output: NA

j. Exhaust Temperature: NA Units k. Exhaust % Moisture: NA l. Exhaust Flow Volume: NA SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

Yes No

☐ ☒ Emissions unit uses a control device to achieve compliance.

☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
C205C	HP Elevated Flare	S205C	Stack (HP Elevated Flare)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Natural gas / Waste gas	30190023	3,900 MMBtu/hr (HHV)	NA

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Visible emissions from the HP Elevated Flare shall not exceed 0% except for a total of five minutes during any consecutive two-hour period.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	The HP Elevated Flare shall be designed and operated to reduce collected VOC emissions by a minimum of 98%.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	Vapors collected by the HP Header System shall only be routed to the HP Elevated Flare in the event that the combined capacity of the TEGFs is exceeded due to malfunction or emergency, or due to maintenance of the TEGFs.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	The HP Elevated Flare shall be equipped with automated controls for control of the total steam mass flow rate to the flare.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR Part 63 Subpart YY, 40 CFR Part 63 Subpart FFFF, 40 CFR 63.670, and 40 CFR 63.671.	The same limitation as the limitation associated with the citation is used for the source.
30190023	25 Pa. Code §127.441(b)	Net heating value of the combustion zone gas at the HP Header shall equal or exceed 500 Btu/scf on a three-hour rolling average, calculated every 15 minutes.	The same limitation as the limitation associated with the citation is used for the source.
30190023	25 Pa. Code §127.441(b)	Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 60.18(c) through (f) and 40 CFR 63.11(b).	The same limitation as the limitation associated with the citation is used for the source.

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	40 CFR Part 60 Subpart DDD §60.562-1(a)(1)(i)(C)	Meet the conditions specified in 40 CFR 60.18 at all times.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 60 Subpart NNN §60.662(b)	Meet the requirements of 40 CFR 60.18.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart FFFF §63.2535(m)(1)	Flares that are subject to the provisions of 40 CFR 60.18 or 63.11 and must comply with the requirements in 40 CFR 63.2450(e)(5) are required to comply only with the provisions specified in 40 CFR 63 Subpart FFFF.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart YY §63.1100(g)(7)(i)	Flares that are subject to 40 CFR 60.18 or 40 CFR 63.11 and used as a control device for an emission point subject to the requirements in Table 7 to 40 CFR 63.1103(e) are required to comply only with 40 CFR 63.1103(e)(4).	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart FFFF §63.2450(e)(5)	Reduce organic HAP emissions by venting emissions through a closed-vent system to a steam-assisted, air-assisted, non-assisted, or pressure-assisted multi-point flare and meet the applicable requirements for flares as specified in 40 CFR 63.670 and 63.671 of 40 CFR 63 Subpart CC, including the provisions in Tables 12 and 13 to 40 CFR 63 Subpart CC, except as specified in 40 CFR 63.1103(e)(5)(i) through (xiii).	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(b)	Operate the flare with a pilot flame present at all times when regulated material is routed to the flare. Each 15-minute block during which there is at least one minute where no pilot flame is present when regulated material is routed to the flare is a deviation of the standard. Deviations in different 15-minute blocks from the same event are considered separate deviations.	The same limitation as the limitation associated with the citation is used for the source.

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	40 CFR Part 63 Subpart CC §63.670(c)	Specify the smokeless design capacity of the flare and operate with no visible emissions, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours, when regulated material is routed to the flare.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(d)	Comply with either 40 CFR 63.670(d)(1) or (2), provided the appropriate monitoring systems are in-place, whenever regulated material is routed to the flare for at least 15-minutes and the flare vent gas flow rate is less than the smokeless design capacity of the flare.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(e)(1)	Operate each non-pressure-assisted flare to maintain the net heating value of flare combustion zone gas (NHVcz) at or above 270 Btu/scf determined on a 15-minute block period basis when regulated material is routed to the flare for at least 15-minutes.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(o)	Comply with the provisions in 40 CFR 63.670(o)(1) through (8) for any flare that has the potential to operate above its smokeless capacity under any circumstance.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(r)	An owner or operator may request approval from the Administrator for site-specific operating limits that shall apply specifically to a selected flare. Site-specific operating limits include alternative threshold values for the parameters specified in 40 CFR 63.670(d) through (f) as well as threshold values for operating parameters other than those specified in 40 CFR 63.670(d) through (f). The owner or operator must demonstrate that the flare achieves 96.5% combustion efficiency (or 98% destruction efficiency) using the site-specific operating limits based on a performance evaluation as described in 40 CFR 63.670(r)(1). The request shall include information as described in 40 CFR 63.670(r)(2).	The same limitation as the limitation associated with the citation is used for the source.

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G05 and G09 in Section 4.2 for additional requirements that may be applicable to the source.			



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	
☐	Group of Sources	Unit ID	205 (HP Header System) / C205C (HP Elevated Flare)
☒	Single Source	Scenario Name	
☐	Alternative Operating Scenario		
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Net heating value of the combustion zone gas at the HP Header shall be measured and recorded at a minimum of once every 15 minutes. An adjusted net heating value of hydrogen of 1,212 Btu/scf may be used for this calculation.			
Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 63 Subpart YY, 40 CFR 63 Subpart FFFF, 40 CFR 63.670, and 40 CFR 63.671.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the HP Header as well as any flare supplemental gas used.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist steam used by the HP Elevated Flare.			
Utilize a gas chromatograph (or equivalent monitor) to measure, calculate, and record VOC and GHG content at the HP Header at a minimum of once every 15 minutes.			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

VOC and GHG content measured by the gas chromatograph (or equivalent monitor) shall be used to calculate 12-month rolling total VOC and GHG emissions for the TEGF A, TEGF B, and HP Elevated Flare.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Minimize flaring resulting from startups, shutdowns, and unforeseeable events by operating the HP Flare System at all times in accordance with an approved flare minimization plan. The plan shall include the following:

- a. Procedures for operating and maintaining the HP Flare System during periods of process unit startup, shutdown, and unforeseeable events.
- b. A program of corrective action for malfunctioning process equipment.
- c. Procedures to minimize discharges either directly to the atmosphere or to the HP Flare System during the planned and unplanned startup or shutdown of process unit and air pollution control equipment, including an evaluation of flaring that has occurred or may reasonably be expected to occur during planned maintenance activities, including startup and shutdown, that considers the feasibility of performing these activities without flaring.
- d. Procedures for conducting root cause analyses.
- e. Procedures for taking identified corrective actions.
- f. The baseline flow to the HP Flare System determined in accordance with the provisions of 40 CFR 60.103a(a)(4).

Conduct a root cause analysis within 45 days after any startup flaring event, shutdown flaring event, or unforeseeable flaring event at the HP Flare System. Flaring event shall be defined as an event that exceeds the baseline by 500,000 scf within a 24-hour period. The analysis shall address the following:

- a. The date and time that the flaring event started and ended.
- b. The total quantity of gas flared during each event.
- c. An estimate of the quantity of VOC that was emitted and the calculations used to determine the quantities.
- d. The steps taken to limit the duration of the flaring event or the quantity of emissions associated with the event.
- e. A detailed analysis that sets forth the root cause and all significant contributing causes of the flaring event to the extent determinable.
- f. An analysis of the measures that are available to reduce the likelihood of a recurrence of a flaring event resulting from the same root cause or significant contributing causes in the future. The analysis of prevention measures must consider the adequacy of existing maintenance schedules and protocols for equipment contributing to the flaring event.
- g. A demonstration that the actions taken during the flaring event are consistent with the procedures specified in the flare minimization plan.
- h. In response to a flaring event, the Owner/Operator shall implement, as expeditiously as practicable, such interim and/or long-term corrective actions as are consistent with good engineering practice to minimize the likelihood of a recurrence of the root cause and all significant contributing causes of that flaring event.
- i. If any items required to be addressed in this analysis are still under investigation 45 days after the flaring event, the Owner/Operator shall include a statement of the anticipated date by which a follow-up report fully conforming to the requirements of this Condition shall be completed.



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	205 (HP Header System) / C205C (HP Elevated Flare)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	25 Pa. Code §127.441(b)		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Net heating value of the combustion zone gas at the HP Header shall be measured and recorded at a minimum of once every 15 minutes. An adjusted net heating value of hydrogen of 1,212 Btu/scf may be used for this calculation.			
Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 60.18(c) through (f) and 40 CFR 63.11(b).			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the HP Header as well as any flare supplemental gas used.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist steam used by the HP Elevated Flare.			
Utilize a gas chromatograph (or equivalent monitor) to measure, calculate, and record VOC content at the HP Header at a minimum of once every 15 minutes.			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

VOC content measured by the gas chromatograph (or equivalent monitor) shall be used to calculate 12-month rolling total VOC emissions for the TEGF A, TEGF B, and HP Elevated Flare.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Minimize flaring resulting from startups, shutdowns, and unforeseeable events by operating the HP Flare System at all times in accordance with an approved flare minimization plan. The plan shall include the following:

- a. Procedures for operating and maintaining the HP Flare System during periods of process unit startup, shutdown, and unforeseeable events.
- b. A program of corrective action for malfunctioning process equipment.
- c. Procedures to minimize discharges either directly to the atmosphere or to the HP Flare System during the planned and unplanned startup or shutdown of process unit and air pollution control equipment.
- d. Procedures for conducting root cause analyses.
- e. Procedures for taking identified corrective actions.
- f. The baseline flow to the HP Flare System determined in accordance with the provisions of 40 CFR 60.103a(a)(4).

Conduct a root cause analysis within 45 days after any startup flaring event, shutdown flaring event, or unforeseeable flaring event at the HP Flare System. Flaring event shall be defined as an event that exceeds the baseline by 500,000 scf within a 24-hour period. The analysis shall address the following:

- a. The date and time that the flaring event started and ended.
- b. The total quantity of gas flared during each event.
- c. An estimate of the quantity of VOC that was emitted and the calculations used to determine the quantities.
- d. The steps taken to limit the duration of the flaring event or the quantity of emissions associated with the event.
- e. A detailed analysis that sets forth the root cause and all significant contributing causes of the flaring event to the extent determinable.
- f. An analysis of the measures that are available to reduce the likelihood of a recurrence of a flaring event resulting from the same root cause or significant contributing causes in the future.
- g. A demonstration that the actions taken during the flaring event are consistent with the procedures specified in the flare minimization plan.
- h. In response to a flaring event, implement, as expeditiously as practicable, such interim and/or long-term corrective actions as are consistent with good engineering practice to minimize the likelihood of a recurrence of the root cause and all significant contributing causes of that flaring event.
- i. If any items required to be addressed in this analysis are still under investigation 45 days after the flaring event, include a statement of the anticipated date by which a follow-up report fully conforming to the requirements of this Condition shall be completed.



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	205 (HP Header System) / C205C (HP Elevated Flare)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart NNN		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	CMS		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Presence of a flame monitored by heat sensing device continuously. Use a heat sensing device, such as an ultra-violet beam sensor or thermocouple, at the pilot light to monitor the continuous presence of a flame. [40 CFR 60.663(b)(1)].			
Flow monitored by flow indicator hourly. Monitor the vent stream flow to the flare. Install the flow indicator in the vent stream from each affected facility at a point closest to the flare and before being joined with any other vent stream. [40 CFR 60.663(b)(2)].			
How will data be reported? See Section E. Reporting below.			
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Flow recordkeeping by electronic or hard copy hourly. Record the vent stream flow to the flare at least once every hour for each affected facility. Make records readily available for inspection. [40 CFR 60.665(d)].

Maintain up-to-date, readily accessible records of all periods when the vent stream is diverted from the control device or has no flow rate. [40 CFR 60.665(d)].

Flare pilot flame recordkeeping by electronic or hard copy continuously. Make records readily available for inspection. [40 CFR 60.665(f)].

Maintain up-to-date, readily accessible records of all periods of operations in which the pilot flame is absent. [40 CFR 60.665(f)].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Notify the Department with the specific provisions of 40 CFR 60.662 (40 CFR 60.662(a), (b), or (c)) with which the facility operator has elected to comply. Submit the notification with the notification of initial start-up required in 40 CFR 60.7(a)(3). [40 CFR 60.665(a)].

Notify the Department 90 days before implementing any change in the provision of 40 CFR 60.662 with which the operator elects to comply. [40 CFR 60.665(a)].

Submit report: Due semiannually. Submit initial report within 6 months after the initial start-up date. Include the information outlined in 40 CFR 60.665(l)(1) through (l)(7). [40 CFR 60.665(l)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	205 (HP Header System) / C205C (HP Elevated Flare)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 63 Subpart CC		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)			
Monitoring Device Location			
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Continuously monitor the presence of the pilot flame or flare flame(s) using a device (including, but not limited to, a thermocouple, ultraviolet beam sensor, or infrared sensor) capable of detecting that the pilot flame or flare flame(s) is present. [40 CFR 63.670(g)].			
Monitor visible emissions while regulated materials are vented to the flare. An initial visible emissions demonstration must be conducted using an observation period of 2 hours using Method 22 at 40 CFR 60, Appendix A-7. Subsequent visible emissions observations must be conducted using either the methods in 40 CFR 63.670(h)(1) or, alternatively, the methods in 40 CFR 63.670(h)(2). [40 CFR 63.670(h)].			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the flare header or headers that feed the flare as well as any supplemental natural gas used. Different flow monitoring methods may be used to measure different gaseous streams that make up the flare vent gas provided that the flow rates of all gas streams that contribute to the flare vent gas are determined. If assist air or assist steam is used, the owner or operator shall install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist air and/or assist steam used with the flare. [40 CFR 63.670(i)].			
Determine the concentration of individual components in the flare vent gas using either the methods provided in 40 CFR 63.670(j)(1) or (2), to assess compliance with the operating limits in 40 CFR 63.670(e) and, if applicable, 40 CFR 63.670(d) and (f). Alternatively, the owner or operator may elect to directly monitor the net heating value of the flare vent gas following the methods provided in 40 CFR 63.670(j)(3) and, if desired, may directly measure the hydrogen concentration in the flare vent gas following the methods provided in 40 CFR 63.670(j)(4). The owner or operator may elect to use different monitoring methods for different gaseous streams that make up the flare vent gas using different methods provided the composition or net heating value of all gas streams that contribute to the flare vent gas are determined. [40 CFR 63.670(j)].			

Determine V_{tip} on a 15-minute block average basis according to the requirements in 40 CFR 63.670(k)(1) through (k)(4). [40 CFR 63.670(k)].

When calculating NH_{Vvg} for a specific 15-minute block:

- (A) If the results from the first sample collected during an event (for periodic flare vent gas flow events) are not available until after the second 15-minute block starts, use the results from the first sample collected during an event for the first 15-minute block associated with that event.
- (B) For all other cases, use the arithmetic average of all NH_{Vvg} measurement data results that become available during a 15-minute block to calculate the 15-minute block average for that period. For the purpose of this requirement, use the time that the results become available rather than the time the sample was collected. For example, if a sample is collected at 12:25 a.m. and the analysis is completed at 12:38 a.m., the results are available at 12:38 a.m. and these results would be used to determine compliance during the 15-minute block period from 12:30 a.m. to 12:45 a.m. [40 CFR 63.670(l)(5)(ii)].

Determine the net heating value of the combustion zone gas (NH_{Vcz}) as specified in 40 CFR 63.670(m)(1) or (2), as applicable. [40 CFR 63.670(m)].

Except as specified in 40 CFR 63.670(m)(2), determine the 15-minute block average NH_{Vcz} based on the 15-minute block average vent gas and assist gas flow rates using the equation listed in 40 CFR 63.670(m)(1). For periods when there is no assist steam flow or premix assist air flow, $NH_{Vcz} = NH_{Vvg}$. [40 CFR 63.670(m)(1)].

Owners and operators of flares that use the feed-forward calculation methodology in 40 CFR 63.670(l)(5)(i) and that monitor gas composition or net heating value in a location representative of the cumulative vent gas stream and that directly monitor supplemental natural gas flow additions to the flare must determine the 15-minute block average NH_{Vcz} using equation listed in 40 CFR 63.670(m)(2). [40 CFR 63.670(m)(2)].

For each CPMS installed to comply with applicable provisions in 40 CFR 63.670, install, operate, calibrate, and maintain the CPMS as specified in 40 CFR 63.671(a)(1) through (8). [40 CFR 63.671(a)].

All monitoring equipment, except for CPMS installed for pilot flame monitoring, must meet the applicable minimum accuracy, calibration, and quality control requirements specified in table 13 of 40 CFR 63 Subpart CC. [40 CFR 63.671(a)(1)].

Ensure the readout (that portion of the CPMS that provides a visual display or record) or other indication of the monitored operating parameter from any CPMS required for compliance is readily accessible onsite for operational control or inspection by the operator of the source. [40 CFR 63.671(a)(2)].

All CPMS must complete a minimum of one cycle of operation (sampling, analyzing and data recording) for each successive 15-minute period. [40 CFR 63.671(a)(3)].

Except for periods of monitoring system malfunctions, repairs associated with monitoring system malfunctions, and required monitoring system quality assurance or quality control activities (including, as applicable, calibration checks and required zero and span adjustments), the owner or operator shall operate all CPMS and collect data continuously at all times when regulated emissions are routed to the flare. [40 CFR 63.671(a)(4)].

Operate, maintain, and calibrate each CPMS according to the CPMS monitoring plan specified in 40 CFR 63.671(b). [40 CFR 63.671(a)(5)].

The CPMS must be capable of measuring the appropriate parameter over the range of values expected for that measurement location. The data recording system associated with each CPMS must have a resolution that is equal to or better than the required system accuracy. [40 CFR 63.671(a)(8)].

Develop and implement a CPMS quality control program documented in a CPMS monitoring plan that covers each flare subject to the provisions in 40 CFR 63.670 and each CPMS installed to comply with applicable provisions in 40 CFR 63.670. The CPMS monitoring plan must contain the information listed in 40 CFR 63.671(b)(1) through (5). [40 CFR 63.671(b)].

For each CPMS installed to comply with applicable provisions in 40 CFR 63.670 except for CPMS installed for pilot flame monitoring, the owner or operator shall comply with the out-of-control procedures described in 40 CFR 63.671(c)(1) and (2). [40 CFR 63.671(c)].

Reduce data from a CPMS installed to comply with applicable provisions in 40 CFR 63.670 as specified in 40 CFR 63.671(d)(1) through (3). [40 CFR 63.671(d)].

For monitors used to determine compositional analysis for net heating value per 40 CFR 63.670(j)(1), the gas chromatograph must also meet the requirements of 40 CFR 63.671(e)(1) through (3). [40 CFR 63.671(e)].

How will data be reported? See Section E. Reporting below.

SECTION C. TESTING

Reference Test Method Description

Reference Test Method Citation

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Maintain a copy of the CPMS monitoring plan readily available on-site at all times. [40 CFR 63.671(b)].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Record and report any instances where visible emissions are observed for more than 5 minutes during any 2 consecutive hours as specified in 40 CFR 63.655(g)(11)(ii). [40 CFR 63.670(h)].

Submit a copy of the CPMS monitoring plan to the Administrator upon request by the Administrator. [40 CFR 63.671(b)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Develop a flare management plan to minimize flaring during periods of startup, shutdown, or emergency releases. The flare management plan must include the information described in 40 CFR 63.670(o)(1)(i) through (vii). [40 CFR 63.670(o)(1)].

A root cause analysis and a corrective action analysis must be conducted for each flow event that contains regulated material and that meets the criteria in 40 CFR 63.670(o)(3)(i). [40 CFR 63.670(o)(3)].

A root cause analysis and corrective action analysis must be completed as soon as possible, but no later than 45 days after a flare flow event meeting the criteria in paragraph (o)(3)(i) of this section. Special circumstances affecting the number of root cause analyses and/or corrective action analyses are provided in 40 CFR 63.670(o)(4)(i) through (v). [40 CFR 63.670(o)(4)].

Implement the corrective action(s) identified in the corrective action analysis in accordance with the applicable requirements in 40 CFR 63.670(o)(5)(i) through (iii). [40 CFR 63.670(o)(5)].

Determine the total number of events for which a root cause and corrective action analyses was required during the calendar year for each affected flare separately for events meeting the criteria in 40 CFR 63.670(o)(3)(i). If a single root cause analysis was conducted for an event that caused multiple flares to meet the criteria in 40 CFR 63.670(o)(3)(i), that event would count as an event for each of the flares during that event. The owner or operator shall also determine the total number of events for which a root cause and corrective action analyses was required and the analyses concluded that the root cause was a force majeure event, as defined in 40 CFR 63 Subpart CC. [40 CFR 63.670(o)(6)].

The following events would be a violation of this emergency flaring work practice standard:

- (i) Any flow event for which a root cause analysis was required and the root cause was determined to be operator error or poor maintenance;
- (ii) Two visible emissions exceedance events meeting the criteria in 40 CFR 63.670(o)(3)(i) that were not caused by a force majeure event from a single flare in a 3 calendar year period for the same root cause for the same equipment;
- (iv) Three visible emissions exceedance events meeting the criteria in 40 CFR 63.670(o)(3)(i) that were not caused by a force majeure event from a single flare in a 3 calendar year period for any reason. [40 CFR 63.670(o)(7)].

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Source ID: C206 b. Source Name: SCTO

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: John Zink e. Model Number: NA

f. Source Description: Thermal oxidizer used to control VOC and organic HAP emissions

g. Rated Heat Input/Throughput: 11.07 MMBtu/hr (HHV) h. Installation Date: 3/2020

i. Rated Power/Electric Output: NA

j. Exhaust Temperature: 1,600 Units °F k. Exhaust % Moisture: NA l. Exhaust Flow Volume: 2,173 SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

Yes No

☐ ☒ Emissions unit uses a control device to achieve compliance.

☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
C206	SCTO	S206	Stack (SCTO)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Natural gas / Waste gas	30190013	11.07 MMBtu/hr (HHV)	NA

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190013	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Emissions from the SCTO shall not exceed the following: a. NO _x - 0.06 lb/MMBtu b. CO - 0.0824 lb/MMBtu c. PM ₁₀ - 0.0075 lb/MMBtu d. PM _{2.5} - 0.0075 lb/MMBtu	The same limitation as the limitation associated with the citation is used for the source.
30190013	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Visible emissions from the SCTO shall not exceed 0% except for a total of five minutes during any consecutive two-hour period.	The same limitation as the limitation associated with the citation is used for the source.
30190013	Plan Approval 04-00740D [25 Pa. Code §127.12b]	The SCTO shall be operated to reduce collected VOC emissions by a minimum of 99.9%.	The same limitation as the limitation associated with the citation is used for the source.
30190013	Plan Approval 04-00740D [25 Pa. Code §127.12b]	The SCTO shall, at all times that vapors are being collected, be operated at or above the minimum temperature at which at least 99.9% destruction efficiency is guaranteed by the manufacturer or demonstrated during performance testing.	The same limitation as the limitation associated with the citation is used for the source.
30190013	40 CFR Part 63 Subpart YY §63.1103(e)(3), Table 7(g)(1)	Comply with the requirements of 40 CFR 63 Subpart XX for waste streams.	The same limitation as the limitation associated with the citation is used for the source.
30190013	40 CFR Part 63 Subpart XX §63.1095(b)(2)	Comply with 40 CFR 61 Subpart FF (National Emission Standards for Benzene Waste Operations) requirements applicable to a facility with a total annual benzene quantity that is greater than or equal to 10 Mg/yr, as determined according to 40 CFR 61.342(a). Facility does not have any continuous butadiene waste streams.	The same limitation as the limitation associated with the citation is used for the source.
30190013	40 CFR Part 61 Subpart FF §61.349(a)(2)(i)(C)	Residence time $\geq$ 0.5 sec at a minimum temperature of 760 degrees C (1400 degrees F).	The same limitation as the limitation associated with the citation is used for the source.

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190013	40 CFR Part 61 Subpart FF §61.349(b)	Operate the control device at all times when waste is placed in the waste management unit vented to the control device except when maintenance or repair of the waste management unit cannot be completed without a shutdown of the control device.	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G05 and G06 for additional requirements that may be applicable to the source.



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BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	206 (Spent Caustic Vent Header System) / C206 (SCTO)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒	Testing
☒	Record Keeping	☐	Work Practice Standard
☐		☐	Reporting
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	CMS		
Monitoring Device Location	Firebox		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Monitoring for compliance with the 99.9% destruction efficiency requirement for the SCTO shall be performed in accordance with 40 CFR 63.985(c). Operating parameter monitoring shall include combustion temperature at a minimum.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the flow rate in the vent gas header to the SCTO at a minimum of once every 15 minutes.			
How will data be reported?	NA		

SECTION C. TESTING

Reference Test Method Description

Perform NO_x, CO, PM₁₀, PM_{2.5}, and Benzene emission testing upon the SCTO according to the requirements of 25 Pa. Code Chapter 139. Performance testing is required within 180 days of modification or replacement of the burners of the SCTO or on an alternative schedule as approved by the Department. Subsequent performance testing is required at a minimum of once every 5 years thereafter. Extension of the performance testing deadlines may be granted by the Department in writing in response to a written request from the Owner/Operator and upon a satisfactory showing that an extension is justified. EPA Reference Method performance testing shall be conducted for the performance tests.

Perform VOC destruction efficiency testing upon the SCTO in accordance with 40 CFR 63.985(b)(1)(ii). Performance testing is required within 180 days of startup of the WWTP Permanent Controls Project equipment or on an alternative schedule as approved by the Department. Subsequent performance testing is required at a minimum of once every 5 years thereafter. Extension of the performance testing deadlines may be granted by the Department in writing in response to a written request from the Owner/Operator and upon a satisfactory showing that an extension is justified.

Reference Test Method Citation As specified

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Maintain records of the flow rate in the vent gas header to the SCTO on a daily basis.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	206 (Spent Caustic Vent Header System) / C206 (SCTO)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 61 Subpart FF		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒	Testing
☒	Record Keeping	☒	Work Practice Standard
☒		☒	Reporting
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Equipment/operational data monitored by visual inspection once initially and once every quarter thereafter. Include inspection of ductwork and piping and connections to covers and control devices for evidence of visible defects such as holes in ductwork or piping and loose connections. [40 CFR 61.349(f)].			
Inspect at least once each operating day the data recorded by the monitoring equipment to ensure that the control device is operating properly. [40 CFR 61.354(c)].			
Temperature monitored by temperature monitoring device continuously. Install the temperature sensor at a representative location in the combustion chamber. [40 CFR 61.354(c)(1)].			
How will data be reported?	See Section E. Reporting below.		
SECTION C. TESTING			
Reference Test Method Description			
Demonstrate that the control device achieves the appropriate conditions specified in 40 CFR 61.349(a)(2)(i) using one of the methods specified in 40 CFR 61.349(c)(1) and (c)(2). [40 CFR 61.349(c)].			
Determine compliance with 40 CFR 61 Subpart FF using the test methods and procedures specified in 40 CFR 61.355(a) through (i), as applicable. [40 CFR 61.355].			
Reference Test Method Citation	As specified		

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Temperature recordkeeping by recorder continuously. [40 CFR 61.354(c)(1)].

Equipment/operational data recordkeeping by electronic or hard copy at the regulation's specified frequency. Maintain records as specified in 40 CFR 61.356(a) through (n), as applicable. Maintain each record in a readily accessible location at the facility site for a period not less than two years from the date the information is recorded unless otherwise specified. [40 CFR 61.356].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Submit report: Due quarterly, beginning three months after the date that the equipment necessary to comply with 40 CFR 61 Subpart FF has been certified in accordance with 40 CFR 61.357(d)(1). Include the information specified in 40 CFR 61.357(d)(7)(i) through (d)(7)(v). [40 CFR 61.357(d)(7)].

Submit report: Due annually, beginning one year after the date that the equipment necessary to comply with 40 CFR 61 Subpart FF has been certified in accordance with 40 CFR 61.357(d)(1). Submit a report that summarizes all inspections required by 40 CFR 61.342 through 61.354 during which detectable emissions are measured or a problem that could result in benzene emissions is identified, including information about the repairs or corrective action taken. [40 CFR 61.357(d)(8)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Make a first effort to repair the closed-vent system as soon as practicable but no later than 5 calendar days after visible defects are observed during an inspection, or if other problems are identified, or if detectable emissions are measured, except as provided in 40 CFR 61.350. Complete repair no later than 15 calendar days after the emissions are detected or the visible defect is observed. [40 CFR 61.349(g)].

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

- a. Source ID: C207 b. Source Name: MPGF CVTO Trip
- c. Plan Approval or Operating Permit Number: PA-04-00740A and PA-04-00740C (included under LP MPGF (Source ID C204B) in those plan approvals) and PA-04-00740D
- d. Manufacturer: Zeeco e. Model Number: AFTA-8/18
- f. Source Description: Perimeter air-assisted multi-point ground flare used to control VOC and organic HAP emissions
- g. Rated Heat Input/Throughput: 186 MMBtu/hr (HHV) h. Installation Date: 9/2022
- i. Rated Power/Electric Output: NA
- j. Exhaust Temperature: NA Units k. Exhaust % Moisture: NA l. Exhaust Flow Volume: NA SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

- Yes No
- ☐ ☒ Emissions unit uses a control device to achieve compliance.
- ☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
C207	MPGF CVTO Trip	S207	Stack (MPGF CVTO Trip)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Natural gas / Waste gas	30190023	181.56 MMBtu/hr (HHV)	NA

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Visible emissions from the MPGF CVTO Trip shall not exceed 0% except for a total of five minutes during any consecutive two-hour period.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	The MPGF CVTO Trip shall be designed and operated to reduce collected VOC emissions by a minimum of 98%.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	The MPGF CVTO Trip shall be equipped with automated controls for control of the supplemental gas flow rate to the flare.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	Net heating value of the combustion zone gas at the MPGF CVTO Trip shall equal or exceed 500 Btu/scf on a three-hour rolling average, calculated every 15 minutes.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 63.670 and 40 CFR 63.671.	The same limitation as the limitation associated with the citation is used for the source.
30190023	25 Pa. Code §127.441(b)	Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 60.18(c) through (f) and 40 CFR 63.11(b).	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 60 Subpart Kb §60.112b(a)(3)(ii)	Meet the requirements specified in the general control device requirements, 40 CFR 60.18(c) through (f).	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 60 Subpart DDD §60.562-1(a)(1)(i)(C)	Meet the conditions specified in 40 CFR 60.18 at all times.	The same limitation as the limitation associated with the citation is used for the source.

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	40 CFR Part 63 Subpart FFFF §63.2535(m)(1)	Flares that are subject to the provisions of 40 CFR 60.18 or 63.11 and must comply with the requirements in 40 CFR 63.2450(e)(5) are required to comply only with the provisions specified in 40 CFR 63 Subpart FFFF.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart YY §63.1100(g)(7)(i)	Flares that are subject to 40 CFR 60.18 or 40 CFR 63.11 and used as a control device for an emission point subject to the requirements in Table 7 to 40 CFR 63.1103(e) are required to comply only with 40 CFR 63.1103(e)(4).	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart FFFF §63.2450(e)(5)	Reduce organic HAP emissions by venting emissions through a closed-vent system to a steam-assisted, air-assisted, non-assisted, or pressure-assisted multi-point flare and meet the applicable requirements for flares as specified in 40 CFR 63.670 and 63.671 of 40 CFR 63 Subpart CC, including the provisions in Tables 12 and 13 to 40 CFR 63 Subpart CC, except as specified in 40 CFR 63.1103(e)(5)(i) through (xiii).	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(b)	Operate the flare with a pilot flame present at all times when regulated material is routed to the flare. Each 15-minute block during which there is at least one minute where no pilot flame is present when regulated material is routed to the flare is a deviation of the standard. Deviations in different 15-minute blocks from the same event are considered separate deviations.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(c)	Specify the smokeless design capacity of the flare and operate with no visible emissions, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours, when regulated material is routed to the flare.	The same limitation as the limitation associated with the citation is used for the source.

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	40 CFR Part 63 Subpart CC §63.670(d)	Comply with either 40 CFR 63.670(d)(1) or (2), provided the appropriate monitoring systems are in-place, whenever regulated material is routed to the flare for at least 15-minutes and the flare vent gas flow rate is less than the smokeless design capacity of the flare.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(e)(1)	Operate the flare to maintain the net heating value of flare combustion zone gas (NHVcz) at or above 270 Btu/scf determined on a 15-minute block period basis when regulated material is routed to the flare for at least 15-minutes.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(r)	An owner or operator may request approval from the Administrator for site-specific operating limits that shall apply specifically to a selected flare. Site-specific operating limits include alternative threshold values for the parameters specified in 40 CFR 63.670(d) through (f) as well as threshold values for operating parameters other than those specified in 40 CFR 63.670(d) through (f). The owner or operator must demonstrate that the flare achieves 96.5% combustion efficiency (or 98% destruction efficiency) using the site-specific operating limits based on a performance evaluation as described in 40 CFR 63.670(r)(1). The request shall include information as described in 40 CFR 63.670(r)(2).	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G05 and G09 in Section 4.2 for additional requirements that may be applicable to the source.



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	207 (MPGF CVTO Trip Header) / C207 (MPGF CVTO Trip)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Monitoring for compliance with the 98% destruction efficiency requirement for the MPGF CVTO Trip shall be performed in accordance with 40 CFR 63 Subpart YY, 40 CFR 63 Subpart FFFF, 40 CFR 63.670, and 40 CFR 63.671.			
Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 63.670 and 40 CFR 63.671.			
Net heating value of the combustion zone gas at the MPGF CVTO Trip shall be measured and recorded at a minimum of once every 15 minutes. An adjusted net heating value of hydrogen of 1,212 Btu/scf may be used for this calculation.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the MPGF CVTO Trip Header as well as any flare supplemental gas used.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist air used at the MPGF CVTO Trip. Continuously monitoring fan speed or power and using fan curves is an acceptable method for continuously monitoring assist air flow rates at the MPGF CVTO Trip.			
How will data be reported?	NA		

SECTION C. TESTING

Reference Test Method Description

Reference Test Method Citation

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Maintain records of the flow rate in the MPGF CVTO Trip Header on a daily basis.

VOC and GHG content measured by a gas chromatograph (or equivalent monitor) shall be used to calculate 12-month rolling total VOC and GHG emissions for the MPGF CVTO Trip.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Minimize flaring resulting from startups, shutdowns, and unforeseeable events by operating the MPGF CVTO Trip at all times in accordance with an approved flare minimization plan. The plan shall include the following:

- a. Procedures for operating and maintaining the MPGF CVTO Trip during periods of process unit startup, shutdown, and unforeseeable events.
- b. A program of corrective action for malfunctioning process equipment.
- c. Procedures to minimize discharges either directly to the atmosphere or to the MPGF CVTO Trip during the planned and unplanned startup or shutdown of process unit and air pollution control equipment, including an evaluation of flaring that has occurred or may reasonably be expected to occur during planned maintenance activities, including startup and shutdown, that considers the feasibility of performing these activities without flaring.
- d. Procedures for conducting root cause analyses.
- e. Procedures for taking identified corrective actions.
- f. The baseline flow to the MPGF CVTO Trip determined in accordance with the provisions of 40 CFR 60.103a(a)(4).

Conduct a root cause analysis within 45 days after any startup flaring event, shutdown flaring event, or unforeseeable flaring event at the MPGF CVTO Trip. Flaring event shall be defined as an event that exceeds the baseline by 500,000 scf within a 24-hour period. The analysis shall address the following:

- a. The date and time that the flaring event started and ended.
- b. The total quantity of gas flared during each event.
- c. An estimate of the quantity of VOC that was emitted and the calculations used to determine the quantities.
- d. The steps taken to limit the duration of the flaring event or the quantity of emissions associated with the event.
- e. A detailed analysis that sets forth the root cause and all significant contributing causes of the flaring event to the extent determinable.
- f. An analysis of the measures that are available to reduce the likelihood of a recurrence of a flaring event resulting from the same root cause or significant contributing causes in the future. The analysis of prevention measures must consider the adequacy of existing maintenance schedules and protocols for equipment contributing to the flaring event.
- g. A demonstration that the actions taken during the flaring event are consistent with the procedures specified in the flare minimization plan.
- h. In response to a flaring event, implement, as expeditiously as practicable, such interim and/or long-term corrective actions as are consistent with good engineering practice to minimize the likelihood of a recurrence of the root cause and all significant contributing causes of that flaring event.
- i. If any items required to be addressed in this analysis are still under investigation 45 days after the flaring event, include a statement of the anticipated date by which a follow-up report fully conforming to the requirements of this Condition shall be completed.



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	207 (MPGF CVTO Trip Header) / C207 (MPGF CVTO Trip)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	25 Pa. Code §127.441(b)		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☐	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Monitoring for compliance with the 98% destruction efficiency requirement for the MPGF CVTO Trip shall be performed in accordance with 40 CFR 63.987(c). Operating parameter monitoring shall include flame detection at a minimum.			
Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 60.18(c) through (f) and 40 CFR 63.11(b).			
Net heating value of the combustion zone gas at the MPGF CVTO Trip shall be measured and recorded at a minimum of once every 15 minutes. An adjusted net heating value of hydrogen of 1,212 Btu/scf may be used for this calculation.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the MPGF CVTO Trip Header as well as any flare supplemental gas used.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist air used at the MPGF CVTO Trip.			
How will data be reported?	NA		

SECTION C. TESTING

Reference Test Method Description

Reference Test Method Citation

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Minimize flaring resulting from startups, shutdowns, and unforeseeable events by operating the MPGF CVTO Trip at all times in accordance with an approved flare minimization plan. The plan shall include the following:

- a. Procedures for operating and maintaining the MPGF CVTO Trip during periods of process unit startup, shutdown, and unforeseeable events.
- b. A program of corrective action for malfunctioning process equipment.
- c. Procedures to minimize discharges either directly to the atmosphere or to the MPGF CVTO Trip during the planned and unplanned startup or shutdown of process unit and air pollution control equipment.
- d. Procedures for conducting root cause analyses.
- e. Procedures for taking identified corrective actions.
- f. The baseline flow to the MPGF CVTO Trip determined in accordance with the provisions of 40 CFR 60.103a(a)(4).

Conduct a root cause analysis within 45 days after any startup flaring event, shutdown flaring event, or unforeseeable flaring event at the MPGF CVTO Trip. Flaring event shall be defined as an event that exceeds the baseline by 500,000 scf within a 24-hour period. The analysis shall address the following:

- a. The date and time that the flaring event started and ended.
- b. The total quantity of gas flared during each event.
- c. An estimate of the quantity of VOC that was emitted and the calculations used to determine the quantities.
- d. The steps taken to limit the duration of the flaring event or the quantity of emissions associated with the event.
- e. A detailed analysis that sets forth the root cause and all significant contributing causes of the flaring event to the extent determinable.
- f. An analysis of the measures that are available to reduce the likelihood of a recurrence of a flaring event resulting from the same root cause or significant contributing causes in the future.
- g. A demonstration that the actions taken during the flaring event are consistent with the procedures specified in the flare minimization plan.
- h. In response to a flaring event, implement, as expeditiously as practicable, such interim and/or long-term corrective actions as are consistent with good engineering practice to minimize the likelihood of a recurrence of the root cause and all significant contributing causes of that flaring event.
- i. If any items required to be addressed in this analysis are still under investigation 45 days after the flaring event, include a statement of the anticipated date by which a follow-up report fully conforming to the requirements of this Condition shall be completed.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	207 (MPGF CVTO Trip Header) / C207 (MPGF CVTO Trip)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart Kb		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☐	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)			
Monitoring Device Location			
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter.			
How will data be reported?			
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
Keep copies of all reports required by 40 CFR 60.115b(d)(3) for at least two years. [40 60.115b(d)(3)].			
Presence of a flame recordkeeping by electronic or hard copy upon each occurrence of operation during which the flare pilot flame is absent. Keep copies of all records for at least two years. [40 CFR 60.115b(d)(2)].			

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Submit a report: Due semiannually to the Department for all periods recorded under 40 CFR 60.115b(d)(2) in which the pilot flame was absent. [40 CFR 60.115b(d)(3)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).



COMMONWEALTH OF PENNSYLVANIA
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SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	207 (MPGF CVTO Trip Header) / C207 (MPGF CVTO Trip)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 63 Subpart CC		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Continuously monitor the presence of the pilot flame or flare flame(s) using a device (including, but not limited to, a thermocouple, ultraviolet beam sensor, or infrared sensor) capable of detecting that the pilot flame or flare flame(s) is present. [40 CFR 63.670(g)].			
Monitor visible emissions while regulated materials are vented to the flare. An initial visible emissions demonstration must be conducted using an observation period of 2 hours using Method 22 at 40 CFR 60, Appendix A-7. Subsequent visible emissions observations must be conducted using either the methods in 40 CFR 63.670(h)(1) or, alternatively, the methods in 40 CFR 63.670(h)(2). [40 CFR 63.670(h)].			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the flare header or headers that feed the flare as well as any supplemental natural gas used. Different flow monitoring methods may be used to measure different gaseous streams that make up the flare vent gas provided that the flow rates of all gas streams that contribute to the flare vent gas are determined. If assist air or assist steam is used, the owner or operator shall install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist air and/or assist steam used with the flare. [40 CFR 63.670(i)].			
Determine the concentration of individual components in the flare vent gas using either the methods provided in 40 CFR 63.670(j)(1) or (2), to assess compliance with the operating limits in 40 CFR 63.670(e) and, if applicable, 40 CFR 63.670(d) and (f). Alternatively, the owner or operator may elect to directly monitor the net heating value of the flare vent gas following the methods provided in 40 CFR 63.670(j)(3) and, if desired, may directly measure the hydrogen concentration in the flare vent gas following the methods provided in 40 CFR 63.670(j)(4). The owner or operator may elect to use different monitoring methods for different gaseous streams that make up the flare vent gas using different methods provided the composition or net heating value of all gas streams that contribute to the flare vent gas are determined. [40 CFR 63.670(j)].			

Determine V_{tip} on a 15-minute block average basis according to the requirements in 40 CFR 63.670(k)(1) through (k)(4). [40 CFR 63.670(k)].

When calculating NH_{Vg} for a specific 15-minute block:

- (A) If the results from the first sample collected during an event (for periodic flare vent gas flow events) are not available until after the second 15-minute block starts, use the results from the first sample collected during an event for the first 15-minute block associated with that event.
- (B) For all other cases, use the arithmetic average of all NH_{Vg} measurement data results that become available during a 15-minute block to calculate the 15-minute block average for that period. For the purpose of this requirement, use the time that the results become available rather than the time the sample was collected. For example, if a sample is collected at 12:25 a.m. and the analysis is completed at 12:38 a.m., the results are available at 12:38 a.m. and these results would be used to determine compliance during the 15-minute block period from 12:30 a.m. to 12:45 a.m. [40 CFR 63.670(l)(5)(ii)].

Determine the net heating value of the combustion zone gas (NH_{Vcz}) as specified in 40 CFR 63.670(m)(1) or (2), as applicable. [40 CFR 63.670(m)].

Except as specified in 40 CFR 63.670(m)(2), determine the 15-minute block average NH_{Vcz} based on the 15-minute block average vent gas and assist gas flow rates using the equation listed in 40 CFR 63.670(m)(1). For periods when there is no assist steam flow or premix assist air flow, $NH_{Vcz} = NH_{Vg}$. [40 CFR 63.670(m)(1)].

Owners and operators of flares that use the feed-forward calculation methodology in 40 CFR 63.670(l)(5)(i) and that monitor gas composition or net heating value in a location representative of the cumulative vent gas stream and that directly monitor supplemental natural gas flow additions to the flare must determine the 15-minute block average NH_{Vcz} using equation listed in 40 CFR 63.670(m)(2). [40 CFR 63.670(m)(2)].

For each CPMS installed to comply with applicable provisions in 40 CFR 63.670, install, operate, calibrate, and maintain the CPMS as specified in 40 CFR 63.671(a)(1) through (8). [40 CFR 63.671(a)].

All monitoring equipment, except for CPMS installed for pilot flame monitoring, must meet the applicable minimum accuracy, calibration, and quality control requirements specified in table 13 of 40 CFR 63 Subpart CC. [40 CFR 63.671(a)(1)].

Ensure the readout (that portion of the CPMS that provides a visual display or record) or other indication of the monitored operating parameter from any CPMS required for compliance is readily accessible onsite for operational control or inspection by the operator of the source. [40 CFR 63.671(a)(2)].

All CPMS must complete a minimum of one cycle of operation (sampling, analyzing and data recording) for each successive 15-minute period. [40 CFR 63.671(a)(3)].

Except for periods of monitoring system malfunctions, repairs associated with monitoring system malfunctions, and required monitoring system quality assurance or quality control activities (including, as applicable, calibration checks and required zero and span adjustments), the owner or operator shall operate all CPMS and collect data continuously at all times when regulated emissions are routed to the flare. [40 CFR 63.671(a)(4)].

Operate, maintain, and calibrate each CPMS according to the CPMS monitoring plan specified in 40 CFR 63.671(b). [40 CFR 63.671(a)(5)].

The CPMS must be capable of measuring the appropriate parameter over the range of values expected for that measurement location. The data recording system associated with each CPMS must have a resolution that is equal to or better than the required system accuracy. [40 CFR 63.671(a)(8)].

Develop and implement a CPMS quality control program documented in a CPMS monitoring plan that covers each flare subject to the provisions in 40 CFR 63.670 and each CPMS installed to comply with applicable provisions in 40 CFR 63.670. The CPMS monitoring plan must contain the information listed in 40 CFR 63.671(b)(1) through (5). [40 CFR 63.671(b)].

For each CPMS installed to comply with applicable provisions in 40 CFR 63.670 except for CPMS installed for pilot flame monitoring, the owner or operator shall comply with the out-of-control procedures described in 40 CFR 63.671(c)(1) and (2). [40 CFR 63.671(c)].

Reduce data from a CPMS installed to comply with applicable provisions in 40 CFR 63.670 as specified in 40 CFR 63.671(d)(1) through (3). [40 CFR 63.671(d)].

For monitors used to determine compositional analysis for net heating value per 40 CFR 63.670(j)(1), the gas chromatograph must also meet the requirements of 40 CFR 63.671(e)(1) through (3). [40 CFR 63.671(e)].

How will data be reported? See Section E. Reporting below.

SECTION C. TESTING

Reference Test Method Description

Reference Test Method Citation

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Maintain a copy of the CPMS monitoring plan readily available on-site at all times. [40 CFR 63.671(b)].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Record and report any instances where visible emissions are observed for more than 5 minutes during any 2 consecutive hours as specified in 40 CFR 63.655(g)(11)(ii). [40 CFR 63.670(h)].

Submit a copy of the CPMS monitoring plan to the Administrator upon request by the Administrator. [40 CFR 63.671(b)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Source ID: C208 b. Source Name: MPGF Ethylene Tank

c. Plan Approval or Operating Permit Number: PA-04-00740A and PA-04-00740C (included under LP MPGF (Source ID C204B) in those plan approvals) and PA-04-00740D

d. Manufacturer: Zeeco e. Model Number: AFDS-6/24

f. Source Description: Perimeter air-assisted multi-point ground flare used to control VOC emissions

g. Rated Heat Input/Throughput: 1,152 MMBtu/hr (HHV) h. Installation Date: 9/2022

i. Rated Power/Electric Output: NA

j. Exhaust Temperature: NA Units k. Exhaust % Moisture: NA l. Exhaust Flow Volume: NA SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

Yes No

☐ ☒ Emissions unit uses a control device to achieve compliance.

☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
C208	MPGF Ethylene Tank	S208	Stack (MPGF Ethylene Tank)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Natural gas / Waste gas	30190023	28.71 MMBtu/hr (HHV)	NA

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Visible emissions from the MPGF Ethylene Tank shall not exceed 0% except for a total of five minutes during any consecutive two-hour period.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	The MPGF Ethylene Tank shall be designed and operated to reduce collected VOC emissions by a minimum of 98%.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Net heating value of the combustion zone gas at the MPGF Ethylene Tank shall equal or exceed 500 Btu/scf on a three-hour rolling average, calculated every 15 minutes.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Comply with the applicable VOC standards specified in 40 CFR §60.112b [40 CFR 60.112b(b)(1) and 60.112b(a)(3)(ii)].	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 60 Subpart Kb §§60.112b(b)(1) and 60.112b(a)(3)(ii)	Meet the requirements specified in the general control device requirements, 40 CFR 60.18(c) through (f).	The same limitation as the limitation associated with the citation is used for the source.
Refer to Applicable Requirements for the Entire Site in Section 2 for additional requirements that may be applicable to the source.			



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BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	208 (MPGF Ethylene Tank Header) / C208 (MPGF Ethylene Tank)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Monitoring for compliance with the 98% destruction efficiency requirement for the MPGF Ethylene Tank shall be performed in accordance with 40 CFR 60.18. Operating parameter monitoring shall include flame detection at a minimum.			
Comply with the applicable flare monitoring and work practice requirements specified in 40 CFR 60.18.			
Net heating value of the combustion zone gas at the MPGF Ethylene Tank shall be calculated and recorded at a minimum of once every 15 minutes based on the volumetric flow rate of the waste gas in the MPGF Ethylene Tank Header and the composition of the waste gas. Engineering knowledge can be used to estimate the composition of the waste gas in the MPGF Ethylene Tank Header.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of waste gas in the MPGF Ethylene Tank Header.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist air used at the MPGF Ethylene Tank. Continuously monitoring fan speed or power and using fan curves is an acceptable method for continuously monitoring assist air flow rates at the MPGF Ethylene Tank.			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Maintain records of the flow rate in the MPGF Ethylene Tank Header on a daily basis.

VOC and GHG content based on engineering knowledge shall be used to calculate 12-month rolling total VOC and GHG emissions for the MPGF Ethylene Tank.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Minimize flaring resulting from startups, shutdowns, and unforeseeable events by operating the MPGF Ethylene Tank at all times in accordance with an approved flare minimization plan. The plan shall include the following:

- a. Procedures for operating and maintaining the MPGF Ethylene Tank during periods of process unit startup, shutdown, and unforeseeable events.
- b. A program of corrective action for malfunctioning process equipment.
- c. Procedures to minimize discharges either directly to the atmosphere or to the MPGF Ethylene Tank during the planned and unplanned startup or shutdown of process unit and air pollution control equipment, including an evaluation of flaring that has occurred or may reasonably be expected to occur during planned maintenance activities, including startup and shutdown, that considers the feasibility of performing these activities without flaring.
- d. Procedures for conducting root cause analyses.
- e. Procedures for taking identified corrective actions.
- f. The baseline flow to the MPGF Ethylene Tank determined in accordance with the provisions of 40 CFR 60.103a(a)(4).

Conduct a root cause analysis within 45 days after any startup flaring event, shutdown flaring event, or unforeseeable flaring event at the MPGF Ethylene Tank. Flaring event shall be defined as an event that exceeds the baseline by 500,000 scf within a 24-hour period. The analysis shall address the following:

- a. The date and time that the flaring event started and ended.
- b. The total quantity of gas flared during each event.
- c. An estimate of the quantity of VOC that was emitted and the calculations used to determine the quantities.
- d. The steps taken to limit the duration of the flaring event or the quantity of emissions associated with the event.
- e. A detailed analysis that sets forth the root cause and all significant contributing causes of the flaring event to the extent determinable.
- f. An analysis of the measures that are available to reduce the likelihood of a recurrence of a flaring event resulting from the same root cause or significant contributing causes in the future. The analysis of prevention measures must consider the adequacy of existing maintenance schedules and protocols for equipment contributing to the flaring event.
- g. A demonstration that the actions taken during the flaring event are consistent with the procedures specified in the flare minimization plan.
- h. In response to a flaring event, the Owner/Operator shall implement, as expeditiously as practicable, such interim and/or long-term corrective actions as are consistent with good engineering practice to minimize the likelihood of a recurrence of the root cause and all significant contributing causes of that flaring event.
- i. If any items required to be addressed in this analysis are still under investigation 45 days after the flaring event, the Owner/Operator shall include a statement of the anticipated date by which a follow-up report fully conforming to the requirements of this Condition shall be completed.



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SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	208 (MPGF Ethylene Tank Header) / C208 (MPGF Ethylene Tank)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart Kb		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☐	Monitoring	☒ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)			
Monitoring Device Location			
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter.			
How will data be reported?			
SECTION C. TESTING			
Reference Test Method Description			
Meet the requirements specified in the general control device requirements, 40 CFR 60.18(e) and (f). [40 CFR 60.113b(d)].			
Reference Test Method Citation	As specified		
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
Keep copies of all reports required by 40 CFR 60.115b(d)(1) and (d)(3) for at least two years. [40 CFR 60.115b(d)(1) and 60.115b(d)(3)].			
Presence of a flame recordkeeping by electronic or hard copy upon each occurrence of operation during which the flare pilot flame is absent. Keep copies of all records for at least two years. [40 CFR 60.115b(d)(2)].			

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Submit report: Due to the Department within six months of the initial startup date as required by 40 CFR 60.8. The report shall contain the measurements required by 40 CFR 60.18(f)(1) through (6). [40 CFR 60.115b(d)(1)].

Submit a report: Due semiannually to the Department for all periods recorded under 40 CFR 60.115b(d)(2) in which the pilot flame was absent. [40 CFR 60.115b(d)(3)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	208 (MPGF Ethylene Tank Header) / C208 (MPGF Ethylene Tank)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart A		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒	Testing
☐	Record Keeping	☐	Work Practice Standard
☐		☐	Reporting
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	NA		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Presence of a flame monitored by flame monitor continuously. Use a thermocouple or any other equivalent device to detect the presence of a flare pilot flame. [40 CFR 60.18(f)(2)].			
How will data be reported?	See 40 CFR Part 60 Subpart Kb		
SECTION C. TESTING			
Reference Test Method Description			
Method 22 of 40 CFR Part 60, Appendix A shall be used to determine compliance 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. [40 CFR 60.18(f)(1)].			
Reference Test Method Citation	As specified		
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
SECTION E. REPORTING			
Describe what is to be reported and the frequency of reporting.			
Reporting Start Date			

SECTION F. WORK PRACTICE STANDARD
--

Describe any work practice standard(s).

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Source ID: C209 b. Source Name: MPGF PE Units 1/2 Episodic Vent

c. Plan Approval or Operating Permit Number: PA-04-00740A and PA-04-00740C (included under LP MPGF (Source ID C204B) in those plan approvals) and PA-04-00740D

d. Manufacturer: Zeeco e. Model Number: AFDS-6/24

f. Source Description: Perimeter air-assisted multi-point ground flare used to control VOC emissions

g. Rated Heat Input/Throughput: 860 MMBtu/hr (HHV) h. Installation Date: 9/2022

i. Rated Power/Electric Output: NA

j. Exhaust Temperature: NA Units k. Exhaust % Moisture: NA l. Exhaust Flow Volume: NA SCFM

5.2 Compliance Assurance Monitoring (CAM) Information

Yes No

☐ ☒ Emissions unit uses a control device to achieve compliance.

☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both boxes are checked "Yes.")

5.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	Unit ID Description	Percent Flow
C209	MPGF PE Units 1/2 Episodic Vent	S209	Stack (MPGF PE Units 1/2 Episodic Vent)	100%

5.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Natural gas / Waste gas	30190023	180.91 MMBtu/hr (HHV)	NA

5.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

5.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 5.1 of the application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Visible emissions from the MPGF PE Units 1/2 Episodic Vent shall not exceed 0% except for a total of five minutes during any consecutive two-hour period.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	The MPGF PE Units 1/2 Episodic Vent shall be designed and operated to reduce collected VOC emissions by a minimum of 98%.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	The MPGF PE Units 1/2 Episodic Vent shall be equipped with automated controls for control of the supplemental gas flow rate to the flare.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Net heating value of the combustion zone gas at the MPGF PE Units 1/2 Episodic Vent shall equal or exceed 500 Btu/scf on a three-hour rolling average, calculated every 15 minutes.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 63.670 and 40 CFR 63.671.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 60 Subpart DDD §60.562-1(a)(1)(i)(C)	Meet the conditions specified in 40 CFR 60.18 at all times.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart FFFF §63.2535(m)(1)	Flares that are subject to the provisions of 40 CFR 60.18 or 63.11 and must comply with the requirements in 40 CFR 63.2450(e)(5) are required to comply only with the provisions specified in 40 CFR 63 Subpart FFFF.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart FFFF §63.2450(e)(5)	Reduce organic HAP emissions by venting emissions through a closed-vent system to a steam-assisted, air-assisted, non-assisted, or pressure-assisted multi-point flare and meet the applicable requirements for flares as specified in 40 CFR 63.670 and 63.671 of 40 CFR 63 Subpart CC, including the provisions in Tables 12 and 13 to 40 CFR 63 Subpart CC, except as specified in 40 CFR 63.1103(e)(5)(i) through (xiii).	The same limitation as the limitation associated with the citation is used for the source.

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	40 CFR Part 63 Subpart CC §63.670(b)	Operate the flare with a pilot flame present at all times when regulated material is routed to the flare. Each 15-minute block during which there is at least one minute where no pilot flame is present when regulated material is routed to the flare is a deviation of the standard. Deviations in different 15-minute blocks from the same event are considered separate deviations.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(c)	Specify the smokeless design capacity of the flare and operate with no visible emissions, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours, when regulated material is routed to the flare.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(d)	Comply with either 40 CFR 63.670(d)(1) or (2), provided the appropriate monitoring systems are in-place, whenever regulated material is routed to the flare for at least 15-minutes and the flare vent gas flow rate is less than the smokeless design capacity of the flare.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(e)(1)	Operate the flare to maintain the net heating value of flare combustion zone gas (NHVcz) at or above 270 Btu/scf determined on a 15-minute block period basis when regulated material is routed to the flare for at least 15-minutes.	The same limitation as the limitation associated with the citation is used for the source.

5.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	40 CFR Part 63 Subpart CC §63.670(r)	An owner or operator may request approval from the Administrator for site-specific operating limits that shall apply specifically to a selected flare. Site-specific operating limits include alternative threshold values for the parameters specified in 40 CFR 63.670(d) through (f) as well as threshold values for operating parameters other than those specified in 40 CFR 63.670(d) through (f). The owner or operator must demonstrate that the flare achieves 96.5% combustion efficiency (or 98% destruction efficiency) using the site-specific operating limits based on a performance evaluation as described in 40 CFR 63.670(r)(1). The request shall include information as described in 40 CFR 63.670(r)(2).	The same limitation as the limitation associated with the citation is used for the source.
Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group No. G09 for additional requirements that may be applicable to the source.			



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	209 (MPGF PE Units 1/2 Episodic Vent Header) / C209 (MPGF PE Units 1/2 Episodic Vent)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Monitoring for compliance with the 98% destruction efficiency requirement for the MPGF PE Units 1/2 Episodic Vent shall be performed in accordance with 40 CFR 63 Subpart FFFF, 40 CFR 63.670, and 40 CFR 63.671.			
Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 63.670 and 40 CFR 63.671.			
Net heating value of the combustion zone gas at the MPGF PE Units 1/2 Episodic Vent Header shall be measured and recorded at a minimum of once every 15 minutes. An adjusted net heating value of hydrogen of 1,212 Btu/scf may be used for this calculation.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the MPGF PE Units 1/2 Episodic Vent Header as well as any flare supplemental gas used.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist air used at the MPGF PE Units 1/2 Episodic Vent. Continuously monitoring fan speed or power and using fan curves is an acceptable method for continuously monitoring assist air flow rates at the MPGF PE Units 1/2 Episodic Vent.			
How will data be reported?	NA		

SECTION C. TESTING

Reference Test Method Description

Reference Test Method Citation

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Maintain records of the flow rate in the MPGF PE Units 1/2 Episodic Vent Header on a daily basis.

VOC and GHG content measured by a gas chromatograph (or equivalent monitor) shall be used to calculate 12-month rolling total VOC and GHG emissions for the MPGF PE Units 1/2 Episodic Vent.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Minimize flaring resulting from startups, shutdowns, and unforeseeable events by operating the MPGF PE Units 1/2 Episodic Vent at all times in accordance with an approved flare minimization plan. The plan shall include the following:

- a. Procedures for operating and maintaining the MPGF PE Units 1/2 Episodic Vent during periods of process unit startup, shutdown, and unforeseeable events.
- b. A program of corrective action for malfunctioning process equipment.
- c. Procedures to minimize discharges either directly to the atmosphere or to the MPGF PE Units 1/2 Episodic Vent during the planned and unplanned startup or shutdown of process unit and air pollution control equipment, including an evaluation of flaring that has occurred or may reasonably be expected to occur during planned maintenance activities, including startup and shutdown, that considers the feasibility of performing these activities without flaring.
- d. Procedures for conducting root cause analyses.
- e. Procedures for taking identified corrective actions.
- f. The baseline flow to the MPGF PE Units 1/2 Episodic Vent determined in accordance with the provisions of 40 CFR 60.103a(a)(4).

Conduct a root cause analysis within 45 days after any startup flaring event, shutdown flaring event, or unforeseeable flaring event at the MPGF PE Units 1/2 Episodic Vent. Flaring event shall be defined as an event that exceeds the baseline by 500,000 scf within a 24-hour period. The analysis shall address the following:

- a. The date and time that the flaring event started and ended.
- b. The total quantity of gas flared during each event.
- c. An estimate of the quantity of VOC that was emitted and the calculations used to determine the quantities.
- d. The steps taken to limit the duration of the flaring event or the quantity of emissions associated with the event.
- e. A detailed analysis that sets forth the root cause and all significant contributing causes of the flaring event to the extent determinable.
- f. An analysis of the measures that are available to reduce the likelihood of a recurrence of a flaring event resulting from the same root cause or significant contributing causes in the future. The analysis of prevention measures must consider the adequacy of existing maintenance schedules and protocols for equipment contributing to the flaring event.
- g. A demonstration that the actions taken during the flaring event are consistent with the procedures specified in the flare minimization plan.
- h. In response to a flaring event, the Owner/Operator shall implement, as expeditiously as practicable, such interim and/or long-term corrective actions as are consistent with good engineering practice to minimize the likelihood of a recurrence of the root cause and all significant contributing causes of that flaring event.
- i. If any items required to be addressed in this analysis are still under investigation 45 days after the flaring event, the Owner/Operator shall include a statement of the anticipated date by which a follow-up report fully conforming to the requirements of this Condition shall be completed.



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BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	209 (MPGF PE Units 1/2 Episodic Vent Header) / C209 (MPGF PE Units 1/2 Episodic Vent)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 63 Subpart CC		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Continuously monitor the presence of the pilot flame or flare flame(s) using a device (including, but not limited to, a thermocouple, ultraviolet beam sensor, or infrared sensor) capable of detecting that the pilot flame or flare flame(s) is present. [40 CFR 63.670(g)].			
Monitor visible emissions while regulated materials are vented to the flare. An initial visible emissions demonstration must be conducted using an observation period of 2 hours using Method 22 at 40 CFR 60, Appendix A-7. Subsequent visible emissions observations must be conducted using either the methods in 40 CFR 63.670(h)(1) or, alternatively, the methods in 40 CFR 63.670(h)(2). [40 CFR 63.670(h)].			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the flare header or headers that feed the flare as well as any supplemental natural gas used. Different flow monitoring methods may be used to measure different gaseous streams that make up the flare vent gas provided that the flow rates of all gas streams that contribute to the flare vent gas are determined. If assist air or assist steam is used, the owner or operator shall install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist air and/or assist steam used with the flare. [40 CFR 63.670(i)].			
Determine the concentration of individual components in the flare vent gas using either the methods provided in 40 CFR 63.670(j)(1) or (2), to assess compliance with the operating limits in 40 CFR 63.670(e) and, if applicable, 40 CFR 63.670(d) and (f). Alternatively, the owner or operator may elect to directly monitor the net heating value of the flare vent gas following the methods provided in 40 CFR 63.670(j)(3) and, if desired, may directly measure the hydrogen concentration in the flare vent gas following the methods provided in 40 CFR 63.670(j)(4). The owner or operator may elect to use different monitoring methods for different gaseous streams that make up the flare vent gas using different methods provided the composition or net heating value of all gas streams that contribute to the flare vent gas are determined. [40 CFR 63.670(j)].			

Determine V_{tip} on a 15-minute block average basis according to the requirements in 40 CFR 63.670(k)(1) through (k)(4). [40 CFR 63.670(k)].

When calculating NH_{Vvg} for a specific 15-minute block:

- (A) If the results from the first sample collected during an event (for periodic flare vent gas flow events) are not available until after the second 15-minute block starts, use the results from the first sample collected during an event for the first 15-minute block associated with that event.
- (B) For all other cases, use the arithmetic average of all NH_{Vvg} measurement data results that become available during a 15-minute block to calculate the 15-minute block average for that period. For the purpose of this requirement, use the time that the results become available rather than the time the sample was collected. For example, if a sample is collected at 12:25 a.m. and the analysis is completed at 12:38 a.m., the results are available at 12:38 a.m. and these results would be used to determine compliance during the 15-minute block period from 12:30 a.m. to 12:45 a.m. [40 CFR 63.670(l)(5)(ii)].

Determine the net heating value of the combustion zone gas (NH_{Vcz}) as specified in 40 CFR 63.670(m)(1) or (2), as applicable. [40 CFR 63.670(m)].

Except as specified in 40 CFR 63.670(m)(2), determine the 15-minute block average NH_{Vcz} based on the 15-minute block average vent gas and assist gas flow rates using the equation listed in 40 CFR 63.670(m)(1). For periods when there is no assist steam flow or premix assist air flow, $NH_{Vcz} = NH_{Vvg}$. [40 CFR 63.670(m)(1)].

Owners and operators of flares that use the feed-forward calculation methodology in 40 CFR 63.670(l)(5)(i) and that monitor gas composition or net heating value in a location representative of the cumulative vent gas stream and that directly monitor supplemental natural gas flow additions to the flare must determine the 15-minute block average NH_{Vcz} using equation listed in 40 CFR 63.670(m)(2). [40 CFR 63.670(m)(2)].

For each CPMS installed to comply with applicable provisions in 40 CFR 63.670, install, operate, calibrate, and maintain the CPMS as specified in 40 CFR 63.671(a)(1) through (8). [40 CFR 63.671(a)].

All monitoring equipment, except for CPMS installed for pilot flame monitoring, must meet the applicable minimum accuracy, calibration, and quality control requirements specified in table 13 of 40 CFR 63 Subpart CC. [40 CFR 63.671(a)(1)].

Ensure the readout (that portion of the CPMS that provides a visual display or record) or other indication of the monitored operating parameter from any CPMS required for compliance is readily accessible onsite for operational control or inspection by the operator of the source. [40 CFR 63.671(a)(2)].

All CPMS must complete a minimum of one cycle of operation (sampling, analyzing and data recording) for each successive 15-minute period. [40 CFR 63.671(a)(3)].

Except for periods of monitoring system malfunctions, repairs associated with monitoring system malfunctions, and required monitoring system quality assurance or quality control activities (including, as applicable, calibration checks and required zero and span adjustments), the owner or operator shall operate all CPMS and collect data continuously at all times when regulated emissions are routed to the flare. [40 CFR 63.671(a)(4)].

Operate, maintain, and calibrate each CPMS according to the CPMS monitoring plan specified in 40 CFR 63.671(b). [40 CFR 63.671(a)(5)].

The CPMS must be capable of measuring the appropriate parameter over the range of values expected for that measurement location. The data recording system associated with each CPMS must have a resolution that is equal to or better than the required system accuracy. [40 CFR 63.671(a)(8)].

Develop and implement a CPMS quality control program documented in a CPMS monitoring plan that covers each flare subject to the provisions in 40 CFR 63.670 and each CPMS installed to comply with applicable provisions in 40 CFR 63.670. The CPMS monitoring plan must contain the information listed in 40 CFR 63.671(b)(1) through (5). [40 CFR 63.671(b)].

For each CPMS installed to comply with applicable provisions in 40 CFR 63.670 except for CPMS installed for pilot flame monitoring, the owner or operator shall comply with the out-of-control procedures described in 40 CFR 63.671(c)(1) and (2). [40 CFR 63.671(c)].

Reduce data from a CPMS installed to comply with applicable provisions in 40 CFR 63.670 as specified in 40 CFR 63.671(d)(1) through (3). [40 CFR 63.671(d)].

For monitors used to determine compositional analysis for net heating value per 40 CFR 63.670(j)(1), the gas chromatograph must also meet the requirements of 40 CFR 63.671(e)(1) through (3). [40 CFR 63.671(e)].

How will data be reported? See Section E. Reporting below.

SECTION C. TESTING

Reference Test Method Description

Reference Test Method Citation

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Maintain a copy of the CPMS monitoring plan readily available on-site at all times. [40 CFR 63.671(b)].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Record and report any instances where visible emissions are observed for more than 5 minutes during any 2 consecutive hours as specified in 40 CFR 63.655(g)(11)(ii). [40 CFR 63.670(h)].

Submit a copy of the CPMS monitoring plan to the Administrator upon request by the Administrator. [40 CFR 63.671(b)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

a. Source ID: 104 b. Source Name: Cogeneration Plant Cooling Tower

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: NA e. Model Number: NA

f. Source Description: 6 cell, double-cell row configuration mechanical draft cooling tower

g. Rated Capacity (for engines use BHP): 120,000 gpm h. Installation Date: 3/2020

i. Exhaust Temperature: 71.0 Units °F j. Exhaust % Moisture: NA k. Exhaust Flow Volume: 4,270,896 SCFM

7.2 CAM Information

Yes No

☒ ☐ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
☐ ☒ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
104	Cogeneration Plant Cooling Tower	C104	Drift Eliminators (Cogen Cooling Tower)	100%
C104	Drift Eliminators (Cogen Cooling Tower)	Z104	Fugitive Emissions (Cogen Cooling Tower)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Water	38500101	120,000 gpm	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
38500101	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Cogeneration Plant Cooling Tower water total dissolved solids (TDS) shall not exceed 2,000 ppmw on a monthly 12-month rolling average.	The same limitation as the limitation associated with the citation is used for the source.
38500101	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Maximum designed water circulation rate through the Cogeneration Plant Cooling Tower shall not exceed 7,200,000 gallons per hour.	The same limitation as the limitation associated with the citation is used for the source.
38500101	Plan Approval 04-00740D [25 Pa. Code §127.12b]	The Cogeneration Plant Cooling Tower shall be equipped with drift/mist eliminators designed not to exceed 0.0005% drift loss.	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 for additional requirements that may be applicable to the source.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	104 (Cogeneration Plant Cooling Tower)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒	Testing
☐	Record Keeping	☐	Work Practice Standard
☐		☐	Reporting
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	Conductivity meter		
Monitoring Device Location	NA		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Calculate TDS via continuous online conductivity analyzer readings correlated to TDS as approved by the Department.			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Perform TDS testing upon the Cogeneration Plant Cooling Tower water according to ASTM Method D5907-13 and correlate the results with an online conductivity analyzer. Samples and/or measurements are required to be performed under identical operating conditions at a point which is representative of the water being evaporated to the atmosphere. A factor shall be derived from test results correlating TDS and electrical conductivity such that TDS may be approximated by electrical conductivity measurements. Initial testing is required within 180 days of startup of the cooling tower or on an alternative schedule as approved by the Department. Subsequent TDS testing is required at a minimum of once every 5 years thereafter. Extension to the initial and subsequent performance testing deadlines may be granted by the Department in writing in response to a written request from the Owner/Operator and upon a satisfactory showing that an extension is justified.			
Reference Test Method Citation	ASTM Method D5907-13		
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			

SECTION E. REPORTING
Describe what is to be reported and the frequency of reporting.
Reporting Start Date
SECTION F. WORK PRACTICE STANDARD
Describe any work practice standard(s).

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

- a. Source ID: 201 b. Source Name: Ethylene Manufacturing Line
- c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D
- d. Manufacturer: Linde e. Model Number: NA
- f. Source Description: Ethylene manufacturing unit
- g. Rated Capacity (for engines use BHP): NA h. Installation Date: 9/2022
- i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☒ ☐ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☒ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
201	Ethylene Manufacturing Line	205	HP Header System	
205	HP Header System	C205	HP Flare System	
C205	HP Flare System	C205A	TEGF A	
C205	HP Flare System	C205B	TEGF B	
C205	HP Flare System	C205C	HP Elevated Flare	Used when total TEGF A and TEGF B capacity is exceeded
201	Ethylene Manufacturing Line	C206	SCTO	
C205A	TEGF A	S205A	Stack (TEGF A)	100%
C205B	TEGF B	S205B	Stack (TEGF B)	100%
C205C	HP Elevated Flare	S205C	Stack (HP Elevated Flare)	100%
C206	SCTO	S206	Stack (SCTO)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Ethylene	30119701	1,763,000 metric tons/yr	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30119701	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Spent caustic vent vapors shall be captured and routed through a closed system to the SCTO.	The same limitation as the limitation associated with the citation is used for the source.
30119701	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Compressor seal vent, startup, shutdown, and maintenance gases associated with the ethylene manufacturing line shall be captured and routed to the HP Flare System. Emergency and malfunction event gases shall be captured and routed to the HP Flare System as practicable. Hydrocarbon-containing equipment shall be drained, depressurized, and purged with nitrogen to the HP Flare System prior to being opened to the atmosphere.	The same limitation as the limitation associated with the citation is used for the source.
30119701	25 Pa. Code §129.65	No person may permit the emission into the outdoor atmosphere of a waste gas stream from an ethylene production plant or facility unless the gas stream is properly burned at no less than 1,300°F for at least .3 seconds; except that no person may permit the emission of volatile organic compounds in gaseous form into the outdoor atmosphere from a vapor blowdown system unless these gases are burned by smokeless flares.	The same limitation as the limitation associated with the citation is used for the source.
30119701	25 Pa. Code §129.71a(b)(1)	A process vent that must be controlled according to the requirements of 25 Pa. Code §129.71a and 40 CFR 60 Subpart NNN or RRR is required to comply only with the requirements of 40 CFR 60 Subpart NNN or RRR. Accordingly, SPM has elected to comply only with the requirements of 40 CFR 60 Subparts NNN and RRR, for such process vents, which constitutes compliance with 25 Pa. Code §129.71a.	The same limitation as the limitation associated with the citation is used for the source.

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30119701	40 CFR Part 60 Subpart NNN §60.662(a)	Reduce emissions of TOC (less methane and ethane) by 98 wt%, or to a TOC (less methane and ethane) concentration of 20 ppmvd corrected to 3% oxygen, whichever is less stringent. Introduce the vent stream into the flame zone of the process heater when a process heater is used to comply.	The same limitation as the limitation associated with the citation is used for the source.
30119701	40 CFR Part 60 Subpart NNN §60.662(b)	Combust emissions in a flare that meets the requirements of 40 CFR 60.18.	The same limitation as the limitation associated with the citation is used for the source.
30119701	40 CFR Part 60 Subpart RRR §60.700(c)(5)	A reactor process vent stream is exempt from all provisions of 40 CFR 60 Subpart RRR except for the reporting requirements at 40 CFR 60.705(r) when the vent stream is routed to a distillation unit that is subject to 40 CFR 60 Subpart NNN. Accordingly, SPM's ethylene manufacturing unit reactor process vent streams are exempt from all provisions of 40 CFR 60 Subpart RRR except for the reporting requirements at 40 CFR 60.705(r) because the vent streams are routed to distillation units in the ethylene manufacturing unit that are subject to 40 CFR 60 Subpart NNN.	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G04, G05, G06, G07, and G08 in Section 4.2 for additional requirements that may be applicable to the source.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	201 (Ethylene Manufacturing Line)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart NNN		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒	Testing
☒	Record Keeping	☐	Work Practice Standard
☒		☒	Reporting
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	CMS		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Flow monitored by flow indicator hourly. Monitor the vent stream flow to the flare. Install the flow indicator in the vent stream from each affected facility at a point closest to the flare and before being joined with any other vent stream. [40 CFR 60.663(b)(2)].			
Flow monitored by flow indicator hourly. Monitor the vent stream flow to the process heater. Install the flow indicator in the vent stream from each distillation unit within an affected facility at a point closest to the inlet of each process heater and before being joined with any other vent stream. [40 CFR 60.663(c)(1)].			
How will data be reported?	See Section E. Reporting below.		
SECTION C. TESTING			
Reference Test Method Description			
Run all affected facilities at full operating conditions and flow rates during any performance test intended to demonstrate compliance with 40 CFR 60.662. [40 CFR 60.664(a)].			
Reference Test Method Citation	As specified		

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Performance Test Data recordkeeping by electronic or hard copy at the regulation's specified frequency. Maintain up-to-date, readily accessible records of the data listed in 40 CFR 60.665(b)(3) measured during each performance test required under 40 CFR 60.8. Submit the same specified data in the reports of the initial and all subsequently required performance tests. [40 CFR 60.665(b) and 60.665(b)(3)].

Flow recordkeeping by electronic or hard copy hourly. Record the vent stream flow to the flare at least once every hour for each affected facility. Make records readily available for inspection. [40 CFR 60.665(d)].

Flow recordkeeping by electronic or hard copy hourly. Record the vent stream flow to the process heater at least once every hour for each affected facility. Make records readily available for inspection. [40 CFR 60.665(c) and 60.665(d)].

Maintain up-to-date, readily accessible records of all periods when the vent stream is diverted from the control device or has no flow rate. [40 CFR 60.665(d)].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Notify the Department with the specific provisions of 40 CFR 60.662 (40 CFR 60.662(a), (b), or (c)) with which the facility operator has elected to comply. Submit the notification with the notification of initial start-up required in 40 CFR 60.7(a)(3). [40 CFR 60.665(a)].

Notify the Department 90 days before implementing any change in the provision of 40 CFR 60.662 with which the operator elects to comply. [40 CFR 60.665(a)].

For a process heater with a design heat input capacity of 150 MMBtu/hour or greater that is used to comply with 40 CFR 60.662(a), submit a report to the Department containing a description of the location at which the vent stream is introduced into the process heater. [40 CFR 60.665(b) and 60.665(b)(2)(i)].

Submit report: Due semiannually. Submit initial report within 6 months after the initial start-up date. Include the information outlined in 40 CFR 60.665(l)(1) through (l)(7). [40 CFR 60.665(l)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	201 (Ethylene Manufacturing Line)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart RRR		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☐	Monitoring	☐ Testing	☒ Reporting
☐	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)			
Monitoring Device Location			
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter.			
How will data be reported?			
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
SECTION E. REPORTING			
Describe what is to be reported and the frequency of reporting.			
Submit to the Administrator a process design description as part of the notification of initial startup required by 40 CFR 60.7(a)(3) documenting reactor process vent streams are routed to one or more distillation units subject to 40 CFR 60 Subpart NNN. This process design description must be retained for the life of the process. No other records or reports are required unless process changes are made. [40 CFR 60.705(r)].			
Reporting Start Date	As specified		

SECTION F. WORK PRACTICE STANDARD
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Describe any work practice standard(s).



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	201
Control Type	Flare	AIRS Code No.	Pollutant VOC
Control Make	Zeeco	Control Model No.	NA
		Control Efficiency	≥98%
Control I.D.	C205A	Source or Emission Unit Name	Ethylene Manufacturing Line

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No	
☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act
☐	☒	Approved under an emissions trading program.
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:
	Yes	No
	☐	☐ Is owned by a municipality and
	☐	☐ Is exempt from all Part 75 monitoring requirements
	☐	☐ Is operated solely for providing power during peak electrical demand or emergency situations
	☐	☐ Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
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ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	201
Control Type	Flare	AIRS Code No.	Pollutant HAP
Control Make	Zeeco	Control Model No.	NA
		Control Efficiency	≥98%
Control I.D.	C205A	Source or Emission Unit Name	Ethylene Manufacturing Line

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No	
☒	☐	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act
☐	☒	Approved under an emissions trading program.
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:
	Yes	No
	☐	☐
		Is owned by a municipality and
	☐	☐
		Is exempt from all Part 75 monitoring requirements
	☐	☐
		Is operated solely for providing power during peak electrical demand or emergency situations
	☐	☐
		Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached



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ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	201
Control Type	Flare	AIRS Code No.	Pollutant VOC
Control Make	Zeeco	Control Model No.	NA
		Control Efficiency	≥98%
Control I.D.	C205B	Source or Emission Unit Name	Ethylene Manufacturing Line

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No	
☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act
☐	☒	Approved under an emissions trading program.
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:
	Yes	No
	☐	☐
		Is owned by a municipality and
	☐	☐
		Is exempt from all Part 75 monitoring requirements
	☐	☐
		Is operated solely for providing power during peak electrical demand or emergency situations
	☐	☐
		Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached



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ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	201
Control Type	Flare	AIRS Code No.	Pollutant HAP
Control Make	Zeeco	Control Model No.	NA
		Control Efficiency	≥98%
Control I.D.	C205B	Source or Emission Unit Name	Ethylene Manufacturing Line

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No	
☒	☐	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act
☐	☒	Approved under an emissions trading program.
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:
	Yes	No
	☐	☐
		Is owned by a municipality and
	☐	☐
		Is exempt from all Part 75 monitoring requirements
	☐	☐
		Is operated solely for providing power during peak electrical demand or emergency situations
	☐	☐
		Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached



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ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	201
Control Type	Flare	AIRS Code No.	Pollutant VOC
Control Make	Zeeco	Control Model No.	NA
		Control Efficiency	≥98%
Control I.D.	C205C	Source or Emission Unit Name	Ethylene Manufacturing Line

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No	
☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act
☐	☒	Approved under an emissions trading program.
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:
	Yes	No
	☐	☐ Is owned by a municipality and
	☐	☐ Is exempt from all Part 75 monitoring requirements
	☐	☐ Is operated solely for providing power during peak electrical demand or emergency situations
	☐	☐ Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached



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ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	201
Control Type	Flare	AIRS Code No.	Pollutant HAP
Control Make	Zeeco	Control Model No.	NA
		Control Efficiency	≥98%
Control I.D.	C205C	Source or Emission Unit Name	Ethylene Manufacturing Line

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No	
☒	☐	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act
☐	☒	Approved under an emissions trading program.
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:
	Yes	No
	☐	☐
		Is owned by a municipality and
	☐	☐
		Is exempt from all Part 75 monitoring requirements
	☐	☐
		Is operated solely for providing power during peak electrical demand or emergency situations
	☐	☐
		Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

- a. Source ID: 202 b. Source Name: Polyethylene Manufacturing Lines
- c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D
- d. Manufacturer: NA e. Model Number: NA
- f. Source Description: 2 gas phase polyethylene manufacturing units and 1 liquid phase slurry polyethylene manufacturing unit
- g. Rated Capacity (for engines use BHP): NA h. Installation Date: 10-11/2022
- i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☒ ☐ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☒ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
202	Polyethylene Manufacturing Lines	C202	Particulate Filters (PE MFG)	
202	Polyethylene Manufacturing Lines	204	CVTO Header System	
204	CVTO Header System	C204	CVTO	
204	CVTO Header System	207	MPGF CVTO Trip Header	
207	MPGF CVTO Trip Header	C207	MPGF CVTO Trip	
202	Polyethylene Manufacturing Lines	205	HP Header System	
205	HP Header System	C205	HP Flare System	
C205	HP Flare System	C205A	TEGF A	
C205	HP Flare System	C205B	TEGF B	
C205	HP Flare System	C205C	HP Elevated Flare	Used when total TEGF A and TEGF B capacity is exceeded
202	Polyethylene Manufacturing Lines	209	MPGF PE Units 1/2 Episodic Vent Header	
209	MPGF PE Units 1/2 Episodic Vent Header	C209	MPGF PE Units 1/2 Episodic Vent	
C202	Particulate Filters (PE MFG)	S202	Stacks (PE MFG Particulate Filters)	100%
C204	CVTO	S204	Stack (CVTO)	100%
C207	MPGF CVTO Trip	S207	Stack (MPGF CVTO Trip)	100%
C205A	TEGF A	S205A	Stack (TEGF A)	100%
C205B	TEGF B	S205B	Stack (TEGF B)	100%
C205C	HP Elevated Flare	S205C	Stack (HP Elevated Flare)	100%
C209	MPGF PE Units 1/2 Episodic Vent	S209	Stack (MPGF PE Units 1/2 Episodic Vent)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Low Density Polyethylene (LDPE)	30108101	1,760,000 metric tons/yr LDPE and HDPE combined	NA
High Density Polyethylene (HDPE)	30108110	1,760,000 metric tons/yr LDPE and HDPE combined	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30108101, 30108110	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Visible emissions from any fabric, sintered metal, or HEPA filter-controlled process vent shall not equal or exceed 10% opacity at any time.	The same limitation as the limitation associated with the citation is used for the source.
30108101, 30108110	Plan Approval 04-00740D [25 Pa. Code §127.12b]	PM (filterable) emissions from each polyethylene manufacturing line pellet dryer vent shall not exceed 0.01 gr/dscf.	The same limitation as the limitation associated with the citation is used for the source.
30108101, 30108110	Plan Approval 04-00740D [25 Pa. Code §127.12b]	PM (filterable) emissions from polyethylene manufacturing line catalyst activation vents shall not exceed 0.002 gr/dscf.	The same limitation as the limitation associated with the citation is used for the source.
30108101, 30108110	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Polyethylene manufacturing line particulate matter process vents (excluding the pellet dryer vents) shall be equipped with and controlled by fabric, sintered metal, or HEPA filters.	The same limitation as the limitation associated with the citation is used for the source.
30108101, 30108110	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Compressor seal gas vents; VOC process vents; and startup, shutdown, and maintenance gases associated with the gas phase polyethylene manufacturing lines shall be routed to the HP Header System, CVTO Header System, MPGF CVTO Trip Header, or MPGF PE Units 1/2 Episodic Vent Header. Emergency and malfunction event gases shall be captured and routed to the HP Header System, CVTO Header System, MPGF CVTO Trip Header, or MPGF PE Units 1/2 Episodic Vent Header as practicable. Hydrocarbon-containing equipment shall be drained, depressurized, and purged with nitrogen to the HP Header System, CVTO Header System, MPGF CVTO Trip Header, or MPGF PE Units 1/2 Episodic Vent Header prior to being opened to the atmosphere.	The same limitation as the limitation associated with the citation is used for the source.
30108101, 30108110	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Fabric, sintered metal, and HEPA filters shall be designed not to exceed an outlet PM rate of 0.005 gr/dscf.	The same limitation as the limitation associated with the citation is used for the source.

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30108101, 30108110	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Continuous VOC-containing process gas vents located upstream of and including the product purge bin in each gas phase technology polyethylene manufacturing line or upstream of the degasser in the liquid phase slurry polyethylene manufacturing line shall be routed to the CVTO Header System or MPGF CVTO Trip Header.	The same limitation as the limitation associated with the citation is used for the source.
30108101, 30108110	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Compressor seal gas vents; VOC process vents; and startup, shutdown, and maintenance gases associated with the liquid phase slurry polyethylene manufacturing line shall be routed to the HP Header System, CVTO Header System, or MPGF CVTO Trip Header. Emergency and malfunction event gases shall be captured and routed to the HP Header System, CVTO Header System, or MPGF CVTO Trip Header as practicable. Hydrocarbon-containing equipment shall be drained, depressurized, and purged with nitrogen to the HP Header System, CVTO Header System, or MPGF CVTO Trip Header prior to being opened to the atmosphere.	The same limitation as the limitation associated with the citation is used for the source.

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30108101, 30108110	40 CFR Part 60 Subpart DDD §60.562-1(a), 40 CFR Part 63 Subpart FFFF §63.2535(h)	An MCPU that contains process vents subject to the process vent control requirements of 40 CFR 63 Subpart FFFF that are also subject to the process vent control requirements of 40 CFR 60 Subpart DDD may apply 40 CFR 63 Subpart FFFF to all such process vents in the MCPU. Also, an MCPU subject to the provisions of 40 CFR 63 Subpart FFFF that has process vents to which 40 CFR 63 Subpart FFFF does not apply but which are subject to process vent control requirements in 40 CFR 60 Subpart DDD may elect to comply with the requirements for Group 1 process vents in 40 CFR 63 Subpart FFFF for all such process vents instead of 40 CFR 60 Subpart DDD. However, if you elect these two process vent overlap options, you must consider all total organic compounds, minus methane and ethane, in the subject process vents for purposes of compliance with 40 CFR 63 Subpart FFFF, as if they were organic HAP. Accordingly, SPM has elected to comply only with the requirements of 40 CFR 63 Subpart FFFF for such process vents.	The same limitation as the limitation associated with the citation is used for the source.
30108101, 30108110	40 CFR Part 60 Subpart DDD §60.560(g)	Individual vent streams that emit continuous emissions with a weight percent TOC of less than 0.10 percent are exempt from the requirements of 40 CFR 60.562-1(a)(1).	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G04, G08, G09, and G12 in Section 4.2 for additional requirements that may be applicable to the source.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	202 (Polyethylene Manufacturing Lines)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☐ Monitoring	☒ Testing	☐ Reporting	
☐ Record Keeping	☐ Work Practice Standard		
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)			
Monitoring Device Location			
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter.			
How will data be reported?			
SECTION C. TESTING			
Reference Test Method Description			
Perform chromium and hexavalent chromium emission testing upon each polyethylene manufacturing line chromium catalyst activation vent according to the requirements of 25 Pa. Code Chapter 139 and a Department-approved pre-test protocol. Initial performance testing is required within 180 days of startup of each polyethylene manufacturing line or on an alternative schedule as approved by the Department. Subsequent performance testing is required at minimum of once every 5 years thereafter. Extension to the initial and subsequent performance testing deadlines may be granted by the Department in writing in response to a written request from the Owner/Operator and upon a satisfactory showing that an extension is justified.			
Perform PM (filterable) emission testing upon each polyethylene manufacturing line pellet dryer vent according to the requirements of 25 Pa. Code Chapter 139 and a Department-approved pre-test protocol. Initial performance testing is required within 180 days of startup of each polyethylene manufacturing line or on an alternative schedule as approved by the Department. Subsequent performance testing is required at a minimum of once every 5 years thereafter. Extension to the initial and subsequent performance testing deadlines may be granted by the Department in writing in response to a written request from the Owner/Operator and upon a satisfactory showing that an extension is justified.			
Reference Test Method Citation	As specified		
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD
--

Describe any work practice standard(s).



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	202 (Polyethylene Manufacturing Lines)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart DDD		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☐	Monitoring	☒ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)			
Monitoring Device Location			
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter.			
How will data be reported?			
SECTION C. TESTING			
Reference Test Method Description			
Determine compliance with the individual stream exemptions in 40 CFR 60.560(g) as specified in 40 CFR 60.564(d)(2). [40 CFR 60.564(d)(2)].			
Reference Test Method Citation	As specified		
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
Keep for at least 2 years up-to-date, readily accessible records of any change in process operation that increases the VOC weight percent of the individual stream, if 40 CFR 60.560(g) is applicable. [40 CFR 60.565(h)].			
SECTION E. REPORTING			
Describe what is to be reported and the frequency of reporting.			
Submit a report if there is any change in process operations that increases the VOC weight percent of the individual stream, as recorded in 40 CFR 60.565(h). [40 CFR 60.565(k)].			
Reporting Start Date	As specified		

SECTION F. WORK PRACTICE STANDARD
--

Describe any work practice standard(s).



COMMONWEALTH OF PENNSYLVANIA
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ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	202
Control Type	Thermal Oxidizer	AIRS Code No.	Pollutant VOC
Control Make	John Zink	Control Model No.	NA
		Control Efficiency	≥99.9%
Control I.D.	C204	Source or Emission Unit Name	Polyethylene Manufacturing Lines

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No	
☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act
☐	☒	Approved under an emissions trading program.
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:
	Yes	No
	☐	☐
		Is owned by a municipality and
	☐	☐
		Is exempt from all Part 75 monitoring requirements
	☐	☐
		Is operated solely for providing power during peak electrical demand or emergency situations
	☐	☐
		Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	202
Control Type	Flare	AIRS Code No.	Pollutant VOC
Control Make	Zeeco	Control Model No.	AFTA-8/18 Control Efficiency ≥98%
Control I.D.	C207	Source or Emission Unit Name	Polyethylene Manufacturing Lines

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No		
☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.	
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.	
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act	
☐	☒	Approved under an emissions trading program.	
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).	
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor	
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:	
	Yes	No	
	☐	☐	Is owned by a municipality and
	☐	☐	Is exempt from all Part 75 monitoring requirements
	☐	☐	Is operated solely for providing power during peak electrical demand or emergency situations
	☐	☐	Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

a. Source ID: 203 b. Source Name: Process Cooling Tower

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: NA e. Model Number: NA

f. Source Description: 26 cell, double-cell row configuration mechanical draft cooling tower

g. Rated Capacity (for engines use BHP): 295,900 gpm h. Installation Date: 9/2022

i. Exhaust Temperature: 71.0 Units °F j. Exhaust % Moisture: NA k. Exhaust Flow Volume: 21,261,958 SCFM

7.2 CAM Information

Yes No

- ☒ ☐ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☒ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
203	Process Cooling Tower	C203	Drift Eliminators (Process Cooling Tower)	100%
C203	Drift Eliminators (Process Cooling Tower)	Z203	Fugitive Emissions (Process Cooling Tower)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Water	38500101	295,900 gpm	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
38500101	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Process Cooling Tower water total dissolved solids (TDS) shall not exceed 2,000 ppmw on a monthly 12-month rolling average.	The same limitation as the limitation associated with the citation is used for the source.
38500101	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Process Cooling Tower water VOC content shall not exceed 0.5 lb/MMgal.	The same limitation as the limitation associated with the citation is used for the source.
38500101	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Maximum designed water circulation rate through the Process Cooling Tower shall not exceed 17,800,000 gallons per hour.	The same limitation as the limitation associated with the citation is used for the source.
38500101	Plan Approval 04-00740D [25 Pa. Code §127.12b]	The Process Cooling Tower shall be equipped with drift/mist eliminators designed not to exceed 0.0005% drift loss.	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G05 and G06 in Section 4.2 for additional requirements that may be applicable to the source.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	203 (Process Cooling Tower)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒ Testing	☐ Reporting
☐	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	Conductivity meter		
Monitoring Device Location	NA		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Calculate TDS via continuous online conductivity analyzer readings correlated to TDS as approved by the Department.			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Perform TDS testing upon the Process Cooling Tower water according to ASTM Method D5907-13 and correlate the results with an online conductivity analyzer. Samples and/or measurements are required to be performed under identical operating conditions at a point which is representative of the water being evaporated to the atmosphere. A factor shall be derived from test results correlating TDS and electrical conductivity such that TDS may be approximated by electrical conductivity measurements. Initial testing is required within 180 days of startup of the cooling tower or on an alternative schedule as approved by the Department. Subsequent TDS testing is required at a minimum of once every 5 years thereafter. Extension to the initial and subsequent performance testing deadlines may be granted by the Department in writing in response to a written request from the Owner/Operator and upon a satisfactory showing that an extension is justified.			
Reference Test Method Citation	ASTM Method D5907-13		
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Develop and implement a leak detection and repair (LDAR) program for the Process Cooling Tower heat exchange system. The developed LDAR program shall be submitted to the Department for review prior to implementation and at a minimum of 45 days prior to facility startup. Cooling water shall be monitored for VOC. Other aspects of the LDAR program shall be consistent with the "heat exchange system requirements" under 40 CFR Part 63 Subpart XX.

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

- a. Source ID: 204 b. Source Name: Continuous Vent Thermal Oxidizer (CVTO) Header System
- c. Plan Approval or Operating Permit Number: PA-04-00740A and PA-04-00740C (included under LP Header System (Source ID 204) in those plan approvals) and PA-04-00740D
- d. Manufacturer: NA e. Model Number: NA
- f. Source Description: Low pressure header system that connects emission sources to the CVTO and MPGF CVTO Trip Header
- g. Rated Capacity (for engines use BHP): NA h. Installation Date: 9/2022
- i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☐ ☒ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
204	CVTO Header System	C204	CVTO	
204	CVTO Header System	207	MPGF CVTO Trip Header	
207	MPGF CVTO Trip Header	C207	MPGF CVTO Trip	100%
C204	CVTO	S204	Stack (CVTO)	100%
C207	MPGF CVTO Trip	S207	Stack (MPGF CVTO Trip)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Natural gas / Waste gas	30190013	NA	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190013	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Visible emissions from the CVTO shall not exceed 0% except for a total of five minutes during any consecutive two-hour period.	The same limitation as the limitation associated with the citation is used for the source.
30190013	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Emissions from the CVTO shall not exceed the following: a. NOx - 0.06 lb/MMBtu b. CO - 0.0824 lb/MMBtu c. PM10 - 0.0075 lb/MMBtu d. PM2.5 - 0.0075 lb/MMBtu	The same limitation as the limitation associated with the citation is used for the source.
30190013	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	The CVTO shall be designed and operated to reduce collected VOC emissions by a minimum of 99.9%.	The same limitation as the limitation associated with the citation is used for the source.
30190013	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	The CVTO shall, at all times that vapors are being collected by the CVTO Header System and routed to the CVTO, be operated at or above the minimum temperature at which at least 99.9% destruction efficiency is guaranteed by the manufacturer or demonstrated during performance testing.	The same limitation as the limitation associated with the citation is used for the source.
30190013	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Vent gas from the CVTO Header shall be captured and routed to the MPGF CVTO Trip Header when the CVTO is not available and during abnormal CVTO system operating conditions, such as high CVTO Header System pressure, high CVTO temperature, high CVTO combustion zone temperature, and low CVTO combustion air pressure.	The same limitation as the limitation associated with the citation is used for the source.
30190013	40 CFR Part 60 Subpart Kb §60.112b(a)(3)(ii)	VOC, Total $\geq$ 95 % reduction efficiency.	The same limitation as the limitation associated with the citation is used for the source.

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190013	40 CFR Part 60 Subpart Kb §60.113b(c)(2)	Operate the closed vent system and control device in accordance with the operating plan submitted to DEP in accordance with 40 CFR 60.113b(c)(1), unless the plan was modified by DEP during the review process. In this case, the modified plan applies.	The same limitation as the limitation associated with the citation is used for the source.
30190013	40 CFR Part 63 Subpart FFFF §63.2450(e)(1)	Reduce organic HAP emissions by venting emissions through a closed-vent system to any combination of control devices (except a flare) or recovery devices and meet the requirements of 40 CFR 63.2450(e)(4) and 40 CFR 63.982(c).	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G05, G08, and G09 in Section 4.2 for additional requirements that may be applicable to the source.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	
☐	Group of Sources	Unit ID	204 (CVTO Header System) / C204 (CVTO)
☒	Single Source	Scenario Name	
☐	Alternative Operating Scenario		
Citation No.	PA-04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒	Testing
☒	Record Keeping	☐	Work Practice Standard
☐		☐	Reporting
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Monitoring for compliance with the 99.9% destruction efficiency requirement for the CVTO shall be performed in accordance with 40 CFR 63.985(c). Operating parameter monitoring shall include combustion temperature at a minimum.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the flow rate in the vent gas header to the CVTO at a minimum of once every 15 minutes.			
Utilize a gas chromatograph (or equivalent monitor) to measure, calculate, and record VOC and GHG content at the CVTO Header at a minimum of once every 15 minutes.			
How will data be reported?	NA		

SECTION C. TESTING

Reference Test Method Description

Perform NO_x, CO, PM₁₀, PM_{2.5}, and n-Hexane emission testing upon the CVTO according to the requirements of 25 Pa. Code Chapter 139. Initial performance testing is required within 180 days of startup of the CVTO or on an alternative schedule as approved by the Department. Subsequent performance testing is required at minimum of once every 5 years thereafter. Extension to the initial and subsequent performance testing deadlines may be granted by the Department in writing in response to a written request and upon a satisfactory showing that an extension is justified. EPA Reference Method performance testing shall be conducted for the initial and subsequent performance tests.

Perform VOC destruction efficiency testing upon the CVTO in accordance with 40 CFR 63.985(b)(1)(ii). Initial performance testing is required within 180 days of startup of the CVTO or on an alternative schedule as approved by the Department. Subsequent performance testing is required at a minimum of once every 5 years thereafter. Extension of the initial and subsequent performance testing deadlines may be granted by the Department in writing in response to a written request and upon a satisfactory showing that an extension is justified.

Reference Test Method Citation As specified

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Maintain records of the flow rate in the vent gas header to the CVTO on a daily basis.

VOC and GHG content measured by a gas chromatograph (or equivalent monitor) shall be used to calculate 12-month rolling total VOC and GHG emissions for the CVTO.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).



COMMONWEALTH OF PENNSYLVANIA
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BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	204 (CVTO Header System) / C204 (CVTO)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	25 Pa. Code §127.441(b)		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒	Testing
☒	Record Keeping	☐	Work Practice Standard
☐	Reporting		
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Monitoring for compliance with the 99.9% destruction efficiency requirement for the CVTO shall be performed in accordance with 40 CFR 63.985(c). Operating parameter monitoring shall include combustion temperature at a minimum.			
Utilize a gas chromatograph (or equivalent monitor) to measure, calculate, and record VOC content at the CVTO Header at a minimum of once every 15 minutes.			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Perform VOC destruction efficiency testing upon the CVTO in accordance with 40 CFR 63.985(b)(1)(ii). Initial performance testing is required within 180 days of startup of the CVTO or on an alternative schedule as approved by the Department. Subsequent performance testing is required at a minimum of once every 5 years thereafter. Extension of the initial and subsequent performance testing deadlines may be granted by the Department in writing in response to a written request and upon a satisfactory showing that an extension is justified.			
Reference Test Method Citation	As specified		
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
VOC content measured by a gas chromatograph (or equivalent monitor) shall be used to calculate 12-month rolling total VOC emissions for the CVTO.			

SECTION E. REPORTING
Describe what is to be reported and the frequency of reporting.
Reporting Start Date
SECTION F. WORK PRACTICE STANDARD
Describe any work practice standard(s).



COMMONWEALTH OF PENNSYLVANIA
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BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	204 (CVTO Header System) / C204 (CVTO)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart Kb		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	NA		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Monitor the parameters of the control device in accordance with the operating plan submitted to the Department in accordance with 40 CFR 60.113b(c)(1), unless the plan was modified by Department during the review process. In this case, the modified plan applies. [40 CFR 60.113b(c)(2)].			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording. Operating plan recordkeeping by electronic or hard copy at the approved frequency. Keep copies of all records for the life of the control equipment. [40 CFR 60.115b(c)(1)].			
Monitoring data recordkeeping by electronic or hard copy upon measurement in accordance with the operating plan of 40 CFR 60.113b(c)(2). Keep copies of all records for at least two years. [40 CFR 60.115b(c)(2)].			

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Submit an operating plan as an attachment to the notification required by 40 CFR 60.7(a)(1) for approval by the Department. The operating plan shall contain the information listed in 40 CFR 60.113b(c)(1)(i) and (ii). [40 CFR 60.113b(c)(1)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

- a. Source ID: 205 b. Source Name: High Pressure (HP) Header System
- c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D
- d. Manufacturer: NA e. Model Number: NA
- f. Source Description: High pressure header system that connects emission sources to TEGF A, TEGF B, and HP Elevated Flare
- g. Rated Capacity (for engines use BHP): NA h. Installation Date: 9/2022
- i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☐ ☒ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
205	HP Header System	C205	HP Flare System	100%
C205	HP Flare System	C205A	TEGF A	
C205	HP Flare System	C205B	TEGF B	
C205	HP Flare System	C205C	HP Elevated Flare	
C205A	TEGF A	S205A	Stack (TEGF A)	100%
C205B	TEGF B	S205B	Stack (TEGF B)	100%
C205C	HP Elevated Flare	S205C	Stack (HP Elevated Flare)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Natural gas / Waste gas	30190023	NA	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Visible emissions from the TEGFs and HP Elevated Flare shall not exceed 0% except for a total of five minutes during any consecutive two-hour period.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	The TEGFs and HP Elevated Flare shall be designed and operated to reduce collected VOC emissions by a minimum of 98%.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	Net heating value of the combustion zone gas at the HP Header shall equal or exceed 500 Btu/scf on a three-hour rolling average, calculated every 15 minutes.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	Vapors collected by the HP Header System shall only be routed to the HP Elevated Flare in the event that the combined capacity of the TEGFs is exceeded due to malfunction or emergency, or due to maintenance of the TEGFs.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	The TEGFs shall be equipped with automated controls for control of the supplemental gas flow rate to the flares.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	The HP Elevated Flare shall be equipped with automated controls for control of the total steam mass flow rate to the flare.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR Part 63 Subpart YY, 40 CFR Part 63 Subpart FFFF, 40 CFR 63.670, and 40 CFR 63.671.	The same limitation as the limitation associated with the citation is used for the source.

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	25 Pa. Code §127.441(b)	Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 60.18(c) through (f) and 40 CFR 63.11(b).	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 60 Subpart DDD §60.562-1(a)(1)(i)(C)	Meet the conditions specified in 40 CFR 60.18 at all times.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 60 Subpart NNN §60.662(b)	Meet the requirements of 40 CFR 60.18.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart FFFF §63.2535(m)(1)	Flares that are subject to the provisions of 40 CFR 60.18 or 63.11 and must comply with the requirements in 40 CFR 63.2450(e)(5) are required to comply only with the provisions specified in 40 CFR 63 Subpart FFFF.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart YY §63.1100(g)(7)(i)	Flares that are subject to 40 CFR 60.18 or 40 CFR 63.11 and used as a control device for an emission point subject to the requirements in Table 7 to 40 CFR 63.1103(e) are required to comply only with 40 CFR 63.1103(e)(4).	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart FFFF §63.2450(e)(5)	Reduce organic HAP emissions by venting emissions through a closed-vent system to a steam-assisted, air-assisted, non-assisted, or pressure-assisted multi-point flare and meet the applicable requirements for flares as specified in 40 CFR 63.670 and 63.671 of 40 CFR 63 Subpart CC, including the provisions in Tables 12 and 13 to 40 CFR 63 Subpart CC, except as specified in 40 CFR 63.1103(e)(5)(i) through (xiii).	The same limitation as the limitation associated with the citation is used for the source.

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	40 CFR Part 63 Subpart CC §63.670(b)	For each non-pressure-assisted flare, operate each flare with a pilot flame present at all times when regulated material is routed to the flare. Each 15-minute block during which there is at least one minute where no pilot flame is present when regulated material is routed to the flare is a deviation of the standard. Deviations in different 15-minute blocks from the same event are considered separate deviations.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(c)	Specify the smokeless design capacity of each flare and operate with no visible emissions, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours, when regulated material is routed to the flare.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(d)	For each non-pressure-assisted flare, comply with either 40 CFR 63.670(d)(1) or (2), provided the appropriate monitoring systems are in-place, whenever regulated material is routed to the flare for at least 15-minutes and the flare vent gas flow rate is less than the smokeless design capacity of the flare.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(e)(1)	Operate each non-pressure-assisted flare to maintain the net heating value of flare combustion zone gas (NHVcz) at or above 270 Btu/scf determined on a 15-minute block period basis when regulated material is routed to the flare for at least 15-minutes.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(e)(2)	Operate each pressure-assisted flare to maintain the net heating value of flare combustion zone gas (NHVcz) at or above 800 Btu/scf determined on a 15-minute block period basis when regulated material is routed to the flare for at least 15-minutes. Monitor and calculate NHVcz as specified in 40 CFR 63.670(m).	The same limitation as the limitation associated with the citation is used for the source.

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	40 CFR Part 63 Subpart CC §63.670(o)	Comply with the provisions in 40 CFR 63.670(o)(1) through (8) for any flare that has the potential to operate above its smokeless capacity under any circumstance.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(r)	An owner or operator may request approval from the Administrator for site-specific operating limits that shall apply specifically to a selected flare. Site-specific operating limits include alternative threshold values for the parameters specified in 40 CFR 63.670(d) through (f) as well as threshold values for operating parameters other than those specified in 40 CFR 63.670(d) through (f). The owner or operator must demonstrate that the flare achieves 96.5% combustion efficiency (or 98% destruction efficiency) using the site-specific operating limits based on a performance evaluation as described in 40 CFR 63.670(r)(1). The request shall include information as described in 40 CFR 63.670(r)(2).	The same limitation as the limitation associated with the citation is used for the source.
Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G05 and G09 in Section 4.2 for additional requirements that may be applicable to the source.			



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	205 (HP Header System) / C205A and C205B (TEGF A and TEGF B)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Net heating value of the combustion zone gas at the HP Header shall be measured and recorded at a minimum of once every 15 minutes. An adjusted net heating value of hydrogen of 1,212 Btu/scf may be used for this calculation.			
Monitoring for compliance with the 98% destruction efficiency requirement for the TEGF A and TEGF B shall be performed in accordance with 40 CFR 63 Subpart YY, 40 CFR 63 Subpart FFFF, 40 CFR 63.670, and 40 CFR 63.671.			
Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 63 Subpart YY, 40 CFR 63 Subpart FFFF, 40 CFR 63.670, and 40 CFR 63.671.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the HP Header as well as any flare supplemental gas used.			
Utilize a gas chromatograph (or equivalent monitor) to measure, calculate, and record VOC and GHG content at the HP Header at a minimum of once every 15 minutes.			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

VOC and GHG content measured by the gas chromatograph (or equivalent monitor) shall be used to calculate 12-month rolling total VOC and GHG emissions for the TEGF A, TEGF B, and HP Elevated Flare.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Minimize flaring resulting from startups, shutdowns, and unforeseeable events by operating the HP Flare System at all times in accordance with an approved flare minimization plan. The plan shall include the following:

- a. Procedures for operating and maintaining the HP Flare System during periods of process unit startup, shutdown, and unforeseeable events.
- b. A program of corrective action for malfunctioning process equipment.
- c. Procedures to minimize discharges either directly to the atmosphere or to the HP Flare System during the planned and unplanned startup or shutdown of process unit and air pollution control equipment, including an evaluation of flaring that has occurred or may reasonably be expected to occur during planned maintenance activities, including startup and shutdown, that considers the feasibility of performing these activities without flaring.
- d. Procedures for conducting root cause analyses.
- e. Procedures for taking identified corrective actions.
- f. The baseline flow to the HP Flare System determined in accordance with the provisions of 40 CFR 60.103a(a)(4).

Conduct a root cause analysis within 45 days after any startup flaring event, shutdown flaring event, or unforeseeable flaring event at the HP Flare System. Flaring event shall be defined as an event that exceeds the baseline by 500,000 scf within a 24-hour period. The analysis shall address the following:

- a. The date and time that the flaring event started and ended.
- b. The total quantity of gas flared during each event.
- c. An estimate of the quantity of VOC that was emitted and the calculations used to determine the quantities.
- d. The steps taken to limit the duration of the flaring event or the quantity of emissions associated with the event.
- e. A detailed analysis that sets forth the root cause and all significant contributing causes of the flaring event to the extent determinable.
- f. An analysis of the measures that are available to reduce the likelihood of a recurrence of a flaring event resulting from the same root cause or significant contributing causes in the future. The analysis of prevention measures must consider the adequacy of existing maintenance schedules and protocols for equipment contributing to the flaring event.
- g. A demonstration that the actions taken during the flaring event are consistent with the procedures specified in the flare minimization plan.
- h. In response to a flaring event, the Owner/Operator shall implement, as expeditiously as practicable, such interim and/or long-term corrective actions as are consistent with good engineering practice to minimize the likelihood of a recurrence of the root cause and all significant contributing causes of that flaring event.
- i. If any items required to be addressed in this analysis are still under investigation 45 days after the flaring event, the Owner/Operator shall include a statement of the anticipated date by which a follow-up report fully conforming to the requirements of this Condition shall be completed.

Site-specific flare guidelines, included in the flare minimization and management plan as an Appendix, shall be followed which ensures the stage sequencing and parameters at which stages open or close for the TEGFs in accordance with manufacturer's recommendations.



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	205 (HP Header System) / C205A and C205B (TEGF A and TEGF B)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	25 Pa. Code §127.441(b)		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Net heating value of the combustion zone gas at the HP Header shall be measured and recorded at a minimum of once every 15 minutes. An adjusted net heating value of hydrogen of 1,212 Btu/scf may be used for this calculation.			
Monitoring for compliance with the 98% destruction efficiency requirement for the TEGF A and TEGF B shall be performed in accordance with 40 CFR 63.987(c). Operating parameter monitoring shall include flame detection at a minimum.			
Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 60.18(c) through (f) and 40 CFR 63.11(b).			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the HP Header as well as any flare supplemental gas used.			
Utilize a gas chromatograph (or equivalent monitor) to measure, calculate, and record VOC content at the HP Header at a minimum of once every 15 minutes.			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

VOC content measured by the gas chromatograph (or equivalent monitor) shall be used to calculate 12-month rolling total VOC emissions for the TEGF A, TEGF B, and HP Elevated Flare.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Minimize flaring resulting from startups, shutdowns, and unforeseeable events by operating the HP Flare System at all times in accordance with an approved flare minimization plan. The plan shall include the following:

- a. Procedures for operating and maintaining the HP Flare System during periods of process unit startup, shutdown, and unforeseeable events.
- b. A program of corrective action for malfunctioning process equipment.
- c. Procedures to minimize discharges either directly to the atmosphere or to the HP Flare System during the planned and unplanned startup or shutdown of process unit and air pollution control equipment.
- d. Procedures for conducting root cause analyses.
- e. Procedures for taking identified corrective actions.
- f. The baseline flow to the HP Flare System determined in accordance with the provisions of 40 CFR 60.103a(a)(4).

Conduct a root cause analysis within 45 days after any startup flaring event, shutdown flaring event, or unforeseeable flaring event at the HP Flare System. Flaring event shall be defined as an event that exceeds the baseline by 500,000 scf within a 24-hour period. The analysis shall address the following:

- a. The date and time that the flaring event started and ended.
- b. The total quantity of gas flared during each event.
- c. An estimate of the quantity of VOC that was emitted and the calculations used to determine the quantities.
- d. The steps taken to limit the duration of the flaring event or the quantity of emissions associated with the event.
- e. A detailed analysis that sets forth the root cause and all significant contributing causes of the flaring event to the extent determinable.
- f. An analysis of the measures that are available to reduce the likelihood of a recurrence of a flaring event resulting from the same root cause or significant contributing causes in the future.
- g. A demonstration that the actions taken during the flaring event are consistent with the procedures specified in the flare minimization plan.
- h. In response to a flaring event, implement, as expeditiously as practicable, such interim and/or long-term corrective actions as are consistent with good engineering practice to minimize the likelihood of a recurrence of the root cause and all significant contributing causes of that flaring event.
- i. If any items required to be addressed in this analysis are still under investigation 45 days after the flaring event, include a statement of the anticipated date by which a follow-up report fully conforming to the requirements of this Condition shall be completed.



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	205 (HP Header System) / C205A and C205B (TEGF A and TEGF B)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart NNN		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	CMS		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Presence of a flame monitored by heat sensing device continuously. Use a heat sensing device, such as an ultra-violet beam sensor or thermocouple, at the pilot light to monitor the continuous presence of a flame. [40 CFR 60.663(b)(1)].			
Flow monitored by flow indicator hourly. Monitor the vent stream flow to the flare. Install the flow indicator in the vent stream from each affected facility at a point closest to the flare and before being joined with any other vent stream. [40 CFR 60.663(b)(2)].			
How will data be reported?	See Section E. Reporting below.		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Flow recordkeeping by electronic or hard copy hourly. Record the vent stream flow to the flare at least once every hour for each affected facility. Make records readily available for inspection. [40 CFR 60.665(d)].

Maintain up-to-date, readily accessible records of all periods when the vent stream is diverted from the control device or has no flow rate. [40 CFR 60.665(d)].

Flare pilot flame recordkeeping by electronic or hard copy continuously. Make records readily available for inspection. [40 CFR 60.665(f)].

Maintain up-to-date, readily accessible records of all periods of operations in which the pilot flame is absent. [40 CFR 60.665(f)].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Notify the Department with the specific provisions of 40 CFR 60.662 (40 CFR 60.662(a), (b), or (c)) with which the facility operator has elected to comply. Submit the notification with the notification of initial start-up required in 40 CFR 60.7(a)(3). [40 CFR 60.665(a)].

Notify the Department 90 days before implementing any change in the provision of 40 CFR 60.662 with which the operator elects to comply. [40 CFR 60.665(a)].

Submit report: Due semiannually. Submit initial report within 6 months after the initial start-up date. Include the information outlined in 40 CFR 60.665(l)(1) through (l)(7). [40 CFR 60.665(l)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	205 (HP Header System) / C205A and C205B (TEGF A and TEGF B)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 63 Subpart CC		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Continuously monitor the presence of the pilot flame or flare flame(s) using a device (including, but not limited to, a thermocouple, ultraviolet beam sensor, or infrared sensor) capable of detecting that the pilot flame or flare flame(s) is present. [40 CFR 63.670(g)].			
Monitor visible emissions while regulated materials are vented to the flare. An initial visible emissions demonstration must be conducted using an observation period of 2 hours using Method 22 at 40 CFR 60, Appendix A-7. Subsequent visible emissions observations must be conducted using either the methods in 40 CFR 63.670(h)(1) or, alternatively, the methods in 40 CFR 63.670(h)(2). [40 CFR 63.670(h)].			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the flare header or headers that feed the flare as well as any supplemental natural gas used. Different flow monitoring methods may be used to measure different gaseous streams that make up the flare vent gas provided that the flow rates of all gas streams that contribute to the flare vent gas are determined. If assist air or assist steam is used, the owner or operator shall install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist air and/or assist steam used with the flare. [40 CFR 63.670(i)].			
Determine the concentration of individual components in the flare vent gas using either the methods provided in 40 CFR 63.670(j)(1) or (2), to assess compliance with the operating limits in 40 CFR 63.670(e) and, if applicable, 40 CFR 63.670(d) and (f). Alternatively, the owner or operator may elect to directly monitor the net heating value of the flare vent gas following the methods provided in 40 CFR 63.670(j)(3) and, if desired, may directly measure the hydrogen concentration in the flare vent gas following the methods provided in 40 CFR 63.670(j)(4). The owner or operator may elect to use different monitoring methods for different gaseous streams that make up the flare vent gas using different methods provided the composition or net heating value of all gas streams that contribute to the flare vent gas are determined. [40 CFR 63.670(j)].			

When calculating NHVvg for a specific 15-minute block:

- (A) If the results from the first sample collected during an event (for periodic flare vent gas flow events) are not available until after the second 15-minute block starts, use the results from the first sample collected during an event for the first 15-minute block associated with that event.
- (B) For all other cases, use the arithmetic average of all NHVvg measurement data results that become available during a 15-minute block to calculate the 15-minute block average for that period. For the purpose of this requirement, use the time that the results become available rather than the time the sample was collected. For example, if a sample is collected at 12:25 a.m. and the analysis is completed at 12:38 a.m., the results are available at 12:38 a.m. and these results would be used to determine compliance during the 15-minute block period from 12:30 a.m. to 12:45 a.m. [40 CFR 63.670(l)(5)(ii)].

Determine the net heating value of the combustion zone gas (NHVcz) as specified in 40 CFR 63.670(m)(1) or (2), as applicable. [40 CFR 63.670(m)].

Except as specified in 40 CFR 63.670(m)(2), determine the 15-minute block average NHVcz based on the 15-minute block average vent gas and assist gas flow rates using the equation listed in 40 CFR 63.670(m)(1). For periods when there is no assist steam flow or premix assist air flow, $NHVcz = NHVvg$. [40 CFR 63.670(m)(1)].

Owners and operators of flares that use the feed-forward calculation methodology in 40 CFR 63.670(l)(5)(i) and that monitor gas composition or net heating value in a location representative of the cumulative vent gas stream and that directly monitor supplemental natural gas flow additions to the flare must determine the 15-minute block average NHVcz using equation listed in 40 CFR 63.670(m)(2). [40 CFR 63.670(m)(2)].

For each CPMS installed to comply with applicable provisions in 40 CFR 63.670, install, operate, calibrate, and maintain the CPMS as specified in 40 CFR 63.671(a)(1) through (8). [40 CFR 63.671(a)].

All monitoring equipment, except for CPMS installed for pilot flame monitoring, must meet the applicable minimum accuracy, calibration and quality control requirements specified in table 13 of 40 CFR 63 Subpart CC. [40 CFR 63.671(a)(1)].

Ensure the readout (that portion of the CPMS that provides a visual display or record) or other indication of the monitored operating parameter from any CPMS required for compliance is readily accessible onsite for operational control or inspection by the operator of the source. [40 CFR 63.671(a)(2)].

All CPMS must complete a minimum of one cycle of operation (sampling, analyzing and data recording) for each successive 15-minute period. [40 CFR 63.671(a)(3)].

Except for periods of monitoring system malfunctions, repairs associated with monitoring system malfunctions, and required monitoring system quality assurance or quality control activities (including, as applicable, calibration checks and required zero and span adjustments), the owner or operator shall operate all CPMS and collect data continuously at all times when regulated emissions are routed to the flare. [40 CFR 63.671(a)(4)].

Operate, maintain, and calibrate each CPMS according to the CPMS monitoring plan specified in 40 CFR 63.671(b). [40 CFR 63.671(a)(5)].

The CPMS must be capable of measuring the appropriate parameter over the range of values expected for that measurement location. The data recording system associated with each CPMS must have a resolution that is equal to or better than the required system accuracy. [40 CFR 63.671(a)(8)].

Develop and implement a CPMS quality control program documented in a CPMS monitoring plan that covers each flare subject to the provisions in 40 CFR 63.670 and each CPMS installed to comply with applicable provisions in 40 CFR 63.670. The CPMS monitoring plan must contain the information listed in 40 CFR 63.671(b)(1) through (5). [40 CFR 63.671(b)].

For each CPMS installed to comply with applicable provisions in 40 CFR 63.670 except for CPMS installed for pilot flame monitoring, the owner or operator shall comply with the out-of-control procedures described in 40 CFR 63.671(c)(1) and (2). [40 CFR 63.671(c)].

Reduce data from a CPMS installed to comply with applicable provisions in 40 CFR 63.670 as specified in 40 CFR 63.671(d)(1) through (3). [40 CFR 63.671(d)].

For monitors used to determine compositional analysis for net heating value per 40 CFR 63.670(j)(1), the gas chromatograph must also meet the requirements of 40 CFR 63.671(e)(1) through (3). [40 CFR 63.671(e)].

How will data be reported?	See Section E. Reporting below.
SECTION C. TESTING	
Reference Test Method Description	
Reference Test Method Citation	
SECTION D. RECORD KEEPING	
Describe what parameters will be recorded and the frequency of recording. Maintain a copy of the CPMS monitoring plan readily available on-site at all times. [40 CFR 63.671(b)].	
SECTION E. REPORTING	
Describe what is to be reported and the frequency of reporting. Record and report any instances where visible emissions are observed for more than 5 minutes during any 2 consecutive hours as specified in 40 CFR 63.655(g)(11)(ii). [40 CFR 63.670(h)].	
Submit a copy of the CPMS monitoring plan to the Administrator upon request by the Administrator. [40 CFR 63.671(b)].	
Reporting Start Date	As specified
SECTION F. WORK PRACTICE STANDARD	
Describe any work practice standard(s).	



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	
☐	Group of Sources	Unit ID	205 (HP Header System) / C205C (HP Elevated Flare)
☒	Single Source	Scenario Name	
☐	Alternative Operating Scenario		
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Net heating value of the combustion zone gas at the HP Header shall be measured and recorded at a minimum of once every 15 minutes. An adjusted net heating value of hydrogen of 1,212 Btu/scf may be used for this calculation.			
Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 63 Subpart YY, 40 CFR 63 Subpart FFFF, 40 CFR 63.670, and 40 CFR 63.671.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the HP Header as well as any flare supplemental gas used.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist steam used by the HP Elevated Flare.			
Utilize a gas chromatograph (or equivalent monitor) to measure, calculate, and record VOC and GHG content at the HP Header at a minimum of once every 15 minutes.			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

VOC and GHG content measured by the gas chromatograph (or equivalent monitor) shall be used to calculate 12-month rolling total VOC and GHG emissions for the TEGF A, TEGF B, and HP Elevated Flare.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Minimize flaring resulting from startups, shutdowns, and unforeseeable events by operating the HP Flare System at all times in accordance with an approved flare minimization plan. The plan shall include the following:

- a. Procedures for operating and maintaining the HP Flare System during periods of process unit startup, shutdown, and unforeseeable events.
- b. A program of corrective action for malfunctioning process equipment.
- c. Procedures to minimize discharges either directly to the atmosphere or to the HP Flare System during the planned and unplanned startup or shutdown of process unit and air pollution control equipment, including an evaluation of flaring that has occurred or may reasonably be expected to occur during planned maintenance activities, including startup and shutdown, that considers the feasibility of performing these activities without flaring.
- d. Procedures for conducting root cause analyses.
- e. Procedures for taking identified corrective actions.
- f. The baseline flow to the HP Flare System determined in accordance with the provisions of 40 CFR 60.103a(a)(4).

Conduct a root cause analysis within 45 days after any startup flaring event, shutdown flaring event, or unforeseeable flaring event at the HP Flare System. Flaring event shall be defined as an event that exceeds the baseline by 500,000 scf within a 24-hour period. The analysis shall address the following:

- a. The date and time that the flaring event started and ended.
- b. The total quantity of gas flared during each event.
- c. An estimate of the quantity of VOC that was emitted and the calculations used to determine the quantities.
- d. The steps taken to limit the duration of the flaring event or the quantity of emissions associated with the event.
- e. A detailed analysis that sets forth the root cause and all significant contributing causes of the flaring event to the extent determinable.
- f. An analysis of the measures that are available to reduce the likelihood of a recurrence of a flaring event resulting from the same root cause or significant contributing causes in the future. The analysis of prevention measures must consider the adequacy of existing maintenance schedules and protocols for equipment contributing to the flaring event.
- g. A demonstration that the actions taken during the flaring event are consistent with the procedures specified in the flare minimization plan.
- h. In response to a flaring event, the Owner/Operator shall implement, as expeditiously as practicable, such interim and/or long-term corrective actions as are consistent with good engineering practice to minimize the likelihood of a recurrence of the root cause and all significant contributing causes of that flaring event.
- i. If any items required to be addressed in this analysis are still under investigation 45 days after the flaring event, the Owner/Operator shall include a statement of the anticipated date by which a follow-up report fully conforming to the requirements of this Condition shall be completed.



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	205 (HP Header System) / C205C (HP Elevated Flare)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	25 Pa. Code §127.441(b)		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Net heating value of the combustion zone gas at the HP Header shall be measured and recorded at a minimum of once every 15 minutes. An adjusted net heating value of hydrogen of 1,212 Btu/scf may be used for this calculation.			
Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 60.18(c) through (f) and 40 CFR 63.11(b).			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the HP Header as well as any flare supplemental gas used.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist steam used by the HP Elevated Flare.			
Utilize a gas chromatograph (or equivalent monitor) to measure, calculate, and record VOC content at the HP Header at a minimum of once every 15 minutes.			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

VOC content measured by the gas chromatograph (or equivalent monitor) shall be used to calculate 12-month rolling total VOC emissions for the TEGF A, TEGF B, and HP Elevated Flare.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Minimize flaring resulting from startups, shutdowns, and unforeseeable events by operating the HP Flare System at all times in accordance with an approved flare minimization plan. The plan shall include the following:

- a. Procedures for operating and maintaining the HP Flare System during periods of process unit startup, shutdown, and unforeseeable events.
- b. A program of corrective action for malfunctioning process equipment.
- c. Procedures to minimize discharges either directly to the atmosphere or to the HP Flare System during the planned and unplanned startup or shutdown of process unit and air pollution control equipment.
- d. Procedures for conducting root cause analyses.
- e. Procedures for taking identified corrective actions.
- f. The baseline flow to the HP Flare System determined in accordance with the provisions of 40 CFR 60.103a(a)(4).

Conduct a root cause analysis within 45 days after any startup flaring event, shutdown flaring event, or unforeseeable flaring event at the HP Flare System. Flaring event shall be defined as an event that exceeds the baseline by 500,000 scf within a 24-hour period. The analysis shall address the following:

- a. The date and time that the flaring event started and ended.
- b. The total quantity of gas flared during each event.
- c. An estimate of the quantity of VOC that was emitted and the calculations used to determine the quantities.
- d. The steps taken to limit the duration of the flaring event or the quantity of emissions associated with the event.
- e. A detailed analysis that sets forth the root cause and all significant contributing causes of the flaring event to the extent determinable.
- f. An analysis of the measures that are available to reduce the likelihood of a recurrence of a flaring event resulting from the same root cause or significant contributing causes in the future.
- g. A demonstration that the actions taken during the flaring event are consistent with the procedures specified in the flare minimization plan.
- h. In response to a flaring event, implement, as expeditiously as practicable, such interim and/or long-term corrective actions as are consistent with good engineering practice to minimize the likelihood of a recurrence of the root cause and all significant contributing causes of that flaring event.
- i. If any items required to be addressed in this analysis are still under investigation 45 days after the flaring event, include a statement of the anticipated date by which a follow-up report fully conforming to the requirements of this Condition shall be completed.



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	205 (HP Header System) / C205C (HP Elevated Flare)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart NNN		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	CMS		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Presence of a flame monitored by heat sensing device continuously. Use a heat sensing device, such as an ultra-violet beam sensor or thermocouple, at the pilot light to monitor the continuous presence of a flame. [40 CFR 60.663(b)(1)].			
Flow monitored by flow indicator hourly. Monitor the vent stream flow to the flare. Install the flow indicator in the vent stream from each affected facility at a point closest to the flare and before being joined with any other vent stream. [40 CFR 60.663(b)(2)].			
How will data be reported? See Section E. Reporting below.			
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Flow recordkeeping by electronic or hard copy hourly. Record the vent stream flow to the flare at least once every hour for each affected facility. Make records readily available for inspection. [40 CFR 60.665(d)].

Maintain up-to-date, readily accessible records of all periods when the vent stream is diverted from the control device or has no flow rate. [40 CFR 60.665(d)].

Flare pilot flame recordkeeping by electronic or hard copy continuously. Make records readily available for inspection. [40 CFR 60.665(f)].

Maintain up-to-date, readily accessible records of all periods of operations in which the pilot flame is absent. [40 CFR 60.665(f)].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Notify the Department with the specific provisions of 40 CFR 60.662 (40 CFR 60.662(a), (b), or (c)) with which the facility operator has elected to comply. Submit the notification with the notification of initial start-up required in 40 CFR 60.7(a)(3). [40 CFR 60.665(a)].

Notify the Department 90 days before implementing any change in the provision of 40 CFR 60.662 with which the operator elects to comply. [40 CFR 60.665(a)].

Submit report: Due semiannually. Submit initial report within 6 months after the initial start-up date. Include the information outlined in 40 CFR 60.665(l)(1) through (l)(7). [40 CFR 60.665(l)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	205 (HP Header System) / C205C (HP Elevated Flare)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 63 Subpart CC		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)			
Monitoring Device Location			
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Continuously monitor the presence of the pilot flame or flare flame(s) using a device (including, but not limited to, a thermocouple, ultraviolet beam sensor, or infrared sensor) capable of detecting that the pilot flame or flare flame(s) is present. [40 CFR 63.670(g)].			
Monitor visible emissions while regulated materials are vented to the flare. An initial visible emissions demonstration must be conducted using an observation period of 2 hours using Method 22 at 40 CFR 60, Appendix A-7. Subsequent visible emissions observations must be conducted using either the methods in 40 CFR 63.670(h)(1) or, alternatively, the methods in 40 CFR 63.670(h)(2). [40 CFR 63.670(h)].			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the flare header or headers that feed the flare as well as any supplemental natural gas used. Different flow monitoring methods may be used to measure different gaseous streams that make up the flare vent gas provided that the flow rates of all gas streams that contribute to the flare vent gas are determined. If assist air or assist steam is used, the owner or operator shall install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist air and/or assist steam used with the flare. [40 CFR 63.670(i)].			
Determine the concentration of individual components in the flare vent gas using either the methods provided in 40 CFR 63.670(j)(1) or (2), to assess compliance with the operating limits in 40 CFR 63.670(e) and, if applicable, 40 CFR 63.670(d) and (f). Alternatively, the owner or operator may elect to directly monitor the net heating value of the flare vent gas following the methods provided in 40 CFR 63.670(j)(3) and, if desired, may directly measure the hydrogen concentration in the flare vent gas following the methods provided in 40 CFR 63.670(j)(4). The owner or operator may elect to use different monitoring methods for different gaseous streams that make up the flare vent gas using different methods provided the composition or net heating value of all gas streams that contribute to the flare vent gas are determined. [40 CFR 63.670(j)].			

Determine Vtip on a 15-minute block average basis according to the requirements in 40 CFR 63.670(k)(1) through (k)(4). [40 CFR 63.670(k)].
When calculating NHVvg for a specific 15-minute block: (A) If the results from the first sample collected during an event (for periodic flare vent gas flow events) are not available until after the second 15-minute block starts, use the results from the first sample collected during an event for the first 15-minute block associated with that event. (B) For all other cases, use the arithmetic average of all NHVvg measurement data results that become available during a 15-minute block to calculate the 15-minute block average for that period. For the purpose of this requirement, use the time that the results become available rather than the time the sample was collected. For example, if a sample is collected at 12:25 a.m. and the analysis is completed at 12:38 a.m., the results are available at 12:38 a.m. and these results would be used to determine compliance during the 15-minute block period from 12:30 a.m. to 12:45 a.m. [40 CFR 63.670(l)(5)(ii)].
Determine the net heating value of the combustion zone gas (NHVcz) as specified in 40 CFR 63.670(m)(1) or (2), as applicable. [40 CFR 63.670(m)].
Except as specified in 40 CFR 63.670(m)(2), determine the 15-minute block average NHVcz based on the 15-minute block average vent gas and assist gas flow rates using the equation listed in 40 CFR 63.670(m)(1). For periods when there is no assist steam flow or premix assist air flow, $NHVcz = NHVvg$. [40 CFR 63.670(m)(1)].
Owners and operators of flares that use the feed-forward calculation methodology in 40 CFR 63.670(l)(5)(i) and that monitor gas composition or net heating value in a location representative of the cumulative vent gas stream and that directly monitor supplemental natural gas flow additions to the flare must determine the 15-minute block average NHVcz using equation listed in 40 CFR 63.670(m)(2). [40 CFR 63.670(m)(2)].
For each CPMS installed to comply with applicable provisions in 40 CFR 63.670, install, operate, calibrate, and maintain the CPMS as specified in 40 CFR 63.671(a)(1) through (8). [40 CFR 63.671(a)].
All monitoring equipment, except for CPMS installed for pilot flame monitoring, must meet the applicable minimum accuracy, calibration, and quality control requirements specified in table 13 of 40 CFR 63 Subpart CC. [40 CFR 63.671(a)(1)].
Ensure the readout (that portion of the CPMS that provides a visual display or record) or other indication of the monitored operating parameter from any CPMS required for compliance is readily accessible onsite for operational control or inspection by the operator of the source. [40 CFR 63.671(a)(2)].
All CPMS must complete a minimum of one cycle of operation (sampling, analyzing and data recording) for each successive 15-minute period. [40 CFR 63.671(a)(3)].
Except for periods of monitoring system malfunctions, repairs associated with monitoring system malfunctions, and required monitoring system quality assurance or quality control activities (including, as applicable, calibration checks and required zero and span adjustments), the owner or operator shall operate all CPMS and collect data continuously at all times when regulated emissions are routed to the flare. [40 CFR 63.671(a)(4)].
Operate, maintain, and calibrate each CPMS according to the CPMS monitoring plan specified in 40 CFR 63.671(b). [40 CFR 63.671(a)(5)].
The CPMS must be capable of measuring the appropriate parameter over the range of values expected for that measurement location. The data recording system associated with each CPMS must have a resolution that is equal to or better than the required system accuracy. [40 CFR 63.671(a)(8)].
Develop and implement a CPMS quality control program documented in a CPMS monitoring plan that covers each flare subject to the provisions in 40 CFR 63.670 and each CPMS installed to comply with applicable provisions in 40 CFR 63.670. The CPMS monitoring plan must contain the information listed in 40 CFR 63.671(b)(1) through (5). [40 CFR 63.671(b)].
For each CPMS installed to comply with applicable provisions in 40 CFR 63.670 except for CPMS installed for pilot flame monitoring, the owner or operator shall comply with the out-of-control procedures described in 40 CFR 63.671(c)(1) and (2). [40 CFR 63.671(c)].
Reduce data from a CPMS installed to comply with applicable provisions in 40 CFR 63.670 as specified in 40 CFR 63.671(d)(1) through (3). [40 CFR 63.671(d)].

For monitors used to determine compositional analysis for net heating value per 40 CFR 63.670(j)(1), the gas chromatograph must also meet the requirements of 40 CFR 63.671(e)(1) through (3). [40 CFR 63.671(e)].

How will data be reported? See Section E. Reporting below.

SECTION C. TESTING

Reference Test Method Description

Reference Test Method Citation

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Maintain a copy of the CPMS monitoring plan readily available on-site at all times. [40 CFR 63.671(b)].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Record and report any instances where visible emissions are observed for more than 5 minutes during any 2 consecutive hours as specified in 40 CFR 63.655(g)(11)(ii). [40 CFR 63.670(h)].

Submit a copy of the CPMS monitoring plan to the Administrator upon request by the Administrator. [40 CFR 63.671(b)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Develop a flare management plan to minimize flaring during periods of startup, shutdown, or emergency releases. The flare management plan must include the information described in 40 CFR 63.670(o)(1)(i) through (vii). [40 CFR 63.670(o)(1)].

A root cause analysis and a corrective action analysis must be conducted for each flow event that contains regulated material and that meets the criteria in 40 CFR 63.670(o)(3)(i). [40 CFR 63.670(o)(3)].

A root cause analysis and corrective action analysis must be completed as soon as possible, but no later than 45 days after a flare flow event meeting the criteria in paragraph (o)(3)(i) of this section. Special circumstances affecting the number of root cause analyses and/or corrective action analyses are provided in 40 CFR 63.670(o)(4)(i) through (v). [40 CFR 63.670(o)(4)].

Implement the corrective action(s) identified in the corrective action analysis in accordance with the applicable requirements in 40 CFR 63.670(o)(5)(i) through (iii). [40 CFR 63.670(o)(5)].

Determine the total number of events for which a root cause and corrective action analyses was required during the calendar year for each affected flare separately for events meeting the criteria in 40 CFR 63.670(o)(3)(i). If a single root cause analysis was conducted for an event that caused multiple flares to meet the criteria in 40 CFR 63.670(o)(3)(i), that event would count as an event for each of the flares during that event. The owner or operator shall also determine the total number of events for which a root cause and corrective action analyses was required and the analyses concluded that the root cause was a force majeure event, as defined in 40 CFR 63 Subpart CC. [40 CFR 63.670(o)(6)].

The following events would be a violation of this emergency flaring work practice standard:

- (i) Any flow event for which a root cause analysis was required and the root cause was determined to be operator error or poor maintenance;
- (ii) Two visible emissions exceedance events meeting the criteria in 40 CFR 63.670(o)(3)(i) that were not caused by a force majeure event from a single flare in a 3 calendar year period for the same root cause for the same equipment;
- (iv) Three visible emissions exceedance events meeting the criteria in 40 CFR 63.670(o)(3)(i) that were not caused by a force majeure event from a single flare in a 3 calendar year period for any reason. [40 CFR 63.670(o)(7)].

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

- a. Source ID: 206 b. Source Name: Spent Caustic Vent Header System
- c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D
- d. Manufacturer: NA e. Model Number: NA
- f. Source Description: Header system that connects emission sources to the SCTO
- g. Rated Capacity (for engines use BHP): NA h. Installation Date: 3/2020
- i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☐ ☒ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
206	Spent Caustic Vent Header System	C206	SCTO	100%
C206	SCTO	S206	Stack (SCTO)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Natural gas / Waste gas	30190013	NA	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190013	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Emissions from the SCTO shall not exceed the following: a. NOx - 0.06 lb/MMBtu b. CO - 0.0824 lb/MMBtu c. PM10 - 0.0075 lb/MMBtu d. PM2.5 - 0.0075 lb/MMBtu	The same limitation as the limitation associated with the citation is used for the source.
30190013	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Visible emissions from the SCTO shall not exceed 0% except for a total of five minutes during any consecutive two-hour period.	The same limitation as the limitation associated with the citation is used for the source.
30190013	Plan Approval 04-00740D [25 Pa. Code §127.12b]	The SCTO shall be operated to reduce collected VOC emissions by a minimum of 99.9%.	The same limitation as the limitation associated with the citation is used for the source.
30190013	Plan Approval 04-00740D [25 Pa. Code §127.12b]	The SCTO shall, at all times that vapors are being collected, be operated at or above the minimum temperature at which at least 99.9% destruction efficiency is guaranteed by the manufacturer or demonstrated during performance testing.	The same limitation as the limitation associated with the citation is used for the source.
30190013	40 CFR Part 63 Subpart YY §63.1103(e)(3), Table 7(g)(1)	Comply with the requirements of 40 CFR 63 Subpart XX for waste streams.	The same limitation as the limitation associated with the citation is used for the source.
30190013	40 CFR Part 63 Subpart XX §63.1095(b)(2)	Comply with 40 CFR 61 Subpart FF (National Emission Standards for Benzene Waste Operations) requirements applicable to a facility with a total annual benzene quantity that is greater than or equal to 10 Mg/yr, as determined according to 40 CFR 61.342(a). Facility does not have any continuous butadiene waste streams.	The same limitation as the limitation associated with the citation is used for the source.
30190013	40 CFR Part 61 Subpart FF §61.349(a)(2)(i)(C)	Residence time ≥ 0.5 sec at a minimum temperature of 760 degrees C (1400 degrees F).	The same limitation as the limitation associated with the citation is used for the source.

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190013	40 CFR Part 61 Subpart FF §61.349(b)	Operate the control device at all times when waste is placed in the waste management unit vented to the control device except when maintenance or repair of the waste management unit cannot be completed without a shutdown of the control device.	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G05 and G06 for additional requirements that may be applicable to the source.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	206 (Spent Caustic Vent Header System) / C206 (SCTO)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒	Testing
☐		☐	Reporting
☒	Record Keeping	☐	Work Practice Standard
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	CMS		
Monitoring Device Location	Firebox		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Monitoring for compliance with the 99.9% destruction efficiency requirement for the SCTO shall be performed in accordance with 40 CFR 63.985(c). Operating parameter monitoring shall include combustion temperature at a minimum.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the flow rate in the vent gas header to the SCTO at a minimum of once every 15 minutes.			
How will data be reported?	NA		

SECTION C. TESTING

Reference Test Method Description

Perform NO_x, CO, PM₁₀, PM_{2.5}, and Benzene emission testing upon the SCTO according to the requirements of 25 Pa. Code Chapter 139. Performance testing is required within 180 days of modification or replacement of the burners of the SCTO or on an alternative schedule as approved by the Department. Subsequent performance testing is required at a minimum of once every 5 years thereafter. Extension of the performance testing deadlines may be granted by the Department in writing in response to a written request from the Owner/Operator and upon a satisfactory showing that an extension is justified. EPA Reference Method performance testing shall be conducted for the performance tests.

Perform VOC destruction efficiency testing upon the SCTO in accordance with 40 CFR 63.985(b)(1)(ii). Performance testing is required within 180 days of startup of the WWTP Permanent Controls Project equipment or on an alternative schedule as approved by the Department. Subsequent performance testing is required at a minimum of once every 5 years thereafter. Extension of the performance testing deadlines may be granted by the Department in writing in response to a written request from the Owner/Operator and upon a satisfactory showing that an extension is justified.

Reference Test Method Citation As specified

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Maintain records of the flow rate in the vent gas header to the SCTO on a daily basis.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	206 (Spent Caustic Vent Header System) / C206 (SCTO)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 61 Subpart FF		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒	Testing
☒	Record Keeping	☒	Work Practice Standard
☒		☒	Reporting
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Equipment/operational data monitored by visual inspection once initially and once every quarter thereafter. Include inspection of ductwork and piping and connections to covers and control devices for evidence of visible defects such as holes in ductwork or piping and loose connections. [40 CFR 61.349(f)].			
Inspect at least once each operating day the data recorded by the monitoring equipment to ensure that the control device is operating properly. [40 CFR 61.354(c)].			
Temperature monitored by temperature monitoring device continuously. Install the temperature sensor at a representative location in the combustion chamber. [40 CFR 61.354(c)(1)].			
How will data be reported?	See Section E. Reporting below.		
SECTION C. TESTING			
Reference Test Method Description			
Demonstrate that the control device achieves the appropriate conditions specified in 40 CFR 61.349(a)(2)(i) using one of the methods specified in 40 CFR 61.349(c)(1) and (c)(2). [40 CFR 61.349(c)].			
Determine compliance with 40 CFR 61 Subpart FF using the test methods and procedures specified in 40 CFR 61.355(a) through (i), as applicable. [40 CFR 61.355].			
Reference Test Method Citation	As specified		

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Temperature recordkeeping by recorder continuously. [40 CFR 61.354(c)(1)].

Equipment/operational data recordkeeping by electronic or hard copy at the regulation's specified frequency. Maintain records as specified in 40 CFR 61.356(a) through (n), as applicable. Maintain each record in a readily accessible location at the facility site for a period not less than two years from the date the information is recorded unless otherwise specified. [40 CFR 61.356].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Submit report: Due quarterly, beginning three months after the date that the equipment necessary to comply with 40 CFR 61 Subpart FF has been certified in accordance with 40 CFR 61.357(d)(1). Include the information specified in 40 CFR 61.357(d)(7)(i) through (d)(7)(v). [40 CFR 61.357(d)(7)].

Submit report: Due annually, beginning one year after the date that the equipment necessary to comply with 40 CFR 61 Subpart FF has been certified in accordance with 40 CFR 61.357(d)(1). Submit a report that summarizes all inspections required by 40 CFR 61.342 through 61.354 during which detectable emissions are measured or a problem that could result in benzene emissions is identified, including information about the repairs or corrective action taken. [40 CFR 61.357(d)(8)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Make a first effort to repair the closed-vent system as soon as practicable but no later than 5 calendar days after visible defects are observed during an inspection, or if other problems are identified, or if detectable emissions are measured, except as provided in 40 CFR 61.350. Complete repair no later than 15 calendar days after the emissions are detected or the visible defect is observed. [40 CFR 61.349(g)].

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

- a. Source ID: 207 b. Source Name: MPGF CVTO Trip Header
- c. Plan Approval or Operating Permit Number: PA-04-00740A and PA-04-00740C (included under LP Header System (Source ID 204) in those plan approvals) and PA-04-00740D
- d. Manufacturer: NA e. Model Number: NA
- f. Source Description: Header that connects the CVTO Header System to the MPGF CVTO Trip
- g. Rated Capacity (for engines use BHP): NA h. Installation Date: 9/2022
- i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☐ ☒ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
207	MPGF CVTO Trip Header	C207	MPGF CVTO Trip	100%
C207	MPGF CVTO Trip	S207	Stack (MPGF CVTO Trip)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Natural gas / Waste gas	30190023	NA	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Visible emissions from the MPGF CVTO Trip shall not exceed 0% except for a total of five minutes during any consecutive two-hour period.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	The MPGF CVTO Trip shall be designed and operated to reduce collected VOC emissions by a minimum of 98%.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	The MPGF CVTO Trip shall be equipped with automated controls for control of the supplemental gas flow rate to the flare.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b] 25 Pa. Code §127.441(b)	Net heating value of the combustion zone gas at the MPGF CVTO Trip shall equal or exceed 500 Btu/scf on a three-hour rolling average, calculated every 15 minutes.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 63.670 and 40 CFR 63.671.	The same limitation as the limitation associated with the citation is used for the source.
30190023	25 Pa. Code §127.441(b)	Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 60.18(c) through (f) and 40 CFR 63.11(b).	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 60 Subpart Kb §60.112b(a)(3)(ii)	Meet the requirements specified in the general control device requirements, 40 CFR 60.18(c) through (f).	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 60 Subpart DDD §60.562-1(a)(1)(i)(C)	Meet the conditions specified in 40 CFR 60.18 at all times.	The same limitation as the limitation associated with the citation is used for the source.

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	40 CFR Part 63 Subpart FFFF §63.2535(m)(1)	Flares that are subject to the provisions of 40 CFR 60.18 or 63.11 and must comply with the requirements in 40 CFR 63.2450(e)(5) are required to comply only with the provisions specified in 40 CFR 63 Subpart FFFF.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart YY §63.1100(g)(7)(i)	Flares that are subject to 40 CFR 60.18 or 40 CFR 63.11 and used as a control device for an emission point subject to the requirements in Table 7 to 40 CFR 63.1103(e) are required to comply only with 40 CFR 63.1103(e)(4).	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart FFFF §63.2450(e)(5)	Reduce organic HAP emissions by venting emissions through a closed-vent system to a steam-assisted, air-assisted, non-assisted, or pressure-assisted multi-point flare and meet the applicable requirements for flares as specified in 40 CFR 63.670 and 63.671 of 40 CFR 63 Subpart CC, including the provisions in Tables 12 and 13 to 40 CFR 63 Subpart CC, except as specified in 40 CFR 63.1103(e)(5)(i) through (xiii).	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(b)	Operate the flare with a pilot flame present at all times when regulated material is routed to the flare. Each 15-minute block during which there is at least one minute where no pilot flame is present when regulated material is routed to the flare is a deviation of the standard. Deviations in different 15-minute blocks from the same event are considered separate deviations.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(c)	Specify the smokeless design capacity of the flare and operate with no visible emissions, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours, when regulated material is routed to the flare.	The same limitation as the limitation associated with the citation is used for the source.

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	40 CFR Part 63 Subpart CC §63.670(d)	Comply with either 40 CFR 63.670(d)(1) or (2), provided the appropriate monitoring systems are in-place, whenever regulated material is routed to the flare for at least 15-minutes and the flare vent gas flow rate is less than the smokeless design capacity of the flare.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(e)(1)	Operate the flare to maintain the net heating value of flare combustion zone gas (NHVcz) at or above 270 Btu/scf determined on a 15-minute block period basis when regulated material is routed to the flare for at least 15-minutes.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(r)	An owner or operator may request approval from the Administrator for site-specific operating limits that shall apply specifically to a selected flare. Site-specific operating limits include alternative threshold values for the parameters specified in 40 CFR 63.670(d) through (f) as well as threshold values for operating parameters other than those specified in 40 CFR 63.670(d) through (f). The owner or operator must demonstrate that the flare achieves 96.5% combustion efficiency (or 98% destruction efficiency) using the site-specific operating limits based on a performance evaluation as described in 40 CFR 63.670(r)(1). The request shall include information as described in 40 CFR 63.670(r)(2).	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G05 and G09 in Section 4.2 for additional requirements that may be applicable to the source.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	207 (MPGF CVTO Trip Header) / C207 (MPGF CVTO Trip)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Monitoring for compliance with the 98% destruction efficiency requirement for the MPGF CVTO Trip shall be performed in accordance with 40 CFR 63 Subpart YY, 40 CFR 63 Subpart FFFF, 40 CFR 63.670, and 40 CFR 63.671.			
Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 63.670 and 40 CFR 63.671.			
Net heating value of the combustion zone gas at the MPGF CVTO Trip shall be measured and recorded at a minimum of once every 15 minutes. An adjusted net heating value of hydrogen of 1,212 Btu/scf may be used for this calculation.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the MPGF CVTO Trip Header as well as any flare supplemental gas used.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist air used at the MPGF CVTO Trip. Continuously monitoring fan speed or power and using fan curves is an acceptable method for continuously monitoring assist air flow rates at the MPGF CVTO Trip.			
How will data be reported?	NA		

SECTION C. TESTING

Reference Test Method Description

Reference Test Method Citation

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Maintain records of the flow rate in the MPGF CVTO Trip Header on a daily basis.

VOC and GHG content measured by a gas chromatograph (or equivalent monitor) shall be used to calculate 12-month rolling total VOC and GHG emissions for the MPGF CVTO Trip.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Minimize flaring resulting from startups, shutdowns, and unforeseeable events by operating the MPGF CVTO Trip at all times in accordance with an approved flare minimization plan. The plan shall include the following:

- a. Procedures for operating and maintaining the MPGF CVTO Trip during periods of process unit startup, shutdown, and unforeseeable events.
- b. A program of corrective action for malfunctioning process equipment.
- c. Procedures to minimize discharges either directly to the atmosphere or to the MPGF CVTO Trip during the planned and unplanned startup or shutdown of process unit and air pollution control equipment, including an evaluation of flaring that has occurred or may reasonably be expected to occur during planned maintenance activities, including startup and shutdown, that considers the feasibility of performing these activities without flaring.
- d. Procedures for conducting root cause analyses.
- e. Procedures for taking identified corrective actions.
- f. The baseline flow to the MPGF CVTO Trip determined in accordance with the provisions of 40 CFR 60.103a(a)(4).

Conduct a root cause analysis within 45 days after any startup flaring event, shutdown flaring event, or unforeseeable flaring event at the MPGF CVTO Trip. Flaring event shall be defined as an event that exceeds the baseline by 500,000 scf within a 24-hour period. The analysis shall address the following:

- a. The date and time that the flaring event started and ended.
- b. The total quantity of gas flared during each event.
- c. An estimate of the quantity of VOC that was emitted and the calculations used to determine the quantities.
- d. The steps taken to limit the duration of the flaring event or the quantity of emissions associated with the event.
- e. A detailed analysis that sets forth the root cause and all significant contributing causes of the flaring event to the extent determinable.
- f. An analysis of the measures that are available to reduce the likelihood of a recurrence of a flaring event resulting from the same root cause or significant contributing causes in the future. The analysis of prevention measures must consider the adequacy of existing maintenance schedules and protocols for equipment contributing to the flaring event.
- g. A demonstration that the actions taken during the flaring event are consistent with the procedures specified in the flare minimization plan.
- h. In response to a flaring event, implement, as expeditiously as practicable, such interim and/or long-term corrective actions as are consistent with good engineering practice to minimize the likelihood of a recurrence of the root cause and all significant contributing causes of that flaring event.
- i. If any items required to be addressed in this analysis are still under investigation 45 days after the flaring event, include a statement of the anticipated date by which a follow-up report fully conforming to the requirements of this Condition shall be completed.



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BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	207 (MPGF CVTO Trip Header) / C207 (MPGF CVTO Trip)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	25 Pa. Code §127.441(b)		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☐	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Monitoring for compliance with the 98% destruction efficiency requirement for the MPGF CVTO Trip shall be performed in accordance with 40 CFR 63.987(c). Operating parameter monitoring shall include flame detection at a minimum.			
Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 60.18(c) through (f) and 40 CFR 63.11(b).			
Net heating value of the combustion zone gas at the MPGF CVTO Trip shall be measured and recorded at a minimum of once every 15 minutes. An adjusted net heating value of hydrogen of 1,212 Btu/scf may be used for this calculation.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the MPGF CVTO Trip Header as well as any flare supplemental gas used.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist air used at the MPGF CVTO Trip.			
How will data be reported?	NA		

SECTION C. TESTING

Reference Test Method Description

Reference Test Method Citation

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Minimize flaring resulting from startups, shutdowns, and unforeseeable events by operating the MPGF CVTO Trip at all times in accordance with an approved flare minimization plan. The plan shall include the following:

- a. Procedures for operating and maintaining the MPGF CVTO Trip during periods of process unit startup, shutdown, and unforeseeable events.
- b. A program of corrective action for malfunctioning process equipment.
- c. Procedures to minimize discharges either directly to the atmosphere or to the MPGF CVTO Trip during the planned and unplanned startup or shutdown of process unit and air pollution control equipment.
- d. Procedures for conducting root cause analyses.
- e. Procedures for taking identified corrective actions.
- f. The baseline flow to the MPGF CVTO Trip determined in accordance with the provisions of 40 CFR 60.103a(a)(4).

Conduct a root cause analysis within 45 days after any startup flaring event, shutdown flaring event, or unforeseeable flaring event at the MPGF CVTO Trip. Flaring event shall be defined as an event that exceeds the baseline by 500,000 scf within a 24-hour period. The analysis shall address the following:

- a. The date and time that the flaring event started and ended.
- b. The total quantity of gas flared during each event.
- c. An estimate of the quantity of VOC that was emitted and the calculations used to determine the quantities.
- d. The steps taken to limit the duration of the flaring event or the quantity of emissions associated with the event.
- e. A detailed analysis that sets forth the root cause and all significant contributing causes of the flaring event to the extent determinable.
- f. An analysis of the measures that are available to reduce the likelihood of a recurrence of a flaring event resulting from the same root cause or significant contributing causes in the future.
- g. A demonstration that the actions taken during the flaring event are consistent with the procedures specified in the flare minimization plan.
- h. In response to a flaring event, implement, as expeditiously as practicable, such interim and/or long-term corrective actions as are consistent with good engineering practice to minimize the likelihood of a recurrence of the root cause and all significant contributing causes of that flaring event.
- i. If any items required to be addressed in this analysis are still under investigation 45 days after the flaring event, include a statement of the anticipated date by which a follow-up report fully conforming to the requirements of this Condition shall be completed.



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	207 (MPGF CVTO Trip Header) / C207 (MPGF CVTO Trip)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart Kb		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☐	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)			
Monitoring Device Location			
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter.			
How will data be reported?			
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
Keep copies of all reports required by 40 CFR 60.115b(d)(3) for at least two years. [40 60.115b(d)(3)].			
Presence of a flame recordkeeping by electronic or hard copy upon each occurrence of operation during which the flare pilot flame is absent. Keep copies of all records for at least two years. [40 CFR 60.115b(d)(2)].			

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Submit a report: Due semiannually to the Department for all periods recorded under 40 CFR 60.115b(d)(2) in which the pilot flame was absent. [40 CFR 60.115b(d)(3)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	207 (MPGF CVTO Trip Header) / C207 (MPGF CVTO Trip)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 63 Subpart CC		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Continuously monitor the presence of the pilot flame or flare flame(s) using a device (including, but not limited to, a thermocouple, ultraviolet beam sensor, or infrared sensor) capable of detecting that the pilot flame or flare flame(s) is present. [40 CFR 63.670(g)].			
Monitor visible emissions while regulated materials are vented to the flare. An initial visible emissions demonstration must be conducted using an observation period of 2 hours using Method 22 at 40 CFR 60, Appendix A-7. Subsequent visible emissions observations must be conducted using either the methods in 40 CFR 63.670(h)(1) or, alternatively, the methods in 40 CFR 63.670(h)(2). [40 CFR 63.670(h)].			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the flare header or headers that feed the flare as well as any supplemental natural gas used. Different flow monitoring methods may be used to measure different gaseous streams that make up the flare vent gas provided that the flow rates of all gas streams that contribute to the flare vent gas are determined. If assist air or assist steam is used, the owner or operator shall install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist air and/or assist steam used with the flare. [40 CFR 63.670(i)].			
Determine the concentration of individual components in the flare vent gas using either the methods provided in 40 CFR 63.670(j)(1) or (2), to assess compliance with the operating limits in 40 CFR 63.670(e) and, if applicable, 40 CFR 63.670(d) and (f). Alternatively, the owner or operator may elect to directly monitor the net heating value of the flare vent gas following the methods provided in 40 CFR 63.670(j)(3) and, if desired, may directly measure the hydrogen concentration in the flare vent gas following the methods provided in 40 CFR 63.670(j)(4). The owner or operator may elect to use different monitoring methods for different gaseous streams that make up the flare vent gas using different methods provided the composition or net heating value of all gas streams that contribute to the flare vent gas are determined. [40 CFR 63.670(j)].			

Determine Vtip on a 15-minute block average basis according to the requirements in 40 CFR 63.670(k)(1) through (k)(4). [40 CFR 63.670(k)].
When calculating NHVvg for a specific 15-minute block: (A) If the results from the first sample collected during an event (for periodic flare vent gas flow events) are not available until after the second 15-minute block starts, use the results from the first sample collected during an event for the first 15-minute block associated with that event. (B) For all other cases, use the arithmetic average of all NHVvg measurement data results that become available during a 15-minute block to calculate the 15-minute block average for that period. For the purpose of this requirement, use the time that the results become available rather than the time the sample was collected. For example, if a sample is collected at 12:25 a.m. and the analysis is completed at 12:38 a.m., the results are available at 12:38 a.m. and these results would be used to determine compliance during the 15-minute block period from 12:30 a.m. to 12:45 a.m. [40 CFR 63.670(l)(5)(ii)].
Determine the net heating value of the combustion zone gas (NHVcz) as specified in 40 CFR 63.670(m)(1) or (2), as applicable. [40 CFR 63.670(m)].
Except as specified in 40 CFR 63.670(m)(2), determine the 15-minute block average NHVcz based on the 15-minute block average vent gas and assist gas flow rates using the equation listed in 40 CFR 63.670(m)(1). For periods when there is no assist steam flow or premix assist air flow, $NHVcz = NHVvg$. [40 CFR 63.670(m)(1)].
Owners and operators of flares that use the feed-forward calculation methodology in 40 CFR 63.670(l)(5)(i) and that monitor gas composition or net heating value in a location representative of the cumulative vent gas stream and that directly monitor supplemental natural gas flow additions to the flare must determine the 15-minute block average NHVcz using equation listed in 40 CFR 63.670(m)(2). [40 CFR 63.670(m)(2)].
For each CPMS installed to comply with applicable provisions in 40 CFR 63.670, install, operate, calibrate, and maintain the CPMS as specified in 40 CFR 63.671(a)(1) through (8). [40 CFR 63.671(a)].
All monitoring equipment, except for CPMS installed for pilot flame monitoring, must meet the applicable minimum accuracy, calibration, and quality control requirements specified in table 13 of 40 CFR 63 Subpart CC. [40 CFR 63.671(a)(1)].
Ensure the readout (that portion of the CPMS that provides a visual display or record) or other indication of the monitored operating parameter from any CPMS required for compliance is readily accessible onsite for operational control or inspection by the operator of the source. [40 CFR 63.671(a)(2)].
All CPMS must complete a minimum of one cycle of operation (sampling, analyzing and data recording) for each successive 15-minute period. [40 CFR 63.671(a)(3)].
Except for periods of monitoring system malfunctions, repairs associated with monitoring system malfunctions, and required monitoring system quality assurance or quality control activities (including, as applicable, calibration checks and required zero and span adjustments), the owner or operator shall operate all CPMS and collect data continuously at all times when regulated emissions are routed to the flare. [40 CFR 63.671(a)(4)].
Operate, maintain, and calibrate each CPMS according to the CPMS monitoring plan specified in 40 CFR 63.671(b). [40 CFR 63.671(a)(5)].
The CPMS must be capable of measuring the appropriate parameter over the range of values expected for that measurement location. The data recording system associated with each CPMS must have a resolution that is equal to or better than the required system accuracy. [40 CFR 63.671(a)(8)].
Develop and implement a CPMS quality control program documented in a CPMS monitoring plan that covers each flare subject to the provisions in 40 CFR 63.670 and each CPMS installed to comply with applicable provisions in 40 CFR 63.670. The CPMS monitoring plan must contain the information listed in 40 CFR 63.671(b)(1) through (5). [40 CFR 63.671(b)].
For each CPMS installed to comply with applicable provisions in 40 CFR 63.670 except for CPMS installed for pilot flame monitoring, the owner or operator shall comply with the out-of-control procedures described in 40 CFR 63.671(c)(1) and (2). [40 CFR 63.671(c)].
Reduce data from a CPMS installed to comply with applicable provisions in 40 CFR 63.670 as specified in 40 CFR 63.671(d)(1) through (3). [40 CFR 63.671(d)].

For monitors used to determine compositional analysis for net heating value per 40 CFR 63.670(j)(1), the gas chromatograph must also meet the requirements of 40 CFR 63.671(e)(1) through (3). [40 CFR 63.671(e)].

How will data be reported? See Section E. Reporting below.

SECTION C. TESTING

Reference Test Method Description

Reference Test Method Citation

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Maintain a copy of the CPMS monitoring plan readily available on-site at all times. [40 CFR 63.671(b)].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Record and report any instances where visible emissions are observed for more than 5 minutes during any 2 consecutive hours as specified in 40 CFR 63.655(g)(11)(ii). [40 CFR 63.670(h)].

Submit a copy of the CPMS monitoring plan to the Administrator upon request by the Administrator. [40 CFR 63.671(b)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

- a. Source ID: 208 b. Source Name: MPGF Ethylene Tank Header
- c. Plan Approval or Operating Permit Number: PA-04-00740A and PA-04-00740C (included under LP Header System (Source ID 204) in those plan approvals) and PA-04-00740D
- d. Manufacturer: NA e. Model Number: NA
- f. Source Description: Header that connects the Refrigerated Ethylene Storage Tank to the MPGF Ethylene Tank
- g. Rated Capacity (for engines use BHP): NA h. Installation Date: 9/2022
- i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☐ ☒ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
208	MPGF Ethylene Tank Header	C208	MPGF Ethylene Tank	100%
C208	MPGF Ethylene Tank	S208	Stack (MPGF Ethylene Tank)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Natural gas / Waste gas	30190023	NA	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Visible emissions from the MPGF Ethylene Tank shall not exceed 0% except for a total of five minutes during any consecutive two-hour period.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	The MPGF Ethylene Tank shall be designed and operated to reduce collected VOC emissions by a minimum of 98%.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Net heating value of the combustion zone gas at the MPGF Ethylene Tank shall equal or exceed 500 Btu/scf on a three-hour rolling average, calculated every 15 minutes.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Comply with the applicable VOC standards specified in 40 CFR §60.112b [40 CFR 60.112b(b)(1) and 60.112b(a)(3)(ii)].	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 60 Subpart Kb §§60.112b(b)(1) and 60.112b(a)(3)(ii)	Meet the requirements specified in the general control device requirements, 40 CFR 60.18(c) through (f).	The same limitation as the limitation associated with the citation is used for the source.
Refer to Applicable Requirements for the Entire Site in Section 2 for additional requirements that may be applicable to the source.			



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	208 (MPGF Ethylene Tank Header) / C208 (MPGF Ethylene Tank)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Monitoring for compliance with the 98% destruction efficiency requirement for the MPGF Ethylene Tank shall be performed in accordance with 40 CFR 60.18. Operating parameter monitoring shall include flame detection at a minimum.			
Comply with the applicable flare monitoring and work practice requirements specified in 40 CFR 60.18.			
Net heating value of the combustion zone gas at the MPGF Ethylene Tank shall be calculated and recorded at a minimum of once every 15 minutes based on the volumetric flow rate of the waste gas in the MPGF Ethylene Tank Header and the composition of the waste gas. Engineering knowledge can be used to estimate the composition of the waste gas in the MPGF Ethylene Tank Header.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of waste gas in the MPGF Ethylene Tank Header.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist air used at the MPGF Ethylene Tank. Continuously monitoring fan speed or power and using fan curves is an acceptable method for continuously monitoring assist air flow rates at the MPGF Ethylene Tank.			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Maintain records of the flow rate in the MPGF Ethylene Tank Header on a daily basis.

VOC and GHG content based on engineering knowledge shall be used to calculate 12-month rolling total VOC and GHG emissions for the MPGF Ethylene Tank.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Minimize flaring resulting from startups, shutdowns, and unforeseeable events by operating the MPGF Ethylene Tank at all times in accordance with an approved flare minimization plan. The plan shall include the following:

- a. Procedures for operating and maintaining the MPGF Ethylene Tank during periods of process unit startup, shutdown, and unforeseeable events.
- b. A program of corrective action for malfunctioning process equipment.
- c. Procedures to minimize discharges either directly to the atmosphere or to the MPGF Ethylene Tank during the planned and unplanned startup or shutdown of process unit and air pollution control equipment, including an evaluation of flaring that has occurred or may reasonably be expected to occur during planned maintenance activities, including startup and shutdown, that considers the feasibility of performing these activities without flaring.
- d. Procedures for conducting root cause analyses.
- e. Procedures for taking identified corrective actions.
- f. The baseline flow to the MPGF Ethylene Tank determined in accordance with the provisions of 40 CFR 60.103a(a)(4).

Conduct a root cause analysis within 45 days after any startup flaring event, shutdown flaring event, or unforeseeable flaring event at the MPGF Ethylene Tank. Flaring event shall be defined as an event that exceeds the baseline by 500,000 scf within a 24-hour period. The analysis shall address the following:

- a. The date and time that the flaring event started and ended.
- b. The total quantity of gas flared during each event.
- c. An estimate of the quantity of VOC that was emitted and the calculations used to determine the quantities.
- d. The steps taken to limit the duration of the flaring event or the quantity of emissions associated with the event.
- e. A detailed analysis that sets forth the root cause and all significant contributing causes of the flaring event to the extent determinable.
- f. An analysis of the measures that are available to reduce the likelihood of a recurrence of a flaring event resulting from the same root cause or significant contributing causes in the future. The analysis of prevention measures must consider the adequacy of existing maintenance schedules and protocols for equipment contributing to the flaring event.
- g. A demonstration that the actions taken during the flaring event are consistent with the procedures specified in the flare minimization plan.
- h. In response to a flaring event, the Owner/Operator shall implement, as expeditiously as practicable, such interim and/or long-term corrective actions as are consistent with good engineering practice to minimize the likelihood of a recurrence of the root cause and all significant contributing causes of that flaring event.
- i. If any items required to be addressed in this analysis are still under investigation 45 days after the flaring event, the Owner/Operator shall include a statement of the anticipated date by which a follow-up report fully conforming to the requirements of this Condition shall be completed.



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	208 (MPGF Ethylene Tank Header) / C208 (MPGF Ethylene Tank)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart Kb		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☐	Monitoring	☒ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)			
Monitoring Device Location			
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter.			
How will data be reported?			
SECTION C. TESTING			
Reference Test Method Description			
Meet the requirements specified in the general control device requirements, 40 CFR 60.18(e) and (f). [40 CFR 60.113b(d)].			
Reference Test Method Citation	As specified		
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
Keep copies of all reports required by 40 CFR 60.115b(d)(1) and (d)(3) for at least two years. [40 CFR 60.115b(d)(1) and 60.115b(d)(3)].			
Presence of a flame recordkeeping by electronic or hard copy upon each occurrence of operation during which the flare pilot flame is absent. Keep copies of all records for at least two years. [40 CFR 60.115b(d)(2)].			

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Submit report: Due to the Department within six months of the initial startup date as required by 40 CFR 60.8. The report shall contain the measurements required by 40 CFR 60.18(f)(1) through (6). [40 CFR 60.115b(d)(1)].

Submit a report: Due semiannually to the Department for all periods recorded under 40 CFR 60.115b(d)(2) in which the pilot flame was absent. [40 CFR 60.115b(d)(3)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	208 (MPGF Ethylene Tank Header) / C208 (MPGF Ethylene Tank)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart A		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒	Testing
☐	Record Keeping	☐	Work Practice Standard
☐		☐	Reporting
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	NA		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Presence of a flame monitored by flame monitor continuously. Use a thermocouple or any other equivalent device to detect the presence of a flare pilot flame. [40 CFR 60.18(f)(2)].			
How will data be reported?	See 40 CFR Part 60 Subpart Kb		
SECTION C. TESTING			
Reference Test Method Description			
Method 22 of 40 CFR Part 60, Appendix A shall be used to determine compliance 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. [40 CFR 60.18(f)(1)].			
Reference Test Method Citation	As specified		
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
SECTION E. REPORTING			
Describe what is to be reported and the frequency of reporting.			
Reporting Start Date			

SECTION F. WORK PRACTICE STANDARD
--

Describe any work practice standard(s).

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

- a. Source ID: 209 b. Source Name: MPGF PE Units 1/2 Episodic Vent Header
- c. Plan Approval or Operating Permit Number: PA-04-00740A and PA-04-00740C (included under LP Header System (Source ID 204) in those plan approvals) and PA-04-00740D
- d. Manufacturer: NA e. Model Number: NA
- f. Source Description: Header that connects specific equipment in the 2 gas phase polyethylene manufacturing units to the MPGF PE Units 1/2 Episodic Vent
- g. Rated Capacity (for engines use BHP): NA h. Installation Date: 9-11/2022
- i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☐ ☒ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
209	MPGF PE Units 1/2 Episodic Vent Header	C209	MPGF PE Units 1/2 Episodic Vent	100%
C209	MPGF PE Units 1/2 Episodic Vent	S209	Stack (MPGF PE Units 1/2 Episodic Vent)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Natural gas / Waste gas	30190023	NA	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural gas	NA	0.5 gr/100 SCF	0%	NA

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Visible emissions from the MPGF PE Units 1/2 Episodic Vent shall not exceed 0% except for a total of five minutes during any consecutive two-hour period.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	The MPGF PE Units 1/2 Episodic Vent shall be designed and operated to reduce collected VOC emissions by a minimum of 98%.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	The MPGF PE Units 1/2 Episodic Vent shall be equipped with automated controls for control of the supplemental gas flow rate to the flare.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Net heating value of the combustion zone gas at the MPGF PE Units 1/2 Episodic Vent shall equal or exceed 500 Btu/scf on a three-hour rolling average, calculated every 15 minutes.	The same limitation as the limitation associated with the citation is used for the source.
30190023	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 63.670 and 40 CFR 63.671.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 60 Subpart DDD §60.562-1(a)(1)(i)(C)	Meet the conditions specified in 40 CFR 60.18 at all times.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart FFFF §63.2535(m)(1)	Flares that are subject to the provisions of 40 CFR 60.18 or 63.11 and must comply with the requirements in 40 CFR 63.2450(e)(5) are required to comply only with the provisions specified in 40 CFR 63 Subpart FFFF.	The same limitation as the limitation associated with the citation is used for the source.

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	40 CFR Part 63 Subpart FFFF §63.2450(e)(5)	Reduce organic HAP emissions by venting emissions through a closed-vent system to a steam-assisted, air-assisted, non-assisted, or pressure-assisted multi-point flare and meet the applicable requirements for flares as specified in 40 CFR 63.670 and 63.671 of 40 CFR 63 Subpart CC, including the provisions in Tables 12 and 13 to 40 CFR 63 Subpart CC, except as specified in 40 CFR 63.1103(e)(5)(i) through (xiii).	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(b)	Operate the flare with a pilot flame present at all times when regulated material is routed to the flare. Each 15-minute block during which there is at least one minute where no pilot flame is present when regulated material is routed to the flare is a deviation of the standard. Deviations in different 15-minute blocks from the same event are considered separate deviations.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(c)	Specify the smokeless design capacity of the flare and operate with no visible emissions, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours, when regulated material is routed to the flare.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(d)	Comply with either 40 CFR 63.670(d)(1) or (2), provided the appropriate monitoring systems are in-place, whenever regulated material is routed to the flare for at least 15-minutes and the flare vent gas flow rate is less than the smokeless design capacity of the flare.	The same limitation as the limitation associated with the citation is used for the source.
30190023	40 CFR Part 63 Subpart CC §63.670(e)(1)	Operate the flare to maintain the net heating value of flare combustion zone gas (NHVcz) at or above 270 Btu/scf determined on a 15-minute block period basis when regulated material is routed to the flare for at least 15-minutes.	The same limitation as the limitation associated with the citation is used for the source.

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30190023	40 CFR Part 63 Subpart CC §63.670(r)	An owner or operator may request approval from the Administrator for site-specific operating limits that shall apply specifically to a selected flare. Site-specific operating limits include alternative threshold values for the parameters specified in 40 CFR 63.670(d) through (f) as well as threshold values for operating parameters other than those specified in 40 CFR 63.670(d) through (f). The owner or operator must demonstrate that the flare achieves 96.5% combustion efficiency (or 98% destruction efficiency) using the site-specific operating limits based on a performance evaluation as described in 40 CFR 63.670(r)(1). The request shall include information as described in 40 CFR 63.670(r)(2).	The same limitation as the limitation associated with the citation is used for the source.
Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group No. G09 in Section 4.2 for additional requirements that may be applicable to the source.			



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	209 (MPGF PE Units 1/2 Episodic Vent Header) / C209 (MPGF PE Units 1/2 Episodic Vent)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Monitoring for compliance with the 98% destruction efficiency requirement for the MPGF PE Units 1/2 Episodic Vent shall be performed in accordance with 40 CFR 63 Subpart FFFF, 40 CFR 63.670, and 40 CFR 63.671.			
Comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR 63.670 and 40 CFR 63.671.			
Net heating value of the combustion zone gas at the MPGF PE Units 1/2 Episodic Vent Header shall be measured and recorded at a minimum of once every 15 minutes. An adjusted net heating value of hydrogen of 1,212 Btu/scf may be used for this calculation.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the MPGF PE Units 1/2 Episodic Vent Header as well as any flare supplemental gas used.			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist air used at the MPGF PE Units 1/2 Episodic Vent. Continuously monitoring fan speed or power and using fan curves is an acceptable method for continuously monitoring assist air flow rates at the MPGF PE Units 1/2 Episodic Vent.			
How will data be reported?	NA		

SECTION C. TESTING

Reference Test Method Description

Reference Test Method Citation

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Maintain records of the flow rate in the MPGF PE Units 1/2 Episodic Vent Header on a daily basis.

VOC and GHG content measured by a gas chromatograph (or equivalent monitor) shall be used to calculate 12-month rolling total VOC and GHG emissions for the MPGF PE Units 1/2 Episodic Vent.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Minimize flaring resulting from startups, shutdowns, and unforeseeable events by operating the MPGF PE Units 1/2 Episodic Vent at all times in accordance with an approved flare minimization plan. The plan shall include the following:

- a. Procedures for operating and maintaining the MPGF PE Units 1/2 Episodic Vent during periods of process unit startup, shutdown, and unforeseeable events.
- b. A program of corrective action for malfunctioning process equipment.
- c. Procedures to minimize discharges either directly to the atmosphere or to the MPGF PE Units 1/2 Episodic Vent during the planned and unplanned startup or shutdown of process unit and air pollution control equipment, including an evaluation of flaring that has occurred or may reasonably be expected to occur during planned maintenance activities, including startup and shutdown, that considers the feasibility of performing these activities without flaring.
- d. Procedures for conducting root cause analyses.
- e. Procedures for taking identified corrective actions.
- f. The baseline flow to the MPGF PE Units 1/2 Episodic Vent determined in accordance with the provisions of 40 CFR 60.103a(a)(4).

Conduct a root cause analysis within 45 days after any startup flaring event, shutdown flaring event, or unforeseeable flaring event at the MPGF PE Units 1/2 Episodic Vent. Flaring event shall be defined as an event that exceeds the baseline by 500,000 scf within a 24-hour period. The analysis shall address the following:

- a. The date and time that the flaring event started and ended.
- b. The total quantity of gas flared during each event.
- c. An estimate of the quantity of VOC that was emitted and the calculations used to determine the quantities.
- d. The steps taken to limit the duration of the flaring event or the quantity of emissions associated with the event.
- e. A detailed analysis that sets forth the root cause and all significant contributing causes of the flaring event to the extent determinable.
- f. An analysis of the measures that are available to reduce the likelihood of a recurrence of a flaring event resulting from the same root cause or significant contributing causes in the future. The analysis of prevention measures must consider the adequacy of existing maintenance schedules and protocols for equipment contributing to the flaring event.
- g. A demonstration that the actions taken during the flaring event are consistent with the procedures specified in the flare minimization plan.
- h. In response to a flaring event, the Owner/Operator shall implement, as expeditiously as practicable, such interim and/or long-term corrective actions as are consistent with good engineering practice to minimize the likelihood of a recurrence of the root cause and all significant contributing causes of that flaring event.
- i. If any items required to be addressed in this analysis are still under investigation 45 days after the flaring event, the Owner/Operator shall include a statement of the anticipated date by which a follow-up report fully conforming to the requirements of this Condition shall be completed.



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BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	209 (MPGF PE Units 1/2 Episodic Vent Header) / C209 (MPGF PE Units 1/2 Episodic Vent)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 63 Subpart CC		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Continuously monitor the presence of the pilot flame or flare flame(s) using a device (including, but not limited to, a thermocouple, ultraviolet beam sensor, or infrared sensor) capable of detecting that the pilot flame or flare flame(s) is present. [40 CFR 63.670(g)].			
Monitor visible emissions while regulated materials are vented to the flare. An initial visible emissions demonstration must be conducted using an observation period of 2 hours using Method 22 at 40 CFR 60, Appendix A-7. Subsequent visible emissions observations must be conducted using either the methods in 40 CFR 63.670(h)(1) or, alternatively, the methods in 40 CFR 63.670(h)(2). [40 CFR 63.670(h)].			
Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the flare header or headers that feed the flare as well as any supplemental natural gas used. Different flow monitoring methods may be used to measure different gaseous streams that make up the flare vent gas provided that the flow rates of all gas streams that contribute to the flare vent gas are determined. If assist air or assist steam is used, the owner or operator shall install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist air and/or assist steam used with the flare. [40 CFR 63.670(i)].			
Determine the concentration of individual components in the flare vent gas using either the methods provided in 40 CFR 63.670(j)(1) or (2), to assess compliance with the operating limits in 40 CFR 63.670(e) and, if applicable, 40 CFR 63.670(d) and (f). Alternatively, the owner or operator may elect to directly monitor the net heating value of the flare vent gas following the methods provided in 40 CFR 63.670(j)(3) and, if desired, may directly measure the hydrogen concentration in the flare vent gas following the methods provided in 40 CFR 63.670(j)(4). The owner or operator may elect to use different monitoring methods for different gaseous streams that make up the flare vent gas using different methods provided the composition or net heating value of all gas streams that contribute to the flare vent gas are determined. [40 CFR 63.670(j)].			

Determine Vtip on a 15-minute block average basis according to the requirements in 40 CFR 63.670(k)(1) through (k)(4). [40 CFR 63.670(k)].
When calculating NHVvg for a specific 15-minute block: (A) If the results from the first sample collected during an event (for periodic flare vent gas flow events) are not available until after the second 15-minute block starts, use the results from the first sample collected during an event for the first 15-minute block associated with that event. (B) For all other cases, use the arithmetic average of all NHVvg measurement data results that become available during a 15-minute block to calculate the 15-minute block average for that period. For the purpose of this requirement, use the time that the results become available rather than the time the sample was collected. For example, if a sample is collected at 12:25 a.m. and the analysis is completed at 12:38 a.m., the results are available at 12:38 a.m. and these results would be used to determine compliance during the 15-minute block period from 12:30 a.m. to 12:45 a.m. [40 CFR 63.670(l)(5)(ii)].
Determine the net heating value of the combustion zone gas (NHVcz) as specified in 40 CFR 63.670(m)(1) or (2), as applicable. [40 CFR 63.670(m)].
Except as specified in 40 CFR 63.670(m)(2), determine the 15-minute block average NHVcz based on the 15-minute block average vent gas and assist gas flow rates using the equation listed in 40 CFR 63.670(m)(1). For periods when there is no assist steam flow or premix assist air flow, $NHVcz = NHVvg$. [40 CFR 63.670(m)(1)].
Owners and operators of flares that use the feed-forward calculation methodology in 40 CFR 63.670(l)(5)(i) and that monitor gas composition or net heating value in a location representative of the cumulative vent gas stream and that directly monitor supplemental natural gas flow additions to the flare must determine the 15-minute block average NHVcz using equation listed in 40 CFR 63.670(m)(2). [40 CFR 63.670(m)(2)].
For each CPMS installed to comply with applicable provisions in 40 CFR 63.670, install, operate, calibrate, and maintain the CPMS as specified in 40 CFR 63.671(a)(1) through (8). [40 CFR 63.671(a)].
All monitoring equipment, except for CPMS installed for pilot flame monitoring, must meet the applicable minimum accuracy, calibration, and quality control requirements specified in table 13 of 40 CFR 63 Subpart CC. [40 CFR 63.671(a)(1)].
Ensure the readout (that portion of the CPMS that provides a visual display or record) or other indication of the monitored operating parameter from any CPMS required for compliance is readily accessible onsite for operational control or inspection by the operator of the source. [40 CFR 63.671(a)(2)].
All CPMS must complete a minimum of one cycle of operation (sampling, analyzing and data recording) for each successive 15-minute period. [40 CFR 63.671(a)(3)].
Except for periods of monitoring system malfunctions, repairs associated with monitoring system malfunctions, and required monitoring system quality assurance or quality control activities (including, as applicable, calibration checks and required zero and span adjustments), the owner or operator shall operate all CPMS and collect data continuously at all times when regulated emissions are routed to the flare. [40 CFR 63.671(a)(4)].
Operate, maintain, and calibrate each CPMS according to the CPMS monitoring plan specified in 40 CFR 63.671(b). [40 CFR 63.671(a)(5)].
The CPMS must be capable of measuring the appropriate parameter over the range of values expected for that measurement location. The data recording system associated with each CPMS must have a resolution that is equal to or better than the required system accuracy. [40 CFR 63.671(a)(8)].
Develop and implement a CPMS quality control program documented in a CPMS monitoring plan that covers each flare subject to the provisions in 40 CFR 63.670 and each CPMS installed to comply with applicable provisions in 40 CFR 63.670. The CPMS monitoring plan must contain the information listed in 40 CFR 63.671(b)(1) through (5). [40 CFR 63.671(b)].
For each CPMS installed to comply with applicable provisions in 40 CFR 63.670 except for CPMS installed for pilot flame monitoring, the owner or operator shall comply with the out-of-control procedures described in 40 CFR 63.671(c)(1) and (2). [40 CFR 63.671(c)].
Reduce data from a CPMS installed to comply with applicable provisions in 40 CFR 63.670 as specified in 40 CFR 63.671(d)(1) through (3). [40 CFR 63.671(d)].

For monitors used to determine compositional analysis for net heating value per 40 CFR 63.670(j)(1), the gas chromatograph must also meet the requirements of 40 CFR 63.671(e)(1) through (3). [40 CFR 63.671(e)].

How will data be reported? See Section E. Reporting below.

SECTION C. TESTING

Reference Test Method Description

Reference Test Method Citation

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Maintain a copy of the CPMS monitoring plan readily available on-site at all times. [40 CFR 63.671(b)].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Record and report any instances where visible emissions are observed for more than 5 minutes during any 2 consecutive hours as specified in 40 CFR 63.655(g)(11)(ii). [40 CFR 63.670(h)].

Submit a copy of the CPMS monitoring plan to the Administrator upon request by the Administrator. [40 CFR 63.671(b)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

a. Source ID: 301 b. Source Name: Polyethylene Pellet Material Storage/Handling/Loadout

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: NA e. Model Number: NA

f. Source Description: Polyethylene pellet blending, storage, handling, and loading equipment and operations

g. Rated Capacity (for engines use BHP): NA h. Installation Date: 10/2022

i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

☒ ☐ Emissions unit uses a control device to achieve compliance with emission limitations or standards.

☐ ☒ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
301	Polyethylene Pellet Material Storage/Handling/Loadout	C301	Fabric Filters (PE Pellet Storage/Handling/Loadout)	100%
C301	Fabric Filters (PE Pellet Storage/Handling/Loadout)	S301	Stacks (PE Pellet Fabric Filters)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Polyethylene railcar loading	2515010000	1,600,000 metric tons/yr railcar and truck combined	NA
Polyethylene truck loading	2515030000	1,600,000 metric tons/yr railcar and truck combined	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
2515010000, 2515030000	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Visible emissions from any fabric filter-controlled blending silo, handling and storage silos, or loadout operation shall not equal or exceed 10% opacity at any time.	The same limitation as the limitation associated with the citation is used for the source.
2515010000, 2515030000	Plan Approval 04-00740D [25 Pa. Code §127.12b]	The difference in the polyethylene residual VOC content between the following locations in PE Units 1 and 2 shall not exceed 35.08 ppmw on a monthly average: the polyethylene residual VOC content as measured downstream of the product purge bin in PE Units 1 and 2 and the polyethylene residual VOC content as measured for PE pellets being loaded out from final storage to trucks or railcars. If residual VOC is not measured for PE pellets being loaded out, then it shall be assumed to be zero for purposes of this compliance calculation.	The same limitation as the limitation associated with the citation is used for the source.
2515010000, 2515030000	Plan Approval 04-00740D [25 Pa. Code §127.12b]	The difference in the polyethylene residual VOC content between the following locations in PE Unit 3 shall not exceed 35.08 ppmw on a monthly average: the polyethylene residual VOC content as measured downstream of the degasser in PE Unit 3 and the polyethylene residual VOC content as measured for PE pellets being loaded out from final storage to trucks or railcars. If residual VOC is not measured for PE pellets being loaded out, then it shall be assumed to be zero for purposes of this compliance calculation.	The same limitation as the limitation associated with the citation is used for the source.
2515010000, 2515030000	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Fabric filters shall be designed not to exceed an outlet PM rate of 0.005 gr/dscf.	The same limitation as the limitation associated with the citation is used for the source.
2515010000, 2515030000	Plan Approval 04-00740D [25 Pa. Code §127.12b]	Polyethylene pellet blending silos, handling, storage, and loadout shall be controlled by fabric filters and operated with no fugitive emissions.	The same limitation as the limitation associated with the citation is used for the source.

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
2515010000, 2515030000	40 CFR Part 60 Subpart DDD §60.560(g)	Individual vent streams that emit continuous emissions with a weight percent TOC of less than 0.10 percent are exempt from the requirements of 40 CFR 60.562-1(a)(1).	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 for additional requirements that may be applicable to the source.



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	301 (Polyethylene Pellet Material Storage/Handling/Loadout)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☐	Monitoring	☒ Testing	☐ Reporting
☐	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)			
Monitoring Device Location			
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter.			
How will data be reported?			
SECTION C. TESTING			
Reference Test Method Description			
Polyethylene residual VOC content shall be measured no less than once per calendar month and at a minimum of once per reactor grade change for each polyethylene manufacturing line by methods and techniques acceptable to the Department. A minimum of three samples shall be taken before the first uncontrolled emission point downstream of the product purge bin in each gas phase technology polyethylene manufacturing line or downstream of the degasser in the slurry polyethylene manufacturing line for each measurement. The Owner/Operator may request a reduction of the sampling frequency upon written request and approval from the Department			
Reference Test Method Citation	As specified		
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
SECTION E. REPORTING			
Describe what is to be reported and the frequency of reporting.			
Reporting Start Date			

SECTION F. WORK PRACTICE STANDARD
--

Describe any work practice standard(s).



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ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	301 (Polyethylene Pellet Material Storage/Handling/Loadout)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart DDD		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☐	Monitoring	☒ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)			
Monitoring Device Location			
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter.			
How will data be reported?			
SECTION C. TESTING			
Reference Test Method Description			
Determine compliance with the individual stream exemptions in 40 CFR 60.560(g) as specified in 40 CFR 60.564(d)(2). [40 CFR 60.564(d)(2)].			
Reference Test Method Citation	As specified		
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
Keep for at least 2 years up-to-date, readily accessible records of any change in process operation that increases the VOC weight percent of the individual stream, if 40 CFR 60.560(g) is applicable. [40 CFR 60.565(h)].			
SECTION E. REPORTING			
Describe what is to be reported and the frequency of reporting.			
Submit a report if there is any change in process operations that increases the VOC weight percent of the individual stream, as recorded in 40 CFR 60.565(h). [40 CFR 60.565(k)].			
Reporting Start Date	As specified		

SECTION F. WORK PRACTICE STANDARD
--

Describe any work practice standard(s).

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

a. Source ID: 302 b. Source Name: Liquid Loadout (Recovered Oil)

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: NA e. Model Number: NA

f. Source Description: Submerged loading of recovered oil into trucks

g. Rated Capacity (for engines use BHP): 210,000 gallons/yr h. Installation Date: 9/2022

i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☒ ☐ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☒ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
302	Liquid Loadout (Recovered Oil)	C302	Carbon Canisters (Recovered Oil Loading)	100%
302	Liquid Loadout (Recovered Oil)	Z302	Fugitive Emissions (Liquid Loadout)	100%
C302	Carbon Canisters (Recovered Oil Loading)	S302	Stacks (Carbon Canisters)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Recovered oil	2515030000	210,000 gallons/yr	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
2515030000	Plan Approval 04-0074D [25 Pa. Code §127.12b]	Vent gases generated by loading recovered oil into transport vehicles shall be vented through a closed vent system to a carbon adsorption system designed to reduce VOC emissions by a minimum of 95%.	The same limitation as the limitation associated with the citation is used for the source.
2515030000	40 CFR Part 63 Subpart YY §63.1103(e)(3), Table 7(g)(1)	Comply with the requirements of 40 CFR 63 Subpart XX for waste streams.	The same limitation as the limitation associated with the citation is used for the source.
2515030000	40 CFR Part 63 Subpart XX §63.1095(b)(2)	Comply with 40 CFR 61 Subpart FF (National Emission Standards for Benzene Waste Operations) requirements applicable to a facility with a total annual benzene quantity that is greater than or equal to 10 Mg/yr, as determined according to 40 CFR 61.342(a). Facility does not have any continuous butadiene waste streams.	The same limitation as the limitation associated with the citation is used for the source.
Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G05, G06, and G10 in Section 4.2 for requirements that may be applicable to the source.			



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BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☒	Group of Sources	Group ID	
☐	Single Source	Unit ID	302 (Liquid Loadout (Recovered Oil))
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☐ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Monitor the concentration level of the organic compounds in the exhaust vent stream from the carbon adsorption system during each loadout procedure, and the existing carbon shall be replaced with fresh carbon immediately when carbon breakthrough is indicated. Breakthrough shall be defined as a VOC reading above background for a single canister and greater than or equal to 50 ppmv between the primary and secondary canister for all canisters operated as part of a primary and secondary system. As an alternative to conducting this monitoring, an owner or operator may replace the carbon in the carbon adsorption system with fresh carbon at a regular predetermined time interval that is less than the carbon replacement interval that is determined by the maximum design flow rate and either the organic concentration or the benzene concentration in the gas stream vented to the carbon adsorption system.			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Demonstrate that the carbon adsorption system achieves a minimum 95% control through engineering calculations including the following:

- (1) Specifications, drawings, schematics, and piping and instrumentation diagrams prepared by the owner or operator, or the control device manufacturer or vendor that describe the control device design based on acceptable engineering texts. The design analysis shall address the following vent stream characteristics and control device operating parameters.
- (i) For a carbon adsorption system that does not regenerate the carbon bed directly on-site in the control device, such as a carbon canister, the design analysis shall consider the vent stream composition, constituent concentration, flow rate, relative humidity, and temperature. The design analysis shall also establish the design exhaust vent stream organic compound concentration level or the design exhaust vent stream benzene concentration level, capacity of carbon bed, type and working capacity of activated carbon used for carbon bed, and design carbon replacement interval based on the total carbon working capacity of the control device and source operating schedule.

If a carbon adsorber that is not regenerated directly on site in the control device is used, then the owner or operator shall maintain records of dates and times when the control device is monitored, when breakthrough is measured, and when the existing carbon in the control device is replaced with fresh carbon.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Submerged filling or bottom loading shall be used for loading recovered oil into transport vehicles.

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

- a. Source ID: 303 b. Source Name: Liquid Loadout (Pyrolysis Fuel Oil, Light Gasoline, PE3 Heavies)
- c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D (added PE3 heavies in PA-04-00740D)
- d. Manufacturer: NA e. Model Number: NA
- f. Source Description: Submerged loading of pyrolysis fuel oil, light gasoline, and PE3 heavies into railcars
- g. Rated Capacity (for engines use BHP): 12,079,000 gallons/yr total h. Installation Date: 9/2022
- i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☒ ☐ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☒ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
303	Liquid Loadout (Pyrolysis Fuel Oil, Light Gasoline, PE3 Heavies)	204	CVTO Header System	100%
204	CVTO Header System	C204	CVTO	
204	CVTO Header System	207	MPGF CVTO Trip Header	
207	MPGF CVTO Trip Header	C207	MPGF CVTO Trip	100%
303	Liquid Loadout (Pyrolysis Fuel Oil, Light Gasoline, PE3 Heavies)	Z302	Fugitive Emissions (Liquid Loadout)	100%
C204	CVTO	S204	Stack (CVTO)	100%
C207	MPGF CVTO Trip	S207	Stack (MPGF CVTO Trip)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Pyrolysis fuel oil	2515010000	5,334,000 gallons/yr	NA
Light gasoline	2515010000	6,025,000 gallons/yr	NA
PE3 heavies	2515010000	720,000 gallons/yr	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
2515010000	Plan Approval 04-0074D [25 Pa. Code §127.12b]	Vapors displaced or generated by the loading of pyrolysis fuel oil, light gasoline, and PE3 heavies shall be captured and routed through a closed system to the CVTO Header System or MPGF CVTO Trip Header.	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G05 and G10 in Section 4.2 for additional requirements that may be applicable to the source.

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

- a. Source ID: 304 b. Source Name: Liquid Loadout (C3+, Butene, Isopentane, Isobutane, C3 Ref)
- c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D
- d. Manufacturer: NA e. Model Number: NA
- f. Source Description: Loading/unloading of C3+, butene, isopentane, isobutane, and C3 refrigerant into railcars
- g. Rated Capacity (for engines use BHP): 5,436
loading/unloading
events/yr total h. Installation Date: 9/2022
- i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☒ ☐ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☒ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
304	Liquid Loadout (C3+, Butene, Isopentane, Isobutane, C3 Ref)	205	HP Header System	100%
205	HP Header System	C205	HP Flare System	100%
C205	HP Flare System	C205A	TEGF A	
C205	HP Flare System	C205B	TEGF B	
304	Liquid Loadout (C3+, Butene, Isopentane, Isobutane, C3 Ref)	Z302	Fugitive Emissions (Liquid Loadout)	100%
C205A	TEGF A	S205A	Stack (TEGF A)	100%
C205B	TEGF B	S205B	Stack (TEGF B)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
C3+, butene, isopentane, isobutane, and C3 refrigerant	2515010000	5,436 loading/unloading events/yr total	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
2515010000	Plan Approval 04-0074D [25 Pa. Code §127.12b]	C3+ shall be loaded and C3 refrigerant, butene, isopentane, and isobutane shall be unloaded with vapor balance to pressurized storage tanks capable of maintaining working pressures sufficient at all times to prevent vapor or gas loss to the atmosphere and with no venting during loading and unloading operations.	The same limitation as the limitation associated with the citation is used for the source.
2515010000	Plan Approval 04-0074D [25 Pa. Code §127.12b]	Pressurized truck and rail storage tanks shall be equipped with pressure relief valves calibrated properly for the pressure level of the tank. Release of a pressure relief valve during loading shall cause the emergency shutdown of loading operations for that tank.	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group No. G10 in Section 4.2 for additional requirements that may be applicable to the source.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	304
Control Type	Flare	AIRS Code No.	Pollutant VOC
Control Make	Zeeco	Control Model No.	NA
		Control Efficiency	≥98%
Control I.D.	C205A	Source or Emission Unit Name	Liquid Loadout (C3+ Only)

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No		
☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.	
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.	
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act	
☐	☒	Approved under an emissions trading program.	
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).	
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor	
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:	
	Yes	No	
	☐	☐	Is owned by a municipality and
	☐	☐	Is exempt from all Part 75 monitoring requirements
	☐	☐	Is operated solely for providing power during peak electrical demand or emergency situations
	☐	☐	Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	304
Control Type	Flare	AIRS Code No.	Pollutant HAP
Control Make	Zeeco	Control Model No.	NA
		Control Efficiency	≥98%
Control I.D.	C205A	Source or Emission Unit Name	Liquid Loadout (C3+ Only)

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No	
☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act
☐	☒	Approved under an emissions trading program.
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:
	Yes	No
	☐	☐ Is owned by a municipality and
	☐	☐ Is exempt from all Part 75 monitoring requirements
	☐	☐ Is operated solely for providing power during peak electrical demand or emergency situations
	☐	☐ Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	304
Control Type	Flare	AIRS Code No.	Pollutant VOC
Control Make	Zeeco	Control Model No.	NA
		Control Efficiency	≥98%
Control I.D.	C205B	Source or Emission Unit Name	Liquid Loadout (C3+ Only)
SECTION B. MONITORING			
The emissions unit is exempted from CAM because the emission limitations or standards are:			
Yes	No		
☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.	
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.	
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act	
☐	☒	Approved under an emissions trading program.	
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).	
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor	
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:	
		Yes	No
		☐	☐
		Is owned by a municipality and	
		☐	☐
		Is exempt from all Part 75 monitoring requirements	
		☐	☐
		Is operated solely for providing power during peak electrical demand or emergency situations	
		☐	☐
		Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %	
SECTION C. CAM STATUS			
Yes	No		
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)	
☐	☐	CAM Plan is attached or has been submitted	
☐	☐	An Implementation Plan is attached	



COMMONWEALTH OF PENNSYLVANIA
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BUREAU OF AIR QUALITY

ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	304
Control Type	Flare	AIRS Code No.	Pollutant HAP
Control Make	Zeeco	Control Model No.	NA
		Control Efficiency	≥98%
Control I.D.	C205B	Source or Emission Unit Name	Liquid Loadout (C3+ Only)

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No	
☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act
☐	☒	Approved under an emissions trading program.
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:
	Yes	No
	☐	☐ Is owned by a municipality and
	☐	☐ Is exempt from all Part 75 monitoring requirements
	☐	☐ Is operated solely for providing power during peak electrical demand or emergency situations
	☐	☐ Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

a. Source ID: 305 b. Source Name: Liquid Loadout (Blended Pitch)

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: NA e. Model Number: NA

f. Source Description: Submerged loading of blended pitch into trucks

g. Rated Capacity (for engines use BHP): 504,000 gallons/yr total h. Installation Date: 9/2022

i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☒ ☐ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☒ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
305	Liquid Loadout (Blended Pitch)	205	HP Header System	100%
205	HP Header System	C205	HP Flare System	100%
C205	HP Flare System	C205A	TEGF A	
C205	HP Flare System	C205B	TEGF B	
305	Liquid Loadout (Blended Pitch)	Z302	Fugitive Emissions (Liquid Loadout)	100%
C205A	TEGF A	S205A	Stack (TEGF A)	100%
C205B	TEGF B	S205B	Stack (TEGF B)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Blended pitch	2515030000	504,000 gallons/yr total	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
2515030000	Plan Approval 04-0074D [25 Pa. Code §127.12b]	Vapors displaced or generated by the loading of blended pitch shall be captured and routed through a closed system back to the process or to the HP Header System.	The same limitation as the limitation associated with the citation is used for the source.
Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group No. G10 in Section 4.2 for additional requirements that may be applicable to the source.			

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

- a. Source ID: 401 b. Source Name: Storage Tanks (Recovered Oil, Equalization Wastewater)
- c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D
- d. Manufacturer: NA e. Model Number: NA
- f. Source Description: 1 internal floating roof (IFR) tank for recovered oil storage and 2 IFR tanks for equalization wastewater
- g. Rated Capacity (for engines use BHP): Recovered oil IFR tank: 521,211 gallons
Equalization wastewater IFR tanks: 877,051 gallons each h. Installation Date: 3/2020
- i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

- Yes No
- ☒ ☐ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☒ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
401	Storage Tanks (Recovered Oil, Equalization Wastewater)	206	Spent Caustic Vent Header System	100%
206	Spent Caustic Vent Header System	C206	SCTO	100%
C206	SCTO	S206	Stack (SCTO)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Recovered oil	30182015	61,092,240 gallons/yr	NA
Equalization wastewater	30182015	965,008,480 gallons/yr	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30182015	Plan Approval 04-0074D [25 Pa. Code §127.12b]	Recovered oil and equalization wastewater storage tanks shall be equipped with an internal floating roof.	The same limitation as the limitation associated with the citation is used for the source.
30182015	Plan Approval 04-0074D [25 Pa. Code §127.12b]	Recovered oil and equalization wastewater storage tanks shall be controlled by vapor recovery routed to the SCTO.	The same limitation as the limitation associated with the citation is used for the source.
30182015	40 CFR Part 63 Subpart YY §63.1103(e)(3), Table 7(g)(1)	Comply with the requirements of 40 CFR 63 Subpart XX for waste streams.	The same limitation as the limitation associated with the citation is used for the source.
30190015	40 CFR Part 63 Subpart XX §63.1095(b)(2)	Comply with 40 CFR 61 Subpart FF (National Emission Standards for Benzene Waste Operations) requirements applicable to a facility with a total annual benzene quantity that is greater than or equal to 10 Mg/yr, as determined according to 40 CFR 61.342(a). Facility does not have any continuous butadiene waste streams.	The same limitation as the limitation associated with the citation is used for the source.
30182015	40 CFR Part 61 Subpart FF §61.351(a)(1)	Install and operate a fixed roof and internal floating roof meeting the requirements in 40 CFR 60.112b(a)(1).	The same limitation as the limitation associated with the citation is used for the source.
30182015	40 CFR Part 60 Subpart Kb §60.112b(a)(1)(i)	Equip with a fixed roof in combination with an internal floating roof. The internal floating roof shall rest or float on the liquid surface (but not necessarily in complete contact with it) inside a storage vessel that has a fixed roof. The internal floating roof shall be floating on the liquid surface at all times, except during initial fill and during those intervals when the storage vessel is completely emptied or subsequently emptied and refilled. When the roof is resting on the leg supports, the process of filling, emptying, or refilling shall be continuous and shall be accomplished as rapidly as possible.	The same limitation as the limitation associated with the citation is used for the source.

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30182015	40 CFR Part 60 Subpart Kb §60.112b(a)(1)(ii)(A)	Equip internal floating roof with a liquid mounted seal consisting of a foam- or liquid-filled seal mounted in contact with the liquid between the wall of the storage vessel and the floating roof continuously around the circumference of the tank.	The same limitation as the limitation associated with the citation is used for the source.
30182015	40 CFR Part 60 Subpart Kb §60.112b(a)(1)(iii)-(ix)	Each opening in a noncontact internal floating roof except for automatic bleeder vents (vacuum breaker vents) and the rim space vents is to provide a projection below the liquid surface. Equip each opening in the internal floating roof except for leg sleeves, automatic bleeder vents, rim space vents, column wells, ladder wells, sample wells, and stub drains with a cover or lid and maintain in a closed position at all times (i.e., no visible gap) except when the device is in actual use. Equip the cover or lid with a gasket. Bolt covers on each access hatch and automatic gauge float well except when they are in use. Equip automatic bleeder vents with a gasket and close at all times when the roof is floating except when the roof is being floated off or is being landed on the roof leg supports. Equip rim space vents with a gasket and set to open only when the internal floating roof is not floating or at the manufacturer's recommended setting. Each penetration of the internal floating roof for the purpose of sampling shall be a sample well. The sample well shall have a slit fabric cover that covers at least 90 percent of the opening. Each penetration of the internal floating roof that allows for passage of a column supporting the fixed roof shall have a flexible fabric sleeve seal or a gasketed sliding cover. Each penetration of the internal floating roof that allows for passage of a ladder shall have a gasketed sliding cover.	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G05 and G06 in Section 4.2 for additional requirements that may be applicable to the source.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	401 (Storage Tanks (Recovered Oil, Equalization Wastewater))
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart Kb		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	NA		
Monitoring Device Location	NA		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Inspect the internal floating roof, the primary seal, and the secondary seal (if one is in service), prior to filling the storage vessel with VOL. If there are holes, tears, or other openings in the primary seal, the secondary seal, or the seal fabric or defects in the internal floating roof, or both, repair the items before filling the storage vessel. [40 CFR 60.113b(a)(1)].			
Inspect the internal floating roof and the primary seal or the secondary seal (if one is in service) through manholes and roof hatches on the fixed roof at least once every 12 months after initial fill. If a failure is detected during inspections required in this paragraph initiate repair provisions. [40 CFR 60.113b(a)(2)].			
Inspect the internal floating roof, the primary seal, the secondary seal (if one is in service), gaskets, slotted membranes, and sleeve seals (if any) each time the storage vessel is emptied and degassed. If a failure is detected during inspections required in this paragraph initiate repair provisions. [40 CFR 60.113b(a)(4)].			
How will data be reported?	See Section E. Reporting below.		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Inspection records recordkeeping by electronic or hard copy upon each occurrence of inspection, per 40 CFR 60.113b(a)(1) through (4). Each record shall identify the storage vessel on which the inspection was performed and shall contain the date the vessel was inspected and the observed condition of each component of the control equipment (seals, internal floating roof, and fittings). Keep copies of all records for at least two years. [40 CFR 60.115b(a)(2)].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Submit a report: Due as an attachment to the notification required by 40 CFR 60.7(a)(3). This report shall describe the control equipment and certify that the control equipment meets the specifications of 40 CFR 60.112b(a)(1) and 60.113b(a)(1). Keep copies of all reports for at least two years. [40 CFR 60.115b(a)(1)].

Submit a report: Due within 30 days of the annual visual inspection required by 40 CFR 60.113b(a)(2) that detects any of the conditions described in 40 CFR 60.113b(a)(2). Each report shall identify the storage vessel, the nature of the defects, and the date the storage vessel was emptied or the nature of and date the repair was made. Keep copies of all reports for at least two years. [40 CFR 60.115b(a)(3)].

Submit notification in writing: Due at least 30 days prior to the filling or refilling of each storage vessel for which an inspection is required by 40 CFR 60.113b(a)(1) and (a)(4) to afford DEP an opportunity to have an observer present. If the inspection required by paragraph 40 CFR 60.113b(a)(4) is not planned and the owner or operator could not have known about the inspection 30 days in advance or refilling the tank, notify DEP at least 7 days prior to the refilling of the storage vessel. Notify by telephone immediately followed by written documentation demonstrating why the inspection was unplanned. Alternatively, submit notification in writing including the written documentation and send by express mail so that it is received by DEP at least 7 days prior to the refilling. [40 CFR 60.113b(a)(5)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

If the internal floating roof is not resting on the surface of the VOL inside the storage vessel, or there is liquid accumulated on the roof, or the seal is detached, or there are holes or tears in the seal fabric, repair the items or empty and remove the storage vessel from service within 45 days. If a failure that is detected during inspections required in this paragraph cannot be repaired within 45 days and if the vessel cannot be emptied within 45 days, request a 30-day extension from DEP in the inspection report required in 40 CFR 60.115b(a)(3). Document in the request for extension that alternate storage capacity is unavailable and specify a schedule of actions the company will take that will assure that the control equipment will be repaired or the vessel will be emptied as soon as possible. [40 CFR 60.113b(a)(2)].

If the internal floating roof has defects, the primary seal has holes, tears, or other openings in the seal or the seal fabric, or the secondary seal has holes, tears, or other openings in the seal or the seal fabric, or the gaskets no longer close off the liquid surfaces from the atmosphere, or the slotted membrane has more than 10 percent open area, repair the items as necessary so that none of the conditions specified in this paragraph exist before refilling the storage vessel with VOL. In no event shall inspections conducted in accordance with 40 CFR 60.113b(a)(4) occur at intervals greater than 10 years in the case of vessels conducting the annual visual inspection as specified in 40 CFR 60.113b(a)(2) and (a)(3)(ii) and at intervals no greater than 5 years in the case of vessels specified in paragraph 40 CFR 60.113b(a)(3)(i) of this section. [40 CFR 60.113b(a)(4)].



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	401 (Storage Tanks (Recovered Oil, Equalization Wastewater))
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 61 Subpart FF		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☐	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)			
Monitoring Device Location			
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter.			
How will data be reported?			
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
An owner or operator who elects to install and operate the control equipment in 40 CFR 61.351 shall comply with the recordkeeping requirements in 40 CFR 60.115b. [40 CFR 61.356(k)].			
SECTION E. REPORTING			
Describe what is to be reported and the frequency of reporting.			
An owner or operator who elects to install and operate the control equipment in 40 CFR 61.351 shall comply with the reporting requirements in 40 CFR 60.115b. [40 CFR 61.357(f)].			
Reporting Start Date	As specified		

SECTION F. WORK PRACTICE STANDARD
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Describe any work practice standard(s).

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

- a. Source ID: 402 b. Source Name: Storage Tank (Spent Caustic)
- c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D
- d. Manufacturer: NA e. Model Number: NA
- f. Source Description: IFR tank for spent caustic storage
- g. Rated Capacity (for engines use BHP): 345,273 gallons h. Installation Date: 9/2022
- i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☒ ☐ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☒ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
402	Storage Tank (Spent Caustic)	206	Spent Caustic Vent Header System	100%
206	Spent Caustic Vent Header System	C206	SCTO	100%
C206	SCTO	S206	Stack (SCTO)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Spent caustic	30182015	26,150,110 gallons/yr	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30182015	Plan Approval 04-0074D [25 Pa. Code §127.12b]	The spent caustic storage tank shall be controlled by vapor recovery routed to the SCTO.	The same limitation as the limitation associated with the citation is used for the source.
30182015	Plan Approval 04-0074D [25 Pa. Code §127.12b]	The spent caustic storage tank shall be equipped with an internal floating roof.	The same limitation as the limitation associated with the citation is used for the source.
30182015	40 CFR Part 63 Subpart YY §63.1103(e)(3), Table 7(g)(1)	Comply with the requirements of 40 CFR 63 Subpart XX for waste streams.	The same limitation as the limitation associated with the citation is used for the source.
30190015	40 CFR Part 63 Subpart XX §63.1095(b)(2)	Comply with 40 CFR 61 Subpart FF (National Emission Standards for Benzene Waste Operations) requirements applicable to a facility with a total annual benzene quantity that is greater than or equal to 10 Mg/yr, as determined according to 40 CFR 61.342(a). Facility does not have any continuous butadiene waste streams.	The same limitation as the limitation associated with the citation is used for the source.
30182015	40 CFR Part 61 Subpart FF §61.351(a)(1)	Install and operate a fixed roof and internal floating roof meeting the requirements in 40 CFR 60.112b(a)(1).	The same limitation as the limitation associated with the citation is used for the source.
30182015	40 CFR Part 60 Subpart Kb §60.112b(a)(1)(i)	Equip with a fixed roof in combination with an internal floating roof. The internal floating roof shall rest or float on the liquid surface (but not necessarily in complete contact with it) inside a storage vessel that has a fixed roof. The internal floating roof shall be floating on the liquid surface at all times, except during initial fill and during those intervals when the storage vessel is completely emptied or subsequently emptied and refilled. When the roof is resting on the leg supports, the process of filling, emptying, or refilling shall be continuous and shall be accomplished as rapidly as possible.	The same limitation as the limitation associated with the citation is used for the source.

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30182015	40 CFR Part 60 Subpart Kb §60.112b(a)(1)(ii)(A)	Equip internal floating roof with a liquid mounted seal consisting of a foam- or liquid-filled seal mounted in contact with the liquid between the wall of the storage vessel and the floating roof continuously around the circumference of the tank.	The same limitation as the limitation associated with the citation is used for the source.
30182015	40 CFR Part 60 Subpart Kb §60.112b(a)(1)(iii)-(ix)	Each opening in a noncontact internal floating roof except for automatic bleeder vents (vacuum breaker vents) and the rim space vents is to provide a projection below the liquid surface. Equip each opening in the internal floating roof except for leg sleeves, automatic bleeder vents, rim space vents, column wells, ladder wells, sample wells, and stub drains with a cover or lid and maintain in a closed position at all times (i.e., no visible gap) except when the device is in actual use. Equip the cover or lid with a gasket. Bolt covers on each access hatch and automatic gauge float well except when they are in use. Equip automatic bleeder vents with a gasket and close at all times when the roof is floating except when the roof is being floated off or is being landed on the roof leg supports. Equip rim space vents with a gasket and set to open only when the internal floating roof is not floating or at the manufacturer's recommended setting. Each penetration of the internal floating roof for the purpose of sampling shall be a sample well. The sample well shall have a slit fabric cover that covers at least 90 percent of the opening. Each penetration of the internal floating roof that allows for passage of a column supporting the fixed roof shall have a flexible fabric sleeve seal or a gasketed sliding cover. Each penetration of the internal floating roof that allows for passage of a ladder shall have a gasketed sliding cover.	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G05 and G06 in Section 4.2 for additional requirements that may be applicable to the source.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	402 (Storage Tank (Spent Caustic))
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart Kb		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	NA		
Monitoring Device Location	NA		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Inspect the internal floating roof, the primary seal, and the secondary seal (if one is in service), prior to filling the storage vessel with VOL. If there are holes, tears, or other openings in the primary seal, the secondary seal, or the seal fabric or defects in the internal floating roof, or both, repair the items before filling the storage vessel. [40 CFR 60.113b(a)(1)].			
Inspect the internal floating roof and the primary seal or the secondary seal (if one is in service) through manholes and roof hatches on the fixed roof at least once every 12 months after initial fill. If a failure is detected during inspections required in this paragraph initiate repair provisions. [40 CFR 60.113b(a)(2)].			
Inspect the internal floating roof, the primary seal, the secondary seal (if one is in service), gaskets, slotted membranes, and sleeve seals (if any) each time the storage vessel is emptied and degassed. If a failure is detected during inspections required in this paragraph initiate repair provisions. [40 CFR 60.113b(a)(4)].			
How will data be reported?	See Section E. Reporting below.		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Inspection records recordkeeping by electronic or hard copy upon each occurrence of inspection, per 40 CFR 60.113b(a)(1) through (4). Each record shall identify the storage vessel on which the inspection was performed and shall contain the date the vessel was inspected and the observed condition of each component of the control equipment (seals, internal floating roof, and fittings). Keep copies of all records for at least two years. [40 CFR 60.115b(a)(2)].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Submit a report: Due as an attachment to the notification required by 40 CFR 60.7(a)(3). This report shall describe the control equipment and certify that the control equipment meets the specifications of 40 CFR 60.112b(a)(1) and 60.113b(a)(1). Keep copies of all reports for at least two years. [40 CFR 60.115b(a)(1)].

Submit a report: Due within 30 days of the annual visual inspection required by 40 CFR 60.113b(a)(2) that detects any of the conditions described in 40 CFR 60.113b(a)(2). Each report shall identify the storage vessel, the nature of the defects, and the date the storage vessel was emptied or the nature of and date the repair was made. Keep copies of all reports for at least two years. [40 CFR 60.115b(a)(3)].

Submit notification in writing: Due at least 30 days prior to the filling or refilling of each storage vessel for which an inspection is required by 40 CFR 60.113b(a)(1) and (a)(4) to afford DEP an opportunity to have an observer present. If the inspection required by paragraph 40 CFR 60.113b(a)(4) is not planned and the owner or operator could not have known about the inspection 30 days in advance or refilling the tank, notify DEP at least 7 days prior to the refilling of the storage vessel. Notify by telephone immediately followed by written documentation demonstrating why the inspection was unplanned. Alternatively, submit notification in writing including the written documentation and send by express mail so that it is received by DEP at least 7 days prior to the refilling. [40 CFR 60.113b(a)(5)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

If the internal floating roof is not resting on the surface of the VOL inside the storage vessel, or there is liquid accumulated on the roof, or the seal is detached, or there are holes or tears in the seal fabric, repair the items or empty and remove the storage vessel from service within 45 days. If a failure that is detected during inspections required in this paragraph cannot be repaired within 45 days and if the vessel cannot be emptied within 45 days, request a 30-day extension from DEP in the inspection report required in 40 CFR 60.115b(a)(3). Document in the request for extension that alternate storage capacity is unavailable and specify a schedule of actions the company will take that will assure that the control equipment will be repaired or the vessel will be emptied as soon as possible. [40 CFR 60.113b(a)(2)].

If the internal floating roof has defects, the primary seal has holes, tears, or other openings in the seal or the seal fabric, or the secondary seal has holes, tears, or other openings in the seal or the seal fabric, or the gaskets no longer close off the liquid surfaces from the atmosphere, or the slotted membrane has more than 10 percent open area, repair the items as necessary so that none of the conditions specified in this paragraph exist before refilling the storage vessel with VOL. In no event shall inspections conducted in accordance with 40 CFR 60.113b(a)(4) occur at intervals greater than 10 years in the case of vessels conducting the annual visual inspection as specified in 40 CFR 60.113b(a)(2) and (a)(3)(ii) and at intervals no greater than 5 years in the case of vessels specified in paragraph 40 CFR 60.113b(a)(3)(i) of this section. [40 CFR 60.113b(a)(4)].



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	402 (Storage Tank (Spent Caustic))
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 61 Subpart FF		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☐	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)			
Monitoring Device Location			
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter.			
How will data be reported?			
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording. An owner or operator who elects to install and operate the control equipment in 40 CFR 61.351 shall comply with the recordkeeping requirements in 40 CFR 60.115b. [40 CFR 61.356(k)].			
SECTION E. REPORTING			
Describe what is to be reported and the frequency of reporting. An owner or operator who elects to install and operate the control equipment in 40 CFR 61.351 shall comply with the reporting requirements in 40 CFR 60.115b. [40 CFR 61.357(f)].			
Reporting Start Date	As specified		
SECTION F. WORK PRACTICE STANDARD			
Describe any work practice standard(s).			

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

a. Source ID: 403 b. Source Name: Storage Tank (Light Gasoline)

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: NA e. Model Number: NA

f. Source Description: IFR tank for light gasoline storage

g. Rated Capacity (for engines use BHP): 151,899 gallons h. Installation Date: 9/2022

i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☒ ☐ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☒ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
403	Storage Tank (Light Gasoline)	204	CVTO Header System	100%
204	CVTO Header System	C204	CVTO	
204	CVTO Header System	207	MPGF CVTO Trip Header	
207	MPGF CVTO Trip Header	C207	MPGF CVTO Trip	100%
C204	CVTO	S204	Stack (CVTO)	100%
C207	MPGF	S207	Stack (MPGF CVTO Trip)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Light gasoline	2510000000, 2510995000	6,061,920 gallons/yr	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
2510000000, 2510995000	Plan Approval 04-0074D [25 Pa. Code §127.12b]	Light gasoline storage tanks shall be controlled by vapor recovery routed to the CVTO Header System or MPGF CVTO Trip Header.	The same limitation as the limitation associated with the citation is used for the source.
2510000000, 2510995000	Plan Approval 04-0074D [25 Pa. Code §127.12b]	Light gasoline storage tanks shall be equipped with an internal floating roof.	The same limitation as the limitation associated with the citation is used for the source.
2510000000, 2510995000	40 CFR Part 63 Subpart YY §63.1100(g)(1)(ii)	A storage tank that must be controlled according to the requirements of 40 CFR 63 Subpart YY and 40 CFR 60 Subpart Kb is required to comply only with the storage vessel requirements of 40 CFR 63 Subpart YY.	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G05 and G11 in Section 4.2 for additional requirements that may be applicable to the source.

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

a. Source ID: 404 b. Source Name: Storage Tanks (Hexene)

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: NA e. Model Number: NA

f. Source Description: 2 IFR tanks for hexene storage

g. Rated Capacity (for engines use BHP): 802,026 gallons each h. Installation Date: 5-6/2022

i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☒ ☐ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☒ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
404	Storage Tanks (Hexene)	C204	CVTO Header System	100%
204	CVTO Header System	C204	CVTO	
204	CVTO Header System	207	MPGF CVTO Trip Header	
207	MPGF CVTO Trip Header	C207	MPGF CVTO Trip	100%
C204	CVTO	S204	Stack (CVTO)	100%
C207	MPGF CVTO Trip	S207	Stack (MPGF CVTO Trip)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Hexene	2510000000, 2510995000	7,291,217 gallons/yr	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
2510000000, 2510995000	Plan Approval 04-0074D [25 Pa. Code §127.12b]	Hexene storage tanks shall be controlled by vapor recovery routed to the CVTO Header System or MPGF CVTO Trip Header.	The same limitation as the limitation associated with the citation is used for the source.
2510000000, 2510995000	Plan Approval 04-0074D [25 Pa. Code §127.12b]	Hexene storage tanks shall be equipped with an internal floating roof.	The same limitation as the limitation associated with the citation is used for the source.
2510000000, 2510995000	40 CFR Part 60 Subpart Kb §60.112b(a)(3)(i)	Equip with a closed vent system and control device. Design the closed vent system to collect all VOC vapors and gases discharged from the storage vessel and operate with no detectable emissions.	The same limitation as the limitation associated with the citation is used for the source.
2510000000, 2510995000	40 CFR Part 60 Subpart Kb §60.112b(a)(3)(ii)	VOC, Total $\geq$ 95 % reduction efficiency using a closed vent system and control device.	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group No. G11 in Section 4.2 for additional requirements that may be applicable to the source.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	404 (Storage Tanks (Hexene))
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart Kb		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	NA		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Closed vent system (no detectable emissions): VOC, Total < 500 ppm above background as indicated by instrument readings and visual inspections, as determined in 40 CFR 60 Subpart VV, 40 CFR 60.485(c). [40 CFR 60.112b(a)(3)(i)].			
Monitor the parameters of the closed vent system in accordance with the operating plan submitted to the Department in accordance with 40 CFR 60.113b(c)(1), unless the plan was modified by the Department during the review process. In this case, the modified plan applies. [40 CFR 60.113b(c)(2)].			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Operating plan recordkeeping by electronic or hard copy at the approved frequency. Keep copies of all records for the life of the control equipment. [40 CFR 60.115b(c)(1)].

Monitoring data recordkeeping by electronic or hard copy upon measurement in accordance with the operating plan of 40 CFR 60.113b(c)(2). Keep copies of all records for at least two years. [40 CFR 60.115b(c)(2)].

Keep copies of all reports required by 40 CFR 60.115b(d)(3) for at least two years. [40 CFR 60.115b(d)(3)].

Equipment/operational data recordkeeping by electronic or hard copy at the approved frequency. Keep readily accessible records showing the dimension of the storage vessel and an analysis showing the capacity of the storage vessel. Keep copies of all records for the life of the source as specified by 40 CFR 60.116b(a). [40 CFR 60.116b(b)].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Submit an operating plan as an attachment to the notification required by 40 CFR 60.7(a)(1) for approval by the Department. The operating plan shall contain the information listed in 40 CFR 60.113b(c)(1)(i) and (ii). [40 CFR 60.113b(c)(1)].

Submit a report: Due semiannually to the Department for all periods recorded under 40 CFR 60.115b(d)(2) in which the pilot flame was absent. [40 CFR 60.115b(d)(3)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

- a. Source ID: 405 b. Source Name: Storage Tanks (Misc Pressurized)
- c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D
- d. Manufacturer: NA e. Model Number: NA
- f. Source Description: 1 pressurized horizontal vessel for C3 refrigerant storage
2 pressurized spherical vessels for C3+ storage
1 pressurized spherical vessel for off-spec ethylene storage
1 pressurized horizontal vessel for wash oil storage
1 pressurized spherical vessel for butene storage
2 pressurized horizontal vessels for isopentane storage
1 pressurized horizontal vessel for isobutane storage
1 pressurized horizontal vessel for dimethyl disulfide storage
1 pressurized horizontal vessel for PE3 heavies storage
- g. Rated Capacity (for engines use BHP): C3 refrigerant vessel: 79,252 gallons
C3+ vessels: 607,596 gallons each
Off-spec ethylene vessel: 1,912,077 gallons
Wash oil vessel: 33,343 gallons
Butene vessel: 317,006 gallons
Isopentane vessels: 158,503 gallons each
Isobutane vessel: 52,834 gallons
Dimethyl disulfide vessel: NA
PE3 heavies vessel: 52,834 gallons
- h. Installation Date: 9/2022
- i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

- Yes No
- ☒ ☐ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☒ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
405	Storage Tanks (Misc Pressurized)	205	HP Header System	100%
205	HP Header System	C205	HP Flare System	100%
C205	HP Flare System	C205A	TEGF A	
C205	HP Flare System	C205B	TEGF B	
C205	HP Flare System	C205C	HP Elevated Flare	
C205A	TEGF A	S205A	Stack (TEGF A)	100%
C205B	TEGF B	S205B	Stack (TEGF B)	100%
C205C	HP Elevated Flare	S205C	Stack (HP Elevated Flare)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
C3 refrigerant	40790101	NA	NA
C3+	40790101	NA	NA
Ethylene	40790101	NA	NA
Wash oil	40790101	NA	NA
Butene	40790101	NA	NA
Isopentane	40790101	NA	NA
Isobutane	40790101	NA	NA
Dimethyl disulfide	40790101	NA	NA
PE3 heavies	40790101	NA	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
40790101	Plan Approval 04-0074D [25 Pa. Code §127.12b]	Ethylene, C3+, C3 refrigerant, butene, isopentane, isobutane, aqueous ammonia, dimethyl disulfide, methanol, and PE3 heavies shall be stored in pressurized storage tanks with no uncontrolled vent directed to the atmosphere.	The same limitation as the limitation associated with the citation is used for the source.
40790101	Plan Approval 04-0074D [25 Pa. Code §127.12b]	Pressure control relief vents for pressurized storage tanks shall vent to the HP Header System.	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group No. G11 in Section 4.2 for additional requirements that may be applicable to the source.

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

- a. Source ID: 406 b. Source Name: Storage Tanks (Diesel Fuel > 150 Gallons)
- c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D
- d. Manufacturer: NA e. Model Number: NA
- f. Source Description: Fixed roof storage tanks greater than 150 gallons for diesel fuel storage
- g. Rated Capacity (for engines use BHP): >150 gallons h. Installation Date: 10/2020
- i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☐ ☒ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
406	Storage Tanks (Diesel Fuel > 150 Gallons)	Z406	Fugitive Emissions (Diesel Fuel Tanks > 150 Gallons)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Diesel	39090003, 39090004	124,400 gallons/yr	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Refer to Applicable Requirements for the Entire Site in Section 2 in Section 4.2 for requirements that may be applicable to the source.			

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

a. Source ID: 407 b. Source Name: Storage Tanks (Pyrolysis Fuel Oil)

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: NA e. Model Number: NA

f. Source Description: 2 heated vertical fixed roof tanks for pyrolysis fuel oil storage

g. Rated Capacity (for engines use BHP): 126,803 gallons each h. Installation Date: 9/2022

i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☒ ☐ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☒ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
407	Storage Tanks (Pyrolysis Fuel Oil)	204	CVTO Header System	100%
204	CVTO Header System	C204	CVTO	
204	CVTO Header System	207	MPGF CVTO Trip Header	
207	MPGF CVTO Trip Header	C207	MPGF CVTO Trip	100%
C204	CVTO	S204	Stack (CVTO)	100%
C207	MPGF CVTO Trip	S207	Stack (MPGF CVTO Trip)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Pyrolysis fuel oil	2510000000, 2510995000	5,670,000 gallons/yr	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
2510000000, 2510995000	Plan Approval 04-0074D [25 Pa. Code §127.12b]	Pyrolysis fuel oil storage tanks shall be controlled by vapor recovery routed to the CVTO Header System or MPGF CVTO Trip Header.	The same limitation as the limitation associated with the citation is used for the source.
2510000000, 2510995000	40 CFR Part 63 Subpart YY §63.1100(g)(1)(ii)	A storage tank that must be controlled according to the requirements of 40 CFR 63 Subpart YY and 40 CFR 60 Subpart Kb is required to comply only with the storage vessel requirements of 40 CFR 63 Subpart YY.	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group No. G05 in Section 4.2 for additional requirements that may be applicable to the source.

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

- a. Source ID: 408 b. Source Name: Storage Tanks (Diesel Fuel < 150 Gallons)
- c. Plan Approval or Operating Permit Number: PA-04-00740C and PA-04-00740D
- d. Manufacturer: NA e. Model Number: NA
- f. Source Description: Fixed roof storage tanks less than 150 gallons for diesel fuel storage
- g. Rated Capacity (for engines use BHP): <150 gallons h. Installation Date: 10/2020
- i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☐ ☒ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
408	Storage Tanks (Diesel Fuel < 150 Gallons)	Z408	Fugitive Emissions (Diesel Fuel Tanks < 150 Gallons)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Diesel	39090003, 39090004	NA	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Refer to Applicable Requirements for the Entire Site in Section 2 in Section 4.2 for requirements that may be applicable to the source.			

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

- a. Source ID: 409 b. Source Name: Methanol Storage Vessels and Associated Components
- c. Plan Approval or Operating Permit Number: PA-04-00740C and PA-04-00740D
- d. Manufacturer: NA e. Model Number: NA
- f. Source Description: 2 pressurized horizontal vessels for methanol storage
1 pressurized vertical vessel for methanol (this vessel is a surge control vessel, not a storage vessel)
Valves, relief valves, pumps, connectors, flanges, etc. in methanol service
- g. Rated Capacity (for engines use BHP): Pressurized horizontal vessel: 35,952 gallons
Pressurized horizontal vessel: 67,223 gallons
Pressurized vertical vessel: 6,452 gallons h. Installation Date: 9/2022
- i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☒ ☐ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☒ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
409	Methanol Storage Vessels and Associated Components	205	HP Header System	100%
205	HP Header System	C205	HP Flare System	100%
C205	HP Flare System	C205A	TEGF A	
C205	HP Flare System	C205B	TEGF B	
C205	HP Flare System	C205C	HP Elevated Flare	
C205A	TEGF A	S205A	Stack (TEGF A)	100%
C205B	TEGF B	S205B	Stack (TEGF B)	100%
C205C	HP Elevated Flare	S205C	Stack (HP Elevated Flare)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Methanol	40790101	NA	NA
Methanol	30119749	NA	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group No. G11 in Section 4.2 for requirements that may be applicable to the source.			



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	409 (Methanol Storage Vessels and Associated Components)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 63 Subpart EEEE		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☐	Monitoring	☐ Testing	☐ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)			
Monitoring Device Location			
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter.			
How will data be reported?			
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording. Keep documentation that verifies that each transfer rack identified in 40 CFR 63.2343(a) is not required to be controlled. Keep documentation up-to-date (i.e., all such emission sources at a facility are identified in the documentation regardless of when the documentation was last compiled) and in a form suitable and readily available for expeditious inspection and review according to 40 CFR 63.10(b)(1), including records stored in electronic form in a separate location. [40 CFR 63.2343(a)].			
SECTION E. REPORTING			
Describe what is to be reported and the frequency of reporting.			
Reporting Start Date			

SECTION F. WORK PRACTICE STANDARD
--

Describe any work practice standard(s).

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

- a. Source ID: 410 b. Source Name: Refrigerated Ethylene Storage Tank
- c. Plan Approval or Operating Permit Number: PA-04-00740A and PA-04-00740C (included under Storage Tanks (Misc Pressurized/Refrigerated) (Source ID 405) in those plan approvals) and PA-04-00740D
- d. Manufacturer: NA e. Model Number: NA
- f. Source Description: 1 refrigerated atmospheric vertical fixed roof tank for ethylene storage
- g. Rated Capacity (for engines use BHP): 7,925,162 gallons h. Installation Date: 9/2022
- i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☒ ☐ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☒ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
405	Refrigerated Ethylene Storage Tank	208	MPGF Ethylene Tank Header	100%
208	MPGF Ethylene Tank Header	C208	MPGF Ethylene Tank	100%
C208	MPGF Ethylene Tank	S208	Stack (MPGF Ethylene Tank)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Ethylene	2510000000, 2510995000	1,308,879,185 gallons/yr	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
2510000000, 2510995000	Plan Approval 04-0074D [25 Pa. Code §127.12b]	The Refrigerated Ethylene Storage Tank shall have no uncontrolled vent directed to the atmosphere.	The same limitation as the limitation associated with the citation is used for the source.
2510000000, 2510995000	Plan Approval 04-0074D [25 Pa. Code §127.12b]	Pressure control relief vents for the Refrigerated Ethylene Storage Tank shall vent to the MPGF Ethylene Tank Header.	The same limitation as the limitation associated with the citation is used for the source.
2510000000, 2510995000	40 CFR Part 60 Subpart Kb §§60.112b(b)(1) and 60.112b(a)(3)(i)	Equip with a closed vent system and control device. Design the closed vent system to collect all VOC vapors and gases discharged from the storage vessel and operate with no detectable emissions.	The same limitation as the limitation associated with the citation is used for the source.
2510000000, 2510995000	40 CFR Part 60 Subpart Kb §§60.112b(b)(1) and 60.112b(a)(3)(ii)	VOC, Total $\geq$ 95 % reduction efficiency using a closed vent system and flare. Meet the requirements specified in the general control device requirements, 40 CFR 60.18(c) through (f).	The same limitation as the limitation associated with the citation is used for the source.
Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group No. G11 in Section 4.2 for requirements that may be applicable to the source.			



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	410 (Refrigerated Ethylene Storage Tank)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 60 Subpart Kb		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☐ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	OVA monitor		
Monitoring Device Location	NA		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Closed vent system (no detectable emissions): VOC, Total < 500 ppm above background as indicated by instrument readings and visual inspections, as determined in 40 CFR 60 Subpart VV, 40 CFR 60.485(c). [40 CFR 60.112b(b)(1) and 60.112b(a)(3)(i)].			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording. Keep copies of all reports required by 40 CFR 60.115b(d)(1) and (d)(3) for at least two years. [40 CFR 60.115b(d)(1) and 60.115b(d)(3)].			
Equipment/operational data recordkeeping by electronic or hard copy at the approved frequency. Keep readily accessible records showing the dimension of the storage vessel and an analysis showing the capacity of the storage vessel. Keep copies of all records for the life of the source as specified by 40 CFR 60.116b(a). [40 CFR 60.116b(b)].			

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Submit report: Due to the Department within six months of the initial startup date as required by 40 CFR 60.8. The report shall contain the measurements required by 40 CFR 60.18(f)(1) through (6). [40 CFR 60.115b(d)(1)].

Submit a report: Due semiannually to the Department for all periods recorded under 40 CFR 60.115b(d)(2) in which the pilot flame was absent. [40 CFR 60.115b(d)(3)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 3 CAM APPLICABILITY WORKSHEET FOR SOURCES

SECTION A. GENERAL INFORMATION

Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1	Source I.D.	410
Control Type	Flare	AIRS Code No.	Pollutant VOC
Control Make	Zeeco	Control Model No.	AFDS-6/24 Control Efficiency ≥98%
Control I.D.	C208	Source or Emission Unit Name	Refrigerated Ethylene Storage Tank

SECTION B. MONITORING

The emissions unit is exempted from CAM because the emission limitations or standards are:

Yes	No	
☐	☒	Proposed by the EPA Administrator after November 15, 1990 pursuant to Sections 111 or 112 of the Clean Air Act.
☐	☒	Stratospheric ozone protection requirements under Title VI of the Act.
☐	☒	Acid Rain Program requirements pursuant to sections 404-407(b) or 410 of the Clean Air Act
☐	☒	Approved under an emissions trading program.
☐	☒	An emissions cap that meets the requirements specified in 40 CFR § 70.4(b)(12).
☒	☐	Determined by a continuous compliance method that does not use an assumed control factor
☐	☒	Requirements for a backup utility power emissions unit as defined in § 72.2 which:
	Yes	No
	☐	☐ Is owned by a municipality and
	☐	☐ Is exempt from all Part 75 monitoring requirements
	☐	☐ Is operated solely for providing power during peak electrical demand or emergency situations
	☐	☐ Has annual average emissions (for previous 3 years) of less than 50% of the major source cut off and emissions are expected to remain below 50 %

SECTION C. CAM STATUS

Yes	No	
☐	☒	CAM applies (be sure to include appropriate citation numbers under Source Applicable Requirements section of the application)
☐	☐	CAM Plan is attached or has been submitted
☐	☐	An Implementation Plan is attached

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

a. Source ID: 501 b. Source Name: Equipment Components

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: NA e. Model Number: NA

f. Source Description: Valves, relief valves, pumps, connectors, flanges, etc.

g. Rated Capacity (for engines use BHP): NA h. Installation Date: NA

i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☐ ☒ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
501	Equipment Components	Z501	Fugitive Emissions (Component Leaks)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation			
Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Ethylene	30119749	NA	NA
LDPE	30108101	NA	NA
HDPE	30108110	NA	NA

7.5 Maximum Fuel Physical Characteristics				
If taking limitations on Fuel Physical Characteristics, see instructions.				
SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation						
Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.						
Maximum number of hours of source operation per year: _____						
Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30119749, 30108101, and 30108110	25 Pa. Code §129.71(d)	A facility subject to the equipment leak requirements in 25 Pa. Code §129.71 may comply with an alternative plan for the control of equipment leaks that achieves an emission reduction that is equivalent to or greater than the reduction that can be achieved under 25 Pa. Code §129.71 if the alternative plan is as enforceable as 25 Pa. Code §129.71. SPM complies with equipment design and LDAR LAER requirements for the facility's equipment that are equivalent to or more stringent than the requirements in 25 Pa. Code §129.71 and as enforceable as 25 Pa. Code §129.71.	The same limitation as the limitation associated with the citation is used for the source.
30119749	40 CFR Part 63 Subpart YY §§63.1100(g)(4)(i) and 63.1103(e)(3), Table 7(f)	An affected source with equipment subject to the requirements of 40 CFR 61 Subpart J or Subpart V is required only to comply with the equipment leak requirements of 40 CFR 63 Subpart YY. Accordingly, SPM has elected to comply only with the requirements of 40 CFR 63 Subpart YY for such equipment, which requires compliance with the requirements in 40 CFR 63 Subpart UU and the requirements referenced therein, except instead of complying with the pressure relief device requirements of 40 CFR 63.1030 of 40 CFR 63 Subpart UU, meet the requirements of 40 CFR 63.1107(h), and in lieu of the flare requirement of 40 CFR 63.1034(b)(2)(iii), comply with the requirements specified in 40 CFR 63.1103(e)(4).	The same limitation as the limitation associated with the citation is used for the source.
30119749	40 CFR Part 63 Subpart YY §63.1103(e)(3), Table 7(g)(1)	Comply with the requirements of 40 CFR 63 Subpart XX for waste streams.	The same limitation as the limitation associated with the citation is used for the source.

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
30119749	40 CFR Part 63 Subpart XX §63.1095(b)(2)	Comply with 40 CFR 61 Subpart FF (National Emission Standards for Benzene Waste Operations) requirements applicable to a facility with a total annual benzene quantity that is greater than or equal to 10 Mg/yr, as determined according to 40 CFR 61.342(a). Facility does not have any continuous butadiene waste streams.	The same limitation as the limitation associated with the citation is used for the source.
30119749	40 CFR Part 61 Subpart FF §61.346(b)(3)	Ensure that each applicable sewer line is not open to the atmosphere and is covered or enclosed in a manner so as to have no visual gaps or cracks in joints, seals, or other emission interfaces.	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G04, G05, G06, G07, G09, and G12 in Section 4.2 for additional requirements that may be applicable to the source.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	501 (Equipment Components)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 61 Subpart FF		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	NA		
Monitoring Device Location	NA		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Equipment/operational data monitored by visual inspection once initially and once every quarter thereafter. Inspect unburied portion of each sewer line for indication of cracks, gaps, or other problems that could result in benzene emissions. [40 CFR 61.346(b)(4)(iv)].			
How will data be reported? See Section E. Reporting below.			
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
Maintain a record for each visual inspection required by 40 CFR 61.343 through 61.347 that identifies a problem (such as a broken seal, gap or other problem) which could result in benzene emissions. The record shall include the date of the inspection, waste management unit and control equipment location where the problem is identified, a description of the problem, a description of the corrective action taken, and the date the corrective action was completed. [40 CFR 61.356(g)].			

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Submit report: Due quarterly, beginning three months after the date that the equipment necessary to comply with 40 CFR 61 Subpart FF has been certified in accordance with 40 CFR 61.357(d)(1). Submit a certification that all of the required inspections have been carried out in accordance with the requirements of 40 CFR 61 Subpart FF. [40 CFR 61.357(d)(6)].

Submit report: Due annually, beginning one year after the date that the equipment necessary to comply with 40 CFR 61 Subpart FF has been certified in accordance with 40 CFR 61.357(d)(1). Submit a report that summarizes all inspections required by 40 CFR 61.342 through 61.354 during which detectable emissions are measured or a problem that could result in benzene emissions is identified, including information about the repairs or corrective action taken. [40 CFR 61.357(d)(8)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Make a first attempt at repair as soon as practicable, but not later than 15 calendar days after a broken seal, gap, crack, or other problem is identified, except as specified in 40 CFR 61.350. [40 CFR 61.346(b)(5)].

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

- a. Source ID: 502 b. Source Name: Wastewater Treatment Plant (Secondary and Tertiary Treatment)
- c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D
- d. Manufacturer: NA e. Model Number: NA
- f. Source Description: Two biotreater aeration tanks, two secondary clarifiers, two biosludge holding tanks, a centrifuge, a sand filter, a sump for centrate and sand filter backwash, and a treated effluent sump used for the secondary and tertiary treatment of process wastewater and potentially contaminated stormwater
- g. Rated Capacity (for engines use BHP): NA h. Installation Date: 3/2020
- i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA A NA SCFM

7.2 CAM Information

Yes No

- ☐ ☒ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
502	Wastewater Treatment Plant (Secondary and Tertiary Treatment)	Z502	Fugitive Emissions (WWTP)	

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Wastewater	2630010000	NA	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
2630010000	40 CFR Part 63 Subpart YY §63.1103(e)(3), Table 7(g)(1)	Comply with the requirements of 40 CFR 63 Subpart XX for waste streams.	The same limitation as the limitation associated with the citation is used for the source.
2630010000	40 CFR Part 63 Subpart XX §63.1095(b)(2)	Comply with 40 CFR 61 Subpart FF (National Emission Standards for Benzene Waste Operations) requirements applicable to a facility with a total annual benzene quantity that is greater than or equal to 10 Mg/yr, as determined according to 40 CFR 61.342(a). Facility does not have any continuous butadiene waste streams.	The same limitation as the limitation associated with the citation is used for the source.
2630010000	40 CFR Part 61 Subpart FF §61.342(e)(1)	Manage and treat facility waste with a flow-weighted annual average water content of less than 10% in accordance with 40 CFR 61.342(c)(1).	The same limitation as the limitation associated with the citation is used for the source.
2630010000	40 CFR Part 61 Subpart FF §61.342(e)(2)	Manage and treat facility waste (including remediation and process unit turnaround waste) with a flow-weighted annual average water content $\Rightarrow$ 10%, on a volume basis as total water, and each waste stream that is mixed with water or wastes at any time resulting in a mixture that has an annual water content $\Rightarrow$ 10% such that the benzene quantity for the wastes is $\leq$ 6 Mg/yr (6.6 ton/yr), as determined in accordance with 40 CFR 61.355(k).	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G05 and G06 in Section 4.2 for additional requirements that may be applicable to the source.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	502 (Wastewater Treatment Plant (Secondary and Tertiary Treatment))
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 61 Subpart FF		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☐ Monitoring	☒ Testing	☐ Reporting	
☐ Record Keeping	☐ Work Practice Standard		
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)			
Monitoring Device Location			
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter.			
How will data be reported?			
SECTION C. TESTING			
Reference Test Method Description			
Determine compliance with 40 CFR 61 Subpart FF using the test methods and procedures specified in 40 CFR 61.355(a) through (k), as applicable. [40 CFR 61.355].			
Reference Test Method Citation	As specified		
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			

SECTION E. REPORTING
Describe what is to be reported and the frequency of reporting.
Reporting Start Date
SECTION F. WORK PRACTICE STANDARD
Describe any work practice standard(s).

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

a. Source ID: 503 b. Source Name: Plant Roadways

c. Plan Approval or Operating Permit Number: PA-04-00740A, PA-04-00740C, and PA-04-00740D

d. Manufacturer: NA e. Model Number: NA

f. Source Description: Plant transport truck roads

g. Rated Capacity (for engines use BHP): NA h. Installation Date: 11/2020

i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☐ ☒ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
503	Plant Roadways	Z503	Fugitive Emissions (Plant Roadways)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation			
Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Polyethylene	2294000000	NA	NA
Talc	2294000000	NA	NA
Other	2294000000	NA	NA

7.5 Maximum Fuel Physical Characteristics				
If taking limitations on Fuel Physical Characteristics, see instructions.				
SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation						
Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.						
Maximum number of hours of source operation per year: _____						
Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
2294000000	Plan Approval 04-0074D [25 Pa. Code §127.12b]	In-plant roadways shall be paved and maintained so as to prevent fugitive emissions.	The same limitation as the limitation associated with the citation is used for the source.

Refer to Applicable Requirements for the Entire Site in Section 2 for additional requirements that may be applicable to the source.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	503 (Plant Roadways)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☐	Monitoring	☐	Testing
☐	Record Keeping	☒	Work Practice Standard
☐		☐	Reporting
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)			
Monitoring Device Location			
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter.			
How will data be reported?			
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			
SECTION D. RECORD KEEPING			
Describe what parameters will be recorded and the frequency of recording.			
SECTION E. REPORTING			
Describe what is to be reported and the frequency of reporting.			
Reporting Start Date			
SECTION F. WORK PRACTICE STANDARD			
Describe any work practice standard(s).			
Develop and implement a roadway dust control plan to prevent fugitive emissions. Dust control shall include roadway watering, sweeping, and application of winterized surfactant as necessary during colder months.			

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

- a. Source ID: 504 b. Source Name: Gas Insulated Switchgear (SF6)
- c. Plan Approval or Operating Permit Number: PA-04-00740B
- d. Manufacturer: NA e. Model Number: NA
- f. Source Description: Sulfur hexafluoride (SF6)-insulated high voltage equipment
- g. Rated Capacity (for engines use BHP): NA h. Installation Date: 11/2019
- i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA k. Exhaust Flow Volume: NA SCFM

7.2 CAM Information

Yes No

- ☐ ☒ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☐ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
504	Gas Insulated Switchgear (SF6)	Z504	Fugitive Emissions (Gas Insulated Switchgear)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
SF6	31380001	NA	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
31380001	Plan Approval 04-00740B [25 Pa. Code §127.12b]	The emissions from the SF6-Insulated High Voltage Equipment shall not exceed the following on a 12-month rolling sum basis: • Greenhouse Gases, expressed as Carbon Dioxide Equivalent (CO₂e): 880 tpy	The same limitation as the limitation associated with the citation is used for the source.
31380001	Plan Approval 04-00740B [25 Pa. Code §127.12b]	The enclosed SF6-Insulated High Voltage Equipment for Gas-Insulated Switchgear (GIS) equipment shall have a vendor-guaranteed leak rate of 0.1% or less per year.	The same limitation as the limitation associated with the citation is used for the source.
31380001	Plan Approval 04-00740B [25 Pa. Code §127.12b]	The enclosed SF6-Insulated High Voltage Equipment on transformers shall have a vendor-guaranteed leak rate of 0.5% or less per year.	The same limitation as the limitation associated with the citation is used for the source.
Refer to Applicable Requirements for the Entire Site in Section 2 for additional requirements that may be applicable to the source.			



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	504 (Gas Insulated Switchgear (SF6))
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740B [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☐	Monitoring	☐ Testing	☒ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)			
Monitoring Device Location			
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter.			
How will data be reported?			
SECTION C. TESTING			
Reference Test Method Description			
Reference Test Method Citation			

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Maintain the following comprehensive and accurate records:

- (a) Amount of sulfur hexafluoride (SF₆) dielectric added to or removed from high voltage equipment on a monthly basis.
- (b) Record pressure gauge inspections monthly, and when density monitoring system or concentration monitor alarm sounds.
- (c) Date and time that each alarm associated with SF₆-insulated high voltage equipment is activated, the corrective action taken to remedy the problem associated with each alarm, and the date the corrective action remedied the problem.
- (d) Records of each SF₆ LDAR inspection, including:
 - (1) The date, start time, and end time of the inspection;
 - (2) The monitoring instrument used;
 - (3) The ambient temperature, sky conditions, and maximum wind speed at the time of inspection; and
 - (4) Documentation of each fugitive emission including:
 - a) The identification of each component from which fugitive emissions were detected;
 - b) The instrument reading of each fugitive emissions component;
 - c) The status of repair of each component including:
 - (i) The repair methods applied in each attempt to repair the component;
 - (ii) The tagging or digital photographing of each component not repaired during the inspection in which fugitive emissions were discovered;
 - (iii) The reasons a component was placed on delay of repair;
 - (iv) The date of successful repair of the component; and
 - (v) The information on the instrumentation or method used to resurvey the component after repair, if it was not completed during the inspection in which the fugitive emissions were discovered.

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Submit an annual report either in electronic format, by hand-delivery, courier, or sent by certified mail, return receipt requested, to the Air Program Manager of the Southwest DEP Regional Office. The reporting period specified by the owner/operator shall be no later than one year from the start of operations of the facility, unless otherwise approved by the Department. The initial and subsequent annual reports shall be submitted within 60 days of the end of the reporting periods. The report shall include: company name; facility site name; the beginning and ending dates of the reporting period; and the records of each SF₆ LDAR program inspection conducted during the reporting period.

Reporting Start Date	As specified
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SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Implement an SF6 LDAR program to minimize SF6-Insulated High Voltage Equipment leaks as follows:

- (a) SF6-insulated high voltage equipment are to be state-of-the-art enclosed pressure system equipped with low pressure alarms that are triggered when:
 - (1) 10% of the SF6 by weight has escaped from any SF6-Insulated High Voltage Equipment.
 - (2) A leak exceeds 5,000 ppm SF6.
- (b) When alarms are triggered, the operator shall take corrective action as soon as practicable to repair the SF6-insulated high voltage equipment to a like-new state to minimize emissions of SF6 to the maximum extent possible.
- (c) Each SF6-Insulated High Voltage Equipment shall be checked for leakage no less frequently than once every three months using either an OGI camera, a gas leak detector that meets the requirements of 40 CFR Part 60, Appendix A-7, Method 21, or other leak detection methods approved by the Department's Division of Source Testing and Monitoring. A leak is defined as: any positive indication, whether audible, visual, or odorous, determined during an AVO inspection; or any visible emissions detected by an OGI camera.
- (d) Any leak detected from a fugitive emission component shall be repaired by the owner or operator of the facility as expeditiously as practicable. A first attempt at repair must be attempted within five (5) calendar days of detection, and repair must be completed no later than fifteen (15) calendar days after the leak is detected.
- (e) Once a fugitive emission component has been repaired or replaced, the owner or operator must resurvey the component as soon as practicable, but no later than 30 calendar days after the leak is repaired.
 - (1) For repairs that cannot be made during the inspection when the leak is initially found, either a digital photograph must be taken of the component or the component must be tagged for identification purposes.
 - (2) A leak is considered repaired if there is no visible leak image when using an OGI camera.

Section 7 - Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new process listed in Section 3 of this application.

7.1 General Source Information

- a. Source ID: 505 b. Source Name: WWTP (Settlement and Float/Sludge Drums, DNF Units, and Steam Stripper)
- c. Plan Approval or Operating Permit Number: PA-04-00740D
- d. Manufacturer: NA e. Model Number: NA
- f. Source Description: Settlement and float/sludge drums, dissolved nitrogen flotation (DNF) units, and steam stripper used for the primary treatment of process wastewater and potentially contaminated stormwater
- g. Rated Capacity (for engines use BHP): NA h. Installation Date: 2026-2027
- i. Exhaust Temperature: NA Units j. Exhaust % Moisture: NA A NA SCFM

7.2 CAM Information

Yes No

- ☒ ☐ Emissions unit uses a control device to achieve compliance with emission limitations or standards.
- ☐ ☒ Potential precontrol emissions of applicable pollutant are at least 100 percent of major source amount.

(Addendum 3 must be completed if both are checked "Yes")

7.3 Exhaust System Components

Explain how the exhaust components are configured:

From Unit ID	Unit ID Description	To Unit ID	ID Description	Percent Flow
505	WWTP (Settlement and Float/Sludge Drums, DNF Units, and Steam Stripper)	C206	SCTO	100%
C206	SCTO	S206	Stack (SCTO)	100%

7.4 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence
Wastewater	2630010000	NA	NA

7.5 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
NA				

*FML = Fuel Material Location

7.6 Limitations on Source Operation

Complete this section if you are requesting a limitation on operational hours and/or a permit limitation on the throughput rate equal to or lower than that stated in Section 7.3 of this application.

Maximum number of hours of source operation per year: _____

Fuel/SCC	Hours/Day	Days/Week	Days/Year	Hours/Year	Max. Throughput	Units/Time
NA						

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
2630010000	Plan Approval 04-0074D [25 Pa. Code §127.12b]	The Settlement Drum, DNF Unit #1, DNF Unit #2, Float/Sludge Drum, and above-ground piping shall meet the applicable control standards in 40 CFR 61.343 through 61.347	The same limitation as the limitation associated with the citation is used for the source.
2630010000	Plan Approval 04-0074D [25 Pa. Code §127.12b]	The Steam Stripper shall meet the treatment processes control standards in 40 CFR 61.348.	The same limitation as the limitation associated with the citation is used for the source.
2630010000	Plan Approval 04-0074D [25 Pa. Code §127.12b]	During truck loading from the Settlement Drum or the Recovered Oil Storage Tank, carbon canisters shall be used to control vapors generated from the truck tank during loading.	The same limitation as the limitation associated with the citation is used for the source.
2630010000	40 CFR Part 63 Subpart YY §63.1103(e)(3), Table 7(g)(1)	Comply with the requirements of 40 CFR 63 Subpart XX for waste streams.	The same limitation as the limitation associated with the citation is used for the source.
2630010000	40 CFR Part 63 Subpart XX §63.1095(b)(2)	Comply with 40 CFR 61 Subpart FF (National Emission Standards for Benzene Waste Operations) requirements applicable to a facility with a total annual benzene quantity that is greater than or equal to 10 Mg/yr, as determined according to 40 CFR 61.342(a). Facility does not have any continuous butadiene waste streams.	The same limitation as the limitation associated with the citation is used for the source.
2630010000	40 CFR Part 61 Subpart FF §61.342(e)(1)	Manage and treat facility waste with a flow-weighted annual average water content of less than 10% in accordance with 40 CFR 61.342(c)(1).	The same limitation as the limitation associated with the citation is used for the source.
2630010000	40 CFR Part 61 Subpart FF §61.342(e)(2)	Manage and treat facility waste (including remediation and process unit turnaround waste) with a flow-weighted annual average water content => 10%, on a volume basis as total water, and each waste stream that is mixed with water or wastes at any time resulting in a mixture that has an annual water content => 10% such that the benzene quantity for the wastes is <= 6 Mg/yr (6.6 ton/yr), as determined in accordance with 40 CFR 61.355(k).	The same limitation as the limitation associated with the citation is used for the source.

7.7 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Fuel/SCC	Citation No.	Limitation associated with the citation	Limitation Used
Refer to Applicable Requirements for the Entire Site in Section 2 and Applicable Requirements for Group Nos. G05 and G06 in Section 4.2 for additional requirements that may be applicable to the source.			



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DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site	Group ID	
☐	Group of Sources	Unit ID	
☒	Single Source		505 (WWTP (Settlement and Float/Sludge Drums, DNF Units, and Steam Stripper))
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740D [25 Pa. Code §127.12b]		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒ Testing	☐ Reporting
☒	Record Keeping	☒ Work Practice Standard	
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Monitor the pressure of nitrogen once per calendar day into the primary DNF. The minimum nitrogen pressure target shall be set within 60 days of initial operation.			
Monitor the temperature of the steam stripper bottoms each operating day. The specific location of the thermocouple shall be determined within 60 days of initial operation.			
Monitor the steam stripper inlet steam-to-water ratio on an hourly average when the steam stripper is in operation.			
Monitor the temperature at the outlet of the steam stripper overhead condenser on an hourly average when the condenser is in operation.			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Sample at the settlement drum inlet and DNF #2 outlet for concentration of Total Organic Compounds (TOC) at a minimum of once per calendar week to monitor for operational efficiency of the WWTP's primary treatment system. Sample analyses shall be conducted by methods and techniques acceptable to the Department.			
Sample at the settlement drum inlet and DNF #2 outlet for concentration of Oil and Grease (O&G), as referenced in 40 CFR 401, at a minimum of once per calendar week to monitor for O&G removal efficiency of the WWTP's primary treatment system. Sample analyses shall be conducted by methods and techniques acceptable to the Department			
Reference Test Method Citation	As specified		

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Maintain the following comprehensive and accurate records at a frequency specified in the WWTP Control Plan:

- a. TOC and O&G inlet and outlet concentrations
- b. Nitrogen pressure into the primary DNF
- c. Temperature of the steam stripper bottoms
- d. Steam stripper inlet steam-to-water ratio
- e. Steam stripper overhead condenser outlet temperature

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Reporting Start Date

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Develop and submit a written WWTP Control Plan to the Department within 60 days of commencing operation of the WWTP Permanent Controls Project.

- a. The plan shall be updated periodically to account for changes in the operation of the WWTP's primary treatment system that would impact emissions, and the plan shall be re-submitted to the Department if the Owner/Operator alters the design of the WWTP's primary treatment system such that a plan approval modification is required.

Operate the WWTP's primary treatment system in accordance with the written WWTP Control Plan at all times. At a minimum, the plan shall include the following:

- a. A description of the following parameters that will be monitored to ensure the effectiveness of the WWTP's primary treatment system, and the frequency with which monitoring of these parameters will be performed: settlement drum inlet TOC concentration, DNF #2 outlet TOC concentration, DNF nitrogen pressure, steam stripper bottoms temperature, steam stripper steam-to-water ratio, and steam stripper overhead condenser outlet temperature.
- b. The operating range for each monitoring parameter identified. The specified operating range shall represent the conditions for which the WWTP's primary treatment system is being properly operated and maintained.
- c. A program of corrective action for WWTP primary treatment system equipment operating outside the specified parameter ranges.
- d. Procedures and timeline for taking identified corrective actions.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1 METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT			
Federal Tax ID	46-1624986		
Firm Name	Shell Chemical Appalachia LLC		
Plant Code	1		
Plant Name	Shell Polymers Monaca		
Applicable Requirement for: (check only one)			
☐	Entire Site		
☐	Group of Sources	Group ID	
☒	Single Source	Unit ID	505 (WWTP (Settlement and Float/Sludge Drums, DNF Units, and Steam Stripper))
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	40 CFR Part 61 Subpart FF		
Compliance Method Based Upon	☒ Applicable Requirement	☐ CAM	☐ Other
Method of Compliance Type: [check all that apply and complete all appropriate section(s)]			
☒	Monitoring	☒	Testing
☒	Record Keeping	☒	Work Practice Standard
☒		☒	Reporting
SECTION B. MONITORING			
Monitoring Device Type (stack test, CEM, etc.)	As specified		
Monitoring Device Location	As specified		
Describe all parameters being monitored along with the frequency and duration of monitoring each parameter. Equipment/operational data monitored by visual inspection/determination once initially and once every quarter thereafter to ensure that no cracks or gaps occur and that access doors and other openings are closed and gasketed properly. [40 CFR 61.343(c)].			
Equipment/operational data monitored by visual inspection/determination once initially and once every quarter thereafter to ensure that no cracks or gaps occur between the cover and oil-water separator wall and that access hatches and other openings are closed and gasketed properly. [40 CFR 61.347(b)].			
Seals and/or openings: Equipment/operational data monitored by visual inspection/determination once initially and once every quarter thereafter to ensure that no cracks or gaps occur and that openings are closed and gasketed properly. [40 CFR 61.348(e)(1)].			
Monitor the treatment process or wastewater treatment system in accordance with the applicable requirements in 40 CFR 61.354. [40 CFR 61.348(g)].			
Benzene monitored by the regulation's specified method(s) monthly. Measure the benzene concentration of the waste stream exiting the treatment process by collecting and analyzing one or more samples using the procedures specified in 40 CFR 61.355(c)(3). [40 CFR 61.354(a)(1)].			
How will data be reported?	See Section E. Reporting below.		

SECTION C. TESTING

Reference Test Method Description

Demonstrate that each treatment process or wastewater treatment system unit, except as specified in 40 CFR 61.348(d), achieves the appropriate conditions specified in 40 CFR 61.348(a) or (b) in accordance with the requirements in 40 CFR 61.348(c)(1) or (c)(2). [40 CFR 61.348(c)].

Determine compliance with 40 CFR 61 Subpart FF using the test methods and procedures specified in 40 CFR 61.355(a) through (k), as applicable. [40 CFR 61.355].

Reference Test Method Citation As specified

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.

Equipment/operational data recordkeeping by electronic or hard copy at the regulation's specified frequency. Maintain records as specified in 40 CFR 61.356(a) through (n), as applicable. Maintain each record in a readily accessible location at the facility site for a period not less than two years from the date the information is recorded unless otherwise specified. [40 CFR 61.356].

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.

Submit report: Due by the date of initial startup. Submit a certification that the equipment necessary to comply with 40 CFR 61 Subpart FF has been installed and that the required initial inspections or tests have been carried out in accordance with 40 CFR 61 Subpart FF. [40 CFR 61.357(d)(1)].

Submit report: Due quarterly, beginning three months after the date that the equipment necessary to comply with 40 CFR 61 Subpart FF has been certified in accordance with 40 CFR 61.357(d)(1). Submit a certification that all of the required inspections have been carried out in accordance with the requirements of 40 CFR 61 Subpart FF. [40 CFR 61.357(d)(6)].

Submit report: Due quarterly, beginning three months after the date that the equipment necessary to comply with 40 CFR 61 Subpart FF has been certified in accordance with 40 CFR 61.357(d)(1). Include the information specified in 40 CFR 61.357(d)(7)(i) through (d)(7)(v). [40 CFR 61.357(d)(7)].

Submit report: Due annually, beginning one year after the date that the equipment necessary to comply with 40 CFR 61 Subpart FF has been certified in accordance with 40 CFR 61.357(d)(1). Submit a report that summarizes all inspections required by 40 CFR 61.342 through 61.354 during which detectable emissions are measured or a problem that could result in benzene emissions is identified, including information about the repairs or corrective action taken. [40 CFR 61.357(d)(8)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Make first efforts at repair as soon as practicable, but not later than 45 calendar days after a broken seal or gasket or other problem is identified, or when detectable emissions are measured, except as provided in 40 CFR 61.350. [40 CFR 61.343(d)].

Make a first attempt at repair as soon as practicable, but not later than 15 calendar days after a broken seal or gasket or other problem is identified, or when detectable emissions are measured, except as specified in 40 CFR 61.350. [40 CFR 61.347(c)].

Make first efforts at repair as soon as practicable, but not later than 15 calendar days after a broken seal or gasket or other problem is identified, except as provided in 40 CFR 61.350. [40 CFR 61.348(e)(2)].

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

a. Unit ID: C031 b. Unit Name: SCR (Ethane Cracking Furnace #1)

c. Used by Sources: 031

d. Type: Selective catalytic reduction

e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA

g. Flow Rate (specify unit): 101,254 SCFM

h. Manufacturer: NA i. Model Number: NA

j. Installation Date: 9/2022

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
NOx	10102-43-9	≥90%	Vendor guarantee

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

a. Unit ID: C032 b. Unit Name: SCR (Ethane Cracking Furnace #2)

c. Used by Sources: 032

d. Type: Selective catalytic reduction

e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA

g. Flow Rate (specify unit): 101,254 SCFM

h. Manufacturer: NA i. Model Number: NA

j. Installation Date: 9/2022

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
NOx	10102-43-9	≥90%	Vendor guarantee

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

a. Unit ID: C033 b. Unit Name: SCR (Ethane Cracking Furnace #3)

c. Used by Sources: 033

d. Type: Selective catalytic reduction

e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA

g. Flow Rate (specify unit): 101,254 SCFM

h. Manufacturer: NA i. Model Number: NA

j. Installation Date: 9/2022

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
NOx	10102-43-9	≥90%	Vendor guarantee

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

a. Unit ID: C034 b. Unit Name: SCR (Ethane Cracking Furnace #4)
c. Used by Sources: 034
d. Type: Selective catalytic reduction
e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA
g. Flow Rate (specify unit): 101,254 SCFM
h. Manufacturer: NA i. Model Number: NA
j. Installation Date: 9/2022

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
NOx	10102-43-9	≥90%	Vendor guarantee

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

a. Unit ID: C035 b. Unit Name: SCR (Ethane Cracking Furnace #5)

c. Used by Sources: 035

d. Type: Selective catalytic reduction

e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA

g. Flow Rate (specify unit): 101,254 SCFM

h. Manufacturer: NA i. Model Number: NA

j. Installation Date: 9/2022

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
NOx	10102-43-9	≥90%	Vendor guarantee

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

a. Unit ID: C036 b. Unit Name: SCR (Ethane Cracking Furnace #6)

c. Used by Sources: 036

d. Type: Selective catalytic reduction

e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA

g. Flow Rate (specify unit): 101,254 ACFM

h. Manufacturer: NA i. Model Number: NA

j. Installation Date: 9/2022

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
NOx	10102-43-9	≥90%	Vendor guarantee

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

a. Unit ID: C037 b. Unit Name: SCR (Ethane Cracking Furnace #7)

c. Used by Sources: 037

d. Type: Selective catalytic reduction

e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA

g. Flow Rate (specify unit): 101,254 SCFM

h. Manufacturer: NA i. Model Number: NA

j. Installation Date: 9/2022

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
NOx	10102-43-9	≥90%	Vendor guarantee

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

a. Unit ID: C101 b. Unit Name: SCR (Unit #1)

c. Used by Sources: 101

d. Type: Selective catalytic reduction

e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA

g. Flow Rate (specify unit): 254,896 SCFM

h. Manufacturer: NA i. Model Number: NA

j. Installation Date: 3/2020

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
NO _x	10102-43-9	≥80%	Design basis

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

- a. Unit ID: C101A b. Unit Name: Oxidation Catalyst (Unit #1)
- c. Used by Sources: 101
- d. Type: Oxidation catalyst
- e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA
- g. Flow Rate (specify unit): 254,896 SCFM
- h. Manufacturer: NA i. Model Number: NA
- j. Installation Date: 3/2020

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
CO	630-08-0	≥90%	Vendor data
VOC/Organic HAP		≥30%	Vendor data

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

a. Unit ID: C102 b. Unit Name: SCR (Unit #2)

c. Used by Sources: 102

d. Type: Selective catalytic reduction

e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA

g. Flow Rate (specify unit): 254,896 SCFM

h. Manufacturer: NA i. Model Number: NA

j. Installation Date: 3/2020

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
NOx	10102-43-9	≥80%	Design basis

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

a. Unit ID: C102A b. Unit Name: Oxidation Catalyst (Unit #2)
 c. Used by Sources: 102
 d. Type: Oxidation catalyst
 e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA
 g. Flow Rate (specify unit): 254,896 SCFM
 h. Manufacturer: NA i. Model Number: NA
 j. Installation Date: 3/2020

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
CO	630-08-0	≥90%	Vendor data
VOC/Organic HAP		≥30%	Vendor data

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

a. Unit ID: C103 b. Unit Name: SCR (Unit #3)

c. Used by Sources: 103

d. Type: Selective catalytic reduction

e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA

g. Flow Rate (specify unit): 254,896 SCFM

h. Manufacturer: NA i. Model Number: NA

j. Installation Date: 3/2020

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
NOx	10102-43-9	≥80%	Design basis

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

a. Unit ID: C103A b. Unit Name: Oxidation Catalyst (Unit #3)

c. Used by Sources: 103

d. Type: Oxidation catalyst

e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA

g. Flow Rate (specify unit): 254,896 SCFM

h. Manufacturer: NA i. Model Number: NA

j. Installation Date: 3/2020

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
CO	630-08-0	≥90%	Vendor data
VOC/Organic HAP		≥30%	Vendor data

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

a. Unit ID: C104 b. Unit Name: Drift Eliminators (Cogen Cooling Tower)

c. Used by Sources: 104

d. Type: Drift eliminator

e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA

g. Flow Rate (specify unit): 4,270,896 SCFM

h. Manufacturer: NA i. Model Number: NA

j. Installation Date: 3/2020

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
PM/PM ₁₀ /PM _{2.5}		≥98%	Design basis

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

- a. Unit ID: C202 b. Unit Name: Particulate Filters (PE MFG)
- c. Used by Sources: 202
- d. Type: Particulate filter
- e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA
- g. Flow Rate (specify unit): NA
- h. Manufacturer: NA i. Model Number: NA
- j. Installation Date: 10-11/2022

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
PM/PM ₁₀ /PM _{2.5}		≥99%	Design basis

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

- a. Unit ID: C203 b. Unit Name: Drift Eliminators (Process Cooling Tower)
- c. Used by Sources: 203
- d. Type: Drift eliminator
- e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA
- g. Flow Rate (specify unit): 21,261,958 SCFM
- h. Manufacturer: NA i. Model Number: NA
- j. Installation Date: 9/2022

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
PM/PM ₁₀ /PM _{2.5}		≥98%	Design basis

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

- a. Unit ID: C204 b. Unit Name: CVTO
- c. Used by Sources: 202, 303, 403, 404, and 407
- d. Type: Thermal oxidizer
- e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA
- g. Flow Rate (specify unit): NA
- h. Manufacturer: John Zink i. Model Number: NA
- j. Installation Date: 09/2022

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
VOC/Organic HAP		≥99.9%	Design basis

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

- a. Unit ID: C205A b. Unit Name: TEGF A
- c. Used by Sources: 201, 202, 304, 405, and 409
- d. Type: Enclosed pressure-assisted multi-point ground flare
- e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA
- g. Flow Rate (specify unit): NA
- h. Manufacturer: Zeeco i. Model Number: NA
- j. Installation Date: 09/2022

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
VOC/Organic HAP		≥98%	Design basis

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

- a. Unit ID: C205B b. Unit Name: TEGF B
- c. Used by Sources: 201, 202, 304, 405, and 409
- d. Type: Enclosed pressure-assisted multi-point ground flare
- e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA
- g. Flow Rate (specify unit): NA
- h. Manufacturer: Zeeco i. Model Number: NA
- j. Installation Date: 09/2022

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
VOC/Organic HAP		≥98%	Design basis

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

- a. Unit ID: C205C b. Unit Name: HP Elevated Flare
- c. Used by Sources: 201, 202, 205, 405, and 409
- d. Type: Steam-assisted elevated flare
- e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA
- g. Flow Rate (specify unit): NA
- h. Manufacturer: Zeeco i. Model Number: NA
- j. Installation Date: 09/2022

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
VOC/Organic HAP		≥98%	Design basis

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

- a. Unit ID: C206 b. Unit Name: SCTO
- c. Used by Sources: 201, 401, 402, and 505
- d. Type: Thermal oxidizer
- e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA
- g. Flow Rate (specify unit): NA
- h. Manufacturer: John Zink i. Model Number: ST12160
- j. Installation Date: 03/2020

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
VOC/Organic HAP		≥99.9%	Design basis

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

- a. Unit ID: C207 b. Unit Name: MPGF CVTO Trip
- c. Used by Sources: 207
- d. Type: Perimeter air-assisted multi-point ground flare
- e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA
- g. Flow Rate (specify unit): NA
- h. Manufacturer: Zeeco i. Model Number: AFTA-8/18
- j. Installation Date: 09/2022

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
VOC/Organic HAP		≥98%	Design basis

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

- a. Unit ID: C208 b. Unit Name: MPGF Ethylene Tank
- c. Used by Sources: 410
- d. Type: Perimeter air-assisted multi-point ground flare
- e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA
- g. Flow Rate (specify unit): NA
- h. Manufacturer: Zeeco i. Model Number: AFDS-6/24
- j. Installation Date: 09/2022

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
VOC/Organic HAP		≥98%	Design basis

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

- a. Unit ID: C209 b. Unit Name: MPGF PE Units 1/2 Episodic Vent
- c. Used by Sources: 202
- d. Type: Perimeter air-assisted multi-point ground flare
- e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA
- g. Flow Rate (specify unit): NA
- h. Manufacturer: Zeeco i. Model Number: AFDS-6/24
- j. Installation Date: 09/2022

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
VOC/Organic HAP		≥98%	Design basis

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

- a. Unit ID: C301

- b. Unit Name: Fabric Filters (PE Pellet Storage/Handling/Loadout)

- c. Used by Sources: 301

- d. Type: Fabric filter

- e. Pressure Drop (in. H₂O): NA

- f. Capture Efficiency: NA

- g. Flow Rate (specify unit): NA

- h. Manufacturer: NA

- i. Model Number: NA

- j. Installation Date: 10/2022

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
PM/PM ₁₀ /PM _{2.5}		≥99%	Design basis

Section 8 - Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

a. Unit ID: C302 b. Unit Name: Carbon Canisters (Recovered Oil Loading)
c. Used by Sources: 302
d. Type: Carbon adsorption
e. Pressure Drop (in. H₂O): NA f. Capture Efficiency: NA
g. Flow Rate (specify unit): NA
h. Manufacturer: NA i. Model Number: NA
j. Installation Date: TBD

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS No.	Control Efficiency	Basis for Efficiency Estimate
VOC		≥95%	Design basis

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S031 b. Unit Name: Stack (Ethane Cracking Furnace #1)

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 8.5 Height (ft): 275 Base Elevation (ft): 795

e. Exhaust Temperature: 253.6 °F Exhaust % Moisture: NA Exhaust Velocity: 40.2 ft/s

f. Exhaust Volume: 136,869 ACFM Exhaust Volume: 101,254 SCFM

g. Distance to Nearest Property Line (ft): ~220 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 031

j. Latitude: 40.6688 Longitude: -80.3433

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S032 b. Unit Name: Stack (Ethane Cracking Furnace #2)

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 8.5 Height (ft): 275 Base Elevation (ft): 795

e. Exhaust Temperature: 253.6 °F Exhaust % Moisture: NA Exhaust Velocity: 40.2 ft/s

f. Exhaust Volume: 136,869 ACFM Exhaust Volume: 101,254 SCFM

g. Distance to Nearest Property Line (ft): ~270 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 032

j. Latitude: 40.6687 Longitude: -80.3432

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S033 b. Unit Name: Stack (Ethane Cracking Furnace #3)

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 8.5 Height (ft): 275 Base Elevation (ft): 795

e. Exhaust Temperature: 253.6 °F Exhaust % Moisture: NA Exhaust Velocity: 40.2 ft/s

f. Exhaust Volume: 136,869 ACFM Exhaust Volume: 101,254 SCFM

g. Distance to Nearest Property Line (ft): ~385 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 033

j. Latitude: 40.6684 Longitude: -80.3430

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S034 b. Unit Name: Stack (Ethane Cracking Furnace #4)

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 8.5 Height (ft): 275 Base Elevation (ft): 795

e. Exhaust Temperature: 253.6 °F Exhaust % Moisture: NA Exhaust Velocity: 40.2 ft/s

f. Exhaust Volume: 136,869 ACFM Exhaust Volume: 101,254 SCFM

g. Distance to Nearest Property Line (ft): ~440 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 034

j. Latitude: 40.6683 Longitude: -80.3428

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S035 b. Unit Name: Stack (Ethane Cracking Furnace #5)

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 8.5 Height (ft): 275 Base Elevation (ft): 795

e. Exhaust Temperature: 253.6 °F Exhaust % Moisture: NA Exhaust Velocity: 40.2 ft/s

f. Exhaust Volume: 136,869 ACFM Exhaust Volume: 101,254 SCFM

g. Distance to Nearest Property Line (ft): ~515 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 035

j. Latitude: 40.6682 Longitude: -80.3426

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S036 b. Unit Name: Stack (Ethane Cracking Furnace #6)

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 8.5 Height (ft): 275 Base Elevation (ft): 795

e. Exhaust Temperature: 253.6 °F Exhaust % Moisture: NA Exhaust Velocity: 40.2 ft/s

f. Exhaust Volume: 136,869 ACFM Exhaust Volume: 101,254 SCFM

g. Distance to Nearest Property Line (ft): ~570 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 036

j. Latitude: 40.6681 Longitude: -80.3425

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S037 b. Unit Name: Stack (Ethane Cracking Furnace #7)

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 8.5 Height (ft): 275 Base Elevation (ft): 795

e. Exhaust Temperature: 253.6 °F Exhaust % Moisture: NA Exhaust Velocity: 40.2 ft/s

f. Exhaust Volume: 136,869 ACFM Exhaust Volume: 101,254 SCFM

g. Distance to Nearest Property Line (ft): ~655 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 037

j. Latitude: 40.6679 Longitude: -80.3423

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S101 b. Unit Name: Stack (Unit #1)

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 10 Height (ft): 213 Base Elevation (ft): 795

e. Exhaust Temperature: 311 °F Exhaust % Moisture: NA Exhaust Velocity: 79 ft/s

f. Exhaust Volume: 372,279 ACFM Exhaust Volume: 254,896 SCFM

g. Distance to Nearest Property Line (ft): ~730 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 101

j. Latitude: 40.6675 Longitude: -80.3381

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S102 b. Unit Name: Stack (Unit #2)

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 10 Height (ft): 213 Base Elevation (ft): 795

e. Exhaust Temperature: 311 °F Exhaust % Moisture: NA Exhaust Velocity: 79 ft/s

f. Exhaust Volume: 372,279 ACFM Exhaust Volume: 254,896 SCFM

g. Distance to Nearest Property Line (ft): ~728 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 102

j. Latitude: 40.6679 Longitude: -80.3376

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S103 b. Unit Name: Stack (Unit #3)

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 10 Height (ft): 213 Base Elevation (ft): 795

e. Exhaust Temperature: 311 °F Exhaust % Moisture: NA Exhaust Velocity: 79 ft/s

f. Exhaust Volume: 372,279 ACFM Exhaust Volume: 254,896 SCFM

g. Distance to Nearest Property Line (ft): ~728 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 103

j. Latitude: 40.6682 Longitude: -80.3370

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S105 (GEN1) b. Unit Name: Stacks (Diesel-Fired Emergency Generator Engines);
Generator 1 - Parking Garage Stack

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 0.25 Height (ft): 5 Base Elevation (ft): 850

e. Exhaust Temperature: 778 °F Exhaust % Moisture: NA Exhaust Velocity: 225.8 ft/s

f. Exhaust Volume: 665 ACFM Exhaust Volume: 284 SCFM

g. Distance to Nearest Property Line (ft): ~236 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 105 (GEN1)

j. Latitude: 40.6649 Longitude: -80.3348

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S105 (GEN2) b. Unit Name: Stacks (Diesel-Fired Emergency Generator Engines);
Generator 2 - Telecom Hut Stack

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 0.21 Height (ft): 6 Base Elevation (ft): 850

e. Exhaust Temperature: 914 °F Exhaust % Moisture: NA Exhaust Velocity: 139.8 ft/s

f. Exhaust Volume: 286 ACFM Exhaust Volume: 110 SCFM

g. Distance to Nearest Property Line (ft): ~76 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 105 (GEN2)

j. Latitude: 40.6645 Longitude: -80.3342

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S106 (FWP1) b. Unit Name: Stacks (Fire Pump Engines); Firewater Pump 1 Stack

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 1 Height (ft): 32.7 Base Elevation (ft): 850

e. Exhaust Temperature: 787 °F Exhaust % Moisture: NA Exhaust Velocity: 121 ft/s

f. Exhaust Volume: 5,702 ACFM Exhaust Volume: 2,413 SCFM

g. Distance to Nearest Property Line (ft): ~125 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 106 (FWP1)

j. Latitude: 40.6644 Longitude: -80.3360

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S106 (FWP2) b. Unit Name: Stacks (Fire Pump Engines); Firewater Pump 2 Stack

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 1 Height (ft): 32.7 Base Elevation (ft): 850

e. Exhaust Temperature: 787 °F Exhaust % Moisture: NA Exhaust Velocity: 121 ft/s

f. Exhaust Volume: 5,702 ACFM Exhaust Volume: 2,413 SCFM

g. Distance to Nearest Property Line (ft): ~126 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 106 (FWP2)

j. Latitude: 40.6643 Longitude: -80.3361

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S107 (GEN3) b. Unit Name: Stacks (Nat Gas-Fired Emergency Generator Engines); Generator 3 - Lift Station Stack

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 0.3 Height (ft): 6 Base Elevation (ft): 795

e. Exhaust Temperature: 1,250 °F Exhaust % Moisture: NA Exhaust Velocity: 297.4 ft/s

f. Exhaust Volume: 1,261 ACFM Exhaust Volume: 389 SCFM

g. Distance to Nearest Property Line (ft): ~330 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 107 (GEN3)

j. Latitude: 40.6679 Longitude: -80.3353

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S107 (GEN4) b. Unit Name: Stacks (Nat Gas-Fired Emergency Generator Engines); Generator 4 - Lift Station Stack

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 0.21 Height (ft): 6 Base Elevation (ft): 795

e. Exhaust Temperature: 1,270 °F Exhaust % Moisture: NA Exhaust Velocity: 122.2 ft/s

f. Exhaust Volume: 250 ACFM Exhaust Volume: 76 SCFM

g. Distance to Nearest Property Line (ft): ~645 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 107 (GEN4)

j. Latitude: 40.6673 Longitude: -80.3386

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S202 b. Unit Name: Stacks (PE MFG Particulate Filters); Catalyst Vent Filter 1 Stack

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 1.33 Height (ft): 150 Base Elevation (ft): 795

e. Exhaust Temperature: 392 °F Exhaust % Moisture: NA Exhaust Velocity: 35 ft/s

f. Exhaust Volume: 2,932 ACFM Exhaust Volume: 1,817 SCFM

g. Distance to Nearest Property Line (ft): ~1,045 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 202

j. Latitude: 40.6714 Longitude: -80.3339

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S202 b. Unit Name: Stacks (PE MFG Particulate Filters); Catalyst Vent Filter 2 Stack

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 1.33 Height (ft): 150 Base Elevation (ft): 795

e. Exhaust Temperature: 392 °F Exhaust % Moisture: NA Exhaust Velocity: 35 ft/s

f. Exhaust Volume: 2,932 ACFM Exhaust Volume: 1,817 SCFM

g. Distance to Nearest Property Line (ft): ~1,045 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 202

j. Latitude: 40.6714 Longitude: -80.3340

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S202 b. Unit Name: Stacks (PE MFG Particulate Filters); Catalyst Activator A Filter (External) Stack

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 0.67 Height (ft): 78.3 Base Elevation (ft): 795

e. Exhaust Temperature: 392 °F Exhaust % Moisture: NA Exhaust Velocity: 23.6 ft/s

f. Exhaust Volume: 495 ACFM Exhaust Volume: 307 SCFM

g. Distance to Nearest Property Line (ft): ~990 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 202

j. Latitude: 40.6701 Longitude: -80.3356

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S202 b. Unit Name: Stacks (PE MFG Particulate Filters); Catalyst Activator B Filter (External) Stack

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 0.67 Height (ft): 78.3 Base Elevation (ft): 795

e. Exhaust Temperature: 392 °F Exhaust % Moisture: NA Exhaust Velocity: 23.6 ft/s

f. Exhaust Volume: 495 ACFM Exhaust Volume: 307 SCFM

g. Distance to Nearest Property Line (ft): ~960 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 202

j. Latitude: 40.6700 Longitude: -80.3356

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S202 b. Unit Name: Stacks (PE MFG Particulate Filters); Additive Unloading Station A Filter Stack

c. Discharge Type: Horizontal unobstructed

d. Diameter (ft): 0.5 Height (ft): 115 Base Elevation (ft): 795

e. Exhaust Temperature: 59 °F Exhaust % Moisture: NA Exhaust Velocity: 36.9 ft/s

f. Exhaust Volume: 435 ACFM Exhaust Volume: 442 SCFM

g. Distance to Nearest Property Line (ft): ~880 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 202

j. Latitude: 40.6699 Longitude: -80.3353

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S202 b. Unit Name: Stacks (PE MFG Particulate Filters); Additive Unloading Station B Filter Stack

c. Discharge Type: Horizontal unobstructed

d. Diameter (ft): 0.5 Height (ft): 115 Base Elevation (ft): 795

e. Exhaust Temperature: 59 °F Exhaust % Moisture: NA Exhaust Velocity: 36.9 ft/s

f. Exhaust Volume: 435 ACFM Exhaust Volume: 442 SCFM

g. Distance to Nearest Property Line (ft): ~880 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 202

j. Latitude: 40.6699 Longitude: -80.3353

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S202 b. Unit Name: Stacks (PE MFG Particulate Filters); Additive Unloading Station C Filter Stack

c. Discharge Type: Horizontal unobstructed

d. Diameter (ft): 0.5 Height (ft): 115 Base Elevation (ft): 795

e. Exhaust Temperature: 59 °F Exhaust % Moisture: NA Exhaust Velocity: 36.9 ft/s

f. Exhaust Volume: 435 ACFM Exhaust Volume: 442 SCFM

g. Distance to Nearest Property Line (ft): ~880 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 202

j. Latitude: 40.6699 Longitude: -80.3353

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S202 b. Unit Name: Stacks (PE MFG Particulate Filters); Additive Unloading Station D Filter Stack

c. Discharge Type: Horizontal unobstructed

d. Diameter (ft): 0.5 Height (ft): 115 Base Elevation (ft): 795

e. Exhaust Temperature: 59 °F Exhaust % Moisture: NA Exhaust Velocity: 36.9 ft/s

f. Exhaust Volume: 435 ACFM Exhaust Volume: 442 SCFM

g. Distance to Nearest Property Line (ft): ~880 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 202

j. Latitude: 40.6699 Longitude: -80.3353

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S202
b. Unit Name: Stacks (PE MFG Particulate Filters); FIBC Compactor Filter Stack

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 0.5 Height (ft): 117.5 Base Elevation (ft): 795

e. Exhaust Temperature: 59 °F Exhaust % Moisture: NA Exhaust Velocity: 105.5 ft/s

f. Exhaust Volume: 1,243 ACFM Exhaust Volume: 1,264 SCFM

g. Distance to Nearest Property Line (ft): ~835 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 202

j. Latitude: 40.6697 Longitude: -80.3353

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S202
b. Unit Name: Stacks (PE MFG Particulate Filters); Additive Feeder A Filter Stack

c. Discharge Type: Horizontal unobstructed

d. Diameter (ft): 0.5 Height (ft): 57.5 Base Elevation (ft): 795

e. Exhaust Temperature: 59 °F Exhaust % Moisture: NA Exhaust Velocity: 4 ft/s

f. Exhaust Volume: 47 ACFM Exhaust Volume: 47 SCFM

g. Distance to Nearest Property Line (ft): ~855 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 202

j. Latitude: 40.6699 Longitude: -80.3352

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S202 b. Unit Name: Stacks (PE MFG Particulate Filters); Additive Feeder B Filter Stack

c. Discharge Type: Horizontal unobstructed

d. Diameter (ft): 0.5 Height (ft): 57.5 Base Elevation (ft): 795

e. Exhaust Temperature: 59 °F Exhaust % Moisture: NA Exhaust Velocity: 4 ft/s

f. Exhaust Volume: 47 ACFM Exhaust Volume: 47 SCFM

g. Distance to Nearest Property Line (ft): ~855 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 202

j. Latitude: 40.6699 Longitude: -80.3352

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S202 b. Unit Name: Stacks (PE MFG Particulate Filters); Additive Feeder C Filter Stack

c. Discharge Type: Horizontal unobstructed

d. Diameter (ft): 0.5 Height (ft): 57.5 Base Elevation (ft): 795

e. Exhaust Temperature: 59 °F Exhaust % Moisture: NA Exhaust Velocity: 4 ft/s

f. Exhaust Volume: 47 ACFM Exhaust Volume: 47 SCFM

g. Distance to Nearest Property Line (ft): ~855 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 202

j. Latitude: 40.6699 Longitude: -80.3352

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S202 b. Unit Name: Stacks (PE MFG Particulate Filters); Additive Feeder D Filter Stack

c. Discharge Type: Horizontal unobstructed

d. Diameter (ft): 0.5 Height (ft): 57.5 Base Elevation (ft): 795

e. Exhaust Temperature: 59 °F Exhaust % Moisture: NA Exhaust Velocity: 4 ft/s

f. Exhaust Volume: 47 ACFM Exhaust Volume: 47 SCFM

g. Distance to Nearest Property Line (ft): ~855 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 202

j. Latitude: 40.6699 Longitude: -80.3352

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S202 b. Unit Name: Stacks (PE MFG Particulate Filters); Extruder Filter Stack

c. Discharge Type: Horizontal unobstructed

d. Diameter (ft): 0.33 Height (ft): 84 Base Elevation (ft): 795

e. Exhaust Temperature: 59 °F Exhaust % Moisture: NA Exhaust Velocity: 109.2 ft/s

f. Exhaust Volume: 572 ACFM Exhaust Volume: 581 SCFM

g. Distance to Nearest Property Line (ft): ~855 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 202

j. Latitude: 40.6699 Longitude: -80.3351

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S202 b. Unit Name: Stacks (PE MFG Particulate Filters); Pellet Dryer Vent Stack

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 2.5 Height (ft): 140 Base Elevation (ft): 795

e. Exhaust Temperature: 176 °F Exhaust % Moisture: NA Exhaust Velocity: 63.9 ft/s

f. Exhaust Volume: 18,807 ACFM Exhaust Volume: 15,612 SCFM

g. Distance to Nearest Property Line (ft): ~810 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 202

j. Latitude: 40.6697 Longitude: -80.3352

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S202 b. Unit Name: Stacks (PE MFG Particulate Filters); Vacuum Cleaning System Filter Stack

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 0.33 Height (ft): 78 Base Elevation (ft): 795

e. Exhaust Temperature: 59 °F Exhaust % Moisture: NA Exhaust Velocity: 80.4 ft/s

f. Exhaust Volume: 421 ACFM Exhaust Volume: 429 SCFM

g. Distance to Nearest Property Line (ft): ~780 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 202

j. Latitude: 40.6698 Longitude: -80.3349

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S202 b. Unit Name: Stacks (PE MFG Particulate Filters); PE Unit 1 Filter Stacks

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): NA Height (ft): 45 Base Elevation (ft): 795

e. Exhaust Temperature: NA Exhaust % Moisture: NA Exhaust Velocity: NA

f. Exhaust Volume: NA ACFM Exhaust Volume: NA SCFM

g. Distance to Nearest Property Line (ft): ~750 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 202

j. Latitude: 40.6714 Longitude: -80.3327

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: PUNIT

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S202 b. Unit Name: Stacks (PE MFG Particulate Filters); PE Unit 2 Filter Stacks

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): NA Height (ft): 45 Base Elevation (ft): 795

e. Exhaust Temperature: NA Exhaust % Moisture: NA Exhaust Velocity: NA

f. Exhaust Volume: NA ACFM Exhaust Volume: NA SCFM

g. Distance to Nearest Property Line (ft): ~1,065 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 202

j. Latitude: 40.6714 Longitude: -80.3340

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: PUNIT

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S202 b. Unit Name: Stacks (PE MFG Particulate Filters); Railcar to Truck Talc Transfer Filter Stack

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 0.58 Height (ft): 12 Base Elevation (ft): 795

e. Exhaust Temperature: Ambient Exhaust % Moisture: NA Exhaust Velocity: 0.03 ft/s

f. Exhaust Volume: 0.5 ACFM Exhaust Volume: 0.5 SCFM

g. Distance to Nearest Property Line (ft): ~360 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 202

j. Latitude: 40.6720 Longitude: -80.3310

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S204 b. Unit Name: Stack (CVTO)

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 4.5 Height (ft): 250 Base Elevation (ft): 795

e. Exhaust Temperature: 1,600 °F Exhaust % Moisture: NA Exhaust Velocity: 186.2 ft/s

f. Exhaust Volume: 177,696 ACFM Exhaust Volume: 45,524 SCFM

g. Distance to Nearest Property Line (ft): ~398 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: C204

j. Latitude: 40.6725 Longitude: -80.3366

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRST

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S205A b. Unit Name: Stack (TEGF A)

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): NA Height (ft): NA Base Elevation (ft): 780

e. Exhaust Temperature: NA Exhaust % Moisture: NA Exhaust Velocity: NA

f. Exhaust Volume: NA ACFM Exhaust Volume: NA SCFM

g. Distance to Nearest Property Line (ft): ~545 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: C205A

j. Latitude: 40.6671 Longitude: -80.3437

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: ATETU

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S205B b. Unit Name: Stack (TEGF B)

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): NA Height (ft): NA Base Elevation (ft): 780

e. Exhaust Temperature: NA Exhaust % Moisture: NA Exhaust Velocity: NA

f. Exhaust Volume: NA ACFM Exhaust Volume: NA SCFM

g. Distance to Nearest Property Line (ft): ~305 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: C205B

j. Latitude: 40.6678 Longitude: -80.3443

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: ATETU

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S205C b. Unit Name: Stack (HP Elevated Flare)

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): NA Height (ft): NA Base Elevation (ft): 780

e. Exhaust Temperature: NA Exhaust % Moisture: NA Exhaust Velocity: NA

f. Exhaust Volume: NA ACFM Exhaust Volume: NA SCFM

g. Distance to Nearest Property Line (ft): ~423 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: C205C

j. Latitude: 40.6671 Longitude: -80.3447

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: ATETU

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S206 b. Unit Name: Stack (SCTO)

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 2.0 Height (ft): 200 Base Elevation (ft): 714

e. Exhaust Temperature: 1,600 °F Exhaust % Moisture: NA Exhaust Velocity: 45 ft/s

f. Exhaust Volume: 8,481 ACFM Exhaust Volume: 2,173 SCFM

g. Distance to Nearest Property Line (ft): ~68 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: C206

j. Latitude: 40.6677 Longitude: -80.3463

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: ATETU

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S207 b. Unit Name: Stack (MPGF CVTO Trip)

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): NA Height (ft): NA Base Elevation (ft): 795

e. Exhaust Temperature: NA Exhaust % Moisture: NA Exhaust Velocity: NA

f. Exhaust Volume: NA ACFM Exhaust Volume: NA SCFM

g. Distance to Nearest Property Line (ft): ~190 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: C207

j. Latitude: 40.6730 Longitude: -80.3364

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: ATETU

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S208 b. Unit Name: Stack (MPGF Ethylene Tank)

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): NA Height (ft): NA Base Elevation (ft): 795

e. Exhaust Temperature: NA Exhaust % Moisture: NA Exhaust Velocity: NA

f. Exhaust Volume: NA ACFM Exhaust Volume: NA SCFM

g. Distance to Nearest Property Line (ft): ~190 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: C208

j. Latitude: 40.6730 Longitude: -80.3364

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: ATETU

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S209 b. Unit Name: Stack (MPGF PE Units 1/2 Episodic Vent)

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): NA Height (ft): NA Base Elevation (ft): 795

e. Exhaust Temperature: NA Exhaust % Moisture: NA Exhaust Velocity: NA

f. Exhaust Volume: NA ACFM Exhaust Volume: NA SCFM

g. Distance to Nearest Property Line (ft): ~190 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: C209

j. Latitude: 40.6730 Longitude: -80.3364

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: ATETU

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S301 b. Unit Name: Stacks (PE Pellet Fabric Filters); PE Blending Silos Filter Stack

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): NA Height (ft): 141 Base Elevation (ft): 795

e. Exhaust Temperature: NA Exhaust % Moisture: NA Exhaust Velocity: NA

f. Exhaust Volume: NA ACFM Exhaust Volume: NA SCFM

g. Distance to Nearest Property Line (ft): ~710 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 301

j. Latitude: 40.6701 Longitude: -80.3340

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: PUNIT

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S301 b. Unit Name: Stacks (PE Pellet Fabric Filters); PE Railcar Loading Storage Silos Filter Stack

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): NA Height (ft): 187 Base Elevation (ft): 795

e. Exhaust Temperature: NA Exhaust % Moisture: NA Exhaust Velocity: NA

f. Exhaust Volume: NA ACFM Exhaust Volume: NA SCFM

g. Distance to Nearest Property Line (ft): ~490 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 301

j. Latitude: 40.6701 Longitude: -80.3328

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: PUNIT

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: S301 b. Unit Name: Stacks (PE Pellet Fabric Filters); PE Truck Loading Storage Silos Filter Stack

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): NA Height (ft): 151 Base Elevation (ft): 850

e. Exhaust Temperature: NA Exhaust % Moisture: NA Exhaust Velocity: NA

f. Exhaust Volume: NA ACFM Exhaust Volume: NA SCFM

g. Distance to Nearest Property Line (ft): ~508 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 301

j. Latitude: 40.6683 Longitude: -80.3307

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: PUNIT

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S302 b. Unit Name: Stacks (Carbon Canisters)

c. Discharge Type: TBD

d. Diameter (ft): NA Height (ft): TBD Base Elevation (ft): 715

e. Exhaust Temperature: NA Exhaust % Moisture: NA Exhaust Velocity: NA

f. Exhaust Volume: NA ACFM Exhaust Volume: NA SCFM

g. Distance to Nearest Property Line (ft): ~320 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 302

j. Latitude: 40.6669 Longitude: -80.346

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: PUNIT

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: Z104 b. Unit Name: Fugitive Emissions (Cogen Cooling Tower); Cell 1 of 6

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 37.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 21.3 ft/s

f. Exhaust Volume: 1,431,726 ACFM Exhaust Volume: 1,423,632 SCFM

g. Distance to Nearest Property Line (ft): ~180 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 104

j. Latitude: 40.6725 Longitude: -80.3379

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: Z104 b. Unit Name: Fugitive Emissions (Cogen Cooling Tower); Cell 2 of 6

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 37.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 21.3 ft/s

f. Exhaust Volume: 1,431,726 ACFM Exhaust Volume: 1,423,632 SCFM

g. Distance to Nearest Property Line (ft): ~230 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 104

j. Latitude: 40.6724 Longitude: -80.3378

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: Z104 b. Unit Name: Fugitive Emissions (Cogen Cooling Tower); Cell 3 of 6

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 37.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 21.3 ft/s

f. Exhaust Volume: 1,431,726 ACFM Exhaust Volume: 1,423,632 SCFM

g. Distance to Nearest Property Line (ft): ~180 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 104

j. Latitude: 40.6726 Longitude: -80.3378

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: Z104 b. Unit Name: Fugitive Emissions (Cogen Cooling Tower); Cell 4 of 6

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 37.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 21.3 ft/s

f. Exhaust Volume: 1,431,726 ACFM Exhaust Volume: 1,423,632 SCFM

g. Distance to Nearest Property Line (ft): ~230 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 104

j. Latitude: 40.6725 Longitude: -80.3377

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: Z104 b. Unit Name: Fugitive Emissions (Cogen Cooling Tower); Cell 5 of 6

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 37.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 21.3 ft/s

f. Exhaust Volume: 1,431,726 ACFM Exhaust Volume: 1,423,632 SCFM

g. Distance to Nearest Property Line (ft): ~180 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 104

j. Latitude: 40.6727 Longitude: -80.3376

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: Z104 b. Unit Name: Fugitive Emissions (Cogen Cooling Tower); Cell 6 of 6

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 37.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 21.3 ft/s

f. Exhaust Volume: 1,431,726 ACFM Exhaust Volume: 1,423,632 SCFM

g. Distance to Nearest Property Line (ft): ~230 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 104

j. Latitude: 40.6726 Longitude: -80.3375

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 1 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~180 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6712 Longitude: -80.3399

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 2 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~230 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6711 Longitude: -80.3398

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 3 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~180 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6713 Longitude: -80.3398

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 4 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~230 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6712 Longitude: -80.3396

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 5 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~180 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6714 Longitude: -80.3396

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 6 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~230 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6713 Longitude: -80.3395

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 7 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~180 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6715 Longitude: -80.3395

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 8 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~230 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6714 Longitude: -80.3393

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 9 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~180 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6716 Longitude: -80.3393

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 10 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~230 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6715 Longitude: -80.3392

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 11 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~180 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6717 Longitude: -80.3392

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 12 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~230 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6716 Longitude: -80.339

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 13 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~180 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6718 Longitude: -80.339

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 14 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~230 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6717 Longitude: -80.3389

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 15 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~180 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6719 Longitude: -80.3389

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 16 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~230 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6718 Longitude: -80.3387

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 17 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~180 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.672 Longitude: -80.3387

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 18 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~230 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6719 Longitude: -80.3386

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 19 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~180 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6721 Longitude: -80.3386

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 20 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~230 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.672 Longitude: -80.3384

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 21 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~180 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6722 Longitude: -80.3384

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 22 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~230 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6721 Longitude: -80.3383

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 23 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~180 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6723 Longitude: -80.3382

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 24 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~230 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6722 Longitude: -80.3381

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 25 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~180 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6724 Longitude: -80.3381

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: Z203 b. Unit Name: Fugitive Emissions (Process Cooling Tower); Cell 26 of 26

c. Discharge Type: Vertical unobstructed

d. Diameter (ft): 36.74 Height (ft): 71 Base Elevation (ft): 795

e. Exhaust Temperature: 71 °F Exhaust % Moisture: NA Exhaust Velocity: 25.9 ft/s

f. Exhaust Volume: 1,644,834 ACFM Exhaust Volume: 1,635,535 SCFM

g. Distance to Nearest Property Line (ft): ~230 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 203

j. Latitude: 40.6723 Longitude: -80.338

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: AIRVT

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: Z302 b. Unit Name: Fugitive Emissions (Liquid Loadout); Recovered Oil

c. Discharge Type: Fugitive

d. Diameter (ft): NA Height (ft): 12 Base Elevation (ft): 715

e. Exhaust Temperature: NA Exhaust % Moisture: NA Exhaust Velocity: NA

f. Exhaust Volume: NA ACFM Exhaust Volume: NA SCFM

g. Distance to Nearest Property Line (ft): ~320 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 302

j. Latitude: 40.6669 Longitude: -80.346

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: PUNIT

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: Z406 b. Unit Name: Fugitive Emissions (Diesel Fuel Tanks > 150 Gallons)

c. Discharge Type: Fugitive

d. Diameter (ft): NA Height (ft): NA Base Elevation (ft): 795

e. Exhaust Temperature: NA Exhaust % Moisture: NA Exhaust Velocity: NA

f. Exhaust Volume: NA ACFM Exhaust Volume: NA SCFM

g. Distance to Nearest Property Line (ft): ~185 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 406

j. Latitude: 40.6645 Longitude: -80.3361

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: STANK

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: Z408 b. Unit Name: Fugitive Emissions (Diesel Fuel Tanks < 150 Gallons)

c. Discharge Type: Fugitive

d. Diameter (ft): NA Height (ft): NA Base Elevation (ft): 795

e. Exhaust Temperature: NA Exhaust % Moisture: NA Exhaust Velocity: NA

f. Exhaust Volume: NA ACFM Exhaust Volume: NA SCFM

g. Distance to Nearest Property Line (ft): ~185 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 408

j. Latitude: 40.6645 Longitude: -80.3361

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: STANK

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: Z501 b. Unit Name: Fugitive Emissions (Component Leaks)

c. Discharge Type: Fugitive

d. Diameter (ft): NA Height (ft): NA Base Elevation (ft): 795

e. Exhaust Temperature: NA Exhaust % Moisture: NA Exhaust Velocity: NA

f. Exhaust Volume: NA ACFM Exhaust Volume: NA SCFM

g. Distance to Nearest Property Line (ft): ~50 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 501

j. Latitude: 40.6696 Longitude: -80.3369

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: CNTER

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: Z502 b. Unit Name: Fugitive Emissions (WWTP)

c. Discharge Type: Fugitive

d. Diameter (ft): NA Height (ft): NA Base Elevation (ft): 715

e. Exhaust Temperature: NA Exhaust % Moisture: NA Exhaust Velocity: NA

f. Exhaust Volume: NA ACFM Exhaust Volume: NA SCFM

g. Distance to Nearest Property Line (ft): ~240 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 502

j. Latitude: 40.6662 Longitude: -80.3461

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: PUNIT

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 9 - Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: Z503 b. Unit Name: Fugitive Emissions (Plant Roadways)

c. Discharge Type: Fugitive

d. Diameter (ft): NA Height (ft): NA Base Elevation (ft): 795

e. Exhaust Temperature: NA Exhaust % Moisture: NA Exhaust Velocity: NA

f. Exhaust Volume: NA ACFM Exhaust Volume: NA SCFM

g. Distance to Nearest Property Line (ft): ~50 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 503

j. Latitude: 40.6696 Longitude: -80.3369

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: CENTER

k. Does the stack have a bypass? ☐ Yes ☒ No

a. Unit ID: Z504 b. Unit Name: Fugitive Emissions (Gas Insulated Switchgear)

c. Discharge Type: Fugitive

d. Diameter (ft): NA Height (ft): NA Base Elevation (ft): NA

e. Exhaust Temperature: NA Exhaust % Moisture: NA Exhaust Velocity: NA

f. Exhaust Volume: NA ACFM Exhaust Volume: NA SCFM

g. Distance to Nearest Property Line (ft): ~300 h. Weather Cap?: ☐ Yes ☒ No

i. Used by Units: 504

j. Latitude: 40.6696 Longitude: -80.3369

Horizontal Reference Datum: NAD83 Horizontal Collection Method: GISDAR Reference Point: CENTER

k. Does the stack have a bypass? ☐ Yes ☒ No

Section 10 - Fuel Material Location (FML) Information

For renewals, review and correct any pre-printed information and add additional sections for any new FML listed in Section 3 of this application.

10.1 Fuel Material Location Information

a. FML ID: NA b. Name: _____

c. Capacity: _____ Units: _____ d. Fuel: _____

e. Maximum Fuel Characteristics: If fuel is coal, what is the moisture content? _____

% Ash: _____ % Sulfur: _____ BTU Content: _____ Units: _____

f. Used by Source: _____

a. FML ID: _____ b. Name: _____

c. Capacity: _____ Units: _____ d. Fuel: _____

e. Maximum Fuel Characteristics: If fuel is coal, what is the moisture content? _____

% Ash: _____ % Sulfur: _____ BTU Content: _____ Units: _____

f. Used by Source: _____

a. FML ID: _____ b. Name: _____

c. Capacity: _____ Units: _____ d. Fuel: _____

e. Maximum Fuel Characteristics: If fuel is coal, what is the moisture content? _____

% Ash: _____ % Sulfur: _____ BTU Content: _____ Units: _____

f. Used by Source: _____

Section 11 - Compliance Plan for the Facility

- 11.1 Will your facility be in compliance with all applicable requirements at the time of permit issuance and continue to comply with these requirements during the permit duration? ☐ Yes ☒ No
- 11.2 Will your facility be in compliance with all applicable requirements presently scheduled to take effect during the term of the permit? ☒ Yes ☐ No
- 11.3 Will these requirements be met by the regulatory required dates? ☒ Yes ☐ No

If you checked "No" in Part 11.1, 11.2 or 11.3, answer the following questions:

- 11.4 Identify applicable requirement(s) for which compliance is not or will not be achieved:

Unit ID	Citation No.
See Appendix D – Compliance Plan in this submittal for a summary of the applicable requirements for which compliance will be achieved after the date of submittal of this permit application.	

- 11.4.1 Briefly describe how compliance with this/these applicable requirement(s) will be achieved:

See Appendix D – Compliance Plan in this submittal that addresses how compliance with applicable requirements will be achieved.

11.4.2 Provide a detailed schedule of compliance for the noncomplying sources or activities identified in this section of the application. Include an enforceable sequence of corrective actions with milestone and projected compliance dates.

Date	Action/Milestone
See Appendix D – Compliance Plan in this submittal for a compliance schedule for applicable requirements for which compliance will be achieved after the date of submittal of this Title V operating permit application.	

11.4.3 Indicate the submittal frequency for the progress report (s): Semiannually – Due March 31 and September 30

11.4.4 Starting date for the submittal of the progress report(s): March 31, 2026 with respect to the Compliance Plan included in this submittal

Section 12 - Alternative Operating Scenario (optional)

(Duplicate this section for each source participated in this alternative scenario.)

12.1 General Information

- a. Alternative Operating Scenario Name or ID: NA
- b. Unit ID: _____ c. Unit Name: _____
- d. Unit Type (check one): ☐ Combustion ☐ Incinerator ☐ Process
☐ Control Device ☐ Fuel Material Location
- e. Give a brief description of this alternative scenario stating how it is different from the standard operation:

12.2 Operational Flexibility Request

Check all that apply.

- ☐ Alternative exhaust system component configuration
If this box is checked, complete Sections 12.3 and 12.7
- ☐ Alternative type of fuel usage replacing or in addition to an existing fuel in standard operation.
If this box is checked, complete Sections 12.4 and/or 12.5 and 12.7
- ☐ Alternative process method replacing or in addition to a process SCC existing in standard operation.
If this box is checked, complete Section 12.6 and 12.7
- ☐ Alternative lower limitations. Describe

12.3 Exhaust System Components

Specify the complete exhaust system component configuration for this alternative operating scenario.

From Component Type	From Component Number	To Component Type	To Component Number	Percent Flow	Begin Date	End Date

12.4 Source Classification Code (SCC) Listing for Alternative Operation

Give a complete listing of all fuels burned, products produced by a process or waste incinerated for this alternative operating scenario.

Fuel	Associated SCC	Max. Throughput Rate	Firing Sequence

12.5 Alternative Fuel Physical Characteristics

Give a complete listing of all fuels physical characteristics for this alternative operating scenario.

SCC/Fuel Burned	FML	% Sulfur	% Ash	BTU Content (Units)

12.6 Alternative Process/Product Description

Give a complete listing of all fuels physical characteristics for this alternative operating scenario.

a. Briefly describe the change(s) in raw materials and/or process methods used in this operating scenario, if applicable:

b. Provide and briefly describe the process SCC associated with this alternative operating scenario:

Process SCC:

SCC Description:

c. Alternative Product(s):

12.7 Source Potential to Emit

Give potential emission estimate for all air pollutants emitted at this source for this operating scenario.

[illegible]

Section 13 - Compliance Certification

13.1 Schedule for Compliance Certification Submission

- a. Frequency of Submittal: Annually
- b. Schedule specified in current Title V
Operating Permit or proposed starting date: The proposed starting date for the initial compliance certification period is the date SPM's initial Title V operating permit is issued by DEP. The proposed due date for the initial annual compliance certification is 12 months after the initial compliance certification period starting date. Subsequent annual compliance certifications will be due every 12 months after the initial annual compliance certification due date.

13.2 Monitoring Compliance

Is the site identified in this application in compliance with all applicable requirements and compliance certification requirements?

☐ Yes ☒ No

If "No", describe which requirements are not being met:

See Section 11 – Compliance Plan for the Facility herein for applicable requirements that are not being met.

Potential to Emit Calculations

SPM Annual Potential to Emit Summary

Source ID	Source Description	CO (tpy)	NOx (tpy)	PM (filterable only) (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	SO ₂ (tpy)	VOC (tpy)	CO ₂ e (tpy)	Lead (tpy)	H ₂ SO ₄ (tpy)	Ammonia (tpy)	HAPs (tpy)
031	Ethane Cracking Furnace #1	58.55	25.90	4.75	12.40	12.40	0.68	2.61	157,365	2.27E-04	0.03	10.45	0.73
032	Ethane Cracking Furnace #2	58.55	25.90	4.75	12.40	12.40	0.68	2.61	157,365	2.27E-04	0.03	10.45	0.73
033	Ethane Cracking Furnace #3	58.55	25.90	4.75	12.40	12.40	0.68	2.61	157,365	2.27E-04	0.03	10.45	0.73
034	Ethane Cracking Furnace #4	58.55	25.90	4.75	12.40	12.40	0.68	2.61	157,365	2.27E-04	0.03	10.45	0.73
035	Ethane Cracking Furnace #5	58.55	25.90	4.75	12.40	12.40	0.68	2.61	157,365	2.27E-04	0.03	10.45	0.73
036	Ethane Cracking Furnace #6	58.55	25.90	4.75	12.40	12.40	0.68	2.61	157,365	2.27E-04	0.03	10.45	0.73
037	Ethane Cracking Furnace #7	58.55	25.90	4.75	12.40	12.40	0.68	2.61	157,365	2.27E-04	0.03	10.45	0.73
101	Combustion Turbine/Duct Burner Unit #1	15.00	23.45	5.95	20.68	20.68	4.61	11.03	366,919	0.002	0.23	21.36	1.87
102	Combustion Turbine/Duct Burner Unit #2	15.00	23.45	5.95	20.68	20.68	4.61	11.03	366,919	0.002	0.23	21.36	1.87
103	Combustion Turbine/Duct Burner Unit #3	15.00	23.45	5.95	20.68	20.68	4.61	11.03	366,919	0.002	0.23	21.36	1.87
104	Cogeneration Plant Cooling Tower	-	-	2.63	1.67	0.01	-	-	-	-	-	-	-
105	Diesel-Fired Emergency Generator Engines (2); Generator 1 - Parking Garage	0.01	0.03	0.001	0.001	0.001	5.60E-05	4.54E-04	6	-	2.76E-06	-	1.40E-04
105	Diesel-Fired Emergency Generator Engines (2); Generator 2 - Telecom Hut	0.005	0.02	0.002	0.002	0.001	3.65E-05	0.001	4	-	1.79E-06	-	9.08E-05
106	Fire Pump Engines (2); Firewater Pump 1	0.14	0.10	0.01	0.01	0.01	2.65E-04	0.06	28	-	1.31E-05	-	6.62E-04
106	Fire Pump Engines (2); Firewater Pump 2	0.14	0.10	0.01	0.01	0.01	2.65E-04	0.06	28	-	1.31E-05	-	6.62E-04
107	Natural Gas-Fired Emergency Generator Engines (2); Generator 3 - Lift Station	0.01	0.03	0.001	0.001	0.001	4.17E-05	0.02	11	-	2.05E-06	-	0.002
107	Natural Gas-Fired Emergency Generator Engines (2); Generator 4 - Lift Station	0.13	0.03	1.44E-06	1.86E-04	1.86E-04	1.10E-05	0.002	4	-	5.40E-07	-	0.001

SPM Annual Potential to Emit Summary

Source ID	Source Description	CO (tpy)	NOx (tpy)	PM (filterable only) (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	SO ₂ (tpy)	VOC (tpy)	CO ₂ e (tpy)	Lead (tpy)	H ₂ SO ₄ (tpy)	Ammonia (tpy)	HAPs (tpy)
202	Polyethylene Manufacturing Lines	-	-	3.44	3.44	3.44	-	-	-	-	-	-	1.36E-04
203	Process Cooling Tower	-	-	6.49	4.12	0.01	-	38.88	-	-	-	-	0.97
C204	CVTO	65.29	47.57	1.48	5.91	5.91	1.17	30.77	109,579	3.89E-04	0.06	-	0.11
C205A	TEGF A	569.37	126.03	3.44	13.76	13.76	2.72	245.52	193,857	0.001	0.13	-	8.04
C205B	TEGF B												
C205C	HP Elevated Flare												
C206	SCTO	3.99	2.91	0.09	0.36	0.36	4.19	0.21	6,044	2.38E-05	0.21	-	0.13
C207	MPGF CVTO Trip	9.56	2.26	0.06	0.24	0.24	0.05	23.54	4,442	1.58E-05	0.002	-	0.02
C208	MPGF Ethylene Tank	2.07	0.84	0.02	0.08	0.08	0.02	5.00	1,353	5.02E-06	7.41E-04	-	0.001
C209	MPGF PE Units 1/2 Episodic Vent	105.97	23.56	0.64	2.57	2.57	0.51	6.27	47,614	1.69E-04	0.03	-	0.04
301	Polyethylene Pellet Material Storage/Handling/Loadout	-	-	8.36	2.88	2.88	-	72.73	-	-	-	-	-
302	Liquid Loadout (Recovered Oil)	-	-	-	-	-	-	0.005	-	-	-	-	1.04E-05
304	Liquid Loadout (C3+, Butene, Isopentane, Isobutane, C3 Ref)	-	-	-	-	-	-	0.005	-	-	-	-	0.001
406	Storage Tanks (Diesel Fuel > 150 Gallons)	-	-	-	-	-	-	4.25E-04	-	-	-	-	4.25E-04
501	Equipment Components	2.81	-	-	-	-	-	35.28	401	-	-	-	3.12
502	Wastewater Treatment Plant (Secondary and Tertiary Treatment)	-	-	-	-	-	-	0.28	-	-	-	-	0.28
503	Plant Roadways	-	-	0.64	0.13	0.03	-	-	-	-	-	-	-

SPM Annual Potential to Emit Summary

Source ID	Source Description	CO (tpy)	NOx (tpy)	PM (filterable only) (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	SO ₂ (tpy)	VOC (tpy)	CO ₂ e (tpy)	Lead (tpy)	H ₂ SO ₄ (tpy)	Ammonia (tpy)	HAPs (tpy)
504	Gas Insulated Switchgear (SF6)	-	-	-	-	-	-	-	880	-	-	-	-
Total		1,214.35	455.13	78.41	184.02	178.15	27.24	509.99	2,566,563	0.01	1.32	137.23	23.44

<i>Source IDs = 031 - 037 Ethane Cracking Furnaces #1 - #7</i>									
Furnace Operating Modes	Total Heat Input MMBtu/hr	Heat Input From Carbon Compounds MMBtu/hr	Fuel Source	Event Frequency # per yr	Duration per Event hrs	Annual Event Duration hrs/yr	NOx Emissions lb/hr	PM10 Emissions lb/hr	CO Emissions lb/hr
Normal Operation (ST)	620	-	TG	-	-	-	9.30	3.10	21.70
Normal Operation (LT)	620	336.8	TG	-	-	7,509	6.20	3.10	11.79
Decoking	180	-	TG	12	36	432	2.70	1.86	52.20
Feed In	277	-	NG	12	2	24	4.16	1.39	9.70
Feed Out	277	-	NG	12	2	24	4.16	1.39	9.70
Hot Steam Standby	173	-	NG	12	60	723	4.33	0.87	6.06
Startup	86.5	-	NG	1	24	24	15.57	0.43	25.09
Shutdown	86.5	-	NG	1	24	24	15.57	0.43	25.09
Annual Emissions =									
Decoking Cycle ST Rates =							4.33	1.86	52.20
Normal Ops ST Rates =							9.30	3.10	21.70
Normal Ops LT Rates =							6.20	3.10	11.79
Average Annual Rates =							5.91	2.83	13.37

Source IDs	= 031 - 037 Ethane Cracking Furnaces #1 - #7												
Furnace Operating Modes	NOx EF lb/MMBtu	PM (filterable) EF lb/MMBtu	PM (condensable) EF lb/MMBtu	PM10/2.5 EF lb/MMBtu	CO EF lb/MMBtu	SO2 EF lb/MMBtu	VOC EF lb/MMBtu	CO2 EF lb/MMBtu	CH4 EF lb/MMBtu	N2O EF lb/MMBtu	CO2e EF lb/MMBtu	H2SO4 EF lb/MMBtu	Pb EF lb/MMBtu
Normal Operation (ST)	0.015	0.00186	0.00314	0.005	0.035	0.0002	0.0019	62.7	0.0012	0.00022	62.8	1.20E-05	8.12E-08
Normal Operation (LT)	0.010	0.00186	0.00314	0.005	0.035	0.0002	0.0019	62.7	0.0012	0.00022	62.8	1.20E-05	8.12E-08
Decoking	0.015	0.00716	0.00314	0.0103	0.290	0.0002	0.0019	70.9	0.0012	0.00022	70.9	1.20E-05	8.12E-08
Feed In	0.015	0.00186	0.00314	0.005	0.035	0.0015	0.0019	117.0	0.0022	0.00022	117.1	7.23E-05	4.90E-07
Feed Out	0.015	0.00186	0.00314	0.005	0.035	0.0015	0.0019	117.0	0.0022	0.00022	117.1	7.23E-05	4.90E-07
Hot Steam Standby	0.025	0.00186	0.00314	0.005	0.035	0.0015	0.0019	117.0	0.0022	0.00022	117.1	7.23E-05	4.90E-07
Startup	0.180	0.00186	0.00314	0.005	0.290	0.0015	0.0019	117.0	0.0022	0.00022	117.1	7.23E-05	4.90E-07
Shutdown	0.180	0.00186	0.00314	0.005	0.290	0.0015	0.0019	117.0	0.0022	0.00022	117.1	7.23E-05	4.90E-07
Annual Emissions =											PTE per furnace		
Decoking Cycle ST Rates =													
Normal Ops ST Rates =													
Normal Ops LT Rates =													
Average Annual Rates =													

<i>Source IDs</i>	<i>= 031 - 037 Ethane Cracking Furnaces #1 - #7</i>												
Furnace Operating Modes	NOx Emissions T/yr	PM (filterable) Emissions T/yr	PM (condensable) Emissions T/yr	PM10/2.5 Emissions T/yr	CO Emissions T/yr	SO2 Emissions T/yr	VOC Emissions T/yr	CO2 Emissions T/yr	CH4 Emissions T/yr	N2O Emissions T/yr	CO2e Emissions T/yr	H2SO4 Emissions T/yr	Pb Emissions T/yr
Normal Operation (ST)	-	-	-	-	-	-	-	-	-	-	-	-	-
Normal Operation (LT)	23.28	4.34	7.30	11.64	44.25	0.57	2.40	146,048	2.79	0.51	146,262	0.03	1.89E-04
Decoking	0.58	0.28	0.12	0.40	11.28	0.01	0.07	2,755	0.05	0.01	2,758	4.66E-04	3.16E-06
Feed In	0.05	0.01	0.01	0.02	0.12	0.005	0.01	389	0.01	0.001	389	2.40E-04	1.63E-06
Feed Out	0.05	0.01	0.01	0.02	0.12	0.005	0.01	389	0.01	0.001	389	2.40E-04	1.63E-06
Hot Steam Standby	1.56	0.12	0.20	0.31	2.19	0.09	0.12	7,316	0.14	0.01	7,323	0.005	3.07E-05
Startup	0.19	0.002	0.003	0.01	0.30	0.002	0.002	121	0.002	2.3E-04	122	7.5E-05	5.09E-07
Shutdown	0.19	0.002	0.003	0.01	0.30	0.002	0.002	121	0.002	2.3E-04	122	7.5E-05	5.09E-07
Annual Emissions =	25.90	4.75	7.65	12.40	58.55	0.68	2.61	157,139	2.99	0.54	157,365	0.03	2.27E-04
Decoking Cycle ST Rates =													
Normal Ops ST Rates =													
Normal Ops LT Rates =													
Average Annual Rates =													

Ethane Cracking Furnace Calculation Notes/Basis	
General:	
Calculation is for 1 furnace.	
ST = short-term; this mode represents the possibility of reduced SCR performance due to short-term process fluctuations. No more than 2 furnaces expected to be in this mode at any one time.	
LT = long-term; this mode represents the average NOx limit achievable by the SCR system including short-term fluctuations.	
Furnace operating mode parameters are estimated based on 7 furnaces with 6 in normal operation at all times.	
Each furnace is assumed to require decoking a maximum of 12 times per year.	
Each furnace is assumed to undergo one startup/shutdown cycle per year.	
Heat input estimates for decoking-related operating modes are the average for an activity over the period (e.g., "Feed In" value is average of 160 MMBtu/hr at start and 395 MMBtu/hr at end of "Feed In").	
Heat Input From Carbon Compounds is used for Normal Operation (LT) CO emissions estimate and is based on 620 MMBtu/hr and 54.3% of heat input from CH4+NG.	
Annual Emissions (T/yr) = (Mode Heat Input - MMBtu/hr) x (Hours/Year in Mode) x (EF - lb/MMBtu) / (2,000 lb/T)	
Hourly Emissions (lb/hr) = (Mode Heat Input - MMBtu/hr) x (EF - lb/MMBtu)	
BASIS OF EMISSION FACTORS:	
NOx:	
- Normal Operation: ST and LT rates based on LAER limits. - Decoking, Feed In, Feed Out, Hot Standby and Shutdown: based on preliminary vendor data / expected SCR performance. - Startup = SCR Offline.	
CO:	
- Normal Operation, Feed In, Feed Out and Hot Steam Standby = BACT limit. - Decoking, Startup, Shutdown: factors equivalent to lb/hr BACT limit for decoking.	
SO2/H2SO4:	
- All Modes: SO2 EF based on a natural gas sulfur content of 5,000 gr/MMSCF and an average natural gas firing rate equal to 16.6% of a furnace's heat input (remainder is tail gas). - All Modes: Tail gas fired in furnace does not contain any sulfur. - All Modes: H2SO4-to-SO2 ratio is assumed equal to ratio for firing distillate oil (see AP-42, Table 1.3-1).	
VOC	
All modes: VOC EF is equivalent to LAER limit at max firing rate.	
PM/PM10/PM2.5:	
- Normal Operation, Feed In, Feed Out, Hot Standby, Startup and Shutdown: EF based on preliminary vendor data. - Decoking: based on preliminary vendor data; hourly emissions during decoking are estimated at 1.86 lb/hr; value shown is converted to lb/MMBtu for consistency with calculation methodology.	
GHGs	
- All modes except decoking: emissions factors for CO2, CH4, and N2O are from 40 CFR 98, Tables C-1 and C-2. - Firing H2 does not produce any CO2 or CH4 emissions so CO2 and CH4 emissions factors are adjusted to account for tail gas H2 concentration of 45.7% where applicable. - N2O emissions factor for natural gas used for both tail gas and natural gas firing. - CO2e emissions during decoking include emissions from fuel combustion as well as emissions from coke burn-off. See 'Constants' sheet for coke burn-off emissions rate. - CO2e emissions equal total of CO2, CH4, and N2O emissions adjusted for global warming potentials of 1, 28, and 265 respectively.	
Lead	
- All Modes: Pb emission factor based on AP-42 natural gas emission factor (see Table 1.4-2) and an average natural gas firing rate of 16.6% of a furnace's heat input (remainder is tail gas). - All Modes: Tail gas fired in furnace does not contain any lead.	

Source IDs =		031 - 037		Ethane Cracking Furnaces #1 - #7		
Normal Operation (LT) Heat Input [HHV]=		620 MMBtu/hr				
Max CH4+NG Heat Input [HHV]=		336.8 MMBtu/hr		Based on 620 MMBtu/hr and 54.3% of heat input from CH4+NG.*		
Annual Hours @ 100% Load =		8,760 hr/yr		Conservatively assumes continuous operation at 100% load		
Hourly PTE (Ammonia) =		(Normal Operation (LT) Heat Input - MMBtu/hr) x (EF - lb/MMBtu)				
Annual PTE (Ammonia) =		(Normal Operation (LT) Heat Input - MMBtu/hr) x (EF - lb/MMBtu) x (Annual Hours @ 100% Load) / (2,000 lb/T)				
Hourly PTE =		(Max CH4+NG Heat Input - MMBtu/hr) x (EF - lb/MMBtu)				
Annual PTE =		(Max CH4+NG Heat Input - MMBtu/hr) x (EF - lb/MMBtu) x (Annual Hours @ 100% Load) / (2,000 lb/T)				
Pollutant	\$112 HAP?	EF (lb/MMSCF)	EF (lb/MMBtu)	EF Source	Hourly PTE 1 Cracking Furnace (lb/hr)	Annual PTE 1 Cracking Furnace (T/yr)
Ammonia***	NO	-	0.0038	40 CFR 60, Method 19	2.39	10.45
2-Methylnaphthalene	YES	2.40E-05	2.35E-08	AP-42, Table 1.4-3	7.92E-06	3.47E-05
3-Methylcholanthrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.94E-07	2.60E-06
7,12-Dimethylbenz(a)anthracene	YES	<1.6E-05	<1.57E-08	AP-42, Table 1.4-3	5.28E-06	2.31E-05
Acenaphthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.94E-07	2.60E-06
Acenaphthylene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.94E-07	2.60E-06
Anthracene	YES	<2.4E-06	<2.35E-09	AP-42, Table 1.4-3	7.92E-07	3.47E-06
Benzo(a)anthracene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.94E-07	2.60E-06
Benzene	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-3	6.93E-04	3.04E-03
Benzo(a)pyrene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	3.96E-07	1.74E-06
Benzo(b)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.94E-07	2.60E-06
Benzo(g,h,i)perylene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	3.96E-07	1.74E-06
Benzo(k)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.94E-07	2.60E-06
Butane	NO	2.10E+00	2.06E-03	AP-42, Table 1.4-3	6.93E-01	3.04E+00
Chrysene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.94E-07	2.60E-06
Dibenzo(a,h)anthracene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	3.96E-07	1.74E-06
Dichlorobenzene	YES	1.20E-03	1.18E-06	AP-42, Table 1.4-3	3.96E-04	1.74E-03
Ethane	NO	3.10E+00	3.04E-03	AP-42, Table 1.4-3	1.02E+00	4.48E+00
Fluoranthene	YES	3.00E-06	2.94E-09	AP-42, Table 1.4-3	9.90E-07	4.34E-06
Fluorene	YES	2.80E-06	2.75E-09	AP-42, Table 1.4-3	9.24E-07	4.05E-06
Formaldehyde	YES	7.50E-02	7.35E-05	AP-42, Table 1.4-3	2.48E-02	1.08E-01
Hexane	YES	-	4.07E-04	Stack Test Data	1.37E-01	6.00E-01
Indeno(1,2,3-cd)pyrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.94E-07	2.60E-06
Naphthalene	YES	6.10E-04	5.98E-07	AP-42, Table 1.4-3	2.01E-04	8.82E-04
Pentane	NO	2.60E+00	2.55E-03	AP-42, Table 1.4-3	8.58E-01	3.76E+00
Phenanthrene	YES	1.70E-05	1.67E-08	AP-42, Table 1.4-3	5.61E-06	2.46E-05
Propane	NO	1.60E+00	1.57E-03	AP-42, Table 1.4-3	5.28E-01	2.31E+00
Pyrene	YES	5.00E-06	4.90E-09	AP-42, Table 1.4-3	1.65E-06	7.23E-06
Toluene	YES	3.40E-03	3.33E-06	AP-42, Table 1.4-3	1.12E-03	4.92E-03
Arsenic	YES	2.00E-04	1.96E-07	AP-42, Table 1.4-4	6.60E-05	2.89E-04
Barium	NO	4.40E-03	4.31E-06	AP-42, Table 1.4-4	1.45E-03	6.36E-03
Beryllium	YES	<1.2E-05	<1.18E-08	AP-42, Table 1.4-4	3.96E-06	1.74E-05
Cadmium	YES	1.10E-03	1.08E-06	AP-42, Table 1.4-4	3.63E-04	1.59E-03
Chromium	YES	1.40E-03	1.37E-06	AP-42, Table 1.4-4	4.62E-04	2.02E-03
Chromium (VI)**	YES / Cr Cmpds	5.60E-05	5.49E-08	AP-42, Table 1.4-4/NEI	1.85E-05	8.10E-05
Cobalt	YES	8.40E-05	8.24E-08	AP-42, Table 1.4-4	2.77E-05	1.21E-04
Copper	NO	8.50E-04	8.33E-07	AP-42, Table 1.4-4	2.81E-04	1.23E-03
Lead	YES	5.00E-04	4.90E-07	AP-42, Table 1.4-2	1.65E-04	7.23E-04
Manganese	YES	3.80E-04	3.73E-07	AP-42, Table 1.4-4	1.25E-04	5.50E-04
Mercury	YES	2.60E-04	2.55E-07	AP-42, Table 1.4-4	8.58E-05	3.76E-04
Molybdenum	NO	1.10E-03	1.08E-06	AP-42, Table 1.4-4	3.63E-04	1.59E-03
Nickel	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-4	6.93E-04	3.04E-03
Selenium	YES	<2.4E-05	<2.35E-08	AP-42, Table 1.4-4	7.92E-06	3.47E-05
Vanadium	NO	2.30E-03	2.25E-06	AP-42, Table 1.4-4	7.59E-04	3.33E-03
Zinc	NO	2.90E-02	2.84E-05	AP-42, Table 1.4-4	9.57E-03	4.19E-02
Total \$112 HAPs from 1 Cracking Furnace =					0.17	0.73
Total \$112 HAPs from 7 Cracking Furnaces =					1.16	5.10

* No HAP emissions attributed to the combustion of hydrogen in the ethane cracking furnaces.

** Based on NEI data for SCC 39000699 (In-Process Fuel Use: Natural Gas, General), 4% of the chromium emission factor found in AP-42, Section 1.4, Table 1.4-4 was estimated to equal chromium (VI).

*** Ammonia emission factor calculated per 40 CFR 60, Method 19 based on 10 ppmvd ammonia @ 3% O2 in ethane cracking furnace exhaust.

Ammonia slip concentration	10	ppmvd @ 3% O2 in exhaust
Ammonia slip conc. at 0% O2	11.68	ppmvd @ 0% O2
Fd (natural gas)	8,710	dscf/MMBtu (Table 19-2, Appendix A-7 of 40 CFR 60)
Fd (H2)	5,971	dscf/MMBtu
Fd (54.3% CH4+NG/45.7% H2)	7,459	dscf/MMBtu 54.3% of heat input from CH4+NG and 45.7% from H2.
Standard Molar Volume	385.33	scf/lbmole @ 1 atm and 68°F
Molecular Weight NH3	17.03	lb/lbmole
Ammonia EF	0.0038	lb/MMBtu

Source IDs = 101 - 103		Combustion Turbine/Duct Burner Units #1 - #3									
Parameter	Value	Source / Basis									
Calculation Inputs:											
Max Heat Input [HHV]	= 715.4 MMBtu/hr	Total maximum heat input to each GE Frame 6B turbine/duct burner unit									
Turbine/Duct Burner PM EF	= 0.0019 lb/MMBtu	AP-42, Table 3.1-2a (filterable only)									
Turbine/Duct Burner PM10 EF	= 0.0066 lb/MMBtu	BACT limit									
Turbine/Duct Burner PM2.5 EF	= 0.0066 lb/MMBtu	LAER limit									
Turbine/Duct Burner VOC EF	= 0.0035 lb/MMBtu	Equivalent to LAER limit of 1 ppmvd @ 15% O2 as C3H8 at max load									
Turbine/Duct Burner NOx EF	= 0.0074 lb/MMBtu	Equivalent to LAER limit of 2 ppmvd @ 15% O2 as NO2 at max load									
Turbine/Duct Burner SO2 EF	= 0.0015 lb/MMBtu	Based on 0.5 grains S/100 dscf, the max. allowable sulfur content of natural gas fuel									
Turbine/Duct Burner CO EF	= 0.0045 lb/MMBtu	Equivalent to LAER limit of 2 ppmvd @ 15% O2 at max load									
Turbine/Duct Burner CO2 EF	= 117.0 lb/MMBtu	40 CFR 98, Table C-1 EF for natural gas									
Turbine/Duct Burner N2O EF	= 2.2E-04 lb/MMBtu	40 CFR 98, Table C-2 EF for natural gas									
Turbine/Duct Burner CH4 EF	= 2.2E-03 lb/MMBtu	40 CFR 98, Table C-2 EF for natural gas									
Turbine/Duct Burner H2SO4 EF	= 7.2E-05 lb/MMBtu	Based on SO3-to-SO2 emission factor ratio in AP-42, Table 1.3-1 for distillate oil combustion in boilers > 100 MMBtu/hr									
Turbine/Duct Burner Pb EF	= 4.9E-07 lb/MMBtu	AP-42, Table 1.4-2									
Turbine/Duct Burner Fluoride EF	= 0 lb/MMBtu	Not emitted									
Startup/Shutdown NOx EF	= 113 lb/hr	Design estimate									
Startup/Shutdown CO EF	= 276 lb/hr	Design estimate									
Startup/Shutdown Hours	= 7 hr/yr	Worst-case estimate									
Annual Hours	= 8,760 hr/yr										
Annual PTE Calculations (for 1 unit):											
PM Emissions	= 5.95 T/yr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner PM EF) x (Annual Hours) / (2000 lb/T)									
PM10 Emissions	= 20.68 T/yr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner PM10 EF) x (Annual Hours) / (2000 lb/T)									
PM2.5 Emissions	= 20.68 T/yr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner PM2.5 EF) x (Annual Hours) / (2000 lb/T)									
VOC Emissions	= 11.03 T/yr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner VOC EF) x (Annual Hours) / (2000 lb/T)									
NOx Emissions	= 23.45 T/yr	= [(Max Heat Input [HHV]) x (Turbine/Duct Burner NOx EF) x (Annual Hours - Startup/Shutdown Hours) + (Startup/Shutdown NOx EF) x (Startup/Shutdown Hours)] / (2000 lb/T)									
SO2 Emissions	= 4.61 T/yr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner SO2 EF) x (Annual Hours) / (2000 lb/T)									
CO Emissions	= 15.00 T/yr	= [(Max Heat Input [HHV]) x (Turbine/Duct Burner CO EF) x (Annual Hours - Startup/Shutdown Hours) + (Startup/Shutdown CO EF) x (Startup/Shutdown Hours)] / (2000 lb/T)									
CO2 Emissions	= 366,542 T/yr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner CO2 EF) x (Annual Hours) / (2000 lb/T)									
N2O Emissions	= 0.69 T/yr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner N2O EF) x (Annual Hours) / (2000 lb/T)									
CH4 Emissions	= 6.91 T/yr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner CH4 EF) x (Annual Hours) / (2000 lb/T)									
H2SO4 Emissions	= 0.23 T/yr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner H2SO4 EF) x (Annual Hours) / (2000 lb/T)									
Pb Emissions	= 0.002 T/yr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner Pb EF) x (Annual Hours) / (2000 lb/T)									
Fluoride Emissions	= 0 T/yr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner Fluoride EF) x (Annual Hours) / (2000 lb/T)									
CO2e Emissions	= 366,919 T/yr	= Sum of CO2, N2O and CH4 emissions adjusted for NO2 and CH4 GWPs of 265 and 28									
Short-Term PTE Calculations (for 1 unit):											
PM Emissions	= 1.36 lb/hr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner PM EF)									
PM10 Emissions	= 4.72 lb/hr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner PM10 EF)									
PM2.5 Emissions	= 4.72 lb/hr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner PM2.5 EF)									
VOC Emissions	= 2.52 lb/hr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner VOC EF)									
NOx Emissions	= 5.35 lb/hr	= Rate for Modeling Purposes									
SO2 Emissions	= 1.05 lb/hr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner SO2 EF)									
CO Emissions	= 276 lb/hr	= Startup/Shutdown Max Rate for Modeling Purposes									
CO2 Emissions	= 83,685 lb/hr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner CO2 EF)									
N2O Emissions	= 0.16 lb/hr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner N2O EF)									
CH4 Emissions	= 1.58 lb/hr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner CH4 EF)									
H2SO4 Emissions	= 0.05 lb/hr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner H2SO4 EF)									
Pb Emissions	= 3.5E-04 lb/hr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner Pb EF)									
Fluoride Emissions	= 0 lb/hr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner Fluoride EF)									
CO2e Emissions	= 83,771 lb/hr	= Sum of CO2, N2O and CH4 emissions adjusted for NO2 and CH4 GWPs of 265 and 28									
Summary of Annual PTE Emission Rates:											
		PTE Emission Rates (T/yr)									
		PM	PM10	PM2.5	VOC	NOx	SO2	CO	H2SO4	Pb	CO2e
1 Unit	=	5.95	20.68	20.68	11.03	23.45	4.61	15.00	0.23	0.002	366,919
3 Units	=	17.86	62.04	62.04	33.10	70.34	13.82	45.00	0.68	0.005	1,100,756

Source IDs = 101 - 103 Combustion Turbine/Duct Burner Units #1 - #3						
Max Heat Input [HHV] :	715.4 MMBtu/hr	Total heat input for turbine and duct burners.*				
Annual Hours @ 100% Load :	8,760 hr/yr	Conservatively assumes continuous operation at 100% load				
Oxidation Catalyst DRE :	30%	http://jmsec.com/Library/Brochures/jm_sec_data_gas_turbine_033012m.pdf				
Hourly PTE :	(Max Heat Input - MMBtu/hr) x (Controlled EF - lb/MMBtu) [Uncontrolled EF is used for Ammonia]					
Annual PTE :	(Max Heat Input - MMBtu/hr) x (Controlled EF - lb/MMBtu) x (Annual Hours @ 100% Load) / (2,000 lb/T) [Uncontrolled EF is used for Ammonia]					
Pollutant	§112 HAP?	Uncontrolled EF (lb/MMBtu)	Controlled** EF (lb/MMBtu)	EF Source	Hourly PTE 1 Unit (lb/hr)	Annual PTE 1 Unit (T/yr)
Ammonia*** :	NO	0.0068	-	40 CFR 60, Method 19	4.88E+00	2.136E+01
1,3-Butadiene :	YES	<4.30E-07	<3.01E-07	AP-42, Table 3.1-3	2.15E-04	9.42E-04
Acetaldehyde :	YES	4.00E-05	2.80E-05	AP-42, Table 3.1-3	2.00E-02	8.76E-02
Acrolein :	YES	6.40E-06	4.48E-06	AP-42, Table 3.1-3	3.20E-03	1.40E-02
Benzene :	YES	-	1.57E-06	11/2022 Stack Test Data	1.12E-03	4.92E-03
Ethylbenzene :	YES	3.20E-05	2.24E-05	AP-42, Table 3.1-3	1.60E-02	7.01E-02
Formaldehyde :	YES	-	2.30E-04	11/2022 Stack Test Data	1.65E-01	7.21E-01
Naphthalene :	YES	1.30E-06	9.09E-07	AP-42, Table 3.1-3	6.50E-04	2.85E-03
PAH :	YES	2.20E-06	1.54E-06	AP-42, Table 3.1-3	1.10E-03	4.82E-03
Propylene Oxide :	YES	<2.90E-05	<2.03E-05	AP-42, Table 3.1-3	1.45E-02	6.35E-02
Toluene :	YES	-	2.44E-04	11/2022 Stack Test Data	1.75E-01	7.65E-01
Xylenes :	YES	6.40E-05	4.48E-05	AP-42, Table 3.1-3	3.20E-02	1.40E-01
Total §112 HAPs from 1 Combustion Turbine/Duct Burner Unit =					0.43	1.87
Total §112 HAPs from 3 Combustion Turbine/Duct Burner Units =					1.28	5.62
* The HAP emissions from the duct burners were assumed to have the same profile as HAP emissions from the turbines.						
** AP-42 emission factors adjusted for controlled emissions due to 30% DRE of oxidation catalyst.						
Ref. http://jmsec.com/Library/Brochures/jm_sec_data_gas_turbine_033012m.pdf						
*** Ammonia emission factor calculated per 40 CFR 60, Method 19 based on 5 ppmvd ammonia @ 15% O2 in unit exhaust.						
Ammonia slip concentration :	5	ppmvd @ 15% O2 in exhaust				
Ammonia slip conc. at 0% O2 :	17.71	ppmvd @ 0% O2				
Fd (natural gas) :	8,710	dscf/MMBtu (Table 19-2, Appendix A-7 of 40 CFR 60)				
Standard Molar Volume :	385.33	scf/lbmole @ 1 atm and 68°F				
Molecular Weight NH3 :	17.03	lb/lbmole				
Ammonia EF :	0.0068	lb/MMBtu				

<u>Source ID</u> = <u>104</u> <u>Cogeneration Plant Cooling Tower</u>		
Parameter	Value	Source / Basis
<u>Calculation Inputs</u>		
Number of Cells =	6	Design specification
Cell Circulation Rate =	20,000 gal/min/cell	= (Cooling Water Rate)/(Number of Cells)
Annual Operating Hours =	8,760 hr/yr	Maximum potential use
Drift Loss Factor =	0.0005% wt. %	Design specification = BACT limit
Cooling Water Rate =	120,000 gal/min	Maximum water flow rate
Cooling Water TDS =	2,000 ppmw	BACT/LAER limit (12-month rolling average basis)
<u>Calculation Results</u>		
PM10 Fraction of PM =	63.50% wt. %	See particle size distribution calculation
PM2.5 Fraction of PM =	0.21% wt. %	See particle size distribution calculation
Hourly PM PTE [per cell] =	0.10 lb/hr	= (Cell Circulation Rate) x (60 min/yr) x (8.34 lb/gal) x (Drift Loss Factor) x (Cooling Water TDS) / (1,000,000)
Annual PM PTE [total] =	2.63 tpy	= (Hourly PM PTE [per cell]) x (Annual Operating Hours) / (2,000 lb/T) x (Number of Cells)
Hourly PM10 PTE [per cell] =	0.06 lb/hr	= (PM10 Fraction of PM) x (Hourly PM PTE [per cell])
Annual PM10 PTE [total] =	1.67 tpy	= (PM10 Fraction of PM) x (Annual PM PTE [total])
Hourly PM2.5 PTE [per cell] =	0.0002 lb/hr	= (PM2.5 Fraction of PM) x (Hourly PM PTE [per cell])
Annual PM2.5 PTE [total] =	0.01 tpy	= (PM2.5 Fraction of PM) x (Annual PM PTE [total])

<u>Source ID</u>		<u>= 104 Cogeneration Plant Cooling Tower</u>						
Wet Droplet Diameter (μm)	Wet Droplet Volume (μm ³)	Wet Droplet Mass (μg)	Dry Particle Mass (μg)	Dry Particle Volume (μm ³)	Dry Particle Diameter (μm)	wt. % Mass Smaller Than Droplet	Wt% PM ₁₀ in PM Emissions	Wt% PM _{2.5} in PM Emissions
10	524	5.24E-04	1.05E-06	0	0.97	0.000		
20	4189	4.19E-03	8.38E-06	4	1.94	0.196		
30	14137	1.41E-02	2.83E-05	13	2.91	0.226		0.2
40	33510	3.35E-02	6.70E-05	30	3.87	0.514		
50	65450	6.54E-02	1.31E-04	59	4.84	1.806		
60	113097	1.13E-01	2.26E-04	103	5.81	5.702		
70	179594	1.80E-01	3.59E-04	163	6.78	21.348		
90	381704	3.82E-01	7.63E-04	347	8.72	49.812		
110	696910	6.97E-01	1.39E-03	634	10.66	70.509	63.5	
130	1150347	1.15E+00	2.30E-03	1046	12.59	82.023		
150	1767146	1.77E+00	3.53E-03	1606	14.53	88.012		
180	3053628	3.05E+00	6.11E-03	2776	17.44	91.032		
210	4849048	4.85E+00	9.70E-03	4408	20.34	92.468		
240	7238229	7.24E+00	1.45E-02	6580	23.25	94.091		
270	10305995	1.03E+01	2.06E-02	9369	26.16	94.689		
300	14137167	1.41E+01	2.83E-02	12852	29.06	96.288		
350	22449298	2.24E+01	4.49E-02	20408	33.91	97.011		
400	33510322	3.35E+01	6.70E-02	30464	38.75	98.340		
450	47712938	4.77E+01	9.54E-02	43375	43.59	99.071		
500	65449847	6.54E+01	1.31E-01	59500	48.44	99.071		
600	113097336	1.13E+02	2.26E-01	102816	58.12	100.000		
Specific Gravity of Water =				1.00 g/cc				
Specific Gravity of Dried Solids =				2.20 g/cc				
Cooling Tower Design TDS =				2,000 ppmw				
PM10 fraction of PM =				63.50 wt. %				
PM2.5 fraction of PM =				0.21 wt. %				

From "Calculating Realistic PM10 Emissions from Cooling Towers"; Reisman & Frisbie (uses EPRI wet droplet size distribution).

Source ID = 105		Diesel-Fired Emergency Generator Engines (Generator 1 - Parking Garage)								
Parameter	Value	Units	Source / Basis							
Calculation Inputs										
Rated Horsepower =	103 bhp	Cummins QSB5-G3								
PM EF =	1.32E-04 lb/bhp-hr	Manufacturer data sheet								
PM10 EF =	1.27E-04 lb/bhp-hr	PM10 = 96% of PM from AP-42, Table B.2-2, Category 1								
PM2.5 EF =	1.19E-04 lb/bhp-hr	PM2.5 = 90% of PM from AP-42, Table B.2-2, Category 1								
VOC EF =	8.82E-05 lb/bhp-hr	Manufacturer data sheet								
NOx EF =	5.14E-03 lb/bhp-hr	NMHC + NOx LAER limit of 2.37 g/bhp-hr converted to lb/bhp-hr EF minus VOC EF								
SO2 EF =	1.09E-05 lb/bhp-hr	Based on: fuel sulfur = 15 ppmw; 7,000 Btu/bhp-hr; fuel HHV = 19,300 Btu/lb								
CO EF =	1.10E-03 lb/bhp-hr	BACT limit of 0.50 g/bhp-hr converted to lb/bhp-hr EF								
CO2 EF =	1.14 lb/bhp-hr	40 CFR 98, Table C-1 (Fuel Oil No. 2) @ 7,000 Btu/bhp-hr								
CH4 EF =	4.63E-05 lb/bhp-hr	40 CFR 98, Table C-2 @ 7,000 Btu/bhp-hr								
N2O EF =	9.26E-06 lb/bhp-hr	40 CFR 98, Table C-2 @ 7,000 Btu/bhp-hr								
CO2e EF =	1.15 lb/bhp-hr	Sum of CO2, N2O, & CH4 adjusted for GWP								
H2SO4 EF =	5.35E-07 lb/bhp-hr	AP-42, Table 1.3-1; estimated based on SO3-to-SO2 emission ratio for distillate oil								
Annual Operating Hours =	100 hr/yr	Permit limit for non-emergency use; no limit on the hours of emergency use								
Hourly Emissions Calculations										
PM Hourly Max =	0.01 lb/hr	= (Rated Horsepower) x (PM EF)								
PM10 Hourly Max =	0.01 lb/hr	= (Rated Horsepower) x (PM10 EF)								
PM2.5 Hourly Max =	0.01 lb/hr	= (Rated Horsepower) x (PM2.5 EF)								
VOC Hourly Max =	0.01 lb/hr	= (Rated Horsepower) x (VOC EF)								
NOx Hourly Max =	0.53 lb/hr	= (Rated Horsepower) x (NOx EF)								
SO2 Hourly Max =	0.001 lb/hr	= (Rated Horsepower) x (SO2 EF)								
CO Hourly Max =	0.11 lb/hr	= (Rated Horsepower) x (CO EF)								
CO2 Hourly Max =	118 lb/hr	= (Rated Horsepower) x (CO2 EF)								
CH4 Hourly Max =	0.005 lb/hr	= (Rated Horsepower) x (CH4 EF)								
N2O Hourly Max =	0.001 lb/hr	= (Rated Horsepower) x (N2O EF)								
CO2e Hourly Max =	118 lb/hr	= (Rated Horsepower) x (CO2e EF)								
H2SO4 Hourly Max =	5.51E-05 lb/hr	= (Rated Horsepower) x (H2SO4 EF)								
Annual Emissions Calculations										
PM PTE =	0.001 tpy	= (PM Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
PM10 PTE =	0.001 tpy	= (PM10 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
PM2.5 PTE =	0.001 tpy	= (PM2.5 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
VOC PTE =	4.54E-04 tpy	= (VOC Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
NOx PTE =	0.03 tpy	= (NOx Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
SO2 PTE =	5.60E-05 tpy	= (SO2 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
CO PTE =	0.01 tpy	= (CO Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
CO2 PTE =	6 tpy	= (CO2 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
CH4 PTE =	2.38E-04 tpy	= (CH4 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
N2O PTE =	4.77E-05 tpy	= (N2O Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
CO2e PTE =	6 tpy	= (CO2e Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
H2SO4 PTE =	2.76E-06 tpy	= (H2SO4 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
Summary of Results										
	Potential Emissions									
	PM	PM10	PM2.5	VOC	NOx	SO2	CO	CO2e	H2SO4	
lb/hr-max =	0.01	0.01	0.01	0.01	0.53	0.001	0.11	118	5.51E-05	
tpy =	0.001	0.001	0.001	4.54E-04	0.03	5.60E-05	0.01	6	2.76E-06	
lb/hr-annualized =	1.55E-04	1.49E-04	1.40E-04	1.04E-04	0.01	1.28E-05	0.001	1.35	6.29E-07	

Source ID = 105		Diesel-Fired Emergency Generator Engines (Generator 2 - Telecom Hut)								
Parameter	Value	Units	Source / Basis							
Calculation Inputs										
Rated Horsepower =	67 bhp	Kohler KDI 3404TM								
PM EF =	4.94E-04 lb/bhp-hr	Manufacturer data sheet								
PM10 EF =	4.74E-04 lb/bhp-hr	PM10 = 96% of PM from AP-42, Table B.2-2, Category 1								
PM2.5 EF =	4.45E-04 lb/bhp-hr	PM2.5 = 90% of PM from AP-42, Table B.2-2, Category 1								
VOC EF =	1.81E-04 lb/bhp-hr	Manufacturer data sheet								
NOx EF =	6.06E-03 lb/bhp-hr	NMHC + NOx LAER limit of 2.83 g/bhp-hr converted to lb/bhp-hr EF minus VOC EF								
SO2 EF =	1.09E-05 lb/bhp-hr	Based on: fuel sulfur = 15 ppmw; 7,000 Btu/bhp-hr; fuel HHV = 19,300 Btu/lb								
CO EF =	1.48E-03 lb/bhp-hr	BACT limit of 0.67 g/bhp-hr converted to lb/bhp-hr EF								
CO2 EF =	1.14 lb/bhp-hr	40 CFR 98, Table C-1 (Fuel Oil No. 2) @ 7,000 Btu/bhp-hr								
CH4 EF =	4.63E-05 lb/bhp-hr	40 CFR 98, Table C-2 @ 7,000 Btu/bhp-hr								
N2O EF =	9.26E-06 lb/bhp-hr	40 CFR 98, Table C-2 @ 7,000 Btu/bhp-hr								
CO2e EF =	1.15 lb/bhp-hr	Sum of CO2, N2O, & CH4 adjusted for GWP								
H2SO4 EF =	5.35E-07 lb/bhp-hr	AP-42, Table 1.3-1; estimated based on SO3-to-SO2 emission ratio for distillate oil								
Annual Operating Hours =	100 hr/yr	Permit limit for non-emergency use; no limit on the hours of emergency use								
Hourly Emissions Calculations										
PM Hourly Max =	0.03 lb/hr	= (Rated Horsepower) x (PM EF)								
PM10 Hourly Max =	0.03 lb/hr	= (Rated Horsepower) x (PM10 EF)								
PM2.5 Hourly Max =	0.03 lb/hr	= (Rated Horsepower) x (PM2.5 EF)								
VOC Hourly Max =	0.01 lb/hr	= (Rated Horsepower) x (VOC EF)								
NOx Hourly Max =	0.41 lb/hr	= (Rated Horsepower) x (NOx EF)								
SO2 Hourly Max =	0.001 lb/hr	= (Rated Horsepower) x (SO2 EF)								
CO Hourly Max =	0.10 lb/hr	= (Rated Horsepower) x (CO EF)								
CO2 Hourly Max =	76 lb/hr	= (Rated Horsepower) x (CO2 EF)								
CH4 Hourly Max =	0.003 lb/hr	= (Rated Horsepower) x (CH4 EF)								
N2O Hourly Max =	0.001 lb/hr	= (Rated Horsepower) x (N2O EF)								
CO2e Hourly Max =	77 lb/hr	= (Rated Horsepower) x (CO2e EF)								
H2SO4 Hourly Max =	3.58E-05 lb/hr	= (Rated Horsepower) x (H2SO4 EF)								
Annual Emissions Calculations										
PM PTE =	0.002 tpy	= (PM Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
PM10 PTE =	0.002 tpy	= (PM10 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
PM2.5 PTE =	0.001 tpy	= (PM2.5 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
VOC PTE =	6.06E-04 tpy	= (VOC Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
NOx PTE =	0.02 tpy	= (NOx Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
SO2 PTE =	3.65E-05 tpy	= (SO2 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
CO PTE =	0.005 tpy	= (CO Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
CO2 PTE =	4 tpy	= (CO2 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
CH4 PTE =	1.55E-04 tpy	= (CH4 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
N2O PTE =	3.10E-05 tpy	= (N2O Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
CO2e PTE =	4 tpy	= (CO2e Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
H2SO4 PTE =	1.79E-06 tpy	= (H2SO4 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)								
Summary of Results										
	Potential Emissions									
	PM	PM10	PM2.5	VOC	NOx	SO2	CO	CO2e	H2SO4	
lb/hr-max =	0.03	0.03	0.03	0.01	0.41	0.001	0.10	77	3.58E-05	
tpy =	0.002	0.002	0.001	0.001	0.02	3.65E-05	0.005	4	1.79E-06	
lb/hr-annualized =	3.78E-04	3.63E-04	3.40E-04	1.38E-04	0.0046	8.32E-06	0.001	0.88	4.09E-07	

Source ID = 107		Natural Gas-Fired Emergency Generator Engines (Generator 3 - Lift Station)								
Parameter	Value	Units	Source / Basis							
Calculation Inputs										
Fuel Usage =	1,389	cfh	Manufacturer data sheet							
Heat Input =	1.42	MMBtu/hr	= (Fuel Usage) x (1020 Btu/scf) x (1 MMBtu/1,000,000 Btu)							
Rated Horsepower =	158	bhp	GM Vortec 5.7L							
PM EF =	9.50E-03	lb/MMBtu	AP-42, Table 3.2-3; 4-stroke rich burn engine							
PM10 EF =	0.019	lb/MMBtu	AP-42, Table 3.2-3; 4-stroke rich burn engine							
PM2.5 EF =	0.019	lb/MMBtu	AP-42, Table 3.2-3; 4-stroke rich burn engine							
VOC EF =	2.20E-03	lb/bhp-hr	LAER limit of 1.0 g/bhp-hr converted to lb/bhp-hr EF							
NOx EF =	4.41E-03	lb/bhp-hr	LAER limit of 2.0 g/bhp-hr converted to lb/bhp-hr EF							
SO2 EF =	5.88E-04	lb/MMBtu	AP-42, Table 3.2-3; 4-stroke rich burn engine							
CO EF =	1.56E-03	lb/bhp-hr	Manufacturer data sheet							
CO2 EF =	1.34	lb/bhp-hr	Manufacturer data sheet							
CH4 EF =	0.23	lb/MMBtu	AP-42, Table 3.2-3; 4-stroke rich burn engine							
N2O EF =	2.20E-04	lb/MMBtu	40 CFR 98, Table C-2							
H2SO4 EF =	2.89E-05	lb/MMBtu	AP-42, Table 1.3-1; estimated based on SO3-to-SO2 emission ratio for distillate oil							
Annual Operating Hours =	100	hr/yr	Permit limit for non-emergency use; no limit on the hours of emergency use							
Hourly Emissions Calculations										
PM Hourly Max =	0.01	lb/hr	= (Heat Input) x (PM EF)							
PM10 Hourly Max =	0.03	lb/hr	= (Heat Input) x (PM10 EF)							
PM2.5 Hourly Max =	0.03	lb/hr	= (Heat Input) x (PM2.5 EF)							
VOC Hourly Max =	0.35	lb/hr	= (Rated Horsepower) x (VOC EF)							
NOx Hourly Max =	0.70	lb/hr	= (Rated Horsepower) x (NOx EF)							
SO2 Hourly Max =	0.001	lb/hr	= (Heat Input) x (SO2 EF)							
CO Hourly Max =	0.25	lb/hr	= (Rated Horsepower) x (CO EF)							
CO2 Hourly Max =	212	lb/hr	= (Rated Horsepower) x (CO2 EF)							
CH4 Hourly Max =	0.33	lb/hr	= (Heat Input) x (CH4 EF)							
N2O Hourly Max =	3.12E-04	lb/hr	= (Heat Input) x (N2O EF)							
CO2e Hourly Max =	221	lb/hr	= Sum of CO2, N2O and CH4 emissions adjusted for NO2 and CH4 GWPs of 265 and 28							
H2SO4 Hourly Max =	4.10E-05	lb/hr	= (Heat Input) x (H2SO4 EF)							
Annual Emissions Calculations										
PM PTE =	0.001	tpy	= (PM Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
PM10 PTE =	0.001	tpy	= (PM10 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
PM2.5 PTE =	0.001	tpy	= (PM2.5 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
VOC PTE =	0.02	tpy	= (VOC Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
NOx PTE =	0.03	tpy	= (NOx Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
SO2 PTE =	4.17E-05	tpy	= (SO2 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
CO PTE =	0.01	tpy	= (CO Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
CO2 PTE =	11	tpy	= (CO2 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
CH4 PTE =	0.02	tpy	= (CH4 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
N2O PTE =	1.56E-05	tpy	= (N2O Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
CO2e PTE =	11	tpy	= (CO2e Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
H2SO4 PTE =	2.05E-06	tpy	= (H2SO4 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
Summary of Results										
	Potential Emissions									
	PM	PM10	PM2.5	VOC	NOx	SO2	CO	CO2e	H2SO4	
lb/hr-max =	0.01	0.03	0.03	0.35	0.70	0.001	0.25	221	4.10E-05	
tpy =	0.001	0.001	0.001	0.02	0.03	4.17E-05	0.01	11	2.05E-06	
lb/hr-annualized =	1.54E-04	3.14E-04	3.14E-04	0.004	0.01	9.51E-06	0.003	2.52	4.68E-07	

Source ID = 107		Natural Gas-Fired Emergency Generator Engines (Generator 4 - Lift Station)								
Parameter	Value	Units	Source / Basis							
Calculation Inputs										
Fuel Usage =	366	cfh	Manufacturer data sheet							
Heat Input =	0.37	MMBtu/hr	= (Fuel Usage) x (1020 Btu/scf) x (1 MMBtu/1,000,000 Btu)							
Rated Horsepower =	50	bhp	GM Vortec 3.0L							
PM EF =	7.71E-05	lb/MMBtu	AP-42, Table 3.2-2; 4-stroke lean burn engine							
PM10 EF =	9.99E-03	lb/MMBtu	AP-42, Table 3.2-2; 4-stroke lean burn engine							
PM2.5 EF =	9.99E-03	lb/MMBtu	AP-42, Table 3.2-2; 4-stroke lean burn engine							
VOC EF =	0.118	lb/MMBtu	AP-42, Table 3.2-2; 4-stroke lean burn engine							
NOx EF =	1.47	lb/MMBtu	NOx + VOC LAER limit of 5.39 g/bhp-hr converted to lb/MMBtu EF minus VOC EF							
SO2 EF =	5.88E-04	lb/MMBtu	AP-42, Table 3.2-2; 4-stroke lean burn engine							
CO EF =	5.37E-02	lb/bhp-hr	Manufacturer data sheet							
CO2 EF =	1.46	lb/bhp-hr	Manufacturer data sheet							
CH4 EF =	1.25	lb/MMBtu	AP-42, Table 3.2-2; 4-stroke lean burn engine							
N2O EF =	2.20E-04	lb/MMBtu	40 CFR 98, Table C-2							
H2SO4 EF =	2.89E-05	lb/MMBtu	AP-42, Table 1.3-1; estimated based on SO3-to-SO2 emission ratio for distillate oil							
Annual Operating Hours =	100	hr/yr	Permit limit for non-emergency use; no limit on the hours of emergency use							
Hourly Emissions Calculations										
PM Hourly Max =	2.88E-05	lb/hr	= (Heat Input) x (PM EF)							
PM10 Hourly Max =	0.004	lb/hr	= (Heat Input) x (PM10 EF)							
PM2.5 Hourly Max =	0.004	lb/hr	= (Heat Input) x (PM2.5 EF)							
VOC Hourly Max =	0.04	lb/hr	= (Heat Input) x (VOC EF)							
NOx Hourly Max =	0.55	lb/hr	= (Heat Input) x (NOx EF)							
SO2 Hourly Max =	2.20E-04	lb/hr	= (Heat Input) x (SO2 EF)							
CO Hourly Max =	2.69	lb/hr	= (Rated Horsepower) x (CO EF)							
CO2 Hourly Max =	73	lb/hr	= (Rated Horsepower) x (CO2 EF)							
CH4 Hourly Max =	0.47	lb/hr	= (Heat Input) x (CH4 EF)							
N2O Hourly Max =	8.23E-05	lb/hr	= (Heat Input) x (N2O EF)							
CO2e Hourly Max =	86	lb/hr	= Sum of CO2, N2O and CH4 emissions adjusted for NO2 and CH4 GWPs of 265 and 28							
H2SO4 Hourly Max =	1.08E-05	lb/hr	= (Heat Input) x (H2SO4 EF)							
Annual Emissions Calculations										
PM PTE =	1.44E-06	tpy	= (PM Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
PM10 PTE =	1.86E-04	tpy	= (PM10 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
PM2.5 PTE =	1.86E-04	tpy	= (PM2.5 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
VOC PTE =	0.002	tpy	= (VOC Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
NOx PTE =	0.03	tpy	= (NOx Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
SO2 PTE =	1.10E-05	tpy	= (SO2 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
CO PTE =	0.13	tpy	= (CO Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
CO2 PTE =	4	tpy	= (CO2 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
CH4 PTE =	0.02	tpy	= (CH4 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
N2O PTE =	4.12E-06	tpy	= (N2O Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
CO2e PTE =	4	tpy	= (CO2e Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
H2SO4 PTE =	5.40E-07	tpy	= (H2SO4 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
Summary of Results										
	Potential Emissions									
	PM	PM10	PM2.5	VOC	NOx	SO2	CO	CO2e	H2SO4	
lb/hr-max =	2.88E-05	0.004	0.004	0.04	0.55	2.20E-04	2.69	86	1.08E-05	
tpy =	1.44E-06	1.86E-04	1.86E-04	0.002	0.03	1.10E-05	0.13	4	5.40E-07	
lb/hr-annualized =	3.29E-07	4.26E-05	4.26E-05	0.001	0.01	2.51E-06	0.03	0.98	1.23E-07	

Emergency Generator Engine HAP Emission Calculations

Engine Parameters	Generator 1 - Parking Garage	Generator 2 - Telecom Hut	Generator 3 - Lift Station	Generator 4 - Lift Station
Size (bhp)	103	67	158	50
Fuel Fired	Diesel	Diesel	Natural gas, 4-stroke rich burn	Natural gas, 4-stroke lean burn
Heat Input (MMBtu/hr)	-	-	1.42	0.37
Hours of Operation (hr/yr)	100	100	100	100

Pollutant		Emission Factor (lb/MMBtu)			Emission Factor (lb/hp-hr)	HAP Emissions by Engine (tpy)			
			Natural Gas, 4-Stroke Rich Burn ^b	Natural Gas, 4-Stroke Lean Burn ^c		Generator 1 - Parking Garage	Generator 2 - Telecom Hut	Generator 3 - Lift Station	Generator 4 - Lift Station
	\$112 HAP?	Diesel ^a			Diesel ^a				
Benzene	YES	9.33E-04	1.58E-03	4.40E-04	6.53E-06	3.36E-05	2.19E-05	1.12E-04	8.21E-06
Toluene	YES	4.09E-04	5.58E-04	4.08E-04	2.86E-06	1.47E-05	9.59E-06	3.95E-05	7.62E-06
Xylenes	YES	2.85E-04	1.95E-04	1.84E-04	2.00E-06	1.03E-05	6.68E-06	1.38E-05	3.43E-06
Propylene	NO	2.58E-03	-	-	1.81E-05	9.30E-05	6.05E-05	-	-
1,3-Butadiene	YES	3.91E-05	6.63E-04	2.67E-04	2.74E-07	1.41E-06	9.17E-07	4.70E-05	4.98E-06
Formaldehyde	YES	1.18E-03	2.05E-02	5.28E-02	8.26E-06	4.25E-05	2.77E-05	1.45E-03	9.86E-04
Acetaldehyde	YES	7.67E-04	2.79E-03	8.36E-03	5.37E-06	2.77E-05	1.80E-05	1.98E-04	1.56E-04
Acrolein	YES	9.25E-05	2.63E-03	5.14E-03	6.48E-07	3.33E-06	2.17E-06	1.86E-04	9.59E-05
Naphthalene	YES / PAH	8.48E-05	9.71E-05	7.44E-05	5.94E-07	3.06E-06	1.99E-06	6.88E-06	1.39E-06
PAH	YES	1.68E-04	1.41E-04	2.69E-05	1.18E-06	6.06E-06	3.94E-06	9.99E-06	5.02E-07
Acenaphthylene	YES / PAH	5.06E-06	-	5.53E-06	3.54E-08	1.82E-07	1.19E-07	-	1.03E-07
Acenaphthene	YES / PAH	1.42E-06	-	1.25E-06	9.94E-09	5.12E-08	3.33E-08	-	2.33E-08
Anthracene	YES / PAH	1.87E-06	-	-	1.31E-08	6.74E-08	4.39E-08	-	-
Benzo(a)anthracene	YES / PAH	1.68E-06	-	-	1.18E-08	6.06E-08	3.94E-08	-	-
Benzo(b)fluoranthene	YES / PAH	9.91E-08	-	1.66E-07	6.94E-10	3.57E-09	2.32E-09	-	3.10E-09
Benzo(k)fluoranthene	YES / PAH	1.55E-07	-	-	1.09E-09	5.59E-09	3.63E-09	-	-
Benzo(a)pyrene	YES / PAH	1.88E-07	-	-	1.32E-09	6.78E-09	4.41E-09	-	-
Benzo(e)pyrene	YES / PAH	-	-	4.15E-07	-	-	-	-	7.75E-09
Benzo(g,h,i)perylene	YES / PAH	4.89E-07	-	4.14E-07	3.42E-09	1.76E-08	1.15E-08	-	7.73E-09
Biphenyl	YES / PAH	-	-	2.12E-04	-	-	-	-	3.96E-06
Butane	NO	-	-	5.41E-04	-	-	-	-	1.01E-05
Butyr/Isobutyraldehyde	NO	-	4.86E-05	1.01E-04	-	-	-	3.44E-06	1.89E-06
Carbon Tetrachloride	YES	-	1.77E-05	3.67E-05	-	-	-	1.25E-06	6.85E-07
Chlorobenzene	YES	-	1.29E-05	3.04E-05	-	-	-	9.14E-07	5.67E-07
Chloroethane	NO	-	-	1.87E-06	-	-	-	-	3.49E-08
Chloroform	YES	-	1.37E-05	2.85E-05	-	-	-	9.70E-07	5.32E-07
Chrysene	YES / PAH	3.53E-07	-	6.93E-07	2.47E-09	1.27E-08	8.28E-09	-	1.29E-08
Cyclopentane	NO	-	-	2.27E-04	-	-	-	-	4.24E-06
Dibenzo(a,h)anthracene	YES / PAH	5.83E-07	-	-	4.08E-09	2.10E-08	1.37E-08	-	-
Ethane	NO	-	7.04E-02	1.05E-01	-	-	-	4.99E-03	1.96E-03
Ethylbenzene	YES	-	2.48E-05	3.97E-05	-	-	-	1.76E-06	7.41E-07

Pollutant		Emission Factor (lb/MMBtu)			Emission Factor (lb/hp-hr)	HAP Emissions by Engine (tpy)			
		Diesel ^a	Natural Gas, 4-Stroke Rich Burn ^b	Natural Gas, 4-Stroke Lean Burn ^c	Diesel ^a	Generator 1 - Parking Garage	Generator 2 - Telecom Hut	Generator 3 - Lift Station	Generator 4 - Lift Station
Ethylene Dibromide	YES	-	2.13E-05	4.43E-05	-	-	-	1.51E-06	8.27E-07
Fluoranthene	YES / PAH	7.61E-06	-	1.11E-06	5.33E-08	2.74E-07	1.78E-07	-	2.07E-08
Fluorene	YES / PAH	2.92E-05	-	5.67E-06	2.04E-07	1.05E-06	6.85E-07	-	1.06E-07
Methanol	YES	-	3.06E-03	2.50E-03	-	-	-	2.17E-04	4.67E-05
Methylcyclohexane	NO	-	-	1.23E-03	-	-	-	-	2.30E-05
Methylene Chloride	YES	-	4.12E-05	2.00E-05	-	-	-	2.92E-06	3.73E-07
n-Hexane	YES	-	-	1.11E-03	-	-	-	-	2.07E-05
n-Nonane	NO	-	-	1.10E-04	-	-	-	-	2.05E-06
n-Octane	NO	-	-	3.51E-04	-	-	-	-	6.55E-06
Indeno(1,2,3-cd)pyrene	YES / PAH	3.75E-07	-	-	2.63E-09	1.35E-08	8.79E-09	-	-
Pentane	NO	-	-	2.60E-03	-	-	-	-	4.85E-05
Perchloroethylene	YES	-	-	2.48E-06	-	-	-	-	4.63E-08
Phenanthrene	YES / PAH	2.94E-05	-	1.04E-05	2.06E-07	1.06E-06	6.89E-07	-	1.94E-07
Phenol	YES	-	-	2.40E-05	-	-	-	-	4.48E-07
Propane	NO	-	-	4.19E-02	-	-	-	-	7.82E-04
Pyrene	YES / PAH	4.78E-06	-	1.36E-06	3.35E-08	1.72E-07	1.12E-07	-	2.54E-08
Styrene	YES	-	1.19E-05	2.36E-05	-	-	-	8.43E-07	4.41E-07
Vinyl Chloride	YES	-	7.18E-06	1.49E-05	-	-	-	5.09E-07	2.78E-07
1,1,2,2-Tetrachloroethane	YES	-	2.53E-05	4.00E-05	-	-	-	1.79E-06	7.47E-07
1,1,2-Trichloroethane	YES	-	1.53E-05	3.18E-05	-	-	-	1.08E-06	5.94E-07
1,1-Dichloroethane	NO	-	1.13E-05	2.36E-05	-	-	-	8.00E-07	4.41E-07
1,2,3-Trimethylbenzene	NO	-	-	2.30E-05	-	-	-	-	4.29E-07
1,2,4-Trimethylbenzene	NO	-	-	1.43E-05	-	-	-	-	2.67E-07
1,2-Dichloroethane	NO	-	1.13E-05	2.36E-05	-	-	-	8.00E-07	4.41E-07
1,2-Dichloropropane	NO	-	1.30E-05	2.69E-05	-	-	-	9.21E-07	5.02E-07
1,3,5-Trimethylbenzene	NO	-	-	3.38E-05	-	-	-	-	6.31E-07
1,3-Dichloropropene	YES	-	1.27E-05	2.64E-05	-	-	-	9.00E-07	4.93E-07
2-Methylnaphthalene	YES / PAH	-	-	3.32E-05	-	-	-	-	6.20E-07
2,2,4-Trimethylpentane	YES	-	-	2.50E-04	-	-	-	-	4.67E-06
Total §112 HAPs						1.40E-04	9.08E-05	0.002	0.001

^aEmission factors from AP-42, Section 3.3 Gasoline and Diesel Industrial Engines, Table 3.3-2 Speciated Organic Compound Emission Factors for Uncontrolled Diesel Engines. Average brake-specific fuel consumption of 7,000 Btu/hp-hr was used to convert from lb/MMBtu to lb/hp-hr.

^bEmission factors from AP-42, Section 3.2 Natural Gas-fired Reciprocating Engines, Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines.

^cEmission factors from AP-42, Section 3.2 Natural Gas-fired Reciprocating Engines, Table 3.2-2 Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines.

Source ID = 106		Fire Pump Engines (Firewater Pump 1)								
Parameter	Value	Units	Source / Basis							
Calculation Inputs										
Rated Horsepower =	488 bhp		Cummins CFP15E-F10							
PM EF =	3.31E-04 lb/bhp-hr		NSPS Subpart IIII limit							
PM10 EF =	3.17E-04 lb/bhp-hr		PM10 = 96% of PM from AP-42, Table B.2-2, Category 1							
PM2.5 EF =	2.98E-04 lb/bhp-hr		PM2.5 = 90% of PM from AP-42, Table B.2-2, Category 1							
VOC EF =	2.51E-03 lb/bhp-hr		AP-42, Table 3.3-1							
NOx EF =	4.10E-03 lb/bhp-hr		NSPS Subpart IIII NMHC + NOx limit of 3.0 g/bhp-hr converted to lb/bhp-hr EF minus VOC EF							
SO2 EF =	1.09E-05 lb/bhp-hr		Based on: fuel sulfur = 15 ppmw; 7,000 Btu/bhp-hr; fuel HHV = 19,300 Btu/lb							
CO EF =	5.73E-03 lb/bhp-hr		NSPS Subpart IIII CO limit of 2.6 g/bhp-hr converted to lb/bhp-hr EF							
CO2 EF =	1.14 lb/bhp-hr		40 CFR 98, Table C-1 (Fuel Oil No. 2) @ 7,000 Btu/bhp-hr							
CH4 EF =	4.63E-05 lb/bhp-hr		40 CFR 98, Table C-2 @ 7,000 Btu/bhp-hr							
N2O EF =	9.26E-06 lb/bhp-hr		40 CFR 98, Table C-2 @ 7,000 Btu/bhp-hr							
CO2e EF =	1.15 lb/bhp-hr		Sum of CO2, N2O, & CH4 adjusted for GWP							
H2SO4 EF =	5.35E-07 lb/bhp-hr		AP-42, Table 1.3-1; estimated based on SO3-to-SO2 emission ratio for distillate oil							
Annual Operating Hours =	100 hr/yr		Permit limit for non-emergency use; no limit on the hours of emergency use							
Hourly Emissions Calculations										
PM Hourly Max =	0.16 lb/hr		= (Rated Horsepower) x (PM EF)							
PM10 Hourly Max =	0.15 lb/hr		= (Rated Horsepower) x (PM10 EF)							
PM2.5 Hourly Max =	0.15 lb/hr		= (Rated Horsepower) x (PM2.5 EF)							
VOC Hourly Max =	1.23 lb/hr		= (Rated Horsepower) x (VOC EF)							
NOx Hourly Max =	2.00 lb/hr		= (Rated Horsepower) x (NOx EF)							
SO2 Hourly Max =	0.01 lb/hr		= (Rated Horsepower) x (SO2 EF)							
CO Hourly Max =	2.80 lb/hr		= (Rated Horsepower) x (CO EF)							
CO2 Hourly Max =	557 lb/hr		= (Rated Horsepower) x (CO2 EF)							
CH4 Hourly Max =	0.02 lb/hr		= (Rated Horsepower) x (CH4 EF)							
N2O Hourly Max =	0.005 lb/hr		= (Rated Horsepower) x (N2O EF)							
CO2e Hourly Max =	559 lb/hr		= (Rated Horsepower) x (CO2e EF)							
H2SO4 Hourly Max =	2.61E-04 lb/hr		= (Rated Horsepower) x (H2SO4 EF)							
Annual Emissions Calculations										
PM PTE =	0.01 tpy		= (PM Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
PM10 PTE =	0.01 tpy		= (PM10 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
PM2.5 PTE =	0.01 tpy		= (PM2.5 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
VOC PTE =	0.06 tpy		= (VOC Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
NOx PTE =	0.10 tpy		= (NOx Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
SO2 PTE =	2.65E-04 tpy		= (SO2 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
CO PTE =	0.14 tpy		= (CO Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
CO2 PTE =	28 tpy		= (CO2 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
CH4 PTE =	0.001 tpy		= (CH4 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
N2O PTE =	2.26E-04 tpy		= (N2O Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
CO2e PTE =	28 tpy		= (CO2e Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
H2SO4 PTE =	1.31E-05 tpy		= (H2SO4 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
Summary of Results										
	Potential Emissions									
	PM	PM10	PM2.5	VOC	NOx	SO2	CO	CO2e	H2SO4	
lb/hr-max =	0.16	0.15	0.15	1.23	2.00	0.01	2.80	559	2.61E-04	
tpy =	0.01	0.01	0.01	0.06	0.10	2.65E-04	0.14	28	1.31E-05	
lb/hr-annualized =	0.002	0.002	0.002	0.01	0.02	6.06E-05	0.03	6.38	2.98E-06	

Source ID = 106		Fire Pump Engines (Firewater Pump 2)								
Parameter	Value	Units	Source / Basis							
Calculation Inputs										
Rated Horsepower =	488 bhp		Cummins CFP15E-F10							
PM EF =	3.31E-04 lb/bhp-hr		NSPS Subpart IIII limit							
PM10 EF =	3.17E-04 lb/bhp-hr		PM10 = 96% of PM from AP-42, Table B.2-2, Category 1							
PM2.5 EF =	2.98E-04 lb/bhp-hr		PM2.5 = 90% of PM from AP-42, Table B.2-2, Category 1							
VOC EF =	2.51E-03 lb/bhp-hr		AP-42, Table 3.3-1							
NOx EF =	4.10E-03 lb/bhp-hr		NSPS Subpart IIII NMHC + NOx limit of 3.0 g/bhp-hr converted to lb/bhp-hr EF minus VOC EF							
SO2 EF =	1.09E-05 lb/bhp-hr		Based on: fuel sulfur = 15 ppmw; 7,000 Btu/bhp-hr; fuel HHV = 19,300 Btu/lb							
CO EF =	5.73E-03 lb/bhp-hr		NSPS Subpart IIII CO limit of 2.6 g/bhp-hr converted to lb/bhp-hr EF							
CO2 EF =	1.14 lb/bhp-hr		40 CFR 98, Table C-1 (Fuel Oil No. 2) @ 7,000 Btu/bhp-hr							
CH4 EF =	4.63E-05 lb/bhp-hr		40 CFR 98, Table C-2 @ 7,000 Btu/bhp-hr							
N2O EF =	9.26E-06 lb/bhp-hr		40 CFR 98, Table C-2 @ 7,000 Btu/bhp-hr							
CO2e EF =	1.15 lb/bhp-hr		Sum of CO2, N2O, & CH4 adjusted for GWP							
H2SO4 EF =	5.35E-07 lb/bhp-hr		AP-42, Table 1.3-1; estimated based on SO3-to-SO2 emission ratio for distillate oil							
Annual Operating Hours =	100 hr/yr		Permit limit for non-emergency use; no limit on the hours of emergency use							
Hourly Emissions Calculations										
PM Hourly Max =	0.16 lb/hr		= (Rated Horsepower) x (PM EF)							
PM10 Hourly Max =	0.15 lb/hr		= (Rated Horsepower) x (PM10 EF)							
PM2.5 Hourly Max =	0.15 lb/hr		= (Rated Horsepower) x (PM2.5 EF)							
VOC Hourly Max =	1.23 lb/hr		= (Rated Horsepower) x (VOC EF)							
NOx Hourly Max =	2.00 lb/hr		= (Rated Horsepower) x (NOx EF)							
SO2 Hourly Max =	0.01 lb/hr		= (Rated Horsepower) x (SO2 EF)							
CO Hourly Max =	2.80 lb/hr		= (Rated Horsepower) x (CO EF)							
CO2 Hourly Max =	557 lb/hr		= (Rated Horsepower) x (CO2 EF)							
CH4 Hourly Max =	0.02 lb/hr		= (Rated Horsepower) x (CH4 EF)							
N2O Hourly Max =	0.005 lb/hr		= (Rated Horsepower) x (N2O EF)							
CO2e Hourly Max =	559 lb/hr		= (Rated Horsepower) x (CO2e EF)							
H2SO4 Hourly Max =	2.61E-04 lb/hr		= (Rated Horsepower) x (H2SO4 EF)							
Annual Emissions Calculations										
PM PTE =	0.01 tpy		= (PM Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
PM10 PTE =	0.01 tpy		= (PM10 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
PM2.5 PTE =	0.01 tpy		= (PM2.5 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
VOC PTE =	0.06 tpy		= (VOC Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
NOx PTE =	0.10 tpy		= (NOx Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
SO2 PTE =	2.65E-04 tpy		= (SO2 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
CO PTE =	0.14 tpy		= (CO Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
CO2 PTE =	28 tpy		= (CO2 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
CH4 PTE =	0.001 tpy		= (CH4 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
N2O PTE =	2.26E-04 tpy		= (N2O Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
CO2e PTE =	28 tpy		= (CO2e Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
H2SO4 PTE =	1.31E-05 tpy		= (H2SO4 Hourly Max) x (Annual Operating Hours) / (2000 lb/ton)							
Summary of Results										
	Potential Emissions									
	PM	PM10	PM2.5	VOC	NOx	SO2	CO	CO2e	H2SO4	
lb/hr-max =	0.16	0.15	0.15	1.23	2.00	0.01	2.80	559	2.61E-04	
tpy =	0.01	0.01	0.01	0.06	0.10	2.65E-04	0.14	28	1.31E-05	
lb/hr-annualized =	0.002	0.002	0.002	0.01	0.02	6.06E-05	0.03	6.38	2.98E-06	

Fire Pump Engine HAP Emission Calculations

Engine Parameters	Firewater Pump 1	Firewater Pump 2
Size (bhp)	488	488
Fuel Fired	Diesel	Diesel
Heat Input (MMBtu/hr)	-	-
Hours of Operation (hr/yr)	100	100

Pollutant		Emission Factor (lb/MMBtu)	Emission Factor (lb/hp-hr)	HAP Emissions by Engine (tpy)	
		Diesel ^a	Diesel ^a	Firewater Pump 1	Firewater Pump 2
Benzene	YES	9.33E-04	6.53E-06	1.59E-04	1.59E-04
Toluene	YES	4.09E-04	2.86E-06	6.99E-05	6.99E-05
Xylenes	YES	2.85E-04	2.00E-06	4.87E-05	4.87E-05
Propylene	NO	2.58E-03	1.81E-05	4.41E-04	4.41E-04
1,3-Butadiene	YES	3.91E-05	2.74E-07	6.68E-06	6.68E-06
Formaldehyde	YES	1.18E-03	8.26E-06	2.02E-04	2.02E-04
Acetaldehyde	YES	7.67E-04	5.37E-06	1.31E-04	1.31E-04
Acrolein	YES	9.25E-05	6.48E-07	1.58E-05	1.58E-05
Naphthalene	YES / PAH	8.48E-05	5.94E-07	1.45E-05	1.45E-05
PAH	YES	1.68E-04	1.18E-06	2.87E-05	2.87E-05
Acenaphthylene	YES / PAH	5.06E-06	3.54E-08	8.64E-07	8.64E-07
Acenaphthene	YES / PAH	1.42E-06	9.94E-09	2.43E-07	2.43E-07
Anthracene	YES / PAH	1.87E-06	1.31E-08	3.19E-07	3.19E-07
Benzo(a)anthracene	YES / PAH	1.68E-06	1.18E-08	2.87E-07	2.87E-07
Benzo(b)fluoranthene	YES / PAH	9.91E-08	6.94E-10	1.69E-08	1.69E-08
Benzo(k)fluoranthene	YES / PAH	1.55E-07	1.09E-09	2.65E-08	2.65E-08
Benzo(a)pyrene	YES / PAH	1.88E-07	1.32E-09	3.21E-08	3.21E-08
Benzo(g,h,i)perylene	YES / PAH	4.89E-07	3.42E-09	8.35E-08	8.35E-08
Chrysene	YES / PAH	3.53E-07	2.47E-09	6.03E-08	6.03E-08
Dibenzo(a,h)anthracene	YES / PAH	5.83E-07	4.08E-09	9.96E-08	9.96E-08
Fluoranthene	YES / PAH	7.61E-06	5.33E-08	1.30E-06	1.30E-06
Fluorene	YES / PAH	2.92E-05	2.04E-07	4.99E-06	4.99E-06
Indeno(1,2,3-cd)pyrene	YES / PAH	3.75E-07	2.63E-09	6.41E-08	6.41E-08
Phenanthrene	YES / PAH	2.94E-05	2.06E-07	5.02E-06	5.02E-06
Pyrene	YES / PAH	4.78E-06	3.35E-08	8.16E-07	8.16E-07
			Total §112 HAPs	6.62E-04	6.62E-04

^aEmission factors from AP-42, Section 3.3 Gasoline and Diesel Industrial Engines, Table 3.3-2 Speciated Organic Compound Emission Factors for Uncontrolled Diesel Engines. Average brake-specific fuel consumption of 7,000 Btu/hp-hr was used to convert from lb/MMBtu to lb/hp-hr.

Source ID = 202 Polyethylene Manufacturing Lines (PE Units 1 and 2 Process Vent Particulate Emissions)							
Vent Descriptions	Control Device IDs	Exhaust Grain Loading (gr/dscf/source)	Hours of Operation (hr/yr/source)	Short Term Max Exhaust Rate (Nm3/hr/source)	Normal Exhaust Rate (Nm3/hr/source)	24-hr Avg PM/PM10/PM2.5 Emission Rate (lb/hr/line)	Annual PM/PM10/PM2.5 Emission Rate (T/yr/line)
Catalyst Vent Filter Vents	PE Unit 1: S-24901 PE Unit 2: S-34901	0.005	100	323	221	0.009	3.0E-04
Granular Resin Surge Hopper Filter Vents	PE Unit 1: S-26211 PE Unit 2: S-36211	N/A	8,760	N/A	N/A	0.042	0.183
Bag Dump Station/Dump Hopper Filter Vents	PE Unit 1: S-26280, S-26281, S-26282, S-26283, S-26284 PE Unit 2: S-36280, S-36281, S-36282, S-36283, S-36284	0.005	1,314	700	700	0.095	0.062
Talc Surge Bin Filter Vents	PE Unit 1: S-26251 PE Unit 2: S-36251	0.005	8,760	29	29	0.001	0.003
Mixer Feed Hopper Filter Vents	PE Unit 1: S-26248 PE Unit 2: S-36248	N/A	8,760	N/A	N/A	0.001	0.004
Pellet Dryer Vents	PE Unit 1: None PE Unit 2: None	N/A	8,760	N/A	N/A	0.152	0.664
Additive Surge Bin Filter Vents	PE Unit 1: S-26261, S-26262, S-26263, S-26264, S-26265 PE Unit 2: S-36261, S-36262, S-36263, S-36264, S-36265	0.005	8,760	78	78	0.011	0.046
Solid Additive/Talc Feeder Filter Vents	PE Unit 1: S-26266, S-26267, S-26270, S-26271, S-26272, S-26285 PE Unit 2: S-36266, S-36267, S-36270, S-36271, S-36272, S-36285	0.005	8,760	29	29	0.005	0.021
Pellet Surge Hopper Filter Vents	PE Unit 1: S-28006 PE Unit 2: S-38006	0.005	8,760	1,037	1,037	0.028	0.123
Seed Bed Conveying Receiving Bin Filter Vents	PE Unit 1: S-25607 PE Unit 2: S-35607	0.005	288	487	487	0.013	0.002
Seed Resin Storage Bin Filter Vents	PE Unit 1: S-25651, S-25652 PE Unit 2: S-35651, S-35652	0.005	288	400	400	0.022	0.003
Catalyst Hold Tank Filter Vents	PE Unit 1: Y-24095A, Y-24095B PE Unit 2: Y-34095A, Y-34095B	0.005	150	34	17	0.002	6.9E-05
Talc Storage Silo Filter Vent	PE Units 1/2: S-36225	0.005	2,920	275	275	0.004	0.005
Vacuum Cleaning System Filter Vent	PE Units 1/2: K-39821	0.005	26	680	680	0.009	1.2E-04
Total per Line =						0.39	1.12
Total Line 1 + Line 2 =						0.78	2.24

Notes:

- Short term and annual rates based on exhaust rates provided by vendor at normal conditions (i.e., 0°C and 1 atm) and exhaust grain loading (BACT/LAER limit) for filterable particulate at standard conditions (i.e., 20°C and 1 atm).
- Vendor data for the Additive Surge Bin Filter Vents, Solid Additive/Talc Feeder Filter Vents, Pellet Surge Hopper Filter Vents, and Miscellaneous Storage and Conveying Filter Vents indicated that particulate emissions from these sources are expected to be negligible/nil. However, the vents were conservatively included for potential to emit purposes and assumed to emit continuously at an exhaust grain loading of 0.005 gr/dscf.

<i>Source ID = 202 Polyethylene Manufacturing Lines (PE Unit 3 Process Vent Particulate Emissions)</i>							
Vent Descriptions	Control Device IDs	Exhaust Grain Loading (gr/dscf)	Hours of Operation (hr/yr)	Short Term Max Exhaust Rate (Nm3/hr)	Normal Exhaust Rate (Nm3/hr)	24-hr Avg PM/PM10/PM2.5 Emission Rate (lb/hr)	Annual PM/PM10/PM2.5 Emission Rate (T/yr)
Catalyst Activator A Filter (External) Vent	S-42003A	0.002	6,132	485	200	0.005	0.007
Catalyst Activator B Filter (External) Vent	S-42003B	0.002	6,132	485	200	0.005	0.007
Additive Unloading Station A Filter Vent	S-46004A	0.005	8,760	700	700	0.019	0.083
Additive Unloading Station B Filter Vent	S-46004B	0.005	8,760	700	700	0.019	0.083
Additive Unloading Station C Filter Vent	S-46004C	0.005	8,760	700	700	0.019	0.083
Additive Unloading Station D Filter Vent	S-46004D	0.005	8,760	700	700	0.019	0.083
FIBC Compactor Filter Vent	S-46005	0.005	122	2,000	2,000	0.054	0.003
Additive Feeder A Filter Vent	Q-46002A	0.005	8,760	75	75	0.002	0.009
Additive Feeder B Filter Vent	Q-46002B	0.005	8,760	75	75	0.002	0.009
Additive Feeder C Filter Vent	Q-46002C	0.005	8,760	75	75	0.002	0.009
Additive Feeder D Filter Vent	Q-46002D	0.005	8,760	75	75	0.002	0.009
Extruder Filter Vent	S-46003	0.005	8,760	920	920	0.025	0.109
Pellet Dryer Vent	None	0.01	8,760	24,700	24,700	0.156	0.682
Vacuum Cleaning System Filter Vent	S-46010	0.005	26	846	846	0.023	3.0E-04
Totals =						0.35	1.18

Notes:

- Short term and annual rates based on exhaust rates provided by vendor at normal conditions (i.e., 0°C and 1 atm) and exhaust grain loading (BACT/LAER limit) for filterable particulate at standard conditions (i.e., 20°C and 1 atm).

Source ID = 202 Polyethylene Manufacturing Lines (PE Units 1 - 3 Process Vent CrVI Emissions)									
Unit Description	Control Device IDs	Exhaust Grain Loading (gr/dscf)	Hours of Operation (hr/yr)	Short Term Max Exhaust Rate (Nm3/hr)	Normal Exhaust Rate (Nm3/hr)	CrVI (% by wt)	24-hr Avg CrVI Emission Rate (lb/hr)	Annualized Avg CrVI Emission Rate (lb/hr)	Annual CrVI Emission Rate (T/yr)
PE Unit 1 Catalyst Vent Filter Vent	S-24901	0.005	100	323	221	0.6	5.25E-05	4.10E-07	1.80E-06
PE Unit 2 Catalyst Vent Filter Vent	S-34901	0.005	100	323	221	0.6	5.25E-05	4.10E-07	1.80E-06
PE Unit 3 Catalyst Activator A Filter (External) Vent	S-42003A	0.002	6,132	485	200	1	5.26E-05	1.52E-05	6.64E-05
PE Unit 3 Catalyst Activator B Filter (External) Vent	S-42003B	0.002	6,132	485	200	1	5.26E-05	1.52E-05	6.64E-05

Source ID = 202 Polyethylene Manufacturing Lines (Railcar to Truck Talc Transfer Particulate Emissions)

Input Variables

Parameter	Value	Units	Comments
Truck Vent Dust Loading	0.01	gr/dscf	Conservative estimate
Conveyance Gas Flow Rate	1,000	ft3/min	Estimated to equal 800 to 1,000 ft3/min
Load Duration	60	minutes/truck	Email 3/27/18 Snyder to May
Truck Loads/Railcar	4	trucks/railcar	Email 3/27/18 Snyder to May
Railcar Deliveries per Year	90	railcars/yr	Updated to 1 truck/day which scales to ~90 railcars/yr
grains/lb	7,000	gr/lb	Unit conversion

Output Calculations PM/PM10/PM2.5

Max short-term emission rate	0.09	lb/hr	=Conveyance Gas Flow Rate*60 min/hr*Truck Vent Dust Loading/(grains/lb)
Avg 24-hr emission rate	0.01	lb/hr	=Max short-term emission rate*Load Duration/(60 min/hr)*Truck Loads/Railcar/(24 hrs/day)
Annual emission rate	30.86	lb/yr	=Max short-term emission rate*Load Duration/(60 min/hr)*Truck Loads/Railcar*Railcar Deliveries per Year
Annual emission rate	0.02	T/yr	=Annual emission rate (lb/yr)/(2,000 lb/T)
Annualized hourly rate	0.004	lb/hr	=Annual emission rate (lb/yr)/(8,760 hr/yr)

Notes:

Assume PM=PM10=PM2.5

Source ID = 203 Process Cooling Tower		
Parameter	Value	Source / Basis
Calculation Inputs		
Number of Cells =	26	Design specification
Cell Circulation Rate =	11,381 gal/min/cell	= (Cooling Water Rate)/(Number of Cells)
Annual Operating Hours =	8,760 hr/yr	Maximum potential use
Drift Loss Factor =	0.0005% wt. %	Design specification = BACT limit
Cooling Water Rate =	295,900 gal/min	Maximum water flow rate
Cooling Water TDS =	2,000 ppmw	BACT/LAER limit (12-month rolling average basis)
VOC Emission Limit =	0.50 lb/MMgal	LAER limit
OHAP Fraction of VOC =	2.5% wt. %	Assumed value based on engineering judgement. There are few HAP-containing streams in the processes and any exchanger leaks will be repaired in a timely manner due to leak monitoring and repair requirements. If there is a HAP-containing stream leak, worst case is C3+ coproduct.
Calculation Results		
Hourly VOC PTE [per cell] =	0.34 lb/hr	= (Cell Circulation Rate) x (60 min/hr) x (VOC Emission Limit - lb/MMGal) / (1,000,000)
Annual VOC PTE [total] =	38.88 tpy	= (Hourly VOC PTE [per cell]) x (Annual Operating Hours) / (2,000 lb/T) x (Number of Cells)
Annual HAP PTE [total] =	0.97 tpy	= (OHAP Fraction of VOC) x (Annual VOC PTE [total])
1,3 Butadiene % of total HAP =	80.17 wt. %	Based on C3+ sample data
Benzene % of total HAP =	18.76 wt. %	Based on C3+ sample data
Toluene% of total HAP =	1.02 wt. %	Based on C3+ sample data
Ethylbenzene % of total HAP =	0.05 wt. %	Based on C3+ sample data
1,3 Butadiene PTE [total] =	0.78 tpy	= (Annual HAP PTE [total]) x (1,3 Butadiene % of total HAP)
Benzene [total] =	0.18 tpy	= (Annual HAP PTE [total]) x (Benzene % of total HAP)
Toluene [total] =	0.01 tpy	= (Annual HAP PTE [total]) x (Toluene% of total HAP)
Ethylbenzene [total] =	0.0005 tpy	= (Annual HAP PTE [total]) x (Ethylbenzene % of total HAP)
PM10 Fraction of PM =	63.5% wt. %	See particle size distribution calculation
PM2.5 Fraction of PM =	0.21% wt. %	See particle size distribution calculation
Hourly PM PTE [per cell] =	0.06 lb/hr	= (Cell Circulation Rate) x (60 min/yr) x (8.34 lb/gal) x (Drift Loss Factor) x (Cooling Water TDS) / (1,000,000)
Annual PM PTE [total] =	6.49 tpy	= (Hourly PM PTE [per cell]) x (Annual Operating Hours) / (2,000 lb/T) x (Number of Cells)
Hourly PM10 PTE [per cell] =	0.04 lb/hr	= (PM10 Fraction of PM) x (Hourly PM PTE [per cell])
Annual PM10 PTE [total] =	4.12 tpy	= (PM10 Fraction of PM) x (Annual PM PTE [total])
Hourly PM2.5 PTE [per cell] =	0.0001 lb/hr	= (PM2.5 Fraction of PM) x (Hourly PM PTE [per cell])
Annual PM2.5 PTE [total] =	0.01 tpy	= (PM2.5 Fraction of PM) x (Annual PM PTE [total])

Source ID		=		203		Process Cooling Tower		
Wet Droplet Diameter (μm)	Wet Droplet Volume (μm ³)	Wet Droplet Mass (μg)	Dry Particle Mass (μg)	Dry Particle Volume (μm ³)	Dry Particle Diameter (μm)	wt. % Mass Smaller Than Droplet	Wt% PM ₁₀ in PM Emissions	Wt% PM _{2.5} in PM Emissions
10	524	5.24E-04	1.05E-06	0	0.97	0.000		
20	4189	4.19E-03	8.38E-06	4	1.94	0.196		
30	14137	1.41E-02	2.83E-05	13	2.91	0.226		0.2
40	33510	3.35E-02	6.70E-05	30	3.87	0.514		
50	65450	6.54E-02	1.31E-04	59	4.84	1.806		
60	113097	1.13E-01	2.26E-04	103	5.81	5.702		
70	179594	1.80E-01	3.59E-04	163	6.78	21.348		
90	381704	3.82E-01	7.63E-04	347	8.72	49.812		
110	696910	6.97E-01	1.39E-03	634	10.66	70.509	63.5	
130	1150347	1.15E+00	2.30E-03	1046	12.59	82.023		
150	1767146	1.77E+00	3.53E-03	1606	14.53	88.012		
180	3053628	3.05E+00	6.11E-03	2776	17.44	91.032		
210	4849048	4.85E+00	9.70E-03	4408	20.34	92.468		
240	7238229	7.24E+00	1.45E-02	6580	23.25	94.091		
270	10305995	1.03E+01	2.06E-02	9369	26.16	94.689		
300	14137167	1.41E+01	2.83E-02	12852	29.06	96.288		
350	22449298	2.24E+01	4.49E-02	20408	33.91	97.011		
400	33510322	3.35E+01	6.70E-02	30464	38.75	98.340		
450	47712938	4.77E+01	9.54E-02	43375	43.59	99.071		
500	65449847	6.54E+01	1.31E-01	59500	48.44	99.071		
600	113097336	1.13E+02	2.26E-01	102816	58.12	100.000		
Specific Gravity of Water =					1.00 g/cc			
Specific Gravity of Dried Solids =					2.20 g/cc			
Cooling Tower Design TDS =					2,000 ppmw			
PM10 fraction of PM =					63.50 wt. %			
PM2.5 fraction of PM =					0.21 wt. %			

From "Calculating Realistic PM10 Emissions from Cooling Towers"; Reisman & Frisbie (uses EPRI wet droplet size distribution).

Source ID = C204 Continuous Vent Thermal Oxidizer																
VOC to Thermal Oxidizer	Basis			NSR POLLUTANT EMISSION FACTORS (lb/MMBtu)												
	MMBtu/hr	VOC to CVTO	VOC DRE	NOx	SO2	PM2.5	VOC	CO2	CH4	N2O	CO2e	CO	PM	PM10	H2SO4	Pb
CVTO / Short-Term Max	199.1	3.86 t/hr	-	0.06	-	-	-	-	-	-	-	0.0824	-	0.0075	-	-
CVTO / Normal Ops	181	3.51 t/hr	99.9% DRE	0.06	0.0015	0.0075	0.0388	137.7	0.0076	0.0013	138.2	0.0824	0.0019	0.0075	7.2E-05	4.90E-07
THERMAL OXIDIZER / OPERATING MODE		Basis		NSR POLLUTANT RATES USED IN AMBIENT IMPACT MODELING (lb/hr)												
		MMBtu/hr	NOTES	NOx	SO2	PM2.5	VOC	CO2	CH4	N2O	CO2e	CO	PM	PM10	H2SO4	Pb
CVTO / Short-Term Max		199.1	[A]	11.95	-	-	-	-	-	-	-	16.40	-	1.48	-	-
CVTO / Normal Ops		181	[B]	10.86	-	-	-	-	-	-	-	14.91	-	1.35	-	-
THERMAL OXIDIZER / OPERATING MODE		Basis		NSR POLLUTANT PTE (T/yr)												
		Hours/yr	MMBtu/yr	NOx	SO2	PM2.5	VOC	CO2	CH4	N2O	CO2e	CO	PM	PM10	H2SO4	Pb
CVTO / Normal Ops		8,760	1,585,623	47.57	1.17	5.91	30.77	109,133	6.02	1.05	109,579	65.29	1.48	5.91	0.06	3.89E-04

THERMAL OXIDIZER EMISSIONS CALCULATIONS NOTES:
General:
• VOC mass rates are based on vendor data associated with various potential operating scenarios and actual process data.
• Short-term VOC mass rate represents maximum expected short-term rate.
• Annual average VOC mass rate represents annual average anticipated rate.
• VOC destruction efficiency represents LAER or beyond-LAER control levels.
Calculation Methodology:
• Hourly Emissions = (Heat Input - MMBtu/hr) x (Emissions Factor - lb/MMBtu)
• Annual Emissions = (Heat Input - MMBtu/hr) x (Annual Hours) x (Emissions Factor - lb/MMBtu) x (1 ton/2,000 lb)
Basis for Emission Factors:
• NOx/NO2 = LAER limit.
• SO2 and CO = AP-42, Tables 1.4-2 and 1.4-1, respectively.
• PM10/2.5 = AP-42, Table 1.4-2.
• CO2 and CH4 are based on the estimated composition of the natural gas and waste gas combusted in the thermal oxidizer.
• N2O is based on the fuel gas emission factor from 40 CFR 98, Table C-2.
• CO2e = sum of CO2, CH4 and N2O emissions adjusted for global warming potentials.
• PM = AP-42, Table 1.4-2 (filterable only).
• H2SO4 = Based on SO3-to-SO2 emission factor ratio in AP-42, Table 1.3-1 for distillate oil combustion in boilers > 100 MMBtu/hr.
[A] - CVTO / Short-Term Maximum Emission Rates:
• Short-term max heat input based on combusting 3.86 t/hr VOC, which is maximum anticipated rate.
[B] - CVTO / Annual Average Emission Rates:
• Annual average heat input based on combusting 3.51 t/hr VOC, which is average anticipated rate.

<u>Source ID</u> = <u>C204</u> <u>Continuous Vent Thermal Oxidizer</u>										
Short-Term Max Heat Input (HHV)		199.1	MMBtu/hr - Maximum expected short term rates based on design and process data							
Normal Ops Heat Input (HHV)		181	MMBtu/hr - Represents reasonably anticipated venting, maintenance events, startups and shutdowns, supplemental gas, and sweep gas							
VOC DRE		99.9%								
Annual Hours =		8,760 hr/yr								
Short-Term Max Hourly Emission Rate =		(Short-Term Max Heat Input - MMBtu/hr) x (EF - lb/MMBtu) [Combustion Pollutants]								
Annual Emission Rate =		(Normal Ops Heat Input - MMBtu/hr) x (EF - lb/MMBtu) x (Annual Hours) / (2,000 lb/T) [Combustion Pollutants]								
Pollutant	§112 HAP?	EF (lb/MMscf)	EF (lb/MMBtu)	EF Source	Combustion Pollutants*		Waste Gas Pollutants**		Total	
					Short-Term Max (lb/hr)	Annual (tpy)	Short-Term Max (lb/hr)	Annual (tpy)	Short-Term Max (lb/hr)	Annual (tpy)
1,3-Butadiene	YES	-	-	-	-	-	2.77E-05	1.21E-04	2.77E-05	1.21E-04
2-Methylnaphthalene	YES	2.40E-05	<2.35E-08	AP-42, Table 1.4-3	4.68E-06	1.87E-05	-	-	4.68E-06	1.87E-05
3-Methylcholanthrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.51E-07	1.40E-06	-	-	3.51E-07	1.40E-06
7,12-Dimethylbenz(a)anthracene	YES	<1.6E-05	<1.57E-08	AP-42, Table 1.4-3	3.12E-06	1.24E-05	-	-	3.12E-06	1.24E-05
Acenaphthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.51E-07	1.40E-06	-	-	3.51E-07	1.40E-06
Acenaphthylene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.51E-07	1.40E-06	-	-	3.51E-07	1.40E-06
Anthracene	YES	<2.4E-06	<2.35E-09	AP-42, Table 1.4-3	4.68E-07	1.87E-06	-	-	4.68E-07	1.87E-06
Benzo(a)anthracene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.51E-07	1.40E-06	-	-	3.51E-07	1.40E-06
Benzene	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-3	4.10E-04	1.63E-03	2.66E-03	1.16E-02	3.07E-03	1.33E-02
Benzo(a)pyrene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	2.34E-07	9.33E-07	-	-	2.34E-07	9.33E-07
Benzo(b)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.51E-07	1.40E-06	-	-	3.51E-07	1.40E-06
Benzo(g,h,i)perylene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	2.34E-07	9.33E-07	-	-	2.34E-07	9.33E-07
Benzo(k)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.51E-07	1.40E-06	-	-	3.51E-07	1.40E-06
Butane	NO	2.10E+00	2.06E-03	AP-42, Table 1.4-3	4.10E-01	1.63E+00	1.54E+00	6.75E+00	1.95E+00	8.39E+00
Chrysene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.51E-07	1.40E-06	-	-	3.51E-07	1.40E-06
Dibenzo(a,h)anthracene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	2.34E-07	9.33E-07	-	-	2.34E-07	9.33E-07
Dichlorobenzene	YES	1.20E-03	1.18E-06	AP-42, Table 1.4-3	2.34E-04	9.33E-04	-	-	2.34E-04	9.33E-04
Ethane	NO	3.10E+00	3.04E-03	AP-42, Table 1.4-3	6.05E-01	2.41E+00	8.99E-01	3.94E+00	1.50E+00	6.35E+00
Ethylbenzene	YES	-	-	-	-	-	1.07E-04	4.71E-04	1.07E-04	4.71E-04
Fluoranthene	YES	3.00E-06	2.94E-09	AP-42, Table 1.4-3	5.86E-07	2.33E-06	-	-	5.86E-07	2.33E-06
Fluorene	YES	2.80E-06	2.75E-09	AP-42, Table 1.4-3	5.47E-07	2.18E-06	-	-	5.47E-07	2.18E-06
Formaldehyde	YES	7.50E-02	7.35E-05	AP-42, Table 1.4-3	1.46E-02	5.83E-02	-	-	1.46E-02	5.83E-02
Hexane	YES	2.90E-02	2.84E-05	Ventura County APCD, AB 2588 Combustions EF, May 2001	5.66E-03	2.25E-02	2.99E-04	1.31E-03	5.96E-03	2.39E-02
Indeno(1,2,3-cd)pyrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.51E-07	1.40E-06	-	-	3.51E-07	1.40E-06
Naphthalene	YES	6.10E-04	5.98E-07	AP-42, Table 1.4-3	1.19E-04	4.74E-04	1.95E-05	8.54E-05	1.39E-04	5.60E-04
Pentane	NO	2.60E+00	2.55E-03	AP-42, Table 1.4-3	5.08E-01	2.02E+00	8.68E-01	3.80E+00	1.38E+00	5.82E+00
Phenanthrene	YES	1.70E-05	1.67E-08	AP-42, Table 1.4-3	3.32E-06	1.32E-05	-	-	3.32E-06	1.32E-05
Propane	NO	1.60E+00	1.57E-03	AP-42, Table 1.4-3	3.12E-01	1.24E+00	-	-	3.12E-01	1.24E+00
Pyrene	YES	5.00E-06	4.90E-09	AP-42, Table 1.4-3	9.76E-07	3.89E-06	-	-	9.76E-07	3.89E-06
Styrene	YES	-	-	-	-	-	6.29E-04	2.76E-03	6.29E-04	2.76E-03
Toluene	YES	3.40E-03	3.33E-06	AP-42, Table 1.4-3	6.64E-04	2.64E-03	1.14E-03	5.01E-03	1.81E-03	7.66E-03

Source ID		=	C204		Continuous Vent Thermal Oxidizer					
Short-Term Max Heat Input (HHV)			199.1	MMBtu/hr - Maximum expected short term rates based on design and process data						
Normal Ops Heat Input (HHV)			181	MMBtu/hr - Represents reasonably anticipated venting, maintenance events, startups and shutdowns, supplemental gas, and sweep gas						
VOC DRE			99.9%							
Annual Hours =		8,760 hr/yr								
Short-Term Max Hourly Emission Rate =		(Short-Term Max Heat Input - MMBtu/hr) x (EF - lb/MMBtu) [Combustion Pollutants]								
Annual Emission Rate =		(Normal Ops Heat Input - MMBtu/hr) x (EF - lb/MMBtu) x (Annual Hours) / (2,000 lb/T) [Combustion Pollutants]								
Pollutant	§112 HAP?	EF (lb/MMscf)	EF (lb/MMBtu)	EF Source	Combustion Pollutants*		Waste Gas Pollutants**		Total	
					Short-Term Max (lb/hr)	Annual (tpy)	Short-Term Max (lb/hr)	Annual (tpy)	Short-Term Max (lb/hr)	Annual (tpy)
Xylenes	YES	-	-	-	-	-	1.00E-04	4.38E-04	1.00E-04	4.38E-04
Arsenic	YES	2.00E-04	1.96E-07	AP-42, Table 1.4-4	3.90E-05	1.55E-04	-	-	3.90E-05	1.55E-04
Barium	NO	4.40E-03	4.31E-06	AP-42, Table 1.4-4	8.59E-04	3.42E-03	-	-	8.59E-04	3.42E-03
Beryllium	YES	<1.2E-05	<1.18E-08	AP-42, Table 1.4-4	2.34E-06	9.33E-06	-	-	2.34E-06	9.33E-06
Cadmium	YES	1.10E-03	1.08E-06	AP-42, Table 1.4-4	2.15E-04	8.55E-04	-	-	2.15E-04	8.55E-04
Chromium	YES	1.40E-03	1.37E-06	AP-42, Table 1.4-4	2.73E-04	1.09E-03	-	-	2.73E-04	1.09E-03
Chromium (VI)***	YES / Cr Cmpds	5.60E-05	5.49E-08	AP-42, Table 1.4-4/NEI	1.09E-05	4.35E-05	-	-	1.09E-05	4.35E-05
Cobalt	YES	8.40E-05	8.24E-08	AP-42, Table 1.4-4	1.64E-05	6.53E-05	-	-	1.64E-05	6.53E-05
Copper	NO	8.50E-04	8.33E-07	AP-42, Table 1.4-4	1.66E-04	6.61E-04	-	-	1.66E-04	6.61E-04
Lead	YES	5.00E-04	4.90E-07	AP-42, Table 1.4-2	9.76E-05	3.89E-04	-	-	9.76E-05	3.89E-04
Manganese	YES	3.80E-04	3.73E-07	AP-42, Table 1.4-4	7.42E-05	2.95E-04	-	-	7.42E-05	2.95E-04
Mercury	YES	2.60E-04	2.55E-07	AP-42, Table 1.4-4	5.08E-05	2.02E-04	-	-	5.08E-05	2.02E-04
Molybdenum	NO	1.10E-03	1.08E-06	AP-42, Table 1.4-4	2.15E-04	8.55E-04	-	-	2.15E-04	8.55E-04
Nickel	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-4	4.10E-04	1.63E-03	-	-	4.10E-04	1.63E-03
Selenium	YES	<2.4E-05	<2.35E-08	AP-42, Table 1.4-4	4.68E-06	1.87E-05	-	-	4.68E-06	1.87E-05
Vanadium	NO	2.30E-03	2.25E-06	AP-42, Table 1.4-4	4.49E-04	1.79E-03	-	-	4.49E-04	1.79E-03
Zinc	NO	2.90E-02	2.84E-05	AP-42, Table 1.4-4	5.66E-03	2.25E-02	-	-	5.66E-03	2.25E-02
Total §112 HAPs =					0.02	0.09	0.005	0.02	0.03	0.11

* Emissions from the combustion of natural gas and waste gas based on natural gas combustion emission factors.

** Emission rates based on actual process data and engineering judgement.

*** Based on NEI data for SCC 39000699 (In-Process Fuel Use: Natural Gas, General), 4% of the chromium emission factor found in AP-42, Section 1.4, Table 1.4-4 was estimated to equal chromium (VI).

CVTO Potential to Emit Calculation Vent/Gas Stream Flow Rate and Composition Data

Vent/Gas Stream to CVTO	Hydrogen	Nitrogen	Methane	Non-VOC/HAP Hydrocarbon	Non-HAP VOC	HAP VOC	Background Information
PE Unit Vents (kg/hr)	43.3	6,207.5	25	401.7	3,182.2	0.14	Shell operates PE Units 1 and 2 under license from Univation Technologies (“Univation”), which covers the “core plant” of these units, including process vents. Similarly, Shell operates PE Unit 3 under license from Ineos Commercial Services UK Ltd. (“Ineos”), which covers the “core plant” of the unit, including process vents. Design process vent flow rates and compositions are provided by the referenced licensors and are unique to each technology. The licensing agreement specifies that all technical information, data, experience, and know-how (including process information and licensor improvement) related to process design, manufacturing techniques, and product properties is confidential. Shell maintains the confidentiality of this information by adhering to the conditions set forth in the licensing agreement. This includes non-disclosure of utility consumption figures, quality of nitrogen and hydrogen supplied to the process, and quantity and contents of all effluent streams. In addition, as further required by the licensing agreement, Shell obtains Univation’s or Ineos’ approval before disclosing any information to a third party, including government agencies. Shell’s claim of confidential business information extends to critical operating data and process flow schematics within the PE Units. This information constitutes production methods and processes which are clearly covered under the licensing agreement between Shell and Univation or Ineos and are thus unique to Shell. Furthermore, disclosure of this information would negatively affect Shell’s competitive position in that it would provide a third party with the information needed to identify production capabilities and key grades of polyethylene manufactured at the unit as well as to reverse-engineer low pressure solvent and vent recovery capabilities of the PE Units. The combination of specific individual vent identifications with flow rate and compositional data are claimed as confidential proprietary information as defined by the Pennsylvania Right to Know Law and pursuant to Section 13.2 of the Air Pollution Control Act, 35 P.S. 4013.2. In consideration of these limitations, Shell is providing total combined GHG, VOC, HAP, and heat content information for the PE Unit vents that are routed to the CVTO for combustion. Note that any natural gas fuel that may be combusted in the CVTO to achieve or maintain appropriate CVTO temperatures under variable ambient and vent stream input conditions is considered to be represented under the PE Unit vents for purposes of the CVTO potential to emit calculation.
Sweep Gas (kg/hr)	-	-	55.4	6.2	-	-	The sweep gas is a continuous flow of natural gas flowing through each header connected to the CVTO (or backup flare) to maintain a constant minimum flow of gas and/or pressure to prevent oxygen infiltration into the header system. Sweep gas flow rates are set at the minimum design and engineering practice standard determination to perform this safety function.
LGO Tank Vent (kg/hr)	-	-	-	-	0.0038	0.0041	The vent stream amount for the LGO internal floating roof (IFR) storage tank was calculated using ProMax. See the attached ProMax calculation for the tank.
LGO Railcar Vent (kg/hr)	-	-	-	-	0.6	1.87	The vent stream amount for the loading of LGO into railcars was calculated using the methodology outlined in AP-42, Section 5.2. See the attached calculation for the railcar loading activity.

CVTO Potential to Emit Calculation Vent/Gas Stream Flow Rate and Composition Data

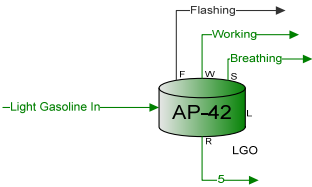
Vent/Gas Stream to CVTO	Hydrogen	Nitrogen	Methane	Non-VOC/HAP Hydrocarbon	Non-HAP VOC	HAP VOC	Background Information
PFO Tanks Vent (kg/hr)	-	-	-	-	0.29	0.08	The total vent stream amount for the two PFO fixed roof storage tanks was calculated using ProMax. See the attached ProMax calculation for the tanks.
PFO Railcar Vent (kg/hr)	-	-	-	-	0.69	0.17	The vent stream amount for the loading of PFO into railcars was calculated using the methodology outlined in AP-42, Section 5.2. See the attached calculation for the railcar loading activity. Note that this is a conservative estimate of the vent rate to the CVTO due to the loading of PFO into railcars because the railcars are vapor balanced with the two PFO fixed roof storage tanks during the loading activity.
Hexene Tanks Vent (kg/hr)	-	-	-	-	0.05	-	The total vent stream amount for the two Hexene IFR storage tanks was calculated using ProMax. See the attached ProMax calculation for the tanks.
Heat of Combustion (Btu/lb)	61,022	0	23,891	22,333	~21,480	~21,000	-
Annual Heat Input (MMBtu/hr) ^a	181						-

^a Each vent/gas stream identified in the table is assumed to be routed to the CVTO at the respective rates indicated in the table for 8,760 hr/yr.

LGO ProMax Outputs and Calculations
Shell Polymers Monaca
2024
LGO

	Annual Working Losses (lb/h)	Annual Breathing Losses (lb/h)	LGO Annual Total Losses (lb/h)
VOC	1.054E-03	1.629E-02	0.01734346
HAP	7.981E-04	0.008140529	0.008938642
1,3-Butadiene	4.035E-06	1.519E-03	0.001522559
Benzene	4.912E-04	5.886E-03	0.006377259
n-Hexane	2.423E-07	7.921E-06	8.163E-06
Toluene	1.975E-04	6.570E-04	0.000854497
Ethylbenzene	1.414E-05	9.664E-06	2.38043E-05
Styrene	7.859E-05	5.010E-05	0.000128691
m-Xylene	4.320E-06	3.850E-06	8.16952E-06
o-Xylene	3.688E-06	3.467E-06	7.15507E-06
p-Xylene	4.320E-06	4.013E-06	8.3327E-06
Naphthalene	1.054E-08	2.640E-10	1.08004E-08
n-Butane	2.529E-07	1.242E-04	0.000124482
Isoprene	2.318E-07	1.954E-05	1.97687E-05
n-Pentane	1.054E-08	1.193E-06	1.20371E-06
Cyclopentene	3.235E-06	1.576E-04	0.000160845
Cyclopentane	2.318E-07	1.043E-05	1.06659E-05
2-Methyl-2-Butene	3.161E-08	2.533E-06	2.565E-06
cis-1,3-Pentadiene	1.781E-06	1.021E-04	0.000103844
trans-1,3-Pentadiene	1.897E-06	1.252E-04	0.00012713
Cyclopentadiene	1.504E-05	1.010E-03	0.001025188
Dicyclopentadiene	2.726E-05	7.597E-06	3.48544E-05
Oil	1.967E-04	1.738E-03	0.001935124
Butene	8.851E-06	4.850E-03	0.004859148

"Flashing" Component Sums		
BTEX	0	lb/h
HAPs	0	lb/h
VOCs	0	lb/h



"Working" Component Sums		
BTEX	0.0007152	lb/h
HAPs	0.0007981	lb/h
VOCs	0.001054	lb/h

"Breathing" Component Sums		
BTEX	0.006564	lb/h
HAPs	0.008141	lb/h
VOCs	0.01629	lb/h

LGO ProMax Input Assumptions
Shell Polymers Monaca
2024
Tank Data/Sample Data

Tank Name	Tank ID	Contents	Length/ Height (m)	Diameter (m)	Temp (C)	Pressure (barg)	Flow Rate (kg/hr)	Reference:
Light Gasoline Storage Tank (LGO)	T-64203	Light Gasoline	7.316	10.008	28.94	0.00426	454	Storage Tank Directory Air Inventory Data.xlsx

Sample Data

Constituent	LGO
	% by weight
1,3-Butadiene	0.383
Benzene	46.621
n-Hexane	0.023
Toluene	18.749
Ethylbenzene	1.342
Styrene	7.459
m-Xylene	0.410
o-Xylene	0.350
p-Xylene	0.410
Naphthalene	0.001
n-Butane	0.024
Isoprene	0.022
n-Pentane	0.001
Cyclopentene	0.307
Cyclopentane	0.022
2-Methyl-2-Butene	0.003
cis-1,3-Pentadiene	0.169
trans-1,3-Pentadiene	0.180
Cyclopentadiene	1.427
Dicyclopentadiene	2.587
Butene	0.840
Oil (balance)	18.670

Single Oil inputs

C7-C10	
MW:	84 g/mol Heat and Material Balance
Specific Gravity:	0.84 from LGO Composition
Promax calculated VP	0.434545 bar at 100 F

*added to create a more volatile composition to match the SDS Vapor Pressure

Process Streams		Breathing	Flashing	Light Gasoline In	Working	5
2024	Status:	Solved	Solved	Solved	Solved	Solved
Phase: Total	From Block:	LGO	LGO	--	LGO	LGO
	To Block:	--	--	LGO	--	--
Mole Fraction		%		%	%	%
1,3-Butadiene		11.5965		0.593972*	0.593972	0.593749
Benzene		31.1267		50.0671*	50.0671	50.0675
n-Hexane		0.0379669		0.0223889*	0.0223889	0.0223886
Toluene		2.94523		17.0697*	17.0697	17.0700
Ethylbenzene		0.0376028		1.06037*	1.06037	1.06039
Styrene		0.198706		6.00776*	6.00776	6.00788
m-Xylene		0.0149782		0.323959*	0.323959	0.323965
o-Xylene		0.0134909		0.276551*	0.276551	0.276556
p-Xylene		0.0156131		0.323959*	0.323959	0.323965
Naphthalene		8.50758E-07		0.000654485*	0.000654485	0.000654498
n-Butane		0.882890		0.0346383*	0.0346383	0.0346211
Isoprene		0.118475		0.0270929*	0.0270929	0.0270910
n-Pentane		0.00683126		0.00116268*	0.00116268	0.00116256
Cyclopentene		0.955773		0.378069*	0.378069	0.378057
Cyclopentane		0.0614554		0.0263141*	0.0263141	0.0263134
2-Methyl-2-Butene		0.0149213		0.00358829*	0.00358829	0.00358806
cis-1,3-Pentadiene		0.618928		0.208122*	0.208122	0.208114
trans-1,3-Pentadiene		0.759439		0.221669*	0.221669	0.221658
Cyclopentadiene		6.31255		1.81093*	1.81093	1.81084
Dicyclopentadiene		0.0237363		1.64152*	1.64152	
C7-C10		8.54869		18.6446*	18.6446	18.6448
Butene-1		35.7095		1.25590*	1.25590	1.25520
Molar Flow		lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h
1,3-Butadiene		2.80738E-05	0	0.0708710*	7.46056E-08	0.0708428
Benzene		7.53540E-05	0	5.97386*	6.28866E-06	5.97378
n-Hexane		9.19133E-08	0	0.00267137*	2.81215E-09	0.00267128
Toluene		7.13003E-06	0	2.03670*	2.14403E-06	1.64155
Ethylbenzene		9.10318E-08	0	0.126521*	1.33188E-07	0.126520
Styrene		4.81042E-07	0	0.716828*	7.54602E-07	0.716827
m-Xylene		3.62604E-08	0	0.0386538*	4.06907E-08	0.0386538
o-Xylene		3.26597E-08	0	0.0329972*	3.47360E-08	0.0329971
p-Xylene		3.77974E-08	0	0.0386538*	4.06907E-08	0.0386538
Naphthalene		2.05958E-12	0	7.80912E-05*	8.22063E-11	7.80911E-05
n-Butane		2.13737E-06	0	0.00413294*	4.35073E-09	0.00413080
Isoprene		2.86814E-07	0	0.00323264*	3.40299E-09	0.00323235
n-Pentane		1.65377E-08	0	0.000138727*	1.46037E-10	0.000138710
Cyclopentene		2.31381E-06	0	0.0451100*	4.74871E-08	0.0451076
Cyclopentane		1.48776E-07	0	0.00313972*	3.30517E-09	0.00313957
2-Methyl-2-Butene		3.61227E-08	0	0.000428144*	4.50705E-10	0.000428107
cis-1,3-Pentadiene		1.49835E-06	0	0.0248325*	2.61411E-08	0.0248310
trans-1,3-Pentadiene		1.83851E-06	0	0.0264489*	2.78426E-08	0.0264470
Cyclopentadiene		1.52819E-05	0	0.216075*	2.27462E-07	0.216060
Dicyclopentadiene		5.74626E-08	0	0.195861*	2.06182E-07	0.195861
C7-C10		2.06953E-05	0	2.22462*	2.34185E-06	2.22459
Butene-1		8.64483E-05	0	0.149850*	1.57747E-07	0.149764
Mass Fraction		%		%	%	%
1,3-Butadiene		9.32192		0.383*	0.383	0.382855

Benzene	36.1332	46.621*	46.621	46.6212
n-Hexane	0.0486234	0.023*	0.023	0.0229996
Toluene	4.03289	18.749*	18.749	18.7492
Ethylbenzene	0.0593278	1.342*	1.342	1.34202
Styrene	0.307555	7.459*	7.459	7.45912
m-Xylene	0.0236319	0.41*	0.41	0.410006
o-Xylene	0.0212852	0.35*	0.35	0.350005
p-Xylene	0.0246336	0.41*	0.41	0.410006
Naphthalene	1.62051E-06	0.001*	0.001	0.00100002
n-Butane	0.762615	0.024*	0.024	0.0239880
Isoprene	0.119933	0.022*	0.022	0.0219984
n-Pentane	0.00732465	0.001*	0.001	0.000999897
Cyclopentene	0.967536	0.307*	0.307	0.306989
Cyclopentane	0.0640529	0.022*	0.022	0.0219993
2-Methyl-2-Butene	0.0155520	0.003*	0.003	0.00299980
cis-1,3-Pentadiene	0.626545	0.169*	0.169	0.168993
trans-1,3-Pentadiene	0.768786	0.18*	0.18	0.179990
Cyclopentadiene	6.20113	1.427*	1.427	1.42692
Dicyclopentadiene	0.0466346	2.587*	2.587	2.58704
C7-C10	10.6717	18.67*	18.67	18.6701
Butene-1	29.7750	0.84*	0.84	0.839529
Mass Flow	lb/h	lb/h	lb/h	lb/h

1,3-Butadiene	0.00151852	0	3.83344*	4.03545E-06	3.83192
Benzene	0.00588604	0	466.629*	0.000491219	466.623
n-Hexane	7.92066E-06	0	0.230207*	2.42338E-07	0.230199
Toluene	0.000656950	0	187.658*	0.000197547	187.658
Ethylbenzene	9.66439E-06	0	13.4321*	1.41399E-05	13.4320
Styrene	5.01001E-05	0	74.6570*	7.85912E-05	74.6569
m-Xylene	3.84959E-06	0	4.10368*	4.31993E-06	4.10368
o-Xylene	3.46732E-06	0	3.50315*	3.68775E-06	3.50314
p-Xylene	4.01276E-06	0	4.10368*	4.31993E-06	4.10368
Naphthalene	2.63978E-10	0	0.0100090*	1.05364E-08	0.0100090
n-Butane	0.000124229	0	0.240216*	2.52874E-07	0.240091
Isoprene	1.95369E-05	0	0.220198*	2.31801E-07	0.220178
n-Pentane	1.19317E-06	0	0.0100090*	1.05364E-08	0.0100078
Cyclopentene	0.000157610	0	3.07276*	3.23468E-06	3.07260
Cyclopentane	1.04341E-05	0	0.220198*	2.31801E-07	0.220187
2-Methyl-2-Butene	2.53339E-06	0	0.0300270*	3.16093E-08	0.0300244
cis-1,3-Pentadiene	0.000102063	0	1.69152*	1.78066E-06	1.69141
trans-1,3-Pentadiene	0.000125234	0	1.80162*	1.89656E-06	1.80149
Cyclopentadiene	0.00101015	0	14.2828*	1.50355E-05	14.2818
Dicyclopentadiene	7.59669E-06	0	25.8932*	2.72577E-05	25.8932
C7-C10	0.00173841	0	186.868*	0.000196715	186.866
Butene-1	0.00485030	0	8.40755*	8.85059E-06	8.40269

Process Streams		Breathing	Flashing	Light Gasoline In	Working	5
Properties	Status:	Solved	Solved	Solved	Solved	Solved
Phase: Total	From Block:	LGO	LGO	--	LGO	LGO
	To Block:	--	--	LGO	--	--
Property	Units					
Temperature	°F	53.3317	53.3317	84.092*	53.3317	53.3317
Pressure	psia	14.1	14.1	14.7577*	14.1	14.1

Mole Fraction Vapor	%	16.8978		0	0	0
Mole Fraction Light Liquid	%	83.1022		100	100	100
Mole Fraction Heavy Liquid	%	0		0	0	0
Phase Mole Fraction	%	100		100	100	100
Molecular Weight	lb/lbmol	67.2889		83.8857	83.8857	83.8860
Mass Density	lb/ft^3	1.03049		53.4004	54.4176	54.4177
Molar Flow	lbmol/h	0.000242088	0	11.9317	1.25605E-05	11.9314
Mass Flow	lb/h	0.0162898	0	1000.90*	0.00105364	1000.88
Vapor Volumetric Flow	ft^3/h	0.0158078	0	18.7433	1.93622E-05	18.3926
Liquid Volumetric Flow	gpm	0.00197084	0	2.33683	2.41398E-06	2.29310
Std Vapor Volumetric Flow	MMSCFD	2.20484E-06	0	0.108669	1.14396E-07	0.108667
Std Liquid Volumetric Flow	sgpm	4.42222E-05	0	2.29916	2.42032E-06	2.29911
Compressibility		0.167238		0.00397275	0.00394807	0.00394808
Specific Gravity				0.856204	0.872514	0.872516
API Gravity				31.3288	31.3297	31.3293
Enthalpy	Btu/h	1.97823?		109315	0.102605?	97466.9?
Mass Enthalpy	Btu/lb	121.439?		109.216	97.3811?	97.3811?
Mass Cp	Btu/(lb*°F)	0.412862?		0.393495	0.376065?	0.376064?
Ideal Gas CpCv Ratio		1.11293		1.09540	1.10210	1.10210
Dynamic Viscosity	cP			0.536152	0.661585	0.661595
Kinematic Viscosity	cSt			0.626791	0.758971	0.758981
Thermal Conductivity	Btu/(h*ft*°F)			0.0760434?	0.0783122?	0.0783122?
Surface Tension	lbf/ft			0.00186522?	0.00200879?	0.00200880?
Net Ideal Gas Heating Value	Btu/ft^3	3271.61		3925.91	3925.91	3925.92
Net Liquid Heating Value	Btu/lb	18288.3		17588.8	17588.8	17588.8
Gross Ideal Gas Heating Value	Btu/ft^3	3454.38		4116.02	4116.02	4116.03
Gross Liquid Heating Value	Btu/lb	19319.7		18448.7	18448.7	18448.7

Process Streams		Breathing	Flashing	Light Gasoline In	Working	5
Composition		Solved	Solved	Solved	Solved	Solved
Phase: Vapor	Status:	LGO	LGO	--	LGO	LGO
	From Block:	--	--	LGO	--	--
	To Block:					
Mole Fraction		%				
1,3-Butadiene		19.4379				
Benzene		3.24037				
n-Hexane		0.0101602				
Toluene		0.0785591				
Ethylbenzene		0.000205852				
Styrene		0.00110453				
m-Xylene		9.85428E-05				
o-Xylene		9.16035E-05				
p-Xylene		0.000107109				
Naphthalene		2.96132E-10				
n-Butane		1.54613				
Isoprene		0.0639390				
n-Pentane		0.00393781				
Cyclopentene		0.323934				
Cyclopentane		0.0190928				
2-Methyl-2-Butene		0.00695703				
cis-1,3-Pentadiene		0.235392				
trans-1,3-Pentadiene		0.319922				
Cyclopentadiene		2.68174				

Dicyclopentadiene	7.19863E-05
C7-C10	0.526782
Butene-1	71.5035
Molar Flow	lbmol/h
1,3-Butadiene	7.95154E-06
Benzene	1.32555E-06
n-Hexane	4.15628E-09
Toluene	3.21365E-08
Ethylbenzene	8.42090E-11
Styrene	4.51834E-10
m-Xylene	4.03114E-11
o-Xylene	3.74727E-11
p-Xylene	4.38156E-11
Naphthalene	1.21140E-16
n-Butane	6.32481E-07
Isoprene	2.61558E-08
n-Pentane	1.61086E-09
Cyclopentene	1.32513E-07
Cyclopentane	7.81039E-09
2-Methyl-2-Butene	2.84594E-09
cis-1,3-Pentadiene	9.62930E-08
trans-1,3-Pentadiene	1.30872E-07
Cyclopentadiene	1.09703E-06
Dicyclopentadiene	2.94478E-11
C7-C10	2.15493E-07
Butene-1	2.92503E-05
Mass Fraction	%
1,3-Butadiene	18.4381
Benzene	4.43872
n-Hexane	0.0153544
Toluene	0.126936
Ethylbenzene	0.000383251
Styrene	0.00201734
m-Xylene	0.000183465
o-Xylene	0.000170545
p-Xylene	0.000199413
Naphthalene	6.65611E-10
n-Butane	1.57592
Isoprene	0.0763779
n-Pentane	0.00498231
Cyclopentene	0.386954
Cyclopentane	0.0234822
2-Methyl-2-Butene	0.00855642
cis-1,3-Pentadiene	0.281186
trans-1,3-Pentadiene	0.382161
Cyclopentadiene	3.10866
Dicyclopentadiene	0.000166892
C7-C10	0.775992
Butene-1	70.3535
Mass Flow	lb/h
1,3-Butadiene	0.000430102
Benzene	0.000103541
n-Hexane	3.58169E-07

Toluene	2.96101E-06
Ethylbenzene	8.94005E-09
Styrene	4.70581E-08
m-Xylene	4.27966E-09
o-Xylene	3.97829E-09
p-Xylene	4.65168E-09
Naphthalene	1.55266E-14
n-Butane	3.67612E-05
Isoprene	1.78166E-06
n-Pentane	1.16222E-07
Cyclopentene	9.02641E-06
Cyclopentane	5.47765E-07
2-Methyl-2-Butene	1.99594E-07
cis-1,3-Pentadiene	6.55919E-06
trans-1,3-Pentadiene	8.91461E-06
Cyclopentadiene	7.25151E-05
Dicyclopentadiene	3.89306E-09
C7-C10	1.81014E-05
Butene-1	0.00164113

Process Streams		Breathing	Flashing	Light Gasoline In	Working	5
Properties		Status:	Solved	Solved	Solved	Solved
Phase: Vapor		From Block:	LGO	LGO	--	LGO
		To Block:	--	--	LGO	--
Property	Units					
Temperature	°F	53.3317				
Pressure	psia	14.1				
Mole Fraction Vapor	%	100				
Mole Fraction Light Liquid	%	0				
Mole Fraction Heavy Liquid	%	0				
Phase Mole Fraction	%	16.8978				
Molecular Weight	lb/lbmol	57.0234				
Mass Density	lb/ft^3	0.150331				
Molar Flow	lbmol/h	4.09075E-05				
Mass Flow	lb/h	0.00233268				
Vapor Volumetric Flow	ft^3/h	0.0155170				
Liquid Volumetric Flow	gpm	0.00193459				
Std Vapor Volumetric Flow	MMSCFD	3.72570E-07				
Std Liquid Volumetric Flow	sgpm	7.50196E-06				
Compressibility		0.971500				
Specific Gravity		1.96887				
API Gravity						
Enthalpy	Btu/h	0.424039?				
Mass Enthalpy	Btu/lb	181.782?				
Mass Cp	Btu/(lb*°F)	0.344886?				
Ideal Gas CpCv Ratio		1.11379				
Dynamic Viscosity	cP	0.00756750				
Kinematic Viscosity	cSt	3.14256				
Thermal Conductivity	Btu/(h*ft*°F)	0.00767361?				
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3	2896.44				
Net Liquid Heating Value	Btu/lb	19137.3				

Gross Ideal Gas Heating Value	Btu/ft ³	3085.82
Gross Liquid Heating Value	Btu/lb	20399.1

Process Streams		Breathing	Flashing	Light Gasoline In	Working	5
Composition		Solved	Solved	Solved	Solved	Solved
Phase: Nonspecific Liquid	Status:	LGO	LGO	--	LGO	LGO
	From Block:	--	--	LGO	--	--
	To Block:	--	--	--	--	--
Mole Fraction		%		%	%	%
1,3-Butadiene		10.0021		0.593972	0.593972	0.593749
Benzene		36.7970		50.0671	50.0671	50.0675
n-Hexane		0.0436210		0.0223889	0.0223889	0.0223886
Toluene		3.52813		17.0697	17.0697	17.0700
Ethylbenzene		0.0452070		1.06037	1.06037	1.06039
Styrene		0.238885		6.00776	6.00776	6.00788
m-Xylene		0.0180038		0.323959	0.323959	0.323965
o-Xylene		0.0162154		0.276551	0.276551	0.276556
p-Xylene		0.0187660		0.323959	0.323959	0.323965
Naphthalene		1.02369E-06		0.000654485	0.000654485	0.000654498
n-Butane		0.748030		0.0346383	0.0346383	0.0346211
Isoprene		0.129564		0.0270929	0.0270929	0.0270910
n-Pentane		0.00741961		0.00116268	0.00116268	0.00116256
Cyclopentene		1.08425		0.378069	0.378069	0.378057
Cyclopentane		0.0700693		0.0263141	0.0263141	0.0263134
2-Methyl-2-Butene		0.0165408		0.00358829	0.00358829	0.00358806
cis-1,3-Pentadiene		0.696915		0.208122	0.208122	0.208114
trans-1,3-Pentadiene		0.848809		0.221669	0.221669	0.221658
Cyclopentadiene		7.05083		1.81093	1.81093	1.81084
Dicyclopentadiene		0.0285481		1.64152	1.64152	1.64155
C7-C10		10.1798		18.6446	18.6446	18.6448
Butene-1		28.4312		1.25590	1.25590	1.25520
Molar Flow		lbmol/h		lbmol/h	lbmol/h	lbmol/h
1,3-Butadiene		2.01222E-05		0.0708710	7.46056E-08	0.0708428
Benzene		7.40285E-05		5.97386	6.28866E-06	5.97378
n-Hexane		8.77570E-08		0.00267137	2.81215E-09	0.00267128
Toluene		7.09790E-06		2.03670	2.14403E-06	2.03669
Ethylbenzene		9.09476E-08		0.126521	1.33188E-07	0.126520
Styrene		4.80591E-07		0.716828	7.54602E-07	0.716827
m-Xylene		3.62201E-08		0.0386538	4.06907E-08	0.0386538
o-Xylene		3.26222E-08		0.0329972	3.47360E-08	0.0329971
p-Xylene		3.77536E-08		0.0386538	4.06907E-08	0.0386538
Naphthalene		2.05946E-12		7.80912E-05	8.22063E-11	7.80911E-05
n-Butane		1.50489E-06		0.00413294	4.35073E-09	0.00413080
Isoprene		2.60658E-07		0.00323264	3.40299E-09	0.00323235
n-Pentane		1.49268E-08		0.000138727	1.46037E-10	0.000138710
Cyclopentene		2.18130E-06		0.0451100	4.74871E-08	0.0451076
Cyclopentane		1.40966E-07		0.00313972	3.30517E-09	0.00313957
2-Methyl-2-Butene		3.32768E-08		0.000428144	4.50705E-10	0.000428107
cis-1,3-Pentadiene		1.40206E-06		0.0248325	2.61411E-08	0.0248310
trans-1,3-Pentadiene		1.70764E-06		0.0264489	2.78426E-08	0.0264470
Cyclopentadiene		1.41849E-05		0.216075	2.27462E-07	0.216060
Dicyclopentadiene		5.74332E-08		0.195861	2.06182E-07	0.195861
C7-C10		2.04798E-05		2.22462	2.34185E-06	2.22459

Butene-1	5.71980E-05	0.149850	1.57747E-07	0.149764
Mass Fraction	%	%	%	%
1,3-Butadiene	7.79832	0.383	0.383	0.382855
Benzene	41.4304	46.621	46.621	46.6212
n-Hexane	0.0541837	0.023	0.023	0.0229996
Toluene	4.68570	18.749	18.749	18.7492
Ethylbenzene	0.0691793	1.342	1.342	1.34202
Styrene	0.358620	7.459	7.459	7.45912
m-Xylene	0.0275508	0.41	0.41	0.410006
o-Xylene	0.0248141	0.35	0.35	0.350005
p-Xylene	0.0287173	0.41	0.41	0.410006
Naphthalene	1.89124E-06	0.001	0.001	0.00100002
n-Butane	0.626686	0.024	0.024	0.0239880
Isoprene	0.127213	0.022	0.022	0.0219984
n-Pentane	0.00771613	0.001	0.001	0.000999897
Cyclopentene	1.06457	0.307	0.307	0.306989
Cyclopentane	0.0708336	0.022	0.022	0.0219993
2-Methyl-2-Butene	0.0167212	0.003	0.003	0.00299980
cis-1,3-Pentadiene	0.684266	0.169	0.169	0.168993
trans-1,3-Pentadiene	0.833403	0.18	0.18	0.179990
Cyclopentadiene	6.71798	1.427	1.427	1.42692
Dicyclopentadiene	0.0544008	2.587	2.587	2.58704
C7-C10	12.3256	18.67	18.67	18.6701
Butene-1	22.9931	0.84	0.84	0.839529
Mass Flow	lb/h	lb/h	lb/h	lb/h
1,3-Butadiene	0.00108842	3.83344	4.03545E-06	3.83192
Benzene	0.00578250	466.629	0.000491219	466.623
n-Hexane	7.56249E-06	0.230207	2.42338E-07	0.230199
Toluene	0.000653989	187.658	0.000197547	187.658
Ethylbenzene	9.65545E-06	13.4321	1.41399E-05	13.4320
Styrene	5.00531E-05	74.6570	7.85912E-05	74.6569
m-Xylene	3.84531E-06	4.10368	4.31993E-06	4.10368
o-Xylene	3.46334E-06	3.50315	3.68775E-06	3.50314
p-Xylene	4.00811E-06	4.10368	4.31993E-06	4.10368
Naphthalene	2.63962E-10	0.0100090	1.05364E-08	0.0100090
n-Butane	8.74675E-05	0.240216	2.52874E-07	0.240091
Isoprene	1.77552E-05	0.220198	2.31801E-07	0.220178
n-Pentane	1.07695E-06	0.0100090	1.05364E-08	0.0100078
Cyclopentene	0.000148583	3.07276	3.23468E-06	3.07260
Cyclopentane	9.88634E-06	0.220198	2.31801E-07	0.220187
2-Methyl-2-Butene	2.33380E-06	0.0300270	3.16093E-08	0.0300244
cis-1,3-Pentadiene	9.55039E-05	1.69152	1.78066E-06	1.69141
trans-1,3-Pentadiene	0.000116319	1.80162	1.89656E-06	1.80149
Cyclopentadiene	0.000937638	14.2828	1.50355E-05	14.2818
Dicyclopentadiene	7.59279E-06	25.8932	2.72577E-05	25.8932
C7-C10	0.00172031	186.868	0.000196715	186.866
Butene-1	0.00320917	8.40755	8.85059E-06	8.40269

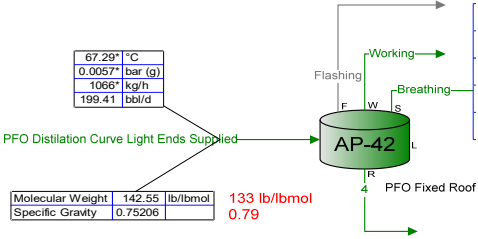
Process Streams		Breathing	Flashing	Light Gasoline In	Working	5
Properties	Status:	Solved	Solved	Solved	Solved	Solved
Phase: Nonspecific Liquid	From Block:	LGO	LGO	--	LGO	LGO
	To Block:	--	--	LGO	--	--
Property	Units					

Temperature	°F	53.3317	84.092	53.3317	53.3317
Pressure	psia	14.1	14.7577	14.1	14.1
Mole Fraction Vapor	%	0	0	0	0
Mole Fraction Light Liquid	%	100	100	100	100
Mole Fraction Heavy Liquid	%	0	0	0	0
Phase Mole Fraction	%	83.1022	100	100	100
Molecular Weight	lb/lbmol	69.3762	83.8857	83.8857	83.8860
Mass Density	lb/ft^3	48.0048	53.4004	54.4176	54.4177
Molar Flow	lbmol/h	0.000201180	11.9317	1.25605E-05	11.9314
Mass Flow	lb/h	0.0139571	1000.90	0.00105364	1000.88
Vapor Volumetric Flow	ft^3/h	0.000290745	18.7433	1.93622E-05	18.3926
Liquid Volumetric Flow	gpm	3.62487E-05	2.33683	2.41398E-06	2.29310
Std Vapor Volumetric Flow	MMSCFD	1.83227E-06	0.108669	1.14396E-07	0.108667
Std Liquid Volumetric Flow	sgpm	3.67203E-05	2.29916	2.42032E-06	2.29911
Compressibility		0.00370137	0.00397275	0.00394807	0.00394808
Specific Gravity		0.769693	0.856204	0.872514	0.872516
API Gravity		53.2680	31.3288	31.3297	31.3293
Enthalpy	Btu/h	1.55419?	109315	0.102605?	97466.9?
Mass Enthalpy	Btu/lb	111.354?	109.216	97.3811?	97.3811?
Mass Cp	Btu/(lb*°F)	0.424223?	0.393495	0.376065?	0.376064?
Ideal Gas CpCv Ratio		1.11275	1.09540	1.10210	1.10210
Dynamic Viscosity	cP	0.355928	0.536152	0.661585	0.661595
Kinematic Viscosity	cSt	0.462868	0.626791	0.758971	0.758981
Thermal Conductivity	Btu/(h*ft*°F)	0.0767860?	0.0760434?	0.0783122?	0.0783122?
Surface Tension	lbf/ft	0.00154221?	0.00186522?	0.00200879?	0.00200880?
Net Ideal Gas Heating Value	Btu/ft^3	3347.90	3925.91	3925.91	3925.92
Net Liquid Heating Value	Btu/lb	18146.4	17588.8	17588.8	17588.8
Gross Ideal Gas Heating Value	Btu/ft^3	3529.32	4116.02	4116.02	4116.03
Gross Liquid Heating Value	Btu/lb	19139.3	18448.7	18448.7	18448.7

PFO ProMax Outputs and Calculations
Shell Polymers Monaca
2024

PFO

	Annual Total Working Losses (lb/h)	Annual Per-Tank Breathing Losses (lb/h)	PFO Annual Total Losses (lb/h)	PFO Annual Total Losses (lb/y)
VOC	5.800E-01	1.247E-01	8.293E-01	7264.86
HAP	1.252E-01	2.692E-02	1.791E-01	1568.81
1,3-Butadiene	3.544E-03	7.617E-04	5.067E-03	44.39
Benzene	5.740E-02	1.234E-02	8.207E-02	718.97
n-Hexane	1.355E-04	2.912E-05	0.00019369	1.70
Toluene	3.433E-02	7.380E-03	0.049092459	430.05
Ethylbenzene	3.849E-03	8.274E-04	0.005504294	48.22
Styrene	2.215E-02	4.761E-03	0.03167355	277.46
m-Xylene	1.124E-03	2.416E-04	0.001607335	14.08
o-Xylene	1.343E-03	2.887E-04	0.001920314	16.82
p-Xylene	1.162E-03	2.498E-04	0.001662067	14.56
Naphthalene	2.046E-04	4.397E-05	0.000292509	2.56
n-Butane	1.973E-03	4.240E-04	0.002820639	24.71
Isoprene	8.473E-05	1.821E-05	0.000121155	1.06
n-Pentane	7.216E-05	1.551E-05	0.000103183	0.90
Cyclopentene	1.912E-04	4.109E-05	0.000273328	2.39
Cyclopentane	7.366E-05	1.583E-05	0.000105324	0.92
2-Methyl-2-Butene	6.621E-05	1.423E-05	9.46757E-05	0.83
cis-1,3-Pentadiene	4.149E-04	8.919E-05	0.000593328	5.20
trans-1,3-Pentadiene	3.783E-04	8.130E-05	0.000540858	4.74
Cyclopentadiene	4.508E-01	9.690E-02	0.644592153	5646.63
Dicyclopentadiene	6.347E-04	1.364E-04	9.075E-04	7.95
Curve Oil	5.718E-05	1.229E-05	8.17553E-05	0.72



Promax Distillation Curve Oil

Cuts	Temperature	Annual Working Losses (lb/h)	Annual Breathing Losses (lb/h)
C1	PFO @224.7 °C	3.37413E-05	7.25234E-06
C2	PFO @237.5 °C	1.38953E-05	2.98664E-06
C3	PFO @250.7 °C	5.55607E-06	1.19422E-06
C4	PFO @263.7 °C	2.51368E-06	5.40289E-07
C5	PFO @276.3 °C	1.09254E-06	2.34829E-07
C6	PFO @289.5 °C	2.52283E-07	5.42255E-08
C7	PFO @302.6 °C	8.5339E-08	1.83427E-08
C8	PFO @315.9 °C	2.59296E-08	5.5733E-09
C9	PFO @328.9 °C	9.16423E-09	1.96975E-09
C10	PFO @342.0 °C	3.1711E-09	6.81595E-10
C11	PFO @355.0 °C	1.13498E-09	2.43952E-10
C12	PFO @367.8 °C	3.23989E-10	6.9638E-11
C13	PFO @381.0 °C	8.9216E-11	1.9176E-11
C14	PFO @394.0 °C	2.62723E-11	5.64695E-12
C15	PFO @407.3 °C	8.26071E-12	1.77555E-12
C16	PFO @420.1 °C	3.02577E-12	6.50357E-13
C17	PFO @436.3 °C	8.96985E-13	1.92797E-13
C18	PFO @455.8 °C	1.24263E-13	2.67089E-14
C19	PFO @475.4 °C	1.44037E-14	3.09592E-15
C20	PFO @494.4 °C	1.26554E-15	2.72015E-16
C21	PFO @516.2 °C	1.05369E-16	2.26479E-17
C22	PFO @537.3 °C	3.45312E-17	7.4221E-18

PFO ProMax Input Assumptions
Shell Polymers Monaca
2024

Tank Data/Sample Data

Tank Name	Tank ID	Contents	Length/ Height (m)	Diameter (m)	Temp (C)	Pressure (barg)	Flow Rate (kg/hr)	Reference:
1 Pyrolysis Fuel Oil Storage Tank (PFO)	T-64204 A/B	Pyrolysis Fuel Oil	7.316	9.14	67.29	0.0057	1066	Storage Tank Directory Air Inventory Data.xlsx

Sample Data

Constituent	PFO % by weight
1,3-Butadiene	0.010
Benzene	1.680
n-Hexane	0.007
Toluene	3.909
Ethylbenzene	1.530
Styrene	10.110
m-Xylene	0.501
o-Xylene	0.644
p-Xylene	0.501
Naphthalene	1.013
n-Butane	0.007
Isoprene	0.001
n-Pentane	0.001
Cyclopentene	0.002
Cyclopentane	0.001
2-Methyl-2-Butene	0.001
cis-1,3-Pentadiene	0.007
trans-1,3-Pentadiene	0.006
Cyclopentadiene	3.605
Dicyclopentadiene	0.845
Curve Oil (balance)	75.619

Curve Oil inputs

Reference: [PFO Distillation Curve 20240305.csv](#)

PFO Distillation Curve

Component % mass	Temperature Results (°C)
0	153.78
5	170.02
10	182.82
15	196.89
20	211.03
25	226.49
30	241.77
35	257.51
40	271.40
45	284.48
50	305.89
55	329.67
60	350.96
65	370.26
70	392.82
75	414.56
80	431.55
85	450.14
90	470.79
95	501.87
98	536.33
100	545.00

MW:	133 g/mol Heat and Material Balance
Specific Gravity:	0.79 from PFO Composition
Promax calculated VP	0.110532 bar at 100 F

Oil Composition Solver used to match the Temperature, Pressure, Flowrate inputs:

(C1 + C2 + C3 + C4 + C5 + C6 + C7 + C8 + C9 + C10 + C11 + C12 + C13 + C14 + C15 + C16 + C17 + C18 + C19 + C20 + C21 + C22) - 75.619

Cut	Oil @ °C	% by weight
C1	PFO @224.7 °C	0.000335096
C2	PFO @237.5 °C	0.002415093
C3	PFO @250.7 °C	0.00207008
C4	PFO @263.7 °C	1.28170413
C5	PFO @276.3 °C	0.150213591
C6	PFO @289.5 °C	0.897006101
C7	PFO @302.6 °C	0.847682639
C8	PFO @315.9 °C	0.799024788
C9	PFO @328.9 °C	0.850206111
C10	PFO @342.0 °C	0.876389889
C11	PFO @355.0 °C	0.523785909
C12	PFO @367.8 °C	0.446264661
C13	PFO @381.0 °C	0.402001775
C14	PFO @394.0 °C	0.407393417
C15	PFO @407.3 °C	0.413002616
C16	PFO @420.1 °C	0.438954535
C17	PFO @436.3 °C	0.376296533
C18	PFO @455.8 °C	0.332665432
C19	PFO @475.4 °C	0.31107624
C20	PFO @494.4 °C	0.324602464
C21	PFO @516.2 °C	0.383430854
C22	PFO @537.3 °C	0.507351299

Process Streams						
Composition	Status:	Breathing	Flashing	PFO Distillation Curve	Light Ends Supplied	Working
Phase: Total	From Block:	Solved	Solved	Solved	Solved	Solved
To Block:	PFO Fixed Roof Tank	PFO Fixed Roof Tank	--	PFO Fixed Roof Tank	PFO Fixed Roof Tank	PFO Fixed Roof Tank
Mole Fraction	--	--	--	--	--	--
	%	%	%	%	%	%
1,3-Butadiene	1.49851			0.0263540*	1.49851	0.0254414
Benzene	10.1214			3.06591*	10.1214	3.06154
n-Hexane	0.0201015			0.0115793*	0.0201015	0.0115740
Toluene	4.39609			6.04773*	4.39609	6.04875
Ethylbenzene	0.397272			2.05436*	0.397272	2.05539
Styrene	2.50226			13.8377*	2.50226	13.8447
m-Xylene	0.114112			0.672704*	0.114112	0.673050
o-Xylene	0.141665			0.864713*	0.141665	0.865161
p-Xylene	0.117096			0.672704*	0.117096	0.673048
Naphthalene	0.0273313			1.12665*	0.0273313	1.12733
n-Butane	0.415177			0.0171681*	0.415177	0.0169214
Isoprene	0.0153202			0.00209272*	0.0153202	0.00208452
n-Pentane	0.0127572			0.00197578*	0.0127572	0.00196910
Cyclopentene	0.0286880			0.00418545*	0.0286880	0.00417026
Cyclopentane	0.00987637			0.00203257*	0.00987637	0.00202771
2-Methyl-2-Butene	0.0118034			0.00203257*	0.0118034	0.00202651
cis-1,3-Pentadiene	0.176798			0.0146491*	0.176798	0.0145485
trans-1,3-Pentadiene	0.0686495			0.0125563*	0.0686495	0.0125216
Cyclopentadiene	79.8359			7.77434*	79.8359	7.72967
Dicyclopentadiene	0.0832589			0.911140*	0.0832589	0.911653
PFO @ 224.7 °C	0.00359168			5.44091*	0.00359168	5.44428
PFO @ 237.5 °C	0.00142948			5.14173*	0.00142948	5.14492
PFO @ 250.7 °C	0.000530489			4.84659*	0.000530489	4.84959
PFO @ 263.7 °C	0.000228392			5.15704*	0.000228392	5.16023
PFO @ 276.3 °C	9.47057E-05			5.31586*	9.47057E-05	5.31915
PFO @ 289.5 °C	2.07409E-05			3.17709*	2.07409E-05	3.17906
PFO @ 302.6 °C	6.93652E-06			2.70688*	6.93652E-06	2.70855
PFO @ 315.9 °C	2.01174E-06			2.43839*	2.01174E-06	2.43991
PFO @ 328.9 °C	6.78127E-07			2.47110*	6.78127E-07	2.47263
PFO @ 342.0 °C	2.24088E-07			2.50512*	2.24088E-07	2.50667
PFO @ 355.0 °C	7.64072E-08			2.66254*	7.64072E-08	2.66419
PFO @ 367.8 °C	2.07516E-08			2.28248*	2.07516E-08	2.28389
PFO @ 381.0 °C	5.45652E-09			2.01783*	5.45652E-09	2.01908
PFO @ 394.0 °C	1.53300E-09			1.88687*	1.53300E-09	1.88804
PFO @ 407.3 °C	4.62324E-10			1.96892*	4.62324E-10	1.97014
PFO @ 420.1 °C	1.61857E-10			2.32575*	1.61857E-10	2.32719
PFO @ 436.3 °C	4.53100E-11			3.07741*	4.53100E-11	3.07931
PFO @ 455.8 °C	5.89114E-12			2.64139*	5.89114E-12	2.64303
PFO @ 475.4 °C	6.41302E-13			1.91527*	6.41302E-13	1.91646
PFO @ 494.4 °C	5.13212E-14			1.00720*	5.13212E-14	1.00782
PFO @ 516.2 °C	4.08894E-15			0.610861*	4.08894E-15	0.611239
PFO @ 537.3 °C	1.26876E-15			1.28024*	1.26876E-15	1.28104
PFO (Unidentified)	0			0*	0	0

Process Streams						
Composition	Status:	Breathing	Flashing	PFO Distillation Curve	Light Ends Supplied	Working
Phase: Total	From Block:	Solved	Solved	Solved	Solved	Solved
To Block:	PFO Fixed Roof Tank	PFO Fixed Roof Tank	--	PFO Fixed Roof Tank	PFO Fixed Roof Tank	PFO Fixed Roof Tank
Mole Fraction	--	--	--	--	--	--
	%	%	%	%	%	%
1,3-Butadiene	0.785840	0.774509		0.0263540*	0.785840	0.0258871
Benzene	8.81405	8.96589		3.06591*	8.81405	3.06238
n-Hexane	0.0188542	0.0194196		0.0115793*	0.0188542	0.0115748
Toluene	4.46951	4.63476		6.04773*	4.46951	6.04870
Ethylbenzene	0.434916	0.459468		2.05436*	0.434916	2.05536
Styrene	2.55109	2.69841		13.8377*	2.55109	13.8446
m-Xylene	0.127002	0.134292		0.672704*	0.127002	0.673039
o-Xylene	0.151732	0.160560		0.864713*	0.151732	0.865151
p-Xylene	0.131327	0.138712		0.672704*	0.131327	0.673036
Naphthalene	0.0191442	0.0208449		1.12665*	0.0191442	1.12733
n-Butane	0.407090	0.402717		0.0171681*	0.407090	0.0169284
Isoprene	0.0149200	0.0150123		0.00209272*	0.0149200	0.00208484
n-Pentane	0.0119968	0.0121110		0.00197578*	0.0119968	0.00196962
Cyclopentene	0.0336600	0.0337416		0.00418545*	0.0336600	0.00416733
Cyclopentane	0.0125976	0.0126754		0.00203257*	0.0125976	0.00202608
2-Methyl-2-Butene	0.0113241	0.0114526		0.00203257*	0.0113241	0.00202686
cis-1,3-Pentadiene	0.0730676	0.0739731		0.0146491*	0.0730676	0.0146131
trans-1,3-Pentadiene	0.0666060	0.0673251		0.0125563*	0.0666060	0.0125231
Cyclopentadiene	81.8016	81.2954		7.77434*	81.8016	7.72883
Dicyclopentadiene	0.0575848	0.0616326		0.911140*	0.0575848	0.911665
PFO @ 224.7 °C	0.00373012	0.00430214		5.44091*	0.00373012	5.44425

PFO @237.5 °C	0.00147425	0.00172391	5.14173*	0.00147425	5.14489
PFO @250.7 °C	0.000558404	0.000662107	4.84659*	0.000558404	4.84957
PFO @263.7 °C	0.000239975	0.000288505	5.15704*	0.000239975	5.16021
PFO @276.3 °C	9.90968E-05	0.000120810	5.31586*	9.90968E-05	5.31912
PFO @289.5 °C	2.16645E-05	2.68195E-05	3.17709*	2.16645E-05	3.17904
PFO @302.6 °C	6.96720E-06	8.75429E-06	2.70688*	6.96720E-06	2.70854
PFO @315.9 °C	2.01439E-06	2.57612E-06	2.43839*	2.01439E-06	2.43989
PFO @328.9 °C	6.76833E-07	8.80273E-07	2.47110*	6.76833E-07	2.47262
PFO @342.0 °C	2.22914E-07	2.94908E-07	2.50512*	2.22914E-07	2.50666
PFO @355.0 °C	7.59608E-08	1.02236E-07	2.66254*	7.59608E-08	2.66417
PFO @367.8 °C	2.05894E-08	2.81949E-08	2.28248*	2.05894E-08	2.28388
PFO @381.0 °C	5.39350E-09	7.52153E-09	2.01783*	5.39350E-09	2.01907
PFO @394.0 °C	1.51024E-09	2.14424E-09	1.88687*	1.51024E-09	1.88803
PFO @407.3 °C	4.53198E-10	6.55441E-10	1.96892*	4.53198E-10	1.97013
PFO @420.1 °C	1.58117E-10	2.32817E-10	2.32575*	1.58117E-10	2.32718
PFO @436.3 °C	4.40306E-11	6.63244E-11	3.07741*	4.40306E-11	3.07930
PFO @455.8 °C	5.66985E-12	8.77829E-12	2.64139*	5.66985E-12	2.64301
PFO @475.4 °C	6.10696E-13	9.71617E-13	1.91527*	6.10696E-13	1.91645
PFO @494.4 °C	4.87024E-14	7.95687E-14	1.00720*	4.87024E-14	1.00782
PFO @516.2 °C	3.79152E-15	6.37295E-15	0.610861*	3.79152E-15	0.611236
PFO @537.3 °C	1.15323E-15	1.98950E-15	1.28024*	1.15323E-15	1.28103
PFO (Unidentified)	0	0	0*	0	0
Molar Flow	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h
1,3-Butadiene	1.40820E-05	0	0.00434481*	6.55163E-05	0.00426521
Benzene	0.000157945	0	0.505457*	0.000734837	0.504564
n-Hexane	3.37862E-07	0	0.00190900*	1.57190E-06	0.00190709
Toluene	8.00923E-05	0	0.997049*	0.000372627	0.996596
Ethylbenzene	7.79358E-06	0	0.338689*	3.62594E-05	0.338645
Styrene	4.57149E-05	0	2.28132*	0.000212688	2.28107
m-Xylene	2.27584E-06	0	0.110904*	1.05883E-05	0.110891
o-Xylene	2.71899E-06	0	0.142559*	1.26500E-05	0.142544
p-Xylene	2.35334E-06	0	0.110904*	1.09488E-05	0.110891
Naphthalene	3.43059E-07	0	0.185743*	1.59607E-06	0.185741
n-Butane	7.29495E-06	0	0.00283040*	3.39396E-05	0.00278916
Isoprene	2.67363E-07	0	0.000345013*	1.24390E-06	0.000343502
n-Pentane	2.14979E-07	0	0.000325734*	1.00019E-06	0.000324518
Cyclopentene	6.03177E-07	0	0.000690027*	2.80627E-06	0.000686617
Cyclopentane	2.25746E-07	0	0.000335096*	1.05028E-06	0.000333820
2-Methyl-2-Butene	2.02924E-07	0	0.000335096*	9.44099E-07	0.000333949
cis-1,3-Pentadiene	1.30935E-06	0	0.00241509*	6.09172E-06	0.00240769
trans-1,3-Pentadiene	1.19356E-06	0	0.00207008*	5.55301E-06	0.00206333
Cyclopentadiene	0.00146586	0	1.28170*	0.00681988	1.27342
Dicyclopentadiene	1.03190E-06	0	0.150214*	4.80090E-06	0.150208
PFO @224.7 °C	6.68428E-08	0	0.897006*	3.10984E-07	0.897006
PFO @237.5 °C	2.64182E-08	0	0.847683*	1.22910E-07	0.847682
PFO @250.7 °C	1.00064E-08	0	0.799025*	4.65548E-08	0.799025
PFO @263.7 °C	4.30029E-09	0	0.850206*	2.00070E-08	0.850206
PFO @276.3 °C	1.77579E-09	0	0.876390*	8.26181E-09	0.876390
PFO @289.5 °C	3.88221E-10	0	0.523786*	1.80619E-09	0.523786
PFO @302.6 °C	1.24850E-10	0	0.446265*	5.80863E-10	0.446265
PFO @315.9 °C	3.60973E-11	0	0.402002*	1.67942E-10	0.402002
PFO @328.9 °C	1.21287E-11	0	0.407393*	5.64283E-11	0.407393
PFO @342.0 °C	3.99456E-12	0	0.413003*	1.85846E-11	0.413003
PFO @355.0 °C	1.36120E-12	0	0.438955*	6.33294E-12	0.438955
PFO @367.8 °C	3.68956E-13	0	0.376297*	1.71656E-12	0.376297
PFO @381.0 °C	9.66500E-14	0	0.332665*	4.49662E-13	0.332665
PFO @394.0 °C	2.70631E-14	0	0.311076*	1.25910E-13	0.311076
PFO @407.3 °C	8.12119E-15	0	0.324602*	3.77836E-14	0.324602
PFO @420.1 °C	2.83342E-15	0	0.383431*	1.31824E-14	0.383431
PFO @436.3 °C	7.89015E-16	0	0.507351*	3.67087E-15	0.507351
PFO @455.8 °C	1.01602E-16	0	0.435468*	4.72702E-16	0.435468
PFO @475.4 °C	1.09435E-17	0	0.315759*	5.09144E-17	0.315759
PFO @494.4 °C	8.72733E-19	0	0.166050*	4.06037E-18	0.166050
PFO @516.2 °C	6.79429E-20	0	0.100709*	3.16103E-19	0.100709
PFO @537.3 °C	2.06655E-20	0	0.211065*	9.61457E-20	0.211065
PFO (Unidentified)	0	0	0*	0	0
Mass Fraction	%	%	%	%	%
1,3-Butadiene	0.611007	0.600964	0.01*	0.611007	0.00981974
Benzene	9.89655	10.0464	1.68*	9.89655	1.67754
n-Hexane	0.0233552	0.0240063	0.007*	0.0233552	0.00699509
Toluene	5.91959	6.12590	3.909*	5.91959	3.90840
Ethylbenzene	0.663710	0.699744	1.53*	0.663710	1.53026
Styrene	3.81921	4.03148	10.11*	3.81921	10.1119
m-Xylene	0.193813	0.204519	0.501*	0.193813	0.501092
o-Xylene	0.231552	0.244523	0.644*	0.231552	0.644124

p-Xylene	0.200413	0.211251	0.501*	0.200413	0.501090
Naphthalene	0.0352709	0.0383257	1.013*	0.0352709	1.01329
n-Butane	0.340114	0.335772	0.007*	0.340114	0.00690009
Isoprene	0.0146089	0.0146691	0.001*	0.0146089	0.000995918
n-Pentane	0.0124419	0.0125346	0.001*	0.0124419	0.000996568
Cyclopentene	0.0329580	0.0329703	0.002*	0.0329580	0.00199071
Cyclopentane	0.0127000	0.0127522	0.001*	0.0127000	0.000996491
2-Methyl-2-Butene	0.0114160	0.0115220	0.001*	0.0114160	0.000996876
cis-1,3-Pentadiene	0.0715438	0.0722822	0.007*	0.0715438	0.00698064
trans-1,3-Pentadiene	0.0652170	0.0657862	0.006*	0.0652170	0.00598224
Cyclopentadiene	77.7252	77.0862	3.605*	77.7252	3.58277
Dicyclopentadiene	0.109430	0.116883	0.845*	0.109430	0.845221
PFO @224.7 °C	0.00581753	0.00669592	4.14122*	0.00581753	4.14246
PFO @237.5 °C	0.00239576	0.00279574	4.07776*	0.00239576	4.07898
PFO @250.7 °C	0.000957952	0.00113353	4.05763*	0.000957952	4.05885
PFO @263.7 °C	0.000433398	0.000519977	4.54529*	0.000433398	4.54666
PFO @276.3 °C	0.000188370	0.000229175	4.93137*	0.000188370	4.93285
PFO @289.5 °C	4.34975E-05	5.37374E-05	3.11306*	4.34975E-05	3.11399
PFO @302.6 °C	1.47138E-05	1.84500E-05	2.78981*	1.47138E-05	2.79065
PFO @315.9 °C	4.47067E-06	5.70567E-06	2.64104*	4.47067E-06	2.64183
PFO @328.9 °C	1.58006E-06	2.05078E-06	2.81528*	1.58006E-06	2.81613
PFO @342.0 °C	5.46747E-07	7.21850E-07	2.99860*	5.46747E-07	2.99950
PFO @355.0 °C	1.95689E-07	2.62840E-07	3.34744*	1.95689E-07	3.34844
PFO @367.8 °C	5.58607E-08	7.63388E-08	3.02211*	5.58607E-08	3.02302
PFO @381.0 °C	1.53822E-08	2.14075E-08	2.80849*	1.53822E-08	2.80933
PFO @394.0 °C	4.52975E-09	6.41819E-09	2.76193*	4.52975E-09	2.76275
PFO @407.3 °C	1.42427E-09	2.05565E-09	3.01977*	1.42427E-09	3.02068
PFO @420.1 °C	5.21689E-10	7.66580E-10	3.74487*	5.21689E-10	3.74599
PFO @436.3 °C	1.54654E-10	2.32483E-10	5.27513*	1.54654E-10	5.27671
PFO @455.8 °C	2.14248E-11	3.31028E-11	4.87100*	2.14248E-11	4.87246
PFO @475.4 °C	2.48342E-12	3.94304E-12	3.80100*	2.48342E-12	3.80214
PFO @494.4 °C	2.18199E-13	3.55759E-13	2.20221*	2.18199E-13	2.20287
PFO @516.2 °C	1.81672E-14	3.04738E-14	1.42843*	1.81672E-14	1.42886
PFO @537.3 °C	5.95371E-15	1.02501E-14	3.22557*	5.95371E-15	3.22654
PFO (Unidentified)	0	0	0*	0	0
Mass Flow	lb/h	lb/h	lb/h	lb/h	lb/h
1,3-Butadiene	0.000761703	0	0.235013*	0.00354380	0.230707
Benzene	0.0123374	0	39.4821*	0.0573995	39.4124
n-Hexane	2.91154E-05	0	0.164509*	0.000135459	0.164344
Toluene	0.00737958	0	91.8665*	0.0343333	91.8248
Ethylbenzene	0.000827405	0	35.9570*	0.00384948	35.9523
Styrene	0.00476117	0	237.598*	0.0221512	237.571
m-Xylene	0.000241615	0	11.7741*	0.00112411	11.7728
o-Xylene	0.000288662	0	15.1348*	0.00134299	15.1332
p-Xylene	0.000249842	0	11.7741*	0.00116238	11.7727
Naphthalene	4.39700E-05	0	23.8068*	0.000204569	23.8065
n-Butane	0.000423998	0	0.164509*	0.00197264	0.162112
Isoprene	1.82120E-05	0	0.0235013*	8.47308E-05	0.0233983
n-Pentane	1.55105E-05	0	0.0235013*	7.21622E-05	0.0234136
Cyclopentene	4.10866E-05	0	0.0470026*	0.000191155	0.0467703
Cyclopentane	1.58322E-05	0	0.0235013*	7.36591E-05	0.0234118
2-Methyl-2-Butene	1.42316E-05	0	0.0235013*	6.62124E-05	0.0234208
cis-1,3-Pentadiene	8.91890E-05	0	0.164509*	0.000414950	0.164005
trans-1,3-Pentadiene	8.13018E-05	0	0.141008*	0.000378255	0.140548
Cyclopentadiene	0.0968951	0	84.7221*	0.450802	84.1744
Dicyclopentadiene	0.000136420	0	19.8586*	0.000634690	19.8578
PFO @224.7 °C	7.25234E-06	0	97.3238*	3.37413E-05	97.3238
PFO @237.5 °C	2.98664E-06	0	95.8325*	1.38953E-05	95.8324
PFO @250.7 °C	1.19422E-06	0	95.3595*	5.55607E-06	95.3595
PFO @263.7 °C	5.40289E-07	0	106.820*	2.51368E-06	106.820
PFO @276.3 °C	2.34829E-07	0	115.893*	1.09254E-06	115.893
PFO @289.5 °C	5.42255E-08	0	73.1608*	2.52283E-07	73.1608
PFO @302.6 °C	1.83427E-08	0	65.5642*	8.53390E-08	65.5642
PFO @315.9 °C	5.57330E-09	0	62.0677*	2.59296E-08	62.0677
PFO @328.9 °C	1.96975E-09	0	66.1627*	9.16423E-09	66.1627
PFO @342.0 °C	6.81595E-10	0	70.4710*	3.17110E-09	70.4710
PFO @355.0 °C	2.43952E-10	0	78.6690*	1.13498E-09	78.6690
PFO @367.8 °C	6.96380E-11	0	71.0235*	3.23989E-10	71.0235
PFO @381.0 °C	1.91760E-11	0	66.0031*	8.92160E-11	66.0031
PFO @394.0 °C	5.64695E-12	0	64.9088*	2.62723E-11	64.9088
PFO @407.3 °C	1.77555E-12	0	70.9685*	8.26071E-12	70.9685
PFO @420.1 °C	6.50357E-13	0	88.0093*	3.02577E-12	88.0093
PFO @436.3 °C	1.92797E-13	0	123.972*	8.96985E-13	123.972
PFO @455.8 °C	2.67089E-14	0	114.475*	1.24263E-13	114.475
PFO @475.4 °C	3.09592E-15	0	89.3283*	1.44037E-14	89.3283

PFO @494.4 °C	2.72015E-16	0	51.7548*	1.26554E-15	51.7548
PFO @516.2 °C	2.26479E-17	0	33.5699*	1.05369E-16	33.5699
PFO @537.3 °C	7.42210E-18	0	75.8051*	3.45312E-17	75.8051
PFO (Unidentified)	0	0	0*	0	0

Process Streams		Breathing	Flashing	PFO Distillation Curve	Light Ends Supplied	Working	4
Properties		Status: Solved	Solved	Solved	Solved	Solved	Solved
Phase: Total		From Block: PFO Fixed Roof Tank	PFO Fixed Roof Tank	--	PFO Fixed Roof Tank	PFO Fixed Roof Tank	PFO Fixed Roof Tank
		To Block: --	--	PFO Fixed Roof Tank	--	--	--
Property	Units						
Temperature	°F	58.0824	58.0824	153.122*	58.0824	58.0824	58.0824
Pressure	psia	14.1	14.1	14.7786*	14.1	14.1	14.1
Mole Fraction Vapor	%	0		0	0	0	0
Mole Fraction Light Liquid	%	100		100	100	100	100
Mole Fraction Heavy Liquid	%	0	0	0	0	0	0
Phase Mole Fraction	%	100	100	100	100	100	100
Molecular Weight	lb/lbmol	69.5678	69.7105	142.550	69.5678	142.595	142.595
Mass Density	lb/ft^3	51.3795		46.9052	51.3795	49.3189	49.3189
Molar Flow	lbmol/h	0.00179197	0	16.4863	0.00833711	16.4762	16.4762
Mass Flow	lb/h	0.124664	0	2350.13*	0.579994	2349.42	2349.42
Vapor Volumetric Flow	ft^3/h	0.00242633	0	50.1038	0.0112884	47.6374	47.6374
Liquid Volumetric Flow	gpm	0.000302504	0	6.24671	0.00140739	5.93921	5.93921
Std Vapor Volumetric Flow	MMSCFD	1.63206E-05	0	0.150151	7.59312E-05	0.150059	0.150059
Std Liquid Volumetric Flow	sgpm	0.000303752	0	5.81616	0.00141320	5.81445	5.81445
Compressibility		0.00343599		0.00682973	0.00343599	0.00733710	0.00733710
Specific Gravity		0.823802		0.752063	0.823802	0.790763	0.790763
API Gravity		40.4995		47.6138	40.4995	47.6153	47.6153
Enthalpy	Btu/h	71.1460?	0	-1.33217E+06	331.005?	-1.45348E+06?	-1.45348E+06?
Mass Enthalpy	Btu/lb	570.704?		-566.848	570.704?	-618.656?	-618.656?
Mass Cp	Btu/(lb*°F)	0.338804?		0.567960	0.338804?	0.514955?	0.514955?
Ideal Gas CpCv Ratio		1.12262	1.12234	1.03381	1.12262	1.03932	1.03932
Dynamic Viscosity	cP	0.390819		1.27014	0.390819	3.37407	3.37407
Kinematic Viscosity	cSt	0.474859		1.69048	0.474859	4.27090	4.27090
Thermal Conductivity	Btu/(h*ft*°F)	0.0793100?		0.0706273?	0.0793100?	0.0751076?	0.0751076?
Surface Tension	lbf/ft	0.00166537?		0.00151519?	0.00166537?	0.00179148?	0.00179148?
Net Ideal Gas Heating Value	Btu/ft^3	3335.64	3341.44	6981.06	3335.64	6983.30	6983.30
Net Liquid Heating Value	Btu/lb	18028.8	18023.4	18405.2	18028.8	18405.3	18405.3
Gross Ideal Gas Heating Value	Btu/ft^3	3491.54	3497.55	7419.07	3491.54	7421.49	7421.49
Gross Liquid Heating Value	Btu/lb	18879.1	18873.1	19571.1	18879.1	19571.3	19571.3

Process Streams		Breathing	Flashing	PFO Distillation Curve	Light Ends Supplied	Working	4
Composition		Status: Solved	Solved	Solved	Solved	Solved	Solved
Phase: Nonspecific Liquid		From Block: PFO Fixed Roof Tank	PFO Fixed Roof Tank	--	PFO Fixed Roof Tank	PFO Fixed Roof Tank	PFO Fixed Roof Tank
		To Block: --	--	PFO Fixed Roof Tank	--	--	--
Mole Fraction		%		%	%	%	
1,3-Butadiene		0.785840		0.0263540	0.785840	0.0258871	
Benzene		8.81405		3.06591	8.81405	3.06238	
n-Hexane		0.0188542		0.0115793	0.0188542	0.0115748	
Toluene		4.46951		6.04773	4.46951	6.04870	
Ethylbenzene		0.434916		2.05436	0.434916	2.05536	
Styrene		2.55109		13.8377	2.55109	13.8446	
m-Xylene		0.127002		0.672704	0.127002	0.673039	
o-Xylene		0.151732		0.864713	0.151732	0.865151	
p-Xylene		0.131327		0.672704	0.131327	0.673036	
Naphthalene		0.0191442		1.12665	0.0191442	1.12733	
n-Butane		0.407090		0.0171681	0.407090	0.0169284	
Isoprene		0.0149200		0.00209272	0.0149200	0.00208484	
n-Pentane		0.0119968		0.00197578	0.0119968	0.00196962	
Cyclopentene		0.0336600		0.00418545	0.0336600	0.00416733	
Cyclopentane		0.0125976		0.00203257	0.0125976	0.00202608	
2-Methyl-2-Butene		0.0113241		0.00203257	0.0113241	0.00202686	
cis-1,3-Pentadiene		0.0730676		0.0146491	0.0730676	0.0146131	
trans-1,3-Pentadiene		0.0666060		0.0125563	0.0666060	0.0125231	
Cyclopentadiene		81.8016		7.77434	81.8016	7.72883	
Dicyclopentadiene		0.0575848		0.911140	0.0575848	0.911665	
PFO @224.7 °C		0.00373012		5.44091	0.00373012	5.44425	
PFO @237.5 °C		0.00147425		5.14173	0.00147425	5.14489	
PFO @250.7 °C		0.000558404		4.84659	0.000558404	4.84957	
PFO @263.7 °C		0.000239975		5.15704	0.000239975	5.16021	
PFO @276.3 °C		9.90968E-05		5.31586	9.90968E-05	5.31912	
PFO @289.5 °C		2.16645E-05		3.17709	2.16645E-05	3.17904	
PFO @302.6 °C		6.96720E-06		2.70688	6.96720E-06	2.70854	
PFO @315.9 °C		2.01439E-06		2.43839	2.01439E-06	2.43989	
PFO @328.9 °C		6.76833E-07		2.47110	6.76833E-07	2.47262	
PFO @342.0 °C		2.22914E-07		2.50512	2.22914E-07	2.50666	

PFO @355.0 °C	7.59608E-08	2.66254	7.59608E-08	2.66417
PFO @367.8 °C	2.05894E-08	2.28248	2.05894E-08	2.28388
PFO @381.0 °C	5.39350E-09	2.01783	5.39350E-09	2.01907
PFO @394.0 °C	1.51024E-09	1.88687	1.51024E-09	1.88803
PFO @407.3 °C	4.53198E-10	1.96892	4.53198E-10	1.97013
PFO @420.1 °C	1.58117E-10	2.32575	1.58117E-10	2.32718
PFO @436.3 °C	4.40306E-11	3.07741	4.40306E-11	3.07930
PFO @455.8 °C	5.66985E-12	2.64139	5.66985E-12	2.64301
PFO @475.4 °C	6.10696E-13	1.91527	6.10696E-13	1.91645
PFO @494.4 °C	4.87024E-14	1.00720	4.87024E-14	1.00782
PFO @516.2 °C	3.79152E-15	0.610861	3.79152E-15	0.611236
PFO @537.3 °C	1.15323E-15	1.28024	1.15323E-15	1.28103
PFO (Unidentified)	0	0	0	0
Molar Flow	lbmol/h	lbmol/h	lbmol/h	lbmol/h
1,3-Butadiene	1.40820E-05	0.00434481	6.55163E-05	0.00426521
Benzene	0.000157945	0.505457	0.000734837	0.504564
n-Hexane	3.37862E-07	0.00190900	1.57190E-06	0.00190709
Toluene	8.00923E-05	0.997049	0.000372627	0.996596
Ethylbenzene	7.79358E-06	0.338689	3.62594E-05	0.338645
Styrene	4.57149E-05	2.28132	0.000212688	2.28107
m-Xylene	2.27584E-06	0.110904	1.05883E-05	0.110891
o-Xylene	2.71899E-06	0.142559	1.26500E-05	0.142544
p-Xylene	2.35334E-06	0.110904	1.09488E-05	0.110891
Naphthalene	3.43059E-07	0.185743	1.59607E-06	0.185741
n-Butane	7.29495E-06	0.00283040	3.39396E-05	0.00278916
Isoprene	2.67363E-07	0.000345013	1.24390E-06	0.000343502
n-Pentane	2.14979E-07	0.000325734	1.00019E-06	0.000324518
Cyclopentene	6.03177E-07	0.000690027	2.80627E-06	0.000686617
Cyclopentane	2.25746E-07	0.000335096	1.05028E-06	0.000333820
2-Methyl-2-Butene	2.02924E-07	0.000335096	9.44099E-07	0.000333949
cis-1,3-Pentadiene	1.30935E-06	0.00241509	6.09172E-06	0.00240769
trans-1,3-Pentadiene	1.19356E-06	0.00207008	5.55301E-06	0.00206333
Cyclopentadiene	0.00146586	1.28170	0.00681988	1.27342
Dicyclopentadiene	1.03190E-06	0.150214	4.80090E-06	0.150208
PFO @224.7 °C	6.68428E-08	0.897006	3.10984E-07	0.897006
PFO @237.5 °C	2.64182E-08	0.847683	1.22910E-07	0.847682
PFO @250.7 °C	1.00064E-08	0.799025	4.65548E-08	0.799025
PFO @263.7 °C	4.30029E-09	0.850206	2.00070E-08	0.850206
PFO @276.3 °C	1.77579E-09	0.876390	8.26181E-09	0.876390
PFO @289.5 °C	3.88221E-10	0.523786	1.80619E-09	0.523786
PFO @302.6 °C	1.24850E-10	0.446265	5.80863E-10	0.446265
PFO @315.9 °C	3.60973E-11	0.402002	1.67942E-10	0.402002
PFO @328.9 °C	1.21287E-11	0.407393	5.64283E-11	0.407393
PFO @342.0 °C	3.99456E-12	0.413003	1.85846E-11	0.413003
PFO @355.0 °C	1.36120E-12	0.438955	6.33294E-12	0.438955
PFO @367.8 °C	3.68956E-13	0.376297	1.71656E-12	0.376297
PFO @381.0 °C	9.66500E-14	0.332665	4.49662E-13	0.332665
PFO @394.0 °C	2.70631E-14	0.311076	1.25910E-13	0.311076
PFO @407.3 °C	8.12119E-15	0.324602	3.77836E-14	0.324602
PFO @420.1 °C	2.83342E-15	0.383431	1.31824E-14	0.383431
PFO @436.3 °C	7.89015E-16	0.507351	3.67087E-15	0.507351
PFO @455.8 °C	1.01602E-16	0.435468	4.72702E-16	0.435468
PFO @475.4 °C	1.09435E-17	0.315759	5.09144E-17	0.315759
PFO @494.4 °C	8.72733E-19	0.166050	4.06037E-18	0.166050
PFO @516.2 °C	6.79429E-20	0.100709	3.16103E-19	0.100709
PFO @537.3 °C	2.06655E-20	0.211065	9.61457E-20	0.211065
PFO (Unidentified)	0	0	0	0
Mass Fraction	%	%	%	%
1,3-Butadiene	0.611007	0.01	0.611007	0.00981974
Benzene	9.89655	1.68	9.89655	1.67754
n-Hexane	0.0233552	0.007	0.0233552	0.00699509
Toluene	5.91959	3.909	5.91959	3.90840
Ethylbenzene	0.663710	1.53	0.663710	1.53026
Styrene	3.81921	10.11	3.81921	10.1119
m-Xylene	0.193813	0.501	0.193813	0.501092
o-Xylene	0.231552	0.644	0.231552	0.644124
p-Xylene	0.200413	0.501	0.200413	0.501090
Naphthalene	0.0352709	1.013	0.0352709	1.01329
n-Butane	0.340114	0.007	0.340114	0.00690009
Isoprene	0.0146089	0.001	0.0146089	0.000995918
n-Pentane	0.0124419	0.001	0.0124419	0.000996568
Cyclopentene	0.0329580	0.002	0.0329580	0.00199071
Cyclopentane	0.0127000	0.001	0.0127000	0.000996491
2-Methyl-2-Butene	0.0114160	0.001	0.0114160	0.000996876
cis-1,3-Pentadiene	0.0715438	0.007	0.0715438	0.00698064

trans-1,3-Pentadiene	0.0652170	0.006	0.0652170	0.00598224
Cyclopentadiene	77.7252	3.605	77.7252	3.58277
Dicyclopentadiene	0.109430	0.845	0.109430	0.845221
PFO @224.7 °C	0.00581753	4.14122	0.00581753	4.14246
PFO @237.5 °C	0.00239576	4.07776	0.00239576	4.07898
PFO @250.7 °C	0.000957952	4.05763	0.000957952	4.05885
PFO @263.7 °C	0.000433398	4.54529	0.000433398	4.54666
PFO @276.3 °C	0.000188370	4.93137	0.000188370	4.93285
PFO @289.5 °C	4.34975E-05	3.11306	4.34975E-05	3.11399
PFO @302.6 °C	1.47138E-05	2.78981	1.47138E-05	2.79065
PFO @315.9 °C	4.47067E-06	2.64104	4.47067E-06	2.64183
PFO @328.9 °C	1.58006E-06	2.81528	1.58006E-06	2.81613
PFO @342.0 °C	5.46747E-07	2.99860	5.46747E-07	2.99950
PFO @355.0 °C	1.95689E-07	3.34744	1.95689E-07	3.34844
PFO @367.8 °C	5.58607E-08	3.02211	5.58607E-08	3.02302
PFO @381.0 °C	1.53822E-08	2.80849	1.53822E-08	2.80933
PFO @394.0 °C	4.52975E-09	2.76193	4.52975E-09	2.76275
PFO @407.3 °C	1.42427E-09	3.01977	1.42427E-09	3.02068
PFO @420.1 °C	5.21689E-10	3.74487	5.21689E-10	3.74599
PFO @436.3 °C	1.54654E-10	5.27513	1.54654E-10	5.27671
PFO @455.8 °C	2.14248E-11	4.87100	2.14248E-11	4.87246
PFO @475.4 °C	2.48342E-12	3.80100	2.48342E-12	3.80214
PFO @494.4 °C	2.18199E-13	2.20221	2.18199E-13	2.20287
PFO @516.2 °C	1.81672E-14	1.42843	1.81672E-14	1.42886
PFO @537.3 °C	5.95371E-15	3.22557	5.95371E-15	3.22654
PFO (Unidentified)	0	0	0	0
Mass Flow	lb/h	lb/h	lb/h	lb/h
1,3-Butadiene	0.000761703	0.235013	0.00354380	0.230707
Benzene	0.0123374	39.4821	0.0573995	39.4124
n-Hexane	2.91154E-05	0.164509	0.000135459	0.164344
Toluene	0.00737958	91.8665	0.0343333	91.8248
Ethylbenzene	0.000827405	35.9570	0.00384948	35.9523
Styrene	0.00476117	237.598	0.0221512	237.571
m-Xylene	0.000241615	11.7741	0.00112411	11.7728
o-Xylene	0.000288662	15.1348	0.00134299	15.1332
p-Xylene	0.000249842	11.7741	0.00116238	11.7727
Naphthalene	4.39700E-05	23.8068	0.000204569	23.8065
n-Butane	0.000423998	0.164509	0.00197264	0.162112
Isoprene	1.82120E-05	0.0235013	8.47308E-05	0.0233983
n-Pentane	1.55105E-05	0.0235013	7.21622E-05	0.0234136
Cyclopentene	4.10866E-05	0.0470026	0.000191155	0.0467703
Cyclopentane	1.58322E-05	0.0235013	7.36591E-05	0.0234118
2-Methyl-2-Butene	1.42316E-05	0.0235013	6.62124E-05	0.0234208
cis-1,3-Pentadiene	8.91890E-05	0.164509	0.000414950	0.164005
trans-1,3-Pentadiene	8.13018E-05	0.141008	0.000378255	0.140548
Cyclopentadiene	0.0968951	84.7221	0.450802	84.1744
Dicyclopentadiene	0.000136420	19.8586	0.000634690	19.8578
PFO @224.7 °C	7.25234E-06	97.3238	3.37413E-05	97.3238
PFO @237.5 °C	2.98664E-06	95.8325	1.38953E-05	95.8324
PFO @250.7 °C	1.19422E-06	95.3595	5.55607E-06	95.3595
PFO @263.7 °C	5.40289E-07	106.820	2.51368E-06	106.820
PFO @276.3 °C	2.34829E-07	115.893	1.09254E-06	115.893
PFO @289.5 °C	5.42255E-08	73.1608	2.52283E-07	73.1608
PFO @302.6 °C	1.83427E-08	65.5642	8.53390E-08	65.5642
PFO @315.9 °C	5.57330E-09	62.0677	2.59296E-08	62.0677
PFO @328.9 °C	1.96975E-09	66.1627	9.16423E-09	66.1627
PFO @342.0 °C	6.81595E-10	70.4710	3.17110E-09	70.4710
PFO @355.0 °C	2.43952E-10	78.6690	1.13498E-09	78.6690
PFO @367.8 °C	6.96380E-11	71.0235	3.23989E-10	71.0235
PFO @381.0 °C	1.91760E-11	66.0031	8.92160E-11	66.0031
PFO @394.0 °C	5.64695E-12	64.9088	2.62723E-11	64.9088
PFO @407.3 °C	1.77555E-12	70.9685	8.26071E-12	70.9685
PFO @420.1 °C	6.50357E-13	88.0093	3.02577E-12	88.0093
PFO @436.3 °C	1.92797E-13	123.972	8.96985E-13	123.972
PFO @455.8 °C	2.67089E-14	114.475	1.24263E-13	114.475
PFO @475.4 °C	3.09592E-15	89.3283	1.44037E-14	89.3283
PFO @494.4 °C	2.72015E-16	51.7548	1.26554E-15	51.7548
PFO @516.2 °C	2.26479E-17	33.5699	1.05369E-16	33.5699
PFO @537.3 °C	7.42210E-18	75.8051	3.45312E-17	75.8051
PFO (Unidentified)	0	0	0	0

Process Streams	Breathing	Flashing	PFO Distillation Curve Light Ends Supplied	Working	4
Properties	Status: Solved	Solved	Solved	Solved	Solved
Phase: Nonspecific Liquid	From Block: PFO Fixed Roof Tank	PFO Fixed Roof Tank	--	PFO Fixed Roof Tank	PFO Fixed Roof Tank
	To Block: --	--	PFO Fixed Roof Tank	--	--

Property	Units				
Temperature	°F	58.0824	153.122	58.0824	58.0824
Pressure	psia	14.1	14.7786	14.1	14.1
Mole Fraction Vapor	%	0	0	0	0
Mole Fraction Light Liquid	%	100	100	100	100
Mole Fraction Heavy Liquid	%	0	0	0	0
Phase Mole Fraction	%	100	100	100	100
Molecular Weight	lb/lbmol	69.5678	142.550	69.5678	142.595
Mass Density	lb/ft^3	51.3795	46.9052	51.3795	49.3189
Molar Flow	lbmol/h	0.00179197	16.4863	0.00833711	16.4762
Mass Flow	lb/h	0.124664	2350.13	0.579994	2349.42
Vapor Volumetric Flow	ft^3/h	0.00242633	50.1038	0.0112884	47.6374
Liquid Volumetric Flow	gpm	0.000302504	6.24671	0.00140739	5.93921
Std Vapor Volumetric Flow	MMSCFD	1.63206E-05	0.150151	7.59312E-05	0.150059
Std Liquid Volumetric Flow	sgpm	0.000303752	5.81616	0.00141320	5.81445
Compressibility		0.00343599	0.00682973	0.00343599	0.00733710
Specific Gravity		0.823802	0.752063	0.823802	0.790763
API Gravity		40.4995	47.6138	40.4995	47.6153
Enthalpy	Btu/h	71.1460?	-1.33217E+06	331.005?	-1.45348E+06?
Mass Enthalpy	Btu/lb	570.704?	-566.848	570.704?	-618.656?
Mass Cp	Btu/(lb*°F)	0.338804?	0.567960	0.338804?	0.514955?
Ideal Gas CpCv Ratio		1.12262	1.03381	1.12262	1.03932
Dynamic Viscosity	cP	0.390819	1.27014	0.390819	3.37407
Kinematic Viscosity	cSt	0.474859	1.69048	0.474859	4.27090
Thermal Conductivity	Btu/(h*ft*°F)	0.0793100?	0.0706273?	0.0793100?	0.0751076?
Surface Tension	lbf/ft	0.00166537?	0.00151519?	0.00166537?	0.00179148?
Net Ideal Gas Heating Value	Btu/ft^3	3335.64	6981.06	3335.64	6983.30
Net Liquid Heating Value	Btu/lb	18028.8	18405.2	18028.8	18405.3
Gross Ideal Gas Heating Value	Btu/ft^3	3491.54	7419.07	3491.54	7421.49
Gross Liquid Heating Value	Btu/lb	18879.1	19571.1	18879.1	19571.3

Hexene ProMax Input Assumptions and Emissions Output
Shell Polymers Monaca

Tank Data/Sample Data

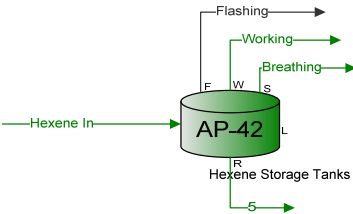
Tank Name	Tank ID	Contents	Length/ Height (m)	Diameter (m)	Temp (C)	Pressure (barg)	Flow Rate (m3/hr)	Reference:
Hexene Storage Tank	T-64302 A/B	Hexene	14.63	16.256	27.29	0.004285	11.2	Storage Tank Directory Air Inventory Data.xlsx

Sample Data

Constituent	Hexene Tank
	% by weight
Hexene	100

Emissions

	Annual Working Losses (lb/h)	Annual Breathing Losses (lb/h)	Annual Total Losses (lb/h)	Annual Total Losses (tpy)
Hexene T-64302A	0.036646849	0.016161542	0.052808391	0.231300754
Hexene T-64302B	0.036646849	0.016161542	0.052808391	0.231300754
Hexene Total	0.073293698	0.032323085	0.105616783	0.462601507



Process Streams		Breathing	Flashing	Hexene In	Working	5
Composition		Status: Solved	Solved	Solved	Solved	Solved
Phase: Total		From Block: Hexene Storage Tanks	Hexene Storage Tanks	--	Hexene Storage Tanks	Hexene Storage Tanks
		To Block: --	--	Hexene Storage Tanks	--	--
Mole Fraction		%		%	%	%
Hexene-1		100		100*	100	100
Molar Flow		lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h
Hexene-1		0.000192035	0	199.019*	0.000435445	199.019
Mass Fraction		%		%	%	%
Hexene-1		100		100*	100	100
Mass Flow		lb/h	lb/h	lb/h	lb/h	lb/h
Hexene-1		0.0161615	0	16749.4*	0.0366468	16749.3

Process Streams		Breathing	Flashing	Hexene In	Working	5
Properties		Status: Solved	Solved	Solved	Solved	Solved
Phase: Total		From Block: Hexene Storage Tanks	Hexene Storage Tanks	--	Hexene Storage Tanks	Hexene Storage Tanks
		To Block: --	--	Hexene Storage Tanks	--	--
Property	Units					
Temperature	°F	58.0110	58.0110	81.122*	58.0110	58.0110
Pressure	psia	14.1	14.1	14.7581*	14.1	14.1
Mole Fraction Vapor	%	0		0	0	0
Mole Fraction Light Liquid	%	100		100	100	100
Mole Fraction Heavy Liquid	%	0		0	0	0
Phase Mole Fraction	%	100		100	100	100
Molecular Weight	lb/lbmol	84.1595		84.1595	84.1595	84.1595
Mass Density	lb/ft^3	42.3607		41.6017	42.3607	42.3607
Molar Flow	lbmol/h	0.000192035	0	199.019	0.000435445	199.019
Mass Flow	lb/h	0.0161615	0	16749.4	0.0366468	16749.3
Vapor Volumetric Flow	ft^3/h	0.000381523	0	402.612	0.000865115	395.398
Liquid Volumetric Flow	gpm	4.75664E-05	0	50.1958	0.000107859	49.2963
Std Vapor Volumetric Flow	MMSCFD	1.74898E-06	0	1.81259	3.96587E-06	1.81259
Std Liquid Volumetric Flow	sgpm	4.75815E-05	0	49.3121*	0.000107893	49.3120
Compressibility		0.00504236		0.00514433	0.00504236	0.00504236
Specific Gravity		0.679197		0.667028	0.679197	0.679197
API Gravity		77.1529		77.1511	77.1529	77.1529
Enthalpy	Btu/h	-6.16130		-6.19246E+06	-13.9710	-6.38537E+06
Mass Enthalpy	Btu/lb	-381.232		-369.713	-381.232	-381.232
Mass Cp	Btu/(lb*°F)	0.491108		0.505712	0.491108	0.491108
Ideal Gas CpCv Ratio		1.06996		1.06743	1.06996	1.06996
Dynamic Viscosity	cP	0.279899		0.246967	0.279899	0.279899
Kinematic Viscosity	cSt	0.412495		0.370602	0.412495	0.412495
Thermal Conductivity	Btu/(h*ft*°F)	0.0716989		0.0691551	0.0716989	0.0716989
Surface Tension	lbf/ft	0.00130148		0.00120987	0.00130148	0.00130148
Net Ideal Gas Heating Value	Btu/ft^3	4271.43		4271.43	4271.43	4271.43
Net Liquid Heating Value	Btu/lb	19101.6		19101.6	19101.6	19101.6
Gross Ideal Gas Heating Value	Btu/ft^3	4572.98		4572.98	4572.98	4572.98
Gross Liquid Heating Value	Btu/lb	20461.4		20461.4	20461.4	20461.4

Process Streams		Breathing	Flashing	Hexene In	Working	5
Composition		Status: Solved	Solved	Solved	Solved	Solved
Phase: Nonspecific Liquid		From Block: Hexene Storage Tanks	Hexene Storage Tanks	--	Hexene Storage Tanks	Hexene Storage Tanks
		To Block: --	--	Hexene Storage Tanks	--	--
Mole Fraction		%		%	%	%
Hexene-1		100		100	100	100
Molar Flow		lbmol/h		lbmol/h	lbmol/h	lbmol/h
Hexene-1		0.000192035		199.019	0.000435445	199.019
Mass Fraction		%		%	%	%
Hexene-1		100		100	100	100
Mass Flow		lb/h		lb/h	lb/h	lb/h
Hexene-1		0.0161615		16749.4	0.0366468	16749.3

Process Streams		Breathing	Flashing	Hexene In	Working	5
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Properties		Status:	Solved	Solved	Solved	Solved	Solved
Phase: Nonspecific Liquid		From Block:	Hexene Storage Tanks	Hexene Storage Tanks	--	Hexene Storage Tanks	Hexene Storage Tanks
To Block:		--	--	Hexene Storage Tanks	--	--	--
Property	Units						
Temperature	°F	58.0110		81.122	58.0110	58.0110	
Pressure	psia	14.1		14.7581	14.1	14.1	
Mole Fraction Vapor	%	0		0	0	0	
Mole Fraction Light Liquid	%	100		100	100	100	
Mole Fraction Heavy Liquid	%	0		0	0	0	
Phase Mole Fraction	%	100		100	100	100	
Molecular Weight	lb/lbmol	84.1595		84.1595	84.1595	84.1595	
Mass Density	lb/ft^3	42.3607		41.6017	42.3607	42.3607	
Molar Flow	lbmol/h	0.000192035		199.019	0.000435445	199.019	
Mass Flow	lb/h	0.0161615		16749.4	0.0366468	16749.3	
Vapor Volumetric Flow	ft^3/h	0.000381523		402.612	0.000865115	395.398	
Liquid Volumetric Flow	gpm	4.75664E-05		50.1958	0.000107859	49.2963	
Std Vapor Volumetric Flow	MMSCFD	1.74898E-06		1.81259	3.96587E-06	1.81259	
Std Liquid Volumetric Flow	sgpm	4.75815E-05		49.3121	0.000107893	49.3120	
Compressibility		0.00504236		0.00514433	0.00504236	0.00504236	
Specific Gravity		0.679197		0.667028	0.679197	0.679197	
API Gravity		77.1529		77.1511	77.1529	77.1529	
Enthalpy	Btu/h	-6.16130		-6.19246E+06	-13.9710	-6.38537E+06	
Mass Enthalpy	Btu/lb	-381.232		-369.713	-381.232	-381.232	
Mass Cp	Btu/(lb*°F)	0.491108		0.505712	0.491108	0.491108	
Ideal Gas CpCv Ratio		1.06996		1.06743	1.06996	1.06996	
Dynamic Viscosity	cP	0.279899		0.246967	0.279899	0.279899	
Kinematic Viscosity	cSt	0.412495		0.370602	0.412495	0.412495	
Thermal Conductivity	Btu/(h*ft*°F)	0.0716989		0.0691551	0.0716989	0.0716989	
Surface Tension	lbf/ft	0.00130148		0.00120987	0.00130148	0.00130148	
Net Ideal Gas Heating Value	Btu/ft^3	4271.43		4271.43	4271.43	4271.43	
Net Liquid Heating Value	Btu/lb	19101.6		19101.6	19101.6	19101.6	
Gross Ideal Gas Heating Value	Btu/ft^3	4572.98		4572.98	4572.98	4572.98	
Gross Liquid Heating Value	Btu/lb	20461.4		20461.4	20461.4	20461.4	

Organic Liquid Loadout Operations				
Parameter	Pyrolysis Fuel Oil (PFO) Loading	Light Gasoline (LGO) Loading	Units	Source / Basis
Material Loaded	Pyrolysis Fuel Oil	Light Gasoline Oil		
Material Temperature	80	40	°C	PFO is heated; LGO is ≈ maximum daily avg temperature in July
Material Temperature	636	564	°R	= (Material Temperature - °C) x (1.8) + (32) + (460)
VOC Vapor Pressure	1.603	6.303	psia	ProMax calculated vapor pressure at 100F
VOC Vapor MW	133	84	lb/lb-mole	Heat and material balance for PFO and LGO
Type of Loadout Operation	RAIL	RAIL		Design
Type of Loading System	SUBMERGED	SUBMERGED		Design
Annual Loading Rate	5,611	6,025	10 ³ gal/yr	Loading rates are from ECU overall material balance mass estimates
Saturation Factor	0.60	0.60		S from AP-42 equation (see below)
VOC Loading Loss Factor	2.952	7.916	lbs/10 ³ gal	L _L from AP-42 equation (see below)
VOC Uncontrolled Rate	1.89	5.44	lb/hr	= (VOC Loading Loss Factor) x (Annual Loading Rate) / (8760)
HAP Fraction	20%	76%	wt. %	Sample Data
HAP Uncontrolled Rate	0.38	4.14	lb/hr	= (VOC Uncontrolled Rate) x (HAP Fraction)

Emissions Estimates based on Equation 1 in AP-42, Chapter 5, Section 2 (Jan-1995 version):

$$L_L = 12.46 \frac{SPM}{T}$$

where:

L_L = loading loss, pounds per 1000 gallons (lb/10³ gal) of liquid loaded

S = a saturation factor (see Table 5.2-1)

P = true vapor pressure of liquid loaded, pounds per square inch absolute (psia)
(see Figure 7.1-5, Figure 7.1-6, and Table 7.1-2)

M = molecular weight of vapors, pounds per pound-mole (lb/lb-mole) (see Table 7.1-2)

T = temperature of bulk liquid loaded, °R (°F + 460)

Source IDs = C205A, C205B, and C205C Totally Enclosed Ground Flare (TEGF) A, TEGF B, and HP Elevated Flare																		
VOC to Flare	Basis					NSR POLLUTANT EMISSION FACTORS (lb/MMBtu)												
	MMBtu/hr	VOC C3- to Flare	VOC C4+ to Flare	VOC DRE C3-	VOC DRE C4+	NOx	SO2	PM2.5	VOC	CO2	CH4	N2O	CO2e	CO	PM	PM10	H2SO4	Pb
TEGF A and TEGF B Vent Gas / Short-Term Max	7,800	111.84 MT/hr	21.44 MT/hr	98% DRE	98% DRE	0.068	-	-	-	-	-	-	-	0.31	-	0.0075	-	-
HPEF Vent Gas / Short-Term Max	3,900	55.92 MT/hr	10.72 MT/hr	98% DRE	98% DRE	0.068	-	-	-	-	-	-	-	0.31	-	0.0075	-	-
TEGF A, TEGF B, and HPEF Vent Gas / Annual Avg	161.2	1.06 MT/hr	0.18 MT/hr	98% DRE	98% DRE	0.068	0.0015	0.0075	0.3391	Variable	Variable	0.0013	Variable	0.31	0.0019	0.0075	7.2E-05	4.9E-07
TEGF A, TEGF B, and HPEF Supplemental Gas / Ann Avg	257.3	NG/TG Only	-	-	-	0.068	0.0015	0.0075	0.0054	Variable	Variable	0.0013	Variable	0.31	0.0019	0.0075	7.2E-05	4.9E-07
TEGF A, TEGF B, and HPEF Pilots / Ann Avg	3.25	NA	NA	NA	NA	0.098	0.0015	0.0075	0.0054	116.9	0.002	0.0002	117.1	0.0824	0.0019	0.0075	7.2E-05	4.9E-07
FLARE / FLARING MODE		Basis				NSR POLLUTANT RATES USED IN AMBIENT IMPACT MODELING (lb/hr)												
		MMBtu/hr			NOTES	NOx	SO2	PM2.5	VOC	CO2	CH4	N2O	CO2e	CO	PM	PM10	H2SO4	Pb
TEGF A and TEGF B Vent Gas + Pilots / Short-Term Max		7,802.99			[A]	106.14	-	-	-	-	-	-	-	2,418.25	-	35.40	-	-
HPEF Vent Gas + Pilots / Short-Term Max		3,900.26			[B]	53.05	-	-	-	-	-	-	-	1,209.02	-	17.69	-	-
TEGF A, TEGF B, and HPEF Vent Gas +Pilots / Annual Avg		164.41			[C]	11.28	-	-	-	-	-	-	-	50.23	-	1.23	-	-
TEGF A, TEGF B, and HPEF Supplemental Gas / Ann Avg		257.3			[D]	17.50	-	-	-	-	-	-	-	79.76	-	1.92	-	-
FLARE / FLARING MODE		Basis				NSR POLLUTANT PTE (T/yr)												
		Hours/yr			MMBtu/yr	NOx	SO2	PM2.5	VOC	CO2	CH4	N2O	CO2e	CO	PM	PM10	H2SO4	Pb
TEGF A, TEGF B, and HPEF Vent Gas +Pilots / Annual Avg		8,760			1,440,264	49.40	1.06	5.37	239.45	88,511	244.98	0.94	95,619	220.00	1.34	5.37	0.05	3.53E-04
TEGF A, TEGF B, and HPEF Supplemental Gas / Ann Avg		8,760			2,253,990	76.64	1.66	8.40	6.08	89,061	318.62	0.96	98,238	349.37	2.10	8.40	0.08	5.52E-04
FLARE / FLARING MODE		Basis				Total PTE (T/yr)												
		Hours/yr			MMBtu/yr	NOx	SO2	PM2.5	VOC	CO2	CH4	N2O	CO2e	CO	PM	PM10	H2SO4	Pb
TEGF A, TEGF B, and HPEF Total / Annual Avg		8,760			3,694,253	126.03	2.72	13.76	245.52	177,572	563.60	1.90	193,857	569.37	3.44	13.76	0.13	0.001
EMACT Project SIL Analysis Emission Rates																		
FLARE / FLARING MODE		Basis				Total (lb/hr)												
		MMBtu/hr			NOTES	NOx	SO2	PM2.5	VOC	CO2	CH4	N2O	CO2e	CO	PM	PM10	H2SO4	Pb
TEGF A and TEGF B Supplemental Gas / Ann Avg		257.3			[D]	17.50	-	1.92	-	-	-	-	-	-	-	-	-	-
TEGF A and TEGF B Supplemental Gas / Short-Term		691.7			[E]	47.04	-	5.15	-	-	-	-	-	214.44	-	-	-	-

FLARE EMISSION CALCULATIONS NOTES:
General:
• Short-term VOC mass rates represent maximum expected short-term rates excluding emergency flaring and are based on actual process data. • Annual average VOC mass rates represent annual average anticipated flaring rates excluding emergency flaring and are based on actual process data. • VOC destruction efficiency represents LAER or beyond-LAER control levels.
Calculation Methodology:
• Hourly Emissions = (Heat Input - MMBtu/hr) x (Emission Factor - lb/MMBtu) • Annual Emissions = (Heat Input - MMBtu/hr) x (Annual Hours) x (Emission Factor - lb/MMBtu) x (1 ton/2,000 lb)
Basis for Emission Factors:
• NOx and CO = AP-42, Tables 13.5-1 and 13.5-2, respectively. • Pilots NOx and CO = AP-42, Table 1.4-1. • SO2 = AP-42, Table 1.4-2. • PM10/2.5 = AP-42, Table 1.4-2; filterable + condensable emission factor used as conservative estimate since flares are smokeless. Smokeless flares have zero filterable PM (see AP-42, Table 13.5-1). • VOC for vent gas based on 98% DRE for incoming C3- VOC and 98% DRE for incoming C4+ VOC. • VOC emission factor for pilots and natural gas/tail gas supplemental gas = AP-42, Table 1.4-2. • CO2 from pilot fuel is based on natural gas firing = weighted U.S. average NG CO2 emission factor from 40 CFR 98, Table C-1. • CO2 from VOC flaring is calculated based on the carbon content of the vent stream material and conservatively assumes 100% conversion to CO2. • CH4 and N2O from pilot fuel is based on natural gas firing = NG emission factors from 40 CFR 98, Table C-2. • CH4 from VOC flaring is based on the amount of methane present in the vent stream material routed to the flares and a 98% DRE. • N2O from VOC flaring is assumed to result from fuel gas flaring = fuel gas emission factor from 40 CFR 98, Table C-2. • CO2e = sum of CO2, CH4 and N2O emissions adjusted for global warming potentials. • PM = AP-42, Table 1.4-2 (filterable only) as conservative estimate since flares are smokeless. • H2SO4 based on SO3-to-SO2 emission factor ratio in AP-42, Table 1.3-1 for distillate oil combustion in boilers > 100 MMBtu/hr.
[A] - TEGF A and TEGF B Short-Term Maximum Emission Rates:
• Short-term max heat input based on maximum anticipated rate from various SU/SD modes. • Heat input also includes 2.99 MMBtu/hr of pilot gas at all times. • The PM10 maximum emission rate used for short-term PM10 modeling is based on a maximum 24-hr average from actual process data. • Consistent with previous PSD modeling approved by DEP, the 1-hr maximum NOx rate used for short-term NO2 modeling is divided by 5 because turnaround SU/SD events are expected to occur less than once every 5 years.
[B] - HP Elevated Flare Short-Term Max Emission Rates:
• Short-term max heat input estimated to equal the firing rate of 1 TEGF. • Heat input also includes 0.26 MMBtu/hr of pilot gas at all times.
[C] - TEGF A, TEGF B, and HP Elevated Flare Annual Average Emission Rates:
• Annual average heat input based on actual process data and design flaring scenarios. • Annual average heat input also includes flaring events associated with reasonably anticipated maintenance events. • Annual average heat input also includes anticipated ethylene manufacturing unit and PE unit releases and 3.25 MMBtu/hr pilot gas at all times.
[D] - TEGF A, TEGF B, and HP Elevated Flare Supplemental Gas Annual Average Emission Rates:
• Annual average heat input based on amount of supplemental gas needed to increase combustion gas heating value to the 40 CFR 63 Subpart YY (EMACT) 800 Btu/scf requirement with compliance margin. • Annual average heat input assumes approximately 90% of supplement is from tail gas and 10% is from natural gas. • Conservative estimate of the emissions increases due to the EMACT Project.
[E] - TEGF A and TEGF B Supplemental Gas Short-Term Max Emission Rates:
• Short-term max heat input based on amount of supplemental gas estimated to be needed during short-term period to increase combustion gas heating value to the 40 CFR 63 Subpart YY (EMACT) 800 Btu/scf requirement with compliance margin. • Conservative estimate of the emissions increases due to the EMACT Project.

Source IDs		=	C205A, C205B, and C205C		Totally Enclosed Ground Flare (TEGF) A, TEGF B, and HP Elevated Flare					
TEGF A and TEGF B / Short-Term Max Heat Input (HHV)**			7,802.99	MMBtu/hr - Maximum expected short term rate based on design and process data						
HP Elevated Flare / Short-Term Max (HHV)**			3,900.26	MMBtu/hr - Estimated to equal the heat input of 1 TEGF						
TEGF A, TEGF B, and HP Elevated Flare/ Annual Average (HHV)**			421.72	MMBtu/hr - Based on actual process data and includes flaring events associated with reasonably anticipated maintenance events and PE unit releases						
VOC DRE			98%	DRE for VOC						
Annual Hours =		8,760 hr/yr								
Short-Term Max Hourly Emission Rate =		(Short-Term Max Heat Input - MMBtu/hr) x (EF - lb/MMBtu)								
Annual Emission Rate =		(Annual Avg Heat Input - MMBtu/hr) x (EF - lb/MMBtu) x (Annual Hours) / (2,000 lb/T)								
Pollutant	§112 HAP?	EF (lb/MMSCF)	EF (lb/MMBtu)	EF Source	Combustion Pollutants*			Waste Gas***		Total
					TEGF A and TEGF B Short-Term Max (lb/hr)	HP Elevated Flare Short Term-Max (lb/hr)	TEGF A, TEGF B, and HP Elevated Flare Annual (tpy)	TEGF A, TEGF B, and HP Elevated Flare Short-Term Max (lb/hr)	TEGF A, TEGF B, and HP Elevated Flare Annual (tpy)	TEGF A, TEGF B, and HP Elevated Flare Annual (tpy)
2-Methylnaphthalene	YES	2.40E-05	2.35E-08	AP-42, Table 1.4-3	1.84E-04	9.18E-05	4.35E-05	-	-	4.35E-05
3-Methylcholanthrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	1.38E-05	6.88E-06	3.26E-06	-	-	3.26E-06
7,12-Dimethylbenz(a)anthracene	YES	<1.6E-05	<1.57E-08	AP-42, Table 1.4-3	1.22E-04	6.12E-05	2.90E-05	-	-	2.90E-05
1,3-Butadiene	YES	-	-	-	-	-	-	6.14E+01	5.91E+00	5.91E+00
Acenaphthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	1.38E-05	6.88E-06	3.26E-06	-	-	3.26E-06
Acenaphthylene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	1.38E-05	6.88E-06	3.26E-06	-	-	3.26E-06
Anthracene	YES	<2.4E-06	<2.35E-09	AP-42, Table 1.4-3	1.84E-05	9.18E-06	4.35E-06	-	-	4.35E-06
Benzo(a)anthracene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	1.38E-05	6.88E-06	3.26E-06	-	-	3.26E-06
Benzene	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-3	1.61E-02	8.03E-03	3.80E-03	1.10E+01	1.02E+00	1.02E+00
Benzo(a)pyrene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	9.18E-06	4.59E-06	2.17E-06	-	-	2.17E-06
Benzo(b)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	1.38E-05	6.88E-06	3.26E-06	-	-	3.26E-06
Benzo(g,h,i)perylene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	9.18E-06	4.59E-06	2.17E-06	-	-	2.17E-06
Benzo(k)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	1.38E-05	6.88E-06	3.26E-06	-	-	3.26E-06
Butane	NO	2.10E+00	2.06E-03	AP-42, Table 1.4-3	1.61E+01	8.03E+00	3.80E+00	4.90E+02	5.35E+00	9.15E+00
Chrysene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	1.38E-05	6.88E-06	3.26E-06	-	-	3.26E-06
Dibenzo(a,h)anthracene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	9.18E-06	4.59E-06	2.17E-06	-	-	2.17E-06
Dichlorobenzene	YES	1.20E-03	1.18E-06	AP-42, Table 1.4-3	9.18E-03	4.59E-03	2.17E-03	-	-	2.17E-03
Ethane	NO	3.10E+00	3.04E-03	AP-42, Table 1.4-3	2.37E+01	1.19E+01	5.61E+00	2.99E+03	1.08E+02	1.13E+02
Ethylbenzene	YES	-	-	-	-	-	-	5.73E-02	2.65E-03	2.65E-03
Fluoranthene	YES	3.00E-06	2.94E-09	AP-42, Table 1.4-3	2.29E-05	1.15E-05	5.43E-06	-	-	5.43E-06
Fluorene	YES	2.80E-06	2.75E-09	AP-42, Table 1.4-3	2.14E-05	1.07E-05	5.07E-06	-	-	5.07E-06
Formaldehyde	YES	7.50E-02	7.35E-05	AP-42, Table 1.4-3	5.74E-01	2.87E-01	1.36E-01	-	-	1.36E-01
Hexane	YES	2.90E-02	2.84E-05	Ventura County APCD, AB 2588 Combustions EF, May 2001	2.22E-01	1.11E-01	5.25E-02	2.20E+00	8.33E-01	8.86E-01
Indeno(1,2,3-cd)pyrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	1.38E-05	6.88E-06	3.26E-06	-	-	3.26E-06
Naphthalene	YES	6.10E-04	5.98E-07	AP-42, Table 1.4-3	4.67E-03	2.33E-03	1.10E-03	-	-	1.10E-03
Pentane	NO	2.60E+00	2.55E-03	AP-42, Table 1.4-3	1.99E+01	9.94E+00	4.71E+00	9.43E+02	1.17E+01	1.64E+01
Phenanthrene	YES	1.70E-05	1.67E-08	AP-42, Table 1.4-3	1.30E-04	6.50E-05	3.08E-05	-	-	3.08E-05
Propane	NO	1.60E+00	1.57E-03	AP-42, Table 1.4-3	1.22E+01	6.12E+00	2.90E+00	4.37E+02	8.98E+00	1.19E+01
Pyrene	YES	5.00E-06	4.90E-09	AP-42, Table 1.4-3	3.82E-05	1.91E-05	9.05E-06	-	-	9.05E-06

Source IDs =		C205A, C205B, and C205C			Totally Enclosed Ground Flare (TEGF) A, TEGF B, and HP Elevated Flare					
TEGF A and TEGF B / Short-Term Max Heat Input (HHV)**		7,802.99	MMBtu/hr - Maximum expected short term rate based on design and process data							
HP Elevated Flare / Short-Term Max (HHV)**		3,900.26	MMBtu/hr - Estimated to equal the heat input of 1 TEGF							
TEGF A, TEGF B, and HP Elevated Flare/ Annual Average (HHV)**		421.72	MMBtu/hr - Based on actual process data and includes flaring events associated with reasonably anticipated maintenance events and PE unit releases							
VOC DRE		98%	DRE for VOC							
Annual Hours =		8,760 hr/yr								
Short-Term Max Hourly Emission Rate =		(Short-Term Max Heat Input - MMBtu/hr) x (EF - lb/MMBtu)								
Annual Emission Rate =		(Annual Avg Heat Input - MMBtu/hr) x (EF - lb/MMBtu) x (Annual Hours) / (2,000 lb/T)								
Pollutant	§112 HAP?	EF (lb/MMSCF)	EF (lb/MMBtu)	EF Source	Combustion Pollutants*			Waste Gas***		Total
					TEGF A and TEGF B Short-Term Max (lb/hr)	HP Elevated Flare Short Term-Max (lb/hr)	TEGF A, TEGF B, and HP Elevated Flare Annual (tpy)	TEGF A, TEGF B, and HP Elevated Flare Short-Term Max (lb/hr)	TEGF A, TEGF B, and HP Elevated Flare Annual (tpy)	TEGF A, TEGF B, and HP Elevated Flare Annual (tpy)
Toluene	YES	3.40E-03	3.33E-06	AP-42, Table 1.4-3	2.60E-02	1.30E-02	6.16E-03	1.21E+00	5.57E-02	6.18E-02
Arsenic	YES	2.00E-04	1.96E-07	AP-42, Table 1.4-4	1.53E-03	7.65E-04	3.62E-04	-	-	3.62E-04
Barium	NO	4.40E-03	4.31E-06	AP-42, Table 1.4-4	3.37E-02	1.68E-02	7.97E-03	-	-	7.97E-03
Beryllium	YES	<1.2E-05	<1.18E-08	AP-42, Table 1.4-4	9.18E-05	4.59E-05	2.17E-05	-	-	2.17E-05
Cadmium	YES	1.10E-03	1.08E-06	AP-42, Table 1.4-4	8.41E-03	4.21E-03	1.99E-03	-	-	1.99E-03
Chromium	YES	1.40E-03	1.37E-06	AP-42, Table 1.4-4	1.07E-02	5.35E-03	2.54E-03	-	-	2.54E-03
Chromium (VI)****	YES / Cr Cmpds	5.60E-05	5.49E-08	AP-42, Table 1.4-4/NEI	4.28E-04	2.14E-04	1.01E-04	-	-	1.01E-04
Cobalt	YES	8.40E-05	8.24E-08	AP-42, Table 1.4-4	6.43E-04	3.21E-04	1.52E-04	-	-	1.52E-04
Copper	NO	8.50E-04	8.33E-07	AP-42, Table 1.4-4	6.50E-03	3.25E-03	1.54E-03	-	-	1.54E-03
Lead	YES	5.00E-04	4.90E-07	AP-42, Table 1.4-2	3.82E-03	1.91E-03	9.05E-04	-	-	9.05E-04
Manganese	YES	3.80E-04	3.73E-07	AP-42, Table 1.4-4	2.91E-03	1.45E-03	6.88E-04	-	-	6.88E-04
Mercury	YES	2.60E-04	2.55E-07	AP-42, Table 1.4-4	1.99E-03	9.94E-04	4.71E-04	-	-	4.71E-04
Molybdenum	NO	1.10E-03	1.08E-06	AP-42, Table 1.4-4	8.41E-03	4.21E-03	1.99E-03	-	-	1.99E-03
Nickel	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-4	1.61E-02	8.03E-03	3.80E-03	-	-	3.80E-03
Selenium	YES	<2.4E-05	<2.35E-08	AP-42, Table 1.4-4	1.84E-04	9.18E-05	4.35E-05	-	-	4.35E-05
Vanadium	NO	2.30E-03	2.25E-06	AP-42, Table 1.4-4	1.76E-02	8.79E-03	4.17E-03	-	-	4.17E-03
Zinc	NO	2.90E-02	2.84E-05	AP-42, Table 1.4-4	2.22E-01	1.11E-01	5.25E-02	-	-	5.25E-02
Total §112 HAPs =					0.90	0.45	0.21	75.88	7.83	8.04

* Emissions from the combustion of natural gas and waste gas based on natural gas combustion emission factors.

** Heat input includes contribution from hydrogen for conservative estimate.

*** Emission rates based on actual process data and engineering judgement.

**** Based on NEI data for SCC 39000699 (In-Process Fuel Use: Natural Gas, General), 4% of the chromium emission factor found in AP-42, Section 1.4, Table 1.4-4 was estimated to equal chromium (VI).

HP Flare System Potential to Emit Calculation Vent/Gas Stream Flow Rate and Composition Data

Vent/Gas Stream to HP Flare	Hydrogen	Nitrogen	Methane	Non-VOC/HAP Hydrocarbon	Non-HAP VOC	HAP	Annual Avg. Heat Input (MMBtu/hr)	Background Information
Continuous Flows (kg/hr)								
Baseline	-	2,000	-	-	250	-	11.04	Baseline flows from ECU and PE include compressors' seal gas, polyethylene powder conveying, analyzer vents, sweep gas (described in the next section), and some potential leakage through all the in-Unit flare connection pressure control or relief valves. A baseline flow rate is projected for PTE purposes through a combination of actual HP Flare Header data collected with the in-line GC and flow meter during low normal flow periods, and additional design inputs where limited or no actual data was available. - Compressors' seal gas. In accordance with PA-04-00740C Section D Source ID 201 Condition #008, compressor seal vent gas is captured and routed to the HP System. These compressors include the cracked gas, ethylene, and propane compressors in ECU as well as other gas compressors in PE and the BOG compressors associated with the refrigerated ethylene storage tank. Nitrogen is the primary loss to flare from these compressor dry gas seals plus some amount of the compressor gas medium such as ethylene or propane. - Polyethylene powder conveying. Nitrogen is used as conveying gas for produced polyethylene powder and vent gas from this conveyance includes primarily nitrogen with some residual hydrocarbon gas from the polyethylene production process. - Analyzer vents include analyzers within ECU monitoring process gas at key points in the production process for feed, intermediate, or outgoing product quality. Some of these points include ethane feed, cracked gas, and ethylene product. Where a gas sample must be extracted and cannot subsequently be returned due to differences between analyzer and process conditions, the analyzer vents are routed to the HP Flare Header. - Multiple in-Unit connections exist to the HP Flare Header including pressure control and relief valves. While these are not used under normal continuous operating conditions, there may be some amount of expected leakage through larger control valves over time and part of the baseline flow rate.
Sweep Gas	-	-	1,097	103	-	-	62.08	The sweep gas is a continuous flow of natural gas flowing through each header connected to the HP Flare System to maintain a constant minimum flow of gas and/or pressure to prevent oxygen infiltration into the header system. Sweep gas flow rates are set at the minimum design and engineering practice standard determination to perform this safety function.
Flare Pilots	-	-	-	-	-	-	3.25	3.25 MMBtu/hr is the sum of all TEGF and HP Elevated Flare pilot heat release capacities.

HP Flare System Potential to Emit Calculation Vent/Gas Stream Flow Rate and Composition Data

Vent/Gas Stream to HP Flare	Hydrogen	Nitrogen	Methane	Non-VOC/HAP Hydrocarbon	Non-HAP VOC	HAP	Annual Avg. Heat Input (MMBtu/hr)	Background Information
<i>Periodic and Variable Flows (kg/yr)</i>								
Supplemental Gas	4,705,564	-	29,530,227	1,333,660	-	-	257.31	(ECU tail gas + natural gas) to offset baseline flow and high nitrogen events. Continuous baseline flow vent gas includes primarily nitrogen with lesser amounts of hydrocarbons present. See the above baseline flow description for more detail. To establish a representative PTE contribution from baseline supplemental gas, baseline flow and sweep gas were added together. Then supplemental tail gas required to maintain NHVcz above the 800 Btu/scf minimum for EMAX compliance was calculated. Tail gas is generated within ECU as a mixture of hydrogen and methane separated from the C2- stream and then routed back to the furnace fuel supply. Natural gas is also mixed with the tail gas to make up the total fuel supply to the furnaces. It is assumed that tail gas is used 90% of the time and natural gas 10% of the time. A compliance margin was added to maintain a setpoint value of ~850 Btu/scf to accommodate for increases in nitrogen vent gas composition from episodic venting. This calculation was also performed for other periodic high nitrogen events where additional supplemental gas would be required to meet NHV. All supplemental gas was then totaled to calculate PTE.

HP Flare System Potential to Emit Calculation Vent/Gas Stream Flow Rate and Composition Data

Vent/Gas Stream to HP Flare	Hydrogen	Nitrogen	Methane	Non-VOC/HAP Hydrocarbon	Non-HAP VOC	HAP	Annual Avg. Heat Input (MMBtu/hr)	Background Information
<i>Periodic and Variable Flows (kg/yr) (cont'd)</i>								
PE Total	5,418	17,389,287	23,938	52,607	1,431,269	36,600	8.38	Total vent gas from PE includes two shutdown and startup events per unit, venting for discontinuous polyethylene grade transitions, and intermittent events include regeneration of treaters and dryers which maintain pure ethylene and comonomer feeds to the PE Units. Dryer regeneration events include primarily nitrogen with lesser amounts of hydrocarbons and account for the highest amount of supplemental gas required (outside of baseline flows) to maintain NHVcz above the 800 Btu/scf minimum for EMACT compliance. Design data has been used for the input basis. Shell operates PE Units 1 and 2 under license from Univation Technologies ("Univation"), which covers the "core plant" of these units, including process vents. Similarly, Shell operates PE Unit 3 under license from Ineos Commercial Services UK Ltd. ("Ineos"), which covers the "core plant" of the unit, including process vents. Design process vent flow rates and compositions are provided by the referenced licensors and are unique to each technology. The licensing agreement specifies that all technical information, data, experience, and know-how (including process information and licensor improvement) related to process design, manufacturing techniques, and product properties is confidential. Shell maintains the confidentiality of this information by adhering to the conditions set forth in the licensing agreement. This includes non-disclosure of utility consumption figures, quality of nitrogen and hydrogen supplied to the process, and quantity and contents of all effluent streams. In addition, as further required by the licensing agreement, Shell obtains Univation's or Ineos' approval before disclosing any information to a third party, including government agencies. Shell's claim of confidential business information extends to critical operating data and process flow schematics within the PE Units. This information constitutes production methods and processes which are clearly covered under the licensing agreement between Shell and Univation or Ineos and are thus unique to Shell. Furthermore, disclosure of this information would negatively affect Shell's competitive position in that it would provide a third party with the information needed to identify production capabilities and key grades of polyethylene manufactured at the unit as well as to reverse-engineer low pressure solvent and vent recovery capabilities of the PE Units. The combination of specific individual vent identifications with flow rate and compositional data are claimed as confidential proprietary information as defined by the Pennsylvania Right to Know Law and pursuant to Section 13.2 of the Air Pollution Control Act, 35 P.S. 4013.2. In consideration of these limitations, Shell is providing total combined GHG, VOC, HAP, and heat content information for the PE Unit vents that are routed to the HP Flare System.
ECU Total	516,441	5,238,538	1,595,617	3,944,382	6,718,297	181,981	77.21	Total vent gas from ECU includes two shutdown and startup events and flaring for maintenance activities. Two shutdown and startup events are included as a reasonable worst-case estimation for PTE purposes. Past actual data from startup, shutdown, and maintenance in 2023 are considered representative and have been used for the input basis.

HP Flare System Potential to Emit Calculation Vent/Gas Stream Flow Rate and Composition Data

Vent/Gas Stream to HP Flare	Hydrogen	Nitrogen	Methane	Non-VOC/HAP Hydrocarbon	Non-HAP VOC	HAP	Annual Avg. Heat Input (MMBtu/hr)	Background Information
<i>Periodic and Variable Flows (kg/yr) (cont'd)</i>								
Railcar Loading and Unloading	-	463,200	-	-	263,195	199,998	2.46	Railcar loading of C3+, Butene, Isobutane, Isopentane, Propane (C3 Refrigerant), PE3 Heavies. Losses from railcar loading activities have been estimated due to losses from vapor return line clearing with nitrogen and pressure balancing prior or subsequent to loading for transport purposes. Losses have been estimated at 100 kg of nitrogen and 100 kg of material per load as a worst case.
<i>Total Flows (kg/yr)</i>								
Total	5,227,423	40,611,025	40,759,502	6,232,929	10,602,761	418,579	421.7	-

Source ID = C206 Spent Caustic Thermal Oxidizer (SCTO)			
Parameter		Value	Source / Basis
Calculation Inputs:			
Design Heat Input [HHV]	=	11.07 MMBtu/hr	Design basis based on waste gas flow and composition and natural gas flow (VOC + NG)
Heat Input from VOC [HHV]	=	1.07 MMBtu/hr	Design basis based on waste gas flow and composition (VOC only)
Design DRE	=	99.9% wt. %	Design basis based on waste gas flow and composition
PM EF	=	0.0019 lb/MMBtu	AP-42, Table 1.4-2 (filterable only)
PM10 EF	=	0.0075 lb/MMBtu	AP-42, Table 1.4-2 (filterable + condensable)
PM2.5 EF	=	0.0075 lb/MMBtu	AP-42, Table 1.4-2 (filterable + condensable)
VOC EF	=	0.0043 lb/MMBtu	Controlled EF: based on actual process data plus VOC from WWTP and 99.9% DRE
NOx EF	=	0.06 lb/MMBtu	LAER limit
SO2 EF	=	0.0865 lb/MMBtu	Based on 0.05 g/Nm3 H2S in waste gas and AP-42, Table 1.4-2 SO2 EF for natural gas
CO EF	=	0.0824 lb/MMBtu	AP-42, Table 1.4-1
CO2 EF	=	124.6 lb/MMBtu	40 CFR 98, Table C-1 EF for natural gas + 8.4 g/Nm3 CO2 in waste gas
N2O EF	=	2.2E-04 lb/MMBtu	40 CFR 98, Table C-2 EF for natural gas
CH4 EF	=	0.0022 lb/MMBtu	40 CFR 98, Table C-2 EF for natural gas
H2SO4 EF	=	0.0043 lb/MMBtu	Based on SO3-to-SO2 emission factor ratio in AP-42, Table 1.3-1 for distillate oil combustion in boilers > 100 MMBtu/hr
Pb EF	=	4.90E-07 lb/MMBtu	AP-42, Table 1.4-2
Annual Hours	=	8,760 hr/yr	Assumed continuous operation
Annual PTE Calculations:			
PM Emissions	=	0.09 T/yr	= (Design Heat Input [HHV]) x (PM EF) x (Annual Hours) / (2000 lb/T)
PM10 Emissions	=	0.36 T/yr	= (Design Heat Input [HHV]) x (PM10 EF) x (Annual Hours) / (2000 lb/T)
PM2.5 Emissions	=	0.36 T/yr	= (Design Heat Input [HHV]) x (PM2.5 EF) x (Annual Hours) / (2000 lb/T)
VOC Emissions	=	0.21 T/yr	= (Design Heat Input [HHV]) x (VOC EF) x (Annual Hours) / (2000 lb/T)
NOx Emissions	=	2.91 T/yr	= (Design Heat Input [HHV]) x (NOx EF) x (Annual Hours) / (2000 lb/T)
SO2 Emissions	=	4.19 T/yr	= (Design Heat Input [HHV]) x (SO2 EF) x (Annual Hours) / (2000 lb/T)
CO Emissions	=	3.99 T/yr	= (Design Heat Input [HHV]) x (CO EF) x (Annual Hours) / (2000 lb/T)
CO2 Emissions	=	6,039 T/yr	= (Design Heat Input [HHV]) x (CO2 EF) x (Annual Hours) / (2000 lb/T)
N2O Emissions	=	0.01 T/yr	= (Design Heat Input [HHV]) x (N2O EF) x (Annual Hours) / (2000 lb/T)
CH4 Emissions	=	0.11 T/yr	= (Design Heat Input [HHV]) x (CH4 EF) x (Annual Hours) / (2000 lb/T)
H2SO4 Emissions	=	0.21 T/yr	= (Design Heat Input [HHV]) x (H2SO4 EF) x (Annual Hours) / (2000 lb/T)
Pb Emissions	=	2.38E-05 T/yr	= (Design Heat Input [HHV]) x (Pb EF) x (Annual Hours) / (2000 lb/T)
CO2e Emissions	=	6,044 T/yr	= Sum of CO2, N2O and CH4 emissions adjusted for NO2 and CH4 GWPs of 265 and 28, respectively

Source ID = C206 Spent Caustic Thermal Oxidizer (SCTO)												
Parameter		Value		Source / Basis								
Short-Term PTE Calculations:												
PM Emissions	=	0.02	lb/hr	= (Design Heat Input [HHV]) x (PM EF)								
PM10 Emissions	=	0.08	lb/hr	= (Design Heat Input [HHV]) x (PM10 EF)								
PM2.5 Emissions	=	0.08	lb/hr	= (Design Heat Input [HHV]) x (PM2.5 EF)								
VOC Emissions	=	0.05	lb/hr	= (Design Heat Input [HHV]) x (VOC EF)								
NOx Emissions	=	0.66	lb/hr	= (Design Heat Input [HHV]) x (NOx EF)								
SO2 Emissions	=	0.96	lb/hr	= (Design Heat Input [HHV]) x (SO2 EF)								
CO Emissions	=	0.91	lb/hr	= (Design Heat Input [HHV]) x (CO EF)								
CO2 Emissions	=	1,379	lb/hr	= (Design Heat Input [HHV]) x (CO2 EF)								
N2O Emissions	=	0.002	lb/hr	= (Design Heat Input [HHV]) x (N2O EF)								
CH4 Emissions	=	0.02	lb/hr	= (Design Heat Input [HHV]) x (CH4 EF)								
H2SO4 Emissions	=	0.05	lb/hr	= (Design Heat Input [HHV]) x (H2SO4 EF)								
Pb Emissions	=	5.42E-06	lb/hr	= (Design Heat Input [HHV]) x (Pb EF)								
CO2e Emissions	=	1,380	lb/hr	= Sum of CO2, N2O and CH4 emissions adjusted for NO2 and CH4 GWPs of 265 and 28, respectively								
Summary of Annual PTE Emission Rates:												
		PTE Emission Rates (T/yr)										
		PM	PM10	PM2.5	VOC	NOx	SO2	CO	GHGm	CO2e	H2SO4	Pb
PTE	=	0.09	0.36	0.36	0.21	2.91	4.19	3.99	6,039	6,044	0.21	2.38E-05

<u>Source ID</u> = <u>C206</u> <u>Spent Caustic Thermal Oxidizer (SCTO)</u>													
Potential Heat Input (HHV)		11.07 MMBtu/hr - Design basis based on waste gas flow and composition and natural gas flow (VOC + NG)											
Short-Term Max Heat Input (HHV)		11.07 MMBtu/hr - Design basis based on waste gas flow and composition and natural gas flow (VOC + NG)											
Annual Hours =		8,760 hr/yr											
DRE =		99.9% wt. %											
Short-Term Max Hourly Emission Rate =		(Short-Term Max Heat Input (HHV) - MMBtu/hr) x (EF - lb/MMBtu)											
Annual Average Hourly Emission Rate =		(Potential Heat Input (HHV) - MMBtu/hr) x (EF - lb/MMBtu)											
Annual Emission Rate =		(Potential Heat Input (HHV) - MMBtu/hr) x (EF - lb/MMBtu) x (Annual Hours) / (2,000 lb/T)											
Pollutant	§112 HAP?	Combustion Pollutants*						Waste Gas Pollutants			Total		
		EF (lb/MMscf)	EF (lb/MMBtu)	EF Source	Short-Term Max (lb/hr)	Annual Average (lb/hr)	Annual (tpy)	Short-Term Max (lb/hr)	Annual Average (lb/hr)	Annual (tpy)	Short-Term Max (lb/hr)	Annual Average (lb/hr)	Annual (tpy)
1,3-Butadiene	YES	-	-	-	-	-	-	1.50E-03	1.50E-03	6.58E-03	1.50E-03	1.50E-03	6.58E-03
2-Methylnaphthalene	YES	2.40E-05	2.35E-08	AP-42, Table 1.4-3	2.60E-07	2.60E-07	1.14E-06	-	-	-	2.60E-07	2.60E-07	1.14E-06
3-Methylcholanthrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	1.95E-08	1.95E-08	8.55E-08	-	-	-	1.95E-08	1.95E-08	8.55E-08
7,12-Dimethylbenz(a)anthracene	YES	<1.6E-05	<1.57E-08	AP-42, Table 1.4-3	1.74E-07	1.74E-07	7.60E-07	-	-	-	1.74E-07	1.74E-07	7.60E-07
Acenaphthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	1.95E-08	1.95E-08	8.55E-08	3.35E-05	3.35E-05	1.47E-04	3.35E-05	3.35E-05	1.47E-04
Acenaphthylene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	1.95E-08	1.95E-08	8.55E-08	2.56E-05	2.56E-05	1.12E-04	2.56E-05	2.56E-05	1.12E-04
Anthracene	YES	<2.4E-06	<2.35E-09	AP-42, Table 1.4-3	2.60E-08	2.60E-08	1.14E-07	7.32E-06	7.32E-06	3.21E-05	7.35E-06	7.35E-06	3.22E-05
Benzo(a)anthracene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	1.95E-08	1.95E-08	8.55E-08	-	-	-	1.95E-08	1.95E-08	8.55E-08
Benzene	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-3	2.28E-05	2.28E-05	9.98E-05	1.41E-02	1.41E-02	6.19E-02	1.42E-02	1.42E-02	6.20E-02
Benzo(a)pyrene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	1.30E-08	1.30E-08	5.70E-08	-	-	-	1.30E-08	1.30E-08	5.70E-08
Benzo(b)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	1.95E-08	1.95E-08	8.55E-08	-	-	-	1.95E-08	1.95E-08	8.55E-08
Benzo(g,h,i)perylene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	1.30E-08	1.30E-08	5.70E-08	-	-	-	1.30E-08	1.30E-08	5.70E-08
Benzo(k)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	1.95E-08	1.95E-08	8.55E-08	-	-	-	1.95E-08	1.95E-08	8.55E-08
Butane	NO	2.10E+00	2.06E-03	AP-42, Table 1.4-3	2.28E-02	2.28E-02	9.98E-02	-	-	-	2.28E-02	2.28E-02	9.98E-02
Chloroform	YES	-	-	-	-	-	-	6.61E-07	6.61E-07	2.90E-06	6.61E-07	6.61E-07	2.90E-06
Chrysene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	1.95E-08	1.95E-08	8.55E-08	-	-	-	1.95E-08	1.95E-08	8.55E-08
Dibenzo(a,h)anthracene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	1.30E-08	1.30E-08	5.70E-08	-	-	-	1.30E-08	1.30E-08	5.70E-08
Dibutylphthalate	YES	-	-	-	-	-	-	9.70E-05	9.70E-05	4.25E-04	9.70E-05	9.70E-05	4.25E-04
Dichlorobenzene	YES	1.20E-03	1.18E-06	AP-42, Table 1.4-3	1.30E-05	1.30E-05	5.70E-05	-	-	-	1.30E-05	1.30E-05	5.70E-05
Ethane	NO	3.10E+00	3.04E-03	AP-42, Table 1.4-3	3.36E-02	3.36E-02	1.47E-01	-	-	-	3.36E-02	3.36E-02	1.47E-01
Ethylbenzene	YES	-	-	-	-	-	-	8.11E-04	8.11E-04	3.55E-03	8.11E-04	8.11E-04	3.55E-03
Fluoranthene	YES	3.00E-06	2.94E-09	AP-42, Table 1.4-3	3.25E-08	3.25E-08	1.43E-07	1.15E-05	1.15E-05	5.02E-05	1.15E-05	1.15E-05	5.04E-05
Fluorene	YES	2.80E-06	2.75E-09	AP-42, Table 1.4-3	3.04E-08	3.04E-08	1.33E-07	2.91E-05	2.91E-05	1.27E-04	2.91E-05	2.91E-05	1.28E-04
Formaldehyde	YES	7.50E-02	7.35E-05	AP-42, Table 1.4-3	8.14E-04	8.14E-04	3.56E-03	-	-	-	8.14E-04	8.14E-04	3.56E-03
Hexane	YES	2.90E-02	2.84E-05	Ventura County APCD, AB 2588 Combustions EF, May 2001	3.15E-04	3.15E-04	1.38E-03	-	-	-	3.15E-04	3.15E-04	1.38E-03
Indeno(1,2,3-cd)pyrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	1.95E-08	1.95E-08	8.55E-08	-	-	-	1.95E-08	1.95E-08	8.55E-08
Naphthalene	YES	6.10E-04	5.98E-07	AP-42, Table 1.4-3	6.62E-06	6.62E-06	2.90E-05	9.70E-04	9.70E-04	4.25E-03	9.77E-04	9.77E-04	4.28E-03
Pentane	NO	2.60E+00	2.55E-03	AP-42, Table 1.4-3	2.82E-02	2.82E-02	1.24E-01	-	-	-	2.82E-02	2.82E-02	1.24E-01
Phenanthrene	YES	1.70E-05	1.67E-08	AP-42, Table 1.4-3	1.84E-07	1.84E-07	8.08E-07	3.70E-05	3.70E-05	1.62E-04	3.72E-05	3.72E-05	1.63E-04
Phenol	YES	-	-	-	-	-	-	2.29E-04	2.29E-04	1.00E-03	2.29E-04	2.29E-04	1.00E-03

<u>Source ID</u> = <u>C206</u> <u>Spent Caustic Thermal Oxidizer (SCTO)</u>													
Potential Heat Input (HHV)		11.07 MMBtu/hr - Design basis based on waste gas flow and composition and natural gas flow (VOC + NG)											
Short-Term Max Heat Input (HHV)		11.07 MMBtu/hr - Design basis based on waste gas flow and composition and natural gas flow (VOC + NG)											
Annual Hours =		8,760 hr/yr											
DRE =		99.9% wt. %											
Short-Term Max Hourly Emission Rate =		(Short-Term Max Heat Input (HHV) - MMBtu/hr) x (EF - lb/MMBtu)											
Annual Average Hourly Emission Rate =		(Potential Heat Input (HHV) - MMBtu/hr) x (EF - lb/MMBtu)											
Annual Emission Rate =		(Potential Heat Input (HHV) - MMBtu/hr) x (EF - lb/MMBtu) x (Annual Hours) / (2,000 lb/T)											
Pollutant	§112 HAP?	Combustion Pollutants*						Waste Gas Pollutants			Total		
		EF (lb/MMscf)	EF (lb/MMBtu)	EF Source	Short-Term Max (lb/hr)	Annual Average (lb/hr)	Annual (tpy)	Short-Term Max (lb/hr)	Annual Average (lb/hr)	Annual (tpy)	Short-Term Max (lb/hr)	Annual Average (lb/hr)	Annual (tpy)
Propane	NO	1.60E+00	1.57E-03	AP-42, Table 1.4-3	1.74E-02	1.74E-02	7.60E-02	-	-	-	1.74E-02	1.74E-02	7.60E-02
Pyrene	YES	5.00E-06	4.90E-09	AP-42, Table 1.4-3	5.42E-08	5.42E-08	2.38E-07	1.15E-05	1.15E-05	5.02E-05	1.15E-05	1.15E-05	5.05E-05
Styrene	YES	-	-	-	-	-	-	1.32E-03	1.32E-03	5.79E-03	1.32E-03	1.32E-03	5.79E-03
Toluene	YES	3.40E-03	3.33E-06	AP-42, Table 1.4-3	3.69E-05	3.69E-05	1.62E-04	7.32E-03	7.32E-03	3.21E-02	7.36E-03	7.36E-03	3.22E-02
Xylenes	YES	-	-	-	-	-	-	7.76E-04	7.76E-04	3.40E-03	7.76E-04	7.76E-04	3.40E-03
Arsenic	YES	2.00E-04	1.96E-07	AP-42, Table 1.4-4	2.17E-06	2.17E-06	9.50E-06	-	-	-	2.17E-06	2.17E-06	9.50E-06
Barium	NO	4.40E-03	4.31E-06	AP-42, Table 1.4-4	4.77E-05	4.77E-05	2.09E-04	-	-	-	4.77E-05	4.77E-05	2.09E-04
Beryllium	YES	<1.2E-05	<1.18E-08	AP-42, Table 1.4-4	1.30E-07	1.30E-07	5.70E-07	-	-	-	1.30E-07	1.30E-07	5.70E-07
Cadmium	YES	1.10E-03	1.08E-06	AP-42, Table 1.4-4	1.19E-05	1.19E-05	5.23E-05	-	-	-	1.19E-05	1.19E-05	5.23E-05
Chromium	YES	1.40E-03	1.37E-06	AP-42, Table 1.4-4	1.52E-05	1.52E-05	6.65E-05	-	-	-	1.52E-05	1.52E-05	6.65E-05
Chromium (VI)**	YES / Cr Cmpds	5.60E-05	5.49E-08	AP-42, Table 1.4-4/NEI	6.08E-07	6.08E-07	2.66E-06	-	-	-	6.08E-07	6.08E-07	2.66E-06
Cobalt	YES	8.40E-05	8.24E-08	AP-42, Table 1.4-4	9.11E-07	9.11E-07	3.99E-06	-	-	-	9.11E-07	9.11E-07	3.99E-06
Copper	NO	8.50E-04	8.33E-07	AP-42, Table 1.4-4	9.22E-06	9.22E-06	4.04E-05	-	-	-	9.22E-06	9.22E-06	4.04E-05
Lead	YES	5.00E-04	4.90E-07	AP-42, Table 1.4-2	5.42E-06	5.42E-06	2.38E-05	-	-	-	5.42E-06	5.42E-06	2.38E-05
Manganese	YES	3.80E-04	3.73E-07	AP-42, Table 1.4-4	4.12E-06	4.12E-06	1.81E-05	-	-	-	4.12E-06	4.12E-06	1.81E-05
Mercury	YES	2.60E-04	2.55E-07	AP-42, Table 1.4-4	2.82E-06	2.82E-06	1.24E-05	-	-	-	2.82E-06	2.82E-06	1.24E-05
Molybdenum	NO	1.10E-03	1.08E-06	AP-42, Table 1.4-4	1.19E-05	1.19E-05	5.23E-05	-	-	-	1.19E-05	1.19E-05	5.23E-05
Nickel	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-4	2.28E-05	2.28E-05	9.98E-05	-	-	-	2.28E-05	2.28E-05	9.98E-05
Selenium	YES	<2.4E-05	<2.35E-08	AP-42, Table 1.4-4	2.60E-07	2.60E-07	1.14E-06	-	-	-	2.60E-07	2.60E-07	1.14E-06
Vanadium	NO	2.30E-03	2.25E-06	AP-42, Table 1.4-4	2.50E-05	2.50E-05	1.09E-04	-	-	-	2.50E-05	2.50E-05	1.09E-04
Zinc	NO	2.90E-02	2.84E-05	AP-42, Table 1.4-4	3.15E-04	3.15E-04	1.38E-03	-	-	-	3.15E-04	3.15E-04	1.38E-03
Total §112 HAPs =					1.3E-03	1.3E-03	0.01	0.03	0.03	0.12	0.03	0.03	0.13

* Emissions from the combustion of natural gas and waste gas based on natural gas combustion emission factors.

** Based on NEI data for SCC 39000699 (In-Process Fuel Use: Natural Gas, General), 4% of the chromium emission factor found in AP-42, Section 1.4, Table 1.4-4 was estimated to equal chromium (VI).

Equipment	Project Change	Emissions Change	Emissions Basis	Emissions Basis Assumptions/Inputs
Wastewater Tanks Blower	Blower will be routed to new KO drum before SCTO.	See below for line ups to blower.	See below.	See below.
Two Flow Equalization and Oil Removal (FEOR) Tanks	No change to tank.	No change in emissions from existing plan approvals. Throughputs are expected to remain the same from the tanks with only changes being upstream routings before FEOR tanks due to the WWTP Permanent Controls Project. Blower will be downsized and spared as part of	Emissions are calculated using Tanks 4.09d for internal floating roof tanks. These emissions are applied in the SCTO PTE calculation as waste gas input.	The throughput for each FEOR tank is 482 MMGal/yr, and the throughput for the Recovered Oil storage tank is 231,417 gpy. Slop oil layer - used Jet/kero material to estimate the light hydrocarbon layer.
Recovered Oil Storage Tank	No change to tank.	WWTP Permanent Controls Project. Downsizing of blower may decrease actual emissions, but conservatively assumed no change in PTE emissions.		
Dissolved Nitrogen Flotation (DNF) Unit #1	New equipment for WWTP Permanent Controls Project.	New potential emissions from additional equipment venting.	Emissions are calculated using process engineering design calculations. These emissions are applied in the SCTO PTE calculation as waste gas input.	Engineering calculations estimated a total of 521 Sm ³ /hr with hydrocarbon concentration of 1.22% with the majority of the breathing being nitrogen. 78% of the venting is from the Settlement Drum, 9% from each DNF Unit, and 4% from the Float/Sludge Drum.
DNF Unit #2	New equipment for WWTP Permanent Controls Project.	New potential emissions from additional equipment venting.		
Settlement Drum	New equipment for WWTP Permanent Controls Project.	New potential emissions from additional equipment venting.		
Float/Sludge Drum	New equipment for WWTP Permanent Controls Project.	New potential emissions from additional equipment venting.		
Steam Stripper & Reflux Drum Vent	New equipment for WWTP Permanent Controls Project.	New steam stripper will vent to the SCTO via a condenser and knock-out vessel to prevent liquid entrainment in the SCTO vent gases.	Emissions are calculated using process engineering design calculations. These emissions are applied in the SCTO PTE calculation as waste gas input.	Engineering calculations estimate 21 Sm ³ /hr with hydrocarbon concentration of 1.56 mol%.
Steam Stripper Vent				
Spent Caustic Blower	Blower will be routed to new KO drum before SCTO.	No change in emissions from existing plan approvals. Routing via KO drum may decrease actual emissions. Conservatively assumed no change in PTE emissions.	Emissions are calculated using Tanks 4.09d for internal floating roof tanks. These emissions are applied in the SCTO PTE calculation as waste gas input.	Tank net throughput 26 MMGal/yr. Spent caustic light hydrocarbon layer - used Jet/kero material to estimate the light hydrocarbon layer. Assumes 1% hydrocarbon layer. The tank is mostly caustic (water) with a hydrocarbon layer on top. The Tanks 4.0.9d manual instructs the user to use the molecular weight and vapor pressure of the top liquid layer and the entire mixture throughput for two phase liquid systems.
Spent Caustic Storage Tank	No change to tank.			
Spent Caustic Oxidizer Vents	Vents will be routed to the KO drum before SCTO.	No change in emissions from existing plan approvals. Routing via KO drum may decrease actual emissions. Conservatively assumed no change in PTE emissions.	Emissions are calculated using process engineering design calculations. These emissions are applied in the SCTO PTE calculation as waste gas input.	Process engineering model calculates 1,750 kg/hr vent flow rate with the majority of the vent being water, oxygen, and carbon monoxide. The VOC portion of the vent is estimated to be 14.76 kg/hr. The main VOC constituents are benzene at 0.37 wt%, 1,3-butadiene at 0.05 wt%, acetone at 0.13 wt%, and acetylene at 0.03 wt%.
Spent Caustic Oxidizer	No change to caustic oxidizer.			

Source ID		=	C207	Multi-Point Ground Flare (MPGF) CVTO Trip												
VOC to Flare	Basis			NSR POLLUTANT EMISSION FACTORS (lb/MMBtu)												
	MMBtu/hr	VOC to Flare	VOC DRE	NOx	SO2	PM2.5	VOC	CO2	CH4	N2O	CO2e	CO	PM	PM10	H2SO4	Pb
MPGF CVTO Trip Header Vent Gas / Short-Term Max	181.1	3.51 t/hr	-	0.068	-	-	-	-	-	-	-	0.31	-	0.0075	-	-
MPGF CVTO Trip Header Vent Gas / Annual Avg	6.9	0.13 t/hr	98%	0.068	0.0015	0.0075	0.7761	137.7	0.0262	0.0013	138.7	0.31	0.0019	0.0075	7.2E-05	4.90E-07
MPGF CVTO Trip Header / Pilots	0.46	NA	NA	0.0980	0.0015	0.0075	0.0054	116.9	0.0022	0.0002	117.1	0.0824	0.0019	0.0075	7.2E-05	4.90E-07
FLARE / FLARING MODE		Basis		NSR POLLUTANT RATES USED IN AMBIENT IMPACT MODELING (lb/hr)												
		MMBtu/hr	NOTES	NOx	SO2	PM2.5	VOC	CO2	CH4	N2O	CO2e	CO	PM	PM10	H2SO4	Pb
MPGF CVTO Trip Header Total / Short-Term Max		181.56	[A]	0.52	-	-	-	-	-	-	-	56.18	-	1.35	-	-
MPGF CVTO Trip Header Total / Annual Avg		7.38	[B]	0.52	-	-	-	-	-	-	-	2.18	-	0.06	-	-
FLARE / FLARING MODE		Basis		NSR POLLUTANT PTE (T/yr)												
		Hours/yr	MMBtu/yr	NOx	SO2	PM2.5	VOC	CO2	CH4	N2O	CO2e	CO	PM	PM10	H2SO4	Pb
MPGF CVTO Trip Header Total / Annual Avg		8,760	64,667	2.26	0.05	0.24	23.54	4,409	0.80	0.04	4,442	9.56	0.06	0.24	0.002	1.58E-05

FLARE EMISSION CALCULATIONS NOTES:
General:
- VOC mass rates are based on vendor data associated with various potential operating scenarios and actual process data. - Short-term VOC mass rate represents maximum expected short-term rate excluding emergency flaring. - Annual average VOC mass rate represents annual average anticipated rate excluding emergency flaring. - VOC destruction efficiency represents LAER or beyond-LAER control levels.
Calculation Methodology:
- Hourly Emissions = (Heat Input - MMBtu/hr) x (Emission Factor - lb/MMBtu) - Annual Emissions = (Heat Input - MMBtu/hr) x (Annual Hours) x (Emission Factor - lb/MMBtu) x (1 ton/2,000 lb)
Basis for Emission Factors:
- NOx and CO = AP-42, Tables 13.5-1 and 13.5-2, respectively. - Pilots NOx and CO = AP-42, Table 1.4-1. - SO2 = AP-42, Table 1.4-2. - PM10/2.5 = AP-42, Table 1.4-2; filterable + condensable emission factor used as conservative estimate since flare is smokeless. Smokeless flares have zero filterable PM (see AP-42, Table 13.5-1). - VOC for vent gas based on 98% DRE for incoming C3- VOC and 98% DRE for incoming C4+ VOC. - Pilots VOC = AP-42, Table 1.4-2. - CO2 is derived from mass balance of total carbon to flare converted to CO2. - CH4 emission factor is from total methane input to the flare + VOC flaring as fuel gas factor from 40 CFR 98, Table C-2 - N2O from VOC flaring is assumed to result from fuel gas flaring = fuel gas emission factors from 40 CFR 98, Table C-2. - Pilots CO2, CH4, N2O = 40 CFR 98, Tables C-1 and C-2 for natural gas. - CO2e = sum of CO2, CH4 and N2O emissions adjusted for global warming potentials. - PM = AP-42, Table 1.4-2 (filterable only) as conservative estimate since flare is smokeless. - H2SO4 based on SO3-to-SO2 emission factor ratio in AP-42, Table 1.3-1 for distillate oil combustion in boilers > 100 MMBtu/hr.
[A] - MPGF CVTO Trip Header / Short-Term Maximum Emission Rates:
- Short-term max. heat input based on flaring 3.51 t/hr, which is maximum anticipated rate. - The 1-hr max NOx rate is set equal to the annual rate as CVTO trip events are infrequent (i.e., not likely to contribute significantly to the annual distribution of the daily maximum concentrations) and are already accounted for in the CVTO emissions estimates (i.e., the emissions are double-counted). - Short-term max. heat input also includes 0.46 MMBtu/hr of pilot gas at all times. Seven pilots (one per burner) at 0.065 MMBtu/hr per pilot.
[B] - MPGF CVTO Trip Header / Annual Average Emission Rates:
- Annual average heat input based on up to two weeks of CVTO trips per year. - Annual average heat input also includes 0.46 MMBtu/hr of pilot gas at all times. Seven pilots (one per burner) at 0.065 MMBtu/hr per pilot.

Source ID = C207 Multi-Point Ground Flare (MPGF) CVTO Trip										
Short-Term Max Heat Input (HHV)		181.56	MMBtu/hr - Maximum expected short term rates based on design and process data							
Annual Avg Heat Input (HHV)		7.38	MMBtu/hr - Represents reasonably anticipated venting, maintenance events, startups and shutdowns, supplemental gas, and sweep gas							
VOC DRE		98%	DRE for C3- compounds							
VOC DRE		98%	DRE for C4+ compounds							
Annual Hours =		8,760 hr/yr								
Short-Term Max Hourly Emission Rate =		(Short-Term Max Heat Input - MMBtu/hr) x (EF - lb/MMBtu)								
Annual Emission Rate =		(Annual Avg Heat Input - MMBtu/hr) x (EF - lb/MMBtu) x (Annual Hours) / (2,000 lb/T)								
Pollutant	§112 HAP?	EF (lb/MMscf)	EF (lb/MMBtu)	EF Source	Combustion Pollutants*		Waste Gas Pollutants**		Total	
					Short-Term Max (lb/hr)	Annual (tpy)	Short-Term Max (lb/hr)	Annual (tpy)	Short-Term Max (lb/hr)	Annual (tpy)
1,3-Butadiene	YES	-	-	-	-	-	5.53E-04	9.29E-05	5.53E-04	9.29E-05
2-Methylnaphthalene	YES	2.40E-05	<2.35E-08	AP-42, Table 1.4-3	4.27E-06	7.61E-07	-	-	4.27E-06	7.61E-07
3-Methylcholanthrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.20E-07	5.71E-08	-	-	3.20E-07	5.71E-08
7,12-Dimethylbenz(a)anthracene	YES	<1.6E-05	<1.57E-08	AP-42, Table 1.4-3	2.85E-06	5.07E-07	-	-	2.85E-06	5.07E-07
Acenaphthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.20E-07	5.71E-08	-	-	3.20E-07	5.71E-08
Acenaphthylene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.20E-07	5.71E-08	-	-	3.20E-07	5.71E-08
Anthracene	YES	<2.4E-06	<2.35E-09	AP-42, Table 1.4-3	4.27E-07	7.61E-08	-	-	4.27E-07	7.61E-08
Benzo(a)anthracene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.20E-07	5.71E-08	-	-	3.20E-07	5.71E-08
Benzene	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-3	3.74E-04	6.66E-05	5.32E-02	8.93E-03	5.35E-02	9.00E-03
Benzo(a)pyrene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	2.14E-07	3.80E-08	-	-	2.14E-07	3.80E-08
Benzo(b)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.20E-07	5.71E-08	-	-	3.20E-07	5.71E-08
Benzo(g,h,i)perylene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	2.14E-07	3.80E-08	-	-	2.14E-07	3.80E-08
Benzo(k)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.20E-07	5.71E-08	-	-	3.20E-07	5.71E-08
Butane	NO	2.10E+00	2.06E-03	AP-42, Table 1.4-3	3.74E-01	6.66E-02	3.08E+01	5.17E+00	3.12E+01	5.23E+00
Chrysene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.20E-07	5.71E-08	-	-	3.20E-07	5.71E-08
Dibenzo(a,h)anthracene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	2.14E-07	3.80E-08	-	-	2.14E-07	3.80E-08
Dichlorobenzene	YES	1.20E-03	1.18E-06	AP-42, Table 1.4-3	2.14E-04	3.80E-05	-	-	2.14E-04	3.80E-05
Ethane	NO	3.10E+00	3.04E-03	AP-42, Table 1.4-3	5.52E-01	9.83E-02	1.80E+01	3.01E+00	1.85E+01	3.11E+00
Ethylbenzene	YES	-	-	-	-	-	2.15E-03	3.61E-04	2.15E-03	3.61E-04
Fluoranthene	YES	3.00E-06	2.94E-09	AP-42, Table 1.4-3	5.34E-07	9.51E-08	-	-	5.34E-07	9.51E-08
Fluorene	YES	2.80E-06	2.75E-09	AP-42, Table 1.4-3	4.98E-07	8.88E-08	-	-	4.98E-07	8.88E-08
Formaldehyde	YES	7.50E-02	7.35E-05	AP-42, Table 1.4-3	1.34E-02	2.38E-03	-	-	1.34E-02	2.38E-03
Hexane	YES	2.90E-02	2.84E-05	Ventura County APCD, AB 2588 Combustions EF, May 2001	5.16E-03	9.19E-04	5.97E-03	1.00E-03	1.11E-02	1.92E-03
Indeno(1,2,3-cd)pyrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.20E-07	5.71E-08	-	-	3.20E-07	5.71E-08
Naphthalene	YES	6.10E-04	5.98E-07	AP-42, Table 1.4-3	1.09E-04	1.93E-05	3.90E-04	6.55E-05	4.99E-04	8.49E-05
Pentane	NO	2.60E+00	2.55E-03	AP-42, Table 1.4-3	4.63E-01	8.24E-02	1.74E+01	2.91E+00	1.78E+01	2.99E+00
Phenanthrene	YES	1.70E-05	1.67E-08	AP-42, Table 1.4-3	3.03E-06	5.39E-07	-	-	3.03E-06	5.39E-07
Propane	NO	1.60E+00	1.57E-03	AP-42, Table 1.4-3	2.85E-01	5.07E-02	-	-	2.85E-01	5.07E-02

Source ID = C207 Multi-Point Ground Flare (MPGF) CVTO Trip										
Short-Term Max Heat Input (HHV)		181.56	MMBtu/hr - Maximum expected short term rates based on design and process data							
Annual Avg Heat Input (HHV)		7.38	MMBtu/hr - Represents reasonably anticipated venting, maintenance events, startups and shutdowns, supplemental gas, and sweep gas							
VOC DRE		98%	DRE for C3- compounds							
VOC DRE		98%	DRE for C4+ compounds							
Annual Hours =		8,760 hr/yr								
Short-Term Max Hourly Emission Rate =		(Short-Term Max Heat Input - MMBtu/hr) x (EF - lb/MMBtu)								
Annual Emission Rate =		(Annual Avg Heat Input - MMBtu/hr) x (EF - lb/MMBtu) x (Annual Hours) / (2,000 lb/T)								
Pollutant	§112 HAP?	EF (lb/MMscf)	EF (lb/MMBtu)	EF Source	Combustion Pollutants*		Waste Gas Pollutants**		Total	
					Short-Term Max (lb/hr)	Annual (tpy)	Short-Term Max (lb/hr)	Annual (tpy)	Short-Term Max (lb/hr)	Annual (tpy)
Pyrene	YES	5.00E-06	4.90E-09	AP-42, Table 1.4-3	8.90E-07	1.58E-07	-	-	8.90E-07	1.58E-07
Styrene	YES	-	-	-	-	-	1.26E-02	2.11E-03	1.26E-02	2.11E-03
Toluene	YES	3.40E-03	3.33E-06	AP-42, Table 1.4-3	6.05E-04	1.08E-04	2.29E-02	3.85E-03	2.35E-02	3.95E-03
Xylenes	YES	-	-	-	-	-	2.00E-03	3.36E-04	2.00E-03	3.36E-04
Arsenic	YES	2.00E-04	1.96E-07	AP-42, Table 1.4-4	3.56E-05	6.34E-06	-	-	3.56E-05	6.34E-06
Barium	NO	4.40E-03	4.31E-06	AP-42, Table 1.4-4	7.83E-04	1.39E-04	-	-	7.83E-04	1.39E-04
Beryllium	YES	<1.2E-05	<1.18E-08	AP-42, Table 1.4-4	2.14E-06	3.80E-07	-	-	2.14E-06	3.80E-07
Cadmium	YES	1.10E-03	1.08E-06	AP-42, Table 1.4-4	1.96E-04	3.49E-05	-	-	1.96E-04	3.49E-05
Chromium	YES	1.40E-03	1.37E-06	AP-42, Table 1.4-4	2.49E-04	4.44E-05	-	-	2.49E-04	4.44E-05
Chromium (VI)***	YES / Cr Cmpds	5.60E-05	5.49E-08	AP-42, Table 1.4-4/NEI	9.97E-06	1.78E-06	-	-	9.97E-06	1.78E-06
Cobalt	YES	8.40E-05	8.24E-08	AP-42, Table 1.4-4	1.50E-05	2.66E-06	-	-	1.50E-05	2.66E-06
Copper	NO	8.50E-04	8.33E-07	AP-42, Table 1.4-4	1.51E-04	2.69E-05	-	-	1.51E-04	2.69E-05
Lead	YES	5.00E-04	4.90E-07	AP-42, Table 1.4-2	8.90E-05	1.58E-05	-	-	8.90E-05	1.58E-05
Manganese	YES	3.80E-04	3.73E-07	AP-42, Table 1.4-4	6.76E-05	1.20E-05	-	-	6.76E-05	1.20E-05
Mercury	YES	2.60E-04	2.55E-07	AP-42, Table 1.4-4	4.63E-05	8.24E-06	-	-	4.63E-05	8.24E-06
Molybdenum	NO	1.10E-03	1.08E-06	AP-42, Table 1.4-4	1.96E-04	3.49E-05	-	-	1.96E-04	3.49E-05
Nickel	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-4	3.74E-04	6.66E-05	-	-	3.74E-04	6.66E-05
Selenium	YES	<2.4E-05	<2.35E-08	AP-42, Table 1.4-4	4.27E-06	7.61E-07	-	-	4.27E-06	7.61E-07
Vanadium	NO	2.30E-03	2.25E-06	AP-42, Table 1.4-4	4.09E-04	7.29E-05	-	-	4.09E-04	7.29E-05
Zinc	NO	2.90E-02	2.84E-05	AP-42, Table 1.4-4	5.16E-03	9.19E-04	-	-	5.16E-03	9.19E-04
Total §112 HAPs =					0.02	0.004	0.10	0.02	0.12	0.02

* Emissions from the combustion of natural gas and waste gas based on natural gas combustion emission factors.

** Emission rates based on actual process data and engineering judgement.

*** Based on NEI data for SCC 39000699 (In-Process Fuel Use: Natural Gas, General), 4% of the chromium emission factor found in AP-42, Section 1.4, Table 1.4-4 was estimated to equal chromium (VI).

MPGF CVTO Trip Potential to Emit Calculation Vent/Gas Stream Flow Rate and Composition Data

Vent/Gas Stream to MPGF CVTO Trip	Hydrogen	Nitrogen	Methane	Non-VOC/HAP Hydrocarbon	Non-HAP VOC	HAP VOC	Background Information
PE Unit Vents (kg/hr)	43.3	6,207.50	25	401.7	3,182.20	0.14	Shell operates PE Units 1 and 2 under license from Univation Technologies (“Univation”), which covers the “core plant” of these units, including process vents. Similarly, Shell operates PE Unit 3 under license from Ineos Commercial Services UK Ltd. (“Ineos”), which covers the “core plant” of the unit, including process vents. Design process vent flow rates and compositions are provided by the referenced licensors and are unique to each technology. The licensing agreement specifies that all technical information, data, experience, and know-how (including process information and licensor improvement) related to process design, manufacturing techniques, and product properties is confidential. Shell maintains the confidentiality of this information by adhering to the conditions set forth in the licensing agreement. This includes non-disclosure of utility consumption figures, quality of nitrogen and hydrogen supplied to the process, and quantity and contents of all effluent streams. In addition, as further required by the licensing agreement, Shell obtains Univation’s or Ineos’ approval before disclosing any information to a third party, including government agencies. Shell’s claim of confidential business information extends to critical operating data and process flow schematics within the PE Units. This information constitutes production methods and processes which are clearly covered under the licensing agreement between Shell and Univation or Ineos and are thus unique to Shell. Furthermore, disclosure of this information would negatively affect Shell’s competitive position in that it would provide a third party with the information needed to identify production capabilities and key grades of polyethylene manufactured at the unit as well as to reverse-engineer low pressure solvent and vent recovery capabilities of the PE Units. The combination of specific individual vent identifications with flow rate and compositional data are claimed as confidential proprietary information as defined by the Pennsylvania Right to Know Law and pursuant to Section 13.2 of the Air Pollution Control Act, 35 P.S. 4013.2. In consideration of these limitations, Shell is providing total combined GHG, VOC, HAP, and heat content information for the PE Unit vents that are routed to the MPGF CVTO Trip when the CVTO is unavailable.
Sweep Gas (kg/hr)	-	-	55.4	6.2	-	-	The sweep gas is a continuous flow of natural gas through each header connected to the CVTO (or backup flare) to maintain a constant minimum flow of gas and/or pressure to prevent oxygen infiltration into the header system. Sweep gas flow rates are set at the minimum design and engineering practice standard determination to perform this safety function.
LGO Tank Vent (kg/hr)	-	-	-	-	0.0038	0.0041	The vent stream amount for the LGO internal floating roof (IFR) storage tank was calculated using ProMax. See the attached ProMax calculation for the tank.
LGO Railcar Vent (kg/hr)	-	-	-	-	0.6	1.87	The vent stream amount for the loading of LGO into railcars was calculated using the methodology outlined in AP-42, Section 5.2. See the attached calculation for the railcar loading activity.

MPGF CVTO Trip Potential to Emit Calculation Vent/Gas Stream Flow Rate and Composition Data

Vent/Gas Stream to MPGF CVTO Trip	Hydrogen	Nitrogen	Methane	Non-VOC/HAP Hydrocarbon	Non-HAP VOC	HAP VOC	Background Information
PFO Tanks Vent (kg/hr)	-	-	-	-	0.29	0.08	The total vent stream amount for the two PFO fixed roof storage tanks was calculated using ProMax. See the attached ProMax calculation for the tanks.
PFO Railcar Vent (kg/hr)	-	-	-	-	0.69	0.17	The vent stream amount for the loading of PFO into railcars was calculated using the methodology outlined in AP-42, Section 5.2. See the attached calculation for the railcar loading activity. Note that this is a conservative estimate of the vent rate due to the loading of PFO into railcars because the railcars are vapor balanced with the two PFO fixed roof storage tanks during the loading activity.
Hexene Tanks Vent (kg/hr)	-	-	-	-	0.05	-	The total vent stream amount for the two Hexene IFR storage tanks was calculated using ProMax. See the attached ProMax calculation for the tanks.
Heat of Combustion (Btu/lb)	61,022	0	23,891	22,333	~21,480	~21,000	Standard or averaged gross calorific values for purposes of heat input calculation.
Annual Heat Input (MMBtu/hr) ^a	7.4						The annual heat input (and PTE) is estimated based upon the MPGF CVTO Trip receiving the vents/gases at the rates indicated in the table for 2 weeks (336 hours) and the pilots operating at 0.46 MMBtu/hr for 8,760 hours. Note that the CVTO is typically down when the MPGF CVTO Trip is in service and, therefore, not generating separate overlapping emissions. Also, it is not necessary to represent additional supplemental natural gas in the PTE because the PTE-basis vent/gas rates contain enough hydrocarbons to achieve ~616 Btu/scf NHVcz . However, supplemental gas is used as necessary to meet 500 Btu/scf NHVcz minimum under other non-maximum hydrocarbon rate scenarios when a greater proportion of nitrogen may be present.

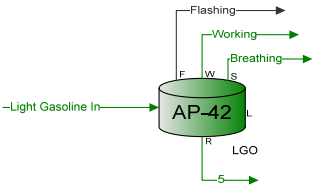
^a Each vent/gas stream identified in the table is assumed to be routed to the MPGF CVTO Trip at the respective rates indicated in the table for 336 hr/yr.

LGO ProMax Outputs and Calculations
Shell Polymers Monaca
2024
LGO

	Annual Working Losses (lb/h)	Annual Breathing Losses (lb/h)	LGO Annual Total Losses (lb/h)
VOC	1.054E-03	1.629E-02	0.01734346
HAP	7.981E-04	0.008140529	0.008938642
1,3-Butadiene	4.035E-06	1.519E-03	0.001522559
Benzene	4.912E-04	5.886E-03	0.006377259
n-Hexane	2.423E-07	7.921E-06	8.163E-06
Toluene	1.975E-04	6.570E-04	0.000854497
Ethylbenzene	1.414E-05	9.664E-06	2.38043E-05
Styrene	7.859E-05	5.010E-05	0.000128691
m-Xylene	4.320E-06	3.850E-06	8.16952E-06
o-Xylene	3.688E-06	3.467E-06	7.15507E-06
p-Xylene	4.320E-06	4.013E-06	8.3327E-06
Naphthalene	1.054E-08	2.640E-10	1.08004E-08
n-Butane	2.529E-07	1.242E-04	0.000124482
Isoprene	2.318E-07	1.954E-05	1.97687E-05
n-Pentane	1.054E-08	1.193E-06	1.20371E-06
Cyclopentene	3.235E-06	1.576E-04	0.000160845
Cyclopentane	2.318E-07	1.043E-05	1.06659E-05
2-Methyl-2-Butene	3.161E-08	2.533E-06	2.565E-06
cis-1,3-Pentadiene	1.781E-06	1.021E-04	0.000103844
trans-1,3-Pentadiene	1.897E-06	1.252E-04	0.00012713
Cyclopentadiene	1.504E-05	1.010E-03	0.001025188
Dicyclopentadiene	2.726E-05	7.597E-06	3.48544E-05
Oil	1.967E-04	1.738E-03	0.001935124
Butene	8.851E-06	4.850E-03	0.004859148

"Flashing" Component Sums		
BTEX	0	lb/h
HAPs	0	lb/h
VOCs	0	lb/h

"Working" Component Sums		
BTEX	0.0007152	lb/h
HAPs	0.0007981	lb/h
VOCs	0.001054	lb/h



"Breathing" Component Sums		
BTEX	0.006564	lb/h
HAPs	0.008141	lb/h
VOCs	0.01629	lb/h

LGO ProMax Input Assumptions
Shell Polymers Monaca
2024
Tank Data/Sample Data

Tank Name	Tank ID	Contents	Length/ Height (m)	Diameter (m)	Temp (C)	Pressure (barg)	Flow Rate (kg/hr)	Reference:
Light Gasoline Storage Tank (LGO)	T-64203	Light Gasoline	7.316	10.008	28.94	0.00426	454	Storage Tank Directory Air Inventory Data.xlsx

Sample Data

Constituent	LGO
	% by weight
1,3-Butadiene	0.383
Benzene	46.621
n-Hexane	0.023
Toluene	18.749
Ethylbenzene	1.342
Styrene	7.459
m-Xylene	0.410
o-Xylene	0.350
p-Xylene	0.410
Naphthalene	0.001
n-Butane	0.024
Isoprene	0.022
n-Pentane	0.001
Cyclopentene	0.307
Cyclopentane	0.022
2-Methyl-2-Butene	0.003
cis-1,3-Pentadiene	0.169
trans-1,3-Pentadiene	0.180
Cyclopentadiene	1.427
Dicyclopentadiene	2.587
Butene	0.840
Oil (balance)	18.670

Single Oil inputs

C7-C10	
MW:	84 g/mol Heat and Material Balance
Specific Gravity:	0.84 from LGO Composition
Promax calculated VP	0.434545 bar at 100 F

*added to create a more volatile composition to match the SDS Vapor Pressure

Process Streams		Breathing	Flashing	Light Gasoline In	Working	5
2024	Status:	Solved	Solved	Solved	Solved	Solved
Phase: Total	From Block:	LGO	LGO	--	LGO	LGO
	To Block:	--	--	LGO	--	--
Mole Fraction		%		%	%	%
1,3-Butadiene		11.5965		0.593972*	0.593972	0.593749
Benzene		31.1267		50.0671*	50.0671	50.0675
n-Hexane		0.0379669		0.0223889*	0.0223889	0.0223886
Toluene		2.94523		17.0697*	17.0697	17.0700
Ethylbenzene		0.0376028		1.06037*	1.06037	1.06039
Styrene		0.198706		6.00776*	6.00776	6.00788
m-Xylene		0.0149782		0.323959*	0.323959	0.323965
o-Xylene		0.0134909		0.276551*	0.276551	0.276556
p-Xylene		0.0156131		0.323959*	0.323959	0.323965
Naphthalene		8.50758E-07		0.000654485*	0.000654485	0.000654498
n-Butane		0.882890		0.0346383*	0.0346383	0.0346211
Isoprene		0.118475		0.0270929*	0.0270929	0.0270910
n-Pentane		0.00683126		0.00116268*	0.00116268	0.00116256
Cyclopentene		0.955773		0.378069*	0.378069	0.378057
Cyclopentane		0.0614554		0.0263141*	0.0263141	0.0263134
2-Methyl-2-Butene		0.0149213		0.00358829*	0.00358829	0.00358806
cis-1,3-Pentadiene		0.618928		0.208122*	0.208122	0.208114
trans-1,3-Pentadiene		0.759439		0.221669*	0.221669	0.221658
Cyclopentadiene		6.31255		1.81093*	1.81093	1.81084
Dicyclopentadiene		0.0237363		1.64152*	1.64152	
C7-C10		8.54869		18.6446*	18.6446	18.6448
Butene-1		35.7095		1.25590*	1.25590	1.25520
Molar Flow		lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h
1,3-Butadiene		2.80738E-05	0	0.0708710*	7.46056E-08	0.0708428
Benzene		7.53540E-05	0	5.97386*	6.28866E-06	5.97378
n-Hexane		9.19133E-08	0	0.00267137*	2.81215E-09	0.00267128
Toluene		7.13003E-06	0	2.03670*	2.14403E-06	1.64155
Ethylbenzene		9.10318E-08	0	0.126521*	1.33188E-07	0.126520
Styrene		4.81042E-07	0	0.716828*	7.54602E-07	0.716827
m-Xylene		3.62604E-08	0	0.0386538*	4.06907E-08	0.0386538
o-Xylene		3.26597E-08	0	0.0329972*	3.47360E-08	0.0329971
p-Xylene		3.77974E-08	0	0.0386538*	4.06907E-08	0.0386538
Naphthalene		2.05958E-12	0	7.80912E-05*	8.22063E-11	7.80911E-05
n-Butane		2.13737E-06	0	0.00413294*	4.35073E-09	0.00413080
Isoprene		2.86814E-07	0	0.00323264*	3.40299E-09	0.00323235
n-Pentane		1.65377E-08	0	0.000138727*	1.46037E-10	0.000138710
Cyclopentene		2.31381E-06	0	0.0451100*	4.74871E-08	0.0451076
Cyclopentane		1.48776E-07	0	0.00313972*	3.30517E-09	0.00313957
2-Methyl-2-Butene		3.61227E-08	0	0.000428144*	4.50705E-10	0.000428107
cis-1,3-Pentadiene		1.49835E-06	0	0.0248325*	2.61411E-08	0.0248310
trans-1,3-Pentadiene		1.83851E-06	0	0.0264489*	2.78426E-08	0.0264470
Cyclopentadiene		1.52819E-05	0	0.216075*	2.27462E-07	0.216060
Dicyclopentadiene		5.74626E-08	0	0.195861*	2.06182E-07	0.195861
C7-C10		2.06953E-05	0	2.22462*	2.34185E-06	2.22459
Butene-1		8.64483E-05	0	0.149850*	1.57747E-07	0.149764
Mass Fraction		%		%	%	%
1,3-Butadiene		9.32192		0.383*	0.383	0.382855

Benzene	36.1332	46.621*	46.621	46.6212
n-Hexane	0.0486234	0.023*	0.023	0.0229996
Toluene	4.03289	18.749*	18.749	18.7492
Ethylbenzene	0.0593278	1.342*	1.342	1.34202
Styrene	0.307555	7.459*	7.459	7.45912
m-Xylene	0.0236319	0.41*	0.41	0.410006
o-Xylene	0.0212852	0.35*	0.35	0.350005
p-Xylene	0.0246336	0.41*	0.41	0.410006
Naphthalene	1.62051E-06	0.001*	0.001	0.00100002
n-Butane	0.762615	0.024*	0.024	0.0239880
Isoprene	0.119933	0.022*	0.022	0.0219984
n-Pentane	0.00732465	0.001*	0.001	0.000999897
Cyclopentene	0.967536	0.307*	0.307	0.306989
Cyclopentane	0.0640529	0.022*	0.022	0.0219993
2-Methyl-2-Butene	0.0155520	0.003*	0.003	0.00299980
cis-1,3-Pentadiene	0.626545	0.169*	0.169	0.168993
trans-1,3-Pentadiene	0.768786	0.18*	0.18	0.179990
Cyclopentadiene	6.20113	1.427*	1.427	1.42692
Dicyclopentadiene	0.0466346	2.587*	2.587	2.58704
C7-C10	10.6717	18.67*	18.67	18.6701
Butene-1	29.7750	0.84*	0.84	0.839529

Mass Flow	lb/h	lb/h	lb/h	lb/h	lb/h
1,3-Butadiene	0.00151852	0	3.83344*	4.03545E-06	3.83192
Benzene	0.00588604	0	466.629*	0.000491219	466.623
n-Hexane	7.92066E-06	0	0.230207*	2.42338E-07	0.230199
Toluene	0.000656950	0	187.658*	0.000197547	187.658
Ethylbenzene	9.66439E-06	0	13.4321*	1.41399E-05	13.4320
Styrene	5.01001E-05	0	74.6570*	7.85912E-05	74.6569
m-Xylene	3.84959E-06	0	4.10368*	4.31993E-06	4.10368
o-Xylene	3.46732E-06	0	3.50315*	3.68775E-06	3.50314
p-Xylene	4.01276E-06	0	4.10368*	4.31993E-06	4.10368
Naphthalene	2.63978E-10	0	0.0100090*	1.05364E-08	0.0100090
n-Butane	0.000124229	0	0.240216*	2.52874E-07	0.240091
Isoprene	1.95369E-05	0	0.220198*	2.31801E-07	0.220178
n-Pentane	1.19317E-06	0	0.0100090*	1.05364E-08	0.0100078
Cyclopentene	0.000157610	0	3.07276*	3.23468E-06	3.07260
Cyclopentane	1.04341E-05	0	0.220198*	2.31801E-07	0.220187
2-Methyl-2-Butene	2.53339E-06	0	0.0300270*	3.16093E-08	0.0300244
cis-1,3-Pentadiene	0.000102063	0	1.69152*	1.78066E-06	1.69141
trans-1,3-Pentadiene	0.000125234	0	1.80162*	1.89656E-06	1.80149
Cyclopentadiene	0.00101015	0	14.2828*	1.50355E-05	14.2818
Dicyclopentadiene	7.59669E-06	0	25.8932*	2.72577E-05	25.8932
C7-C10	0.00173841	0	186.868*	0.000196715	186.866
Butene-1	0.00485030	0	8.40755*	8.85059E-06	8.40269

Process Streams		Breathing	Flashing	Light Gasoline In	Working	5
Properties	Status:	Solved	Solved	Solved	Solved	Solved
Phase: Total	From Block:	LGO	LGO	--	LGO	LGO
	To Block:	--	--	LGO	--	--
Property	Units					
Temperature	°F	53.3317	53.3317	84.092*	53.3317	53.3317
Pressure	psia	14.1	14.1	14.7577*	14.1	14.1

Mole Fraction Vapor	%	16.8978		0	0	0
Mole Fraction Light Liquid	%	83.1022		100	100	100
Mole Fraction Heavy Liquid	%	0		0	0	0
Phase Mole Fraction	%	100		100	100	100
Molecular Weight	lb/lbmol	67.2889		83.8857	83.8857	83.8860
Mass Density	lb/ft^3	1.03049		53.4004	54.4176	54.4177
Molar Flow	lbmol/h	0.000242088	0	11.9317	1.25605E-05	11.9314
Mass Flow	lb/h	0.0162898	0	1000.90*	0.00105364	1000.88
Vapor Volumetric Flow	ft^3/h	0.0158078	0	18.7433	1.93622E-05	18.3926
Liquid Volumetric Flow	gpm	0.00197084	0	2.33683	2.41398E-06	2.29310
Std Vapor Volumetric Flow	MMSCFD	2.20484E-06	0	0.108669	1.14396E-07	0.108667
Std Liquid Volumetric Flow	sgpm	4.42222E-05	0	2.29916	2.42032E-06	2.29911
Compressibility		0.167238		0.00397275	0.00394807	0.00394808
Specific Gravity				0.856204	0.872514	0.872516
API Gravity				31.3288	31.3297	31.3293
Enthalpy	Btu/h	1.97823?		109315	0.102605?	97466.9?
Mass Enthalpy	Btu/lb	121.439?		109.216	97.3811?	97.3811?
Mass Cp	Btu/(lb*°F)	0.412862?		0.393495	0.376065?	0.376064?
Ideal Gas CpCv Ratio		1.11293		1.09540	1.10210	1.10210
Dynamic Viscosity	cP			0.536152	0.661585	0.661595
Kinematic Viscosity	cSt			0.626791	0.758971	0.758981
Thermal Conductivity	Btu/(h*ft*°F)			0.0760434?	0.0783122?	0.0783122?
Surface Tension	lbf/ft			0.00186522?	0.00200879?	0.00200880?
Net Ideal Gas Heating Value	Btu/ft^3	3271.61		3925.91	3925.91	3925.92
Net Liquid Heating Value	Btu/lb	18288.3		17588.8	17588.8	17588.8
Gross Ideal Gas Heating Value	Btu/ft^3	3454.38		4116.02	4116.02	4116.03
Gross Liquid Heating Value	Btu/lb	19319.7		18448.7	18448.7	18448.7

Process Streams		Breathing	Flashing	Light Gasoline In	Working	5
Composition		Status:	Solved	Solved	Solved	Solved
Phase: Vapor	From Block:	LGO	LGO	--	LGO	LGO
	To Block:	--	--	LGO	--	--
Mole Fraction		%				
1,3-Butadiene		19.4379				
Benzene		3.24037				
n-Hexane		0.0101602				
Toluene		0.0785591				
Ethylbenzene		0.000205852				
Styrene		0.00110453				
m-Xylene		9.85428E-05				
o-Xylene		9.16035E-05				
p-Xylene		0.000107109				
Naphthalene		2.96132E-10				
n-Butane		1.54613				
Isoprene		0.0639390				
n-Pentane		0.00393781				
Cyclopentene		0.323934				
Cyclopentane		0.0190928				
2-Methyl-2-Butene		0.00695703				
cis-1,3-Pentadiene		0.235392				
trans-1,3-Pentadiene		0.319922				
Cyclopentadiene		2.68174				

Dicyclopentadiene	7.19863E-05
C7-C10	0.526782
Butene-1	71.5035
Molar Flow	lbmol/h
1,3-Butadiene	7.95154E-06
Benzene	1.32555E-06
n-Hexane	4.15628E-09
Toluene	3.21365E-08
Ethylbenzene	8.42090E-11
Styrene	4.51834E-10
m-Xylene	4.03114E-11
o-Xylene	3.74727E-11
p-Xylene	4.38156E-11
Naphthalene	1.21140E-16
n-Butane	6.32481E-07
Isoprene	2.61558E-08
n-Pentane	1.61086E-09
Cyclopentene	1.32513E-07
Cyclopentane	7.81039E-09
2-Methyl-2-Butene	2.84594E-09
cis-1,3-Pentadiene	9.62930E-08
trans-1,3-Pentadiene	1.30872E-07
Cyclopentadiene	1.09703E-06
Dicyclopentadiene	2.94478E-11
C7-C10	2.15493E-07
Butene-1	2.92503E-05
Mass Fraction	%
1,3-Butadiene	18.4381
Benzene	4.43872
n-Hexane	0.0153544
Toluene	0.126936
Ethylbenzene	0.000383251
Styrene	0.00201734
m-Xylene	0.000183465
o-Xylene	0.000170545
p-Xylene	0.000199413
Naphthalene	6.65611E-10
n-Butane	1.57592
Isoprene	0.0763779
n-Pentane	0.00498231
Cyclopentene	0.386954
Cyclopentane	0.0234822
2-Methyl-2-Butene	0.00855642
cis-1,3-Pentadiene	0.281186
trans-1,3-Pentadiene	0.382161
Cyclopentadiene	3.10866
Dicyclopentadiene	0.000166892
C7-C10	0.775992
Butene-1	70.3535
Mass Flow	lb/h
1,3-Butadiene	0.000430102
Benzene	0.000103541
n-Hexane	3.58169E-07

Toluene	2.96101E-06
Ethylbenzene	8.94005E-09
Styrene	4.70581E-08
m-Xylene	4.27966E-09
o-Xylene	3.97829E-09
p-Xylene	4.65168E-09
Naphthalene	1.55266E-14
n-Butane	3.67612E-05
Isoprene	1.78166E-06
n-Pentane	1.16222E-07
Cyclopentene	9.02641E-06
Cyclopentane	5.47765E-07
2-Methyl-2-Butene	1.99594E-07
cis-1,3-Pentadiene	6.55919E-06
trans-1,3-Pentadiene	8.91461E-06
Cyclopentadiene	7.25151E-05
Dicyclopentadiene	3.89306E-09
C7-C10	1.81014E-05
Butene-1	0.00164113

Process Streams		Breathing	Flashing	Light Gasoline In	Working	5
Properties		Status: Solved	Solved	Solved	Solved	Solved
Phase: Vapor		From Block: LGO	LGO	--	LGO	LGO
		To Block: --	--	LGO	--	--
Property	Units					
Temperature	°F	53.3317				
Pressure	psia	14.1				
Mole Fraction Vapor	%	100				
Mole Fraction Light Liquid	%	0				
Mole Fraction Heavy Liquid	%	0				
Phase Mole Fraction	%	16.8978				
Molecular Weight	lb/lbmol	57.0234				
Mass Density	lb/ft^3	0.150331				
Molar Flow	lbmol/h	4.09075E-05				
Mass Flow	lb/h	0.00233268				
Vapor Volumetric Flow	ft^3/h	0.0155170				
Liquid Volumetric Flow	gpm	0.00193459				
Std Vapor Volumetric Flow	MMSCFD	3.72570E-07				
Std Liquid Volumetric Flow	sgpm	7.50196E-06				
Compressibility		0.971500				
Specific Gravity		1.96887				
API Gravity						
Enthalpy	Btu/h	0.424039?				
Mass Enthalpy	Btu/lb	181.782?				
Mass Cp	Btu/(lb*°F)	0.344886?				
Ideal Gas CpCv Ratio		1.11379				
Dynamic Viscosity	cP	0.00756750				
Kinematic Viscosity	cSt	3.14256				
Thermal Conductivity	Btu/(h*ft*°F)	0.00767361?				
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3	2896.44				
Net Liquid Heating Value	Btu/lb	19137.3				

Gross Ideal Gas Heating Value	Btu/ft ³	3085.82
Gross Liquid Heating Value	Btu/lb	20399.1

Process Streams		Breathing	Flashing	Light Gasoline In	Working	5
Composition		Solved	Solved	Solved	Solved	Solved
Phase: Nonspecific Liquid	Status:	LGO	LGO	--	LGO	LGO
	From Block:	--	--	LGO	--	--
	To Block:	--	--	--	--	--
Mole Fraction		%		%	%	%
1,3-Butadiene		10.0021		0.593972	0.593972	0.593749
Benzene		36.7970		50.0671	50.0671	50.0675
n-Hexane		0.0436210		0.0223889	0.0223889	0.0223886
Toluene		3.52813		17.0697	17.0697	17.0700
Ethylbenzene		0.0452070		1.06037	1.06037	1.06039
Styrene		0.238885		6.00776	6.00776	6.00788
m-Xylene		0.0180038		0.323959	0.323959	0.323965
o-Xylene		0.0162154		0.276551	0.276551	0.276556
p-Xylene		0.0187660		0.323959	0.323959	0.323965
Naphthalene		1.02369E-06		0.000654485	0.000654485	0.000654498
n-Butane		0.748030		0.0346383	0.0346383	0.0346211
Isoprene		0.129564		0.0270929	0.0270929	0.0270910
n-Pentane		0.00741961		0.00116268	0.00116268	0.00116256
Cyclopentene		1.08425		0.378069	0.378069	0.378057
Cyclopentane		0.0700693		0.0263141	0.0263141	0.0263134
2-Methyl-2-Butene		0.0165408		0.00358829	0.00358829	0.00358806
cis-1,3-Pentadiene		0.696915		0.208122	0.208122	0.208114
trans-1,3-Pentadiene		0.848809		0.221669	0.221669	0.221658
Cyclopentadiene		7.05083		1.81093	1.81093	1.81084
Dicyclopentadiene		0.0285481		1.64152	1.64152	1.64155
C7-C10		10.1798		18.6446	18.6446	18.6448
Butene-1		28.4312		1.25590	1.25590	1.25520
Molar Flow		lbmol/h		lbmol/h	lbmol/h	lbmol/h
1,3-Butadiene		2.01222E-05		0.0708710	7.46056E-08	0.0708428
Benzene		7.40285E-05		5.97386	6.28866E-06	5.97378
n-Hexane		8.77570E-08		0.00267137	2.81215E-09	0.00267128
Toluene		7.09790E-06		2.03670	2.14403E-06	2.03669
Ethylbenzene		9.09476E-08		0.126521	1.33188E-07	0.126520
Styrene		4.80591E-07		0.716828	7.54602E-07	0.716827
m-Xylene		3.62201E-08		0.0386538	4.06907E-08	0.0386538
o-Xylene		3.26222E-08		0.0329972	3.47360E-08	0.0329971
p-Xylene		3.77536E-08		0.0386538	4.06907E-08	0.0386538
Naphthalene		2.05946E-12		7.80912E-05	8.22063E-11	7.80911E-05
n-Butane		1.50489E-06		0.00413294	4.35073E-09	0.00413080
Isoprene		2.60658E-07		0.00323264	3.40299E-09	0.00323235
n-Pentane		1.49268E-08		0.000138727	1.46037E-10	0.000138710
Cyclopentene		2.18130E-06		0.0451100	4.74871E-08	0.0451076
Cyclopentane		1.40966E-07		0.00313972	3.30517E-09	0.00313957
2-Methyl-2-Butene		3.32768E-08		0.000428144	4.50705E-10	0.000428107
cis-1,3-Pentadiene		1.40206E-06		0.0248325	2.61411E-08	0.0248310
trans-1,3-Pentadiene		1.70764E-06		0.0264489	2.78426E-08	0.0264470
Cyclopentadiene		1.41849E-05		0.216075	2.27462E-07	0.216060
Dicyclopentadiene		5.74332E-08		0.195861	2.06182E-07	0.195861
C7-C10		2.04798E-05		2.22462	2.34185E-06	2.22459

Butene-1	5.71980E-05	0.149850	1.57747E-07	0.149764
Mass Fraction	%	%	%	%
1,3-Butadiene	7.79832	0.383	0.383	0.382855
Benzene	41.4304	46.621	46.621	46.6212
n-Hexane	0.0541837	0.023	0.023	0.0229996
Toluene	4.68570	18.749	18.749	18.7492
Ethylbenzene	0.0691793	1.342	1.342	1.34202
Styrene	0.358620	7.459	7.459	7.45912
m-Xylene	0.0275508	0.41	0.41	0.410006
o-Xylene	0.0248141	0.35	0.35	0.350005
p-Xylene	0.0287173	0.41	0.41	0.410006
Naphthalene	1.89124E-06	0.001	0.001	0.00100002
n-Butane	0.626686	0.024	0.024	0.0239880
Isoprene	0.127213	0.022	0.022	0.0219984
n-Pentane	0.00771613	0.001	0.001	0.000999897
Cyclopentene	1.06457	0.307	0.307	0.306989
Cyclopentane	0.0708336	0.022	0.022	0.0219993
2-Methyl-2-Butene	0.0167212	0.003	0.003	0.00299980
cis-1,3-Pentadiene	0.684266	0.169	0.169	0.168993
trans-1,3-Pentadiene	0.833403	0.18	0.18	0.179990
Cyclopentadiene	6.71798	1.427	1.427	1.42692
Dicyclopentadiene	0.0544008	2.587	2.587	2.58704
C7-C10	12.3256	18.67	18.67	18.6701
Butene-1	22.9931	0.84	0.84	0.839529
Mass Flow	lb/h	lb/h	lb/h	lb/h
1,3-Butadiene	0.00108842	3.83344	4.03545E-06	3.83192
Benzene	0.00578250	466.629	0.000491219	466.623
n-Hexane	7.56249E-06	0.230207	2.42338E-07	0.230199
Toluene	0.000653989	187.658	0.000197547	187.658
Ethylbenzene	9.65545E-06	13.4321	1.41399E-05	13.4320
Styrene	5.00531E-05	74.6570	7.85912E-05	74.6569
m-Xylene	3.84531E-06	4.10368	4.31993E-06	4.10368
o-Xylene	3.46334E-06	3.50315	3.68775E-06	3.50314
p-Xylene	4.00811E-06	4.10368	4.31993E-06	4.10368
Naphthalene	2.63962E-10	0.0100090	1.05364E-08	0.0100090
n-Butane	8.74675E-05	0.240216	2.52874E-07	0.240091
Isoprene	1.77552E-05	0.220198	2.31801E-07	0.220178
n-Pentane	1.07695E-06	0.0100090	1.05364E-08	0.0100078
Cyclopentene	0.000148583	3.07276	3.23468E-06	3.07260
Cyclopentane	9.88634E-06	0.220198	2.31801E-07	0.220187
2-Methyl-2-Butene	2.33380E-06	0.0300270	3.16093E-08	0.0300244
cis-1,3-Pentadiene	9.55039E-05	1.69152	1.78066E-06	1.69141
trans-1,3-Pentadiene	0.000116319	1.80162	1.89656E-06	1.80149
Cyclopentadiene	0.000937638	14.2828	1.50355E-05	14.2818
Dicyclopentadiene	7.59279E-06	25.8932	2.72577E-05	25.8932
C7-C10	0.00172031	186.868	0.000196715	186.866
Butene-1	0.00320917	8.40755	8.85059E-06	8.40269

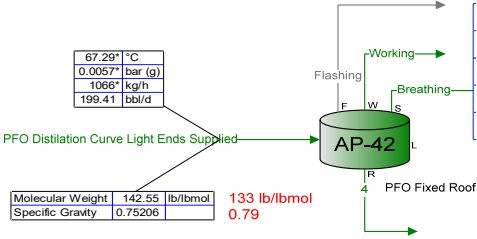
Process Streams		Breathing	Flashing	Light Gasoline In	Working	5
Properties	Status:	Solved	Solved	Solved	Solved	Solved
Phase: Nonspecific Liquid	From Block:	LGO	LGO	--	LGO	LGO
	To Block:	--	--	LGO	--	--
Property	Units					

Temperature	°F	53.3317	84.092	53.3317	53.3317
Pressure	psia	14.1	14.7577	14.1	14.1
Mole Fraction Vapor	%	0	0	0	0
Mole Fraction Light Liquid	%	100	100	100	100
Mole Fraction Heavy Liquid	%	0	0	0	0
Phase Mole Fraction	%	83.1022	100	100	100
Molecular Weight	lb/lbmol	69.3762	83.8857	83.8857	83.8860
Mass Density	lb/ft^3	48.0048	53.4004	54.4176	54.4177
Molar Flow	lbmol/h	0.000201180	11.9317	1.25605E-05	11.9314
Mass Flow	lb/h	0.0139571	1000.90	0.00105364	1000.88
Vapor Volumetric Flow	ft^3/h	0.000290745	18.7433	1.93622E-05	18.3926
Liquid Volumetric Flow	gpm	3.62487E-05	2.33683	2.41398E-06	2.29310
Std Vapor Volumetric Flow	MMSCFD	1.83227E-06	0.108669	1.14396E-07	0.108667
Std Liquid Volumetric Flow	sgpm	3.67203E-05	2.29916	2.42032E-06	2.29911
Compressibility		0.00370137	0.00397275	0.00394807	0.00394808
Specific Gravity		0.769693	0.856204	0.872514	0.872516
API Gravity		53.2680	31.3288	31.3297	31.3293
Enthalpy	Btu/h	1.55419?	109315	0.102605?	97466.9?
Mass Enthalpy	Btu/lb	111.354?	109.216	97.3811?	97.3811?
Mass Cp	Btu/(lb*°F)	0.424223?	0.393495	0.376065?	0.376064?
Ideal Gas CpCv Ratio		1.11275	1.09540	1.10210	1.10210
Dynamic Viscosity	cP	0.355928	0.536152	0.661585	0.661595
Kinematic Viscosity	cSt	0.462868	0.626791	0.758971	0.758981
Thermal Conductivity	Btu/(h*ft*°F)	0.0767860?	0.0760434?	0.0783122?	0.0783122?
Surface Tension	lbf/ft	0.00154221?	0.00186522?	0.00200879?	0.00200880?
Net Ideal Gas Heating Value	Btu/ft^3	3347.90	3925.91	3925.91	3925.92
Net Liquid Heating Value	Btu/lb	18146.4	17588.8	17588.8	17588.8
Gross Ideal Gas Heating Value	Btu/ft^3	3529.32	4116.02	4116.02	4116.03
Gross Liquid Heating Value	Btu/lb	19139.3	18448.7	18448.7	18448.7

PFO ProMax Outputs and Calculations
Shell Polymers Monaca
2024

PFO

	Annual Total Working Losses (lb/h)	Annual Per-Tank Breathing Losses (lb/h)	PFO Annual Total Losses (lb/h)	PFO Annual Total Losses (lb/y)
VOC	5.800E-01	1.247E-01	8.293E-01	7264.86
HAP	1.252E-01	2.692E-02	1.791E-01	1568.81
1,3-Butadiene	3.544E-03	7.617E-04	5.067E-03	44.39
Benzene	5.740E-02	1.234E-02	8.207E-02	718.97
n-Hexane	1.355E-04	2.912E-05	0.00019369	1.70
Toluene	3.433E-02	7.380E-03	0.049092459	430.05
Ethylbenzene	3.849E-03	8.274E-04	0.005504294	48.22
Styrene	2.215E-02	4.761E-03	0.03167355	277.46
m-Xylene	1.124E-03	2.416E-04	0.001607335	14.08
o-Xylene	1.343E-03	2.887E-04	0.001920314	16.82
p-Xylene	1.162E-03	2.498E-04	0.001662067	14.56
Naphthalene	2.046E-04	4.397E-05	0.000292509	2.56
n-Butane	1.973E-03	4.240E-04	0.002820639	24.71
Isoprene	8.473E-05	1.821E-05	0.000121155	1.06
n-Pentane	7.216E-05	1.551E-05	0.000103183	0.90
Cyclopentene	1.912E-04	4.109E-05	0.000273328	2.39
Cyclopentane	7.366E-05	1.583E-05	0.000105324	0.92
2-Methyl-2-Butene	6.621E-05	1.423E-05	9.46757E-05	0.83
cis-1,3-Pentadiene	4.149E-04	8.919E-05	0.000593328	5.20
trans-1,3-Pentadiene	3.783E-04	8.130E-05	0.000540858	4.74
Cyclopentadiene	4.508E-01	9.690E-02	0.644592153	5646.63
Dicyclopentadiene	6.347E-04	1.364E-04	9.075E-04	7.95
Curve Oil	5.718E-05	1.229E-05	8.17553E-05	0.72



Promax Distillation Curve Oil

Cuts	Temperature	Annual Working Losses (lb/h)	Annual Breathing Losses (lb/h)
C1	PFO @224.7 °C	3.37413E-05	7.25234E-06
C2	PFO @237.5 °C	1.38953E-05	2.98664E-06
C3	PFO @250.7 °C	5.55607E-06	1.19422E-06
C4	PFO @263.7 °C	2.51368E-06	5.40289E-07
C5	PFO @276.3 °C	1.09254E-06	2.34829E-07
C6	PFO @289.5 °C	2.52283E-07	5.42255E-08
C7	PFO @302.6 °C	8.5339E-08	1.83427E-08
C8	PFO @315.9 °C	2.59296E-08	5.5733E-09
C9	PFO @328.9 °C	9.16423E-09	1.96975E-09
C10	PFO @342.0 °C	3.1711E-09	6.81595E-10
C11	PFO @355.0 °C	1.13498E-09	2.43952E-10
C12	PFO @367.8 °C	3.23989E-10	6.9638E-11
C13	PFO @381.0 °C	8.9216E-11	1.9176E-11
C14	PFO @394.0 °C	2.62723E-11	5.64695E-12
C15	PFO @407.3 °C	8.26071E-12	1.77555E-12
C16	PFO @420.1 °C	3.02577E-12	6.50357E-13
C17	PFO @436.3 °C	8.96985E-13	1.92797E-13
C18	PFO @455.8 °C	1.24263E-13	2.67089E-14
C19	PFO @475.4 °C	1.44037E-14	3.09592E-15
C20	PFO @494.4 °C	1.26554E-15	2.72015E-16
C21	PFO @516.2 °C	1.05369E-16	2.26479E-17
C22	PFO @537.3 °C	3.45312E-17	7.4221E-18

PFO ProMax Input Assumptions
Shell Polymers Monaca
2024

Tank Data/Sample Data

Tank Name	Tank ID	Contents	Length/ Height (m)	Diameter (m)	Temp (C)	Pressure (barg)	Flow Rate (kg/hr)	Reference:
1 Pyrolysis Fuel Oil Storage Tank (PFO)	T-64204 A/B	Pyrolysis Fuel Oil	7.316	9.14	67.29	0.0057	1066	Storage Tank Directory Air Inventory Data.xlsx

Sample Data

Constituent	PFO % by weight
1,3-Butadiene	0.010
Benzene	1.680
n-Hexane	0.007
Toluene	3.909
Ethylbenzene	1.530
Styrene	10.110
m-Xylene	0.501
o-Xylene	0.644
p-Xylene	0.501
Naphthalene	1.013
n-Butane	0.007
Isoprene	0.001
n-Pentane	0.001
Cyclopentene	0.002
Cyclopentane	0.001
2-Methyl-2-Butene	0.001
cis-1,3-Pentadiene	0.007
trans-1,3-Pentadiene	0.006
Cyclopentadiene	3.605
Dicyclopentadiene	0.845
Curve Oil (balance)	75.619

Curve Oil inputs

Reference: [PFO Distillation Curve 20240305.csv](#)

PFO Distillation Curve

Component % mass	Temperature Results (°C)
0	153.78
5	170.02
10	182.82
15	196.89
20	211.03
25	226.49
30	241.77
35	257.51
40	271.40
45	284.48
50	305.89
55	329.67
60	350.96
65	370.26
70	392.82
75	414.56
80	431.55
85	450.14
90	470.79
95	501.87
98	536.33
100	545.00

MW:	133 g/mol Heat and Material Balance
Specific Gravity:	0.79 from PFO Composition
Promax calculated VP	0.110532 bar at 100 F

Oil Composition Solver used to match the Temperature, Pressure, Flowrate inputs:

(C1 + C2 + C3 + C4 + C5 + C6 + C7 + C8 + C9 + C10 + C11 + C12 + C13 + C14 + C15 + C16 + C17 + C18 + C19 + C20 + C21 + C22) - 75.619

Cut	Oil @ °C	% by weight
C1	PFO @224.7 °C	0.000335096
C2	PFO @237.5 °C	0.002415093
C3	PFO @250.7 °C	0.00207008
C4	PFO @263.7 °C	1.28170413
C5	PFO @276.3 °C	0.150213591
C6	PFO @289.5 °C	0.897006101
C7	PFO @302.6 °C	0.847682639
C8	PFO @315.9 °C	0.799024788
C9	PFO @328.9 °C	0.850206111
C10	PFO @342.0 °C	0.876389889
C11	PFO @355.0 °C	0.523785909
C12	PFO @367.8 °C	0.446264661
C13	PFO @381.0 °C	0.402001775
C14	PFO @394.0 °C	0.407393417
C15	PFO @407.3 °C	0.413002616
C16	PFO @420.1 °C	0.438954535
C17	PFO @436.3 °C	0.376296533
C18	PFO @455.8 °C	0.332665432
C19	PFO @475.4 °C	0.31107624
C20	PFO @494.4 °C	0.324602464
C21	PFO @516.2 °C	0.383430854
C22	PFO @537.3 °C	0.507351299

Process Streams							
Composition		Breathing	Flashing	PFO Distillation Curve	Light Ends Supplied	Working	4
Phase: Total	Status: Solved	Solved	Solved	Solved	Solved	Solved	Solved
From Block:	PFO Fixed Roof Tank	PFO Fixed Roof Tank	--	PFO Fixed Roof Tank	PFO Fixed Roof Tank	PFO Fixed Roof Tank	
To Block:	--	--	PFO Fixed Roof Tank	--	--	--	
Mole Fraction	%	%	%	%	%	%	
1,3-Butadiene	1.49851			0.0263540*	1.49851	0.0254414	
Benzene	10.1214			3.06591*	10.1214	3.06154	
n-Hexane	0.0201015			0.0115793*	0.0201015	0.0115740	
Toluene	4.39609			6.04773*	4.39609	6.04875	
Ethylbenzene	0.397272			2.05436*	0.397272	2.05539	
Styrene	2.50226			13.8377*	2.50226	13.8447	
m-Xylene	0.114112			0.672704*	0.114112	0.673050	
o-Xylene	0.141665			0.864713*	0.141665	0.865161	
p-Xylene	0.117096			0.672704*	0.117096	0.673048	
Naphthalene	0.0273313			1.12665*	0.0273313	1.12733	
n-Butane	0.415177			0.0171681*	0.415177	0.0169214	
Isoprene	0.0153202			0.00209272*	0.0153202	0.00208452	
n-Pentane	0.0127572			0.00197578*	0.0127572	0.00196910	
Cyclopentene	0.0286880			0.00418545*	0.0286880	0.00417026	
Cyclopentane	0.00987637			0.00203257*	0.00987637	0.00202771	
2-Methyl-2-Butene	0.0118034			0.00203257*	0.0118034	0.00202651	
cis-1,3-Pentadiene	0.176798			0.0146491*	0.176798	0.0145485	
trans-1,3-Pentadiene	0.0686495			0.0125563*	0.0686495	0.0125216	
Cyclopentadiene	79.8359			7.77434*	79.8359	7.72967	
Dicyclopentadiene	0.0832589			0.911140*	0.0832589	0.911653	
PFO @ 224.7 °C	0.00359168			5.44091*	0.00359168	5.44428	
PFO @ 237.5 °C	0.00142948			5.14173*	0.00142948	5.14492	
PFO @ 250.7 °C	0.000530489			4.84659*	0.000530489	4.84959	
PFO @ 263.7 °C	0.000228392			5.15704*	0.000228392	5.16023	
PFO @ 276.3 °C	9.47057E-05			5.31586*	9.47057E-05	5.31915	
PFO @ 289.5 °C	2.07409E-05			3.17709*	2.07409E-05	3.17906	
PFO @ 302.6 °C	6.93652E-06			2.70688*	6.93652E-06	2.70855	
PFO @ 315.9 °C	2.01174E-06			2.43839*	2.01174E-06	2.43991	
PFO @ 328.9 °C	6.78127E-07			2.47110*	6.78127E-07	2.47263	
PFO @ 342.0 °C	2.24088E-07			2.50512*	2.24088E-07	2.50667	
PFO @ 355.0 °C	7.64072E-08			2.66254*	7.64072E-08	2.66419	
PFO @ 367.8 °C	2.07516E-08			2.28248*	2.07516E-08	2.28389	
PFO @ 381.0 °C	5.45652E-09			2.01783*	5.45652E-09	2.01908	
PFO @ 394.0 °C	1.53300E-09			1.88687*	1.53300E-09	1.88804	
PFO @ 407.3 °C	4.62324E-10			1.96892*	4.62324E-10	1.97014	
PFO @ 420.1 °C	1.61857E-10			2.32575*	1.61857E-10	2.32719	
PFO @ 436.3 °C	4.53100E-11			3.07741*	4.53100E-11	3.07931	
PFO @ 455.8 °C	5.89114E-12			2.64139*	5.89114E-12	2.64303	
PFO @ 475.4 °C	6.41302E-13			1.91527*	6.41302E-13	1.91646	
PFO @ 494.4 °C	5.13212E-14			1.00720*	5.13212E-14	1.00782	
PFO @ 516.2 °C	4.08894E-15			0.610861*	4.08894E-15	0.611239	
PFO @ 537.3 °C	1.26876E-15			1.28024*	1.26876E-15	1.28104	
PFO (Unidentified)	0			0*	0	0	

Process Streams							
Composition		Breathing	Flashing	PFO Distillation Curve	Light Ends Supplied	Working	4
Phase: Total	Status: Solved	Solved	Solved	Solved	Solved	Solved	Solved
From Block:	PFO Fixed Roof Tank	PFO Fixed Roof Tank	--	PFO Fixed Roof Tank	PFO Fixed Roof Tank	PFO Fixed Roof Tank	
To Block:	--	--	PFO Fixed Roof Tank	--	--	--	
Mole Fraction	%	%	%	%	%	%	
1,3-Butadiene	0.785840	0.774509		0.0263540*	0.785840	0.0258871	
Benzene	8.81405	8.96589		3.06591*	8.81405	3.06238	
n-Hexane	0.0188542	0.0194196		0.0115793*	0.0188542	0.0115748	
Toluene	4.46951	4.63476		6.04773*	4.46951	6.04870	
Ethylbenzene	0.434916	0.459468		2.05436*	0.434916	2.05536	
Styrene	2.55109	2.69841		13.8377*	2.55109	13.8446	
m-Xylene	0.127002	0.134292		0.672704*	0.127002	0.673039	
o-Xylene	0.151732	0.160560		0.864713*	0.151732	0.865151	
p-Xylene	0.131327	0.138712		0.672704*	0.131327	0.673036	
Naphthalene	0.0191442	0.0208449		1.12665*	0.0191442	1.12733	
n-Butane	0.407090	0.402717		0.0171681*	0.407090	0.0169284	
Isoprene	0.0149200	0.0150123		0.00209272*	0.0149200	0.00208484	
n-Pentane	0.0119968	0.0121110		0.00197578*	0.0119968	0.00196962	
Cyclopentene	0.0336600	0.0337416		0.00418545*	0.0336600	0.00416733	
Cyclopentane	0.0125976	0.0126754		0.00203257*	0.0125976	0.00202608	
2-Methyl-2-Butene	0.0113241	0.0114526		0.00203257*	0.0113241	0.00202686	
cis-1,3-Pentadiene	0.0730676	0.0739731		0.0146491*	0.0730676	0.0146131	
trans-1,3-Pentadiene	0.0666060	0.0673251		0.0125563*	0.0666060	0.0125231	
Cyclopentadiene	81.8016	81.2954		7.77434*	81.8016	7.72883	
Dicyclopentadiene	0.0575848	0.0616326		0.911140*	0.0575848	0.911665	
PFO @ 224.7 °C	0.00373012	0.00430214		5.44091*	0.00373012	5.44425	

PFO @237.5 °C	0.00147425	0.00172391	5.14173*	0.00147425	5.14489
PFO @250.7 °C	0.000558404	0.000662107	4.84659*	0.000558404	4.84957
PFO @263.7 °C	0.000239975	0.000288505	5.15704*	0.000239975	5.16021
PFO @276.3 °C	9.90968E-05	0.000120810	5.31586*	9.90968E-05	5.31912
PFO @289.5 °C	2.16645E-05	2.68195E-05	3.17709*	2.16645E-05	3.17904
PFO @302.6 °C	6.96720E-06	8.75429E-06	2.70688*	6.96720E-06	2.70854
PFO @315.9 °C	2.01439E-06	2.57612E-06	2.43839*	2.01439E-06	2.43989
PFO @328.9 °C	6.76833E-07	8.80273E-07	2.47110*	6.76833E-07	2.47262
PFO @342.0 °C	2.22914E-07	2.94908E-07	2.50512*	2.22914E-07	2.50666
PFO @355.0 °C	7.59608E-08	1.02236E-07	2.66254*	7.59608E-08	2.66417
PFO @367.8 °C	2.05894E-08	2.81949E-08	2.28248*	2.05894E-08	2.28388
PFO @381.0 °C	5.39350E-09	7.52153E-09	2.01783*	5.39350E-09	2.01907
PFO @394.0 °C	1.51024E-09	2.14424E-09	1.88687*	1.51024E-09	1.88803
PFO @407.3 °C	4.53198E-10	6.55441E-10	1.96892*	4.53198E-10	1.97013
PFO @420.1 °C	1.58117E-10	2.32817E-10	2.32575*	1.58117E-10	2.32718
PFO @436.3 °C	4.40306E-11	6.63244E-11	3.07741*	4.40306E-11	3.07930
PFO @455.8 °C	5.66985E-12	8.77829E-12	2.64139*	5.66985E-12	2.64301
PFO @475.4 °C	6.10696E-13	9.71617E-13	1.91527*	6.10696E-13	1.91645
PFO @494.4 °C	4.87024E-14	7.95687E-14	1.00720*	4.87024E-14	1.00782
PFO @516.2 °C	3.79152E-15	6.37295E-15	0.610861*	3.79152E-15	0.611236
PFO @537.3 °C	1.15323E-15	1.98950E-15	1.28024*	1.15323E-15	1.28103
PFO (Unidentified)	0	0	0*	0	0
Molar Flow	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h
1,3-Butadiene	1.40820E-05	0	0.00434481*	6.55163E-05	0.00426521
Benzene	0.000157945	0	0.505457*	0.000734837	0.504564
n-Hexane	3.37862E-07	0	0.00190900*	1.57190E-06	0.00190709
Toluene	8.00923E-05	0	0.997049*	0.000372627	0.996596
Ethylbenzene	7.79358E-06	0	0.338689*	3.62594E-05	0.338645
Styrene	4.57149E-05	0	2.28132*	0.000212688	2.28107
m-Xylene	2.27584E-06	0	0.110904*	1.05883E-05	0.110891
o-Xylene	2.71899E-06	0	0.142559*	1.26500E-05	0.142544
p-Xylene	2.35334E-06	0	0.110904*	1.09488E-05	0.110891
Naphthalene	3.43059E-07	0	0.185743*	1.59607E-06	0.185741
n-Butane	7.29495E-06	0	0.00283040*	3.39396E-05	0.00278916
Isoprene	2.67363E-07	0	0.000345013*	1.24390E-06	0.000343502
n-Pentane	2.14979E-07	0	0.000325734*	1.00019E-06	0.000324518
Cyclopentene	6.03177E-07	0	0.000690027*	2.80627E-06	0.000686617
Cyclopentane	2.25746E-07	0	0.000335096*	1.05028E-06	0.000333820
2-Methyl-2-Butene	2.02924E-07	0	0.000335096*	9.44099E-07	0.000333949
cis-1,3-Pentadiene	1.30935E-06	0	0.00241509*	6.09172E-06	0.00240769
trans-1,3-Pentadiene	1.19356E-06	0	0.00207008*	5.55301E-06	0.00206333
Cyclopentadiene	0.00146586	0	1.28170*	0.00681988	1.27342
Dicyclopentadiene	1.03190E-06	0	0.150214*	4.80090E-06	0.150208
PFO @224.7 °C	6.68428E-08	0	0.897006*	3.10984E-07	0.897006
PFO @237.5 °C	2.64182E-08	0	0.847683*	1.22910E-07	0.847682
PFO @250.7 °C	1.00064E-08	0	0.799025*	4.65548E-08	0.799025
PFO @263.7 °C	4.30029E-09	0	0.850206*	2.00070E-08	0.850206
PFO @276.3 °C	1.77579E-09	0	0.876390*	8.26181E-09	0.876390
PFO @289.5 °C	3.88221E-10	0	0.523786*	1.80619E-09	0.523786
PFO @302.6 °C	1.24850E-10	0	0.446265*	5.80863E-10	0.446265
PFO @315.9 °C	3.60973E-11	0	0.402002*	1.67942E-10	0.402002
PFO @328.9 °C	1.21287E-11	0	0.407393*	5.64283E-11	0.407393
PFO @342.0 °C	3.99456E-12	0	0.413003*	1.85846E-11	0.413003
PFO @355.0 °C	1.36120E-12	0	0.438955*	6.33294E-12	0.438955
PFO @367.8 °C	3.68956E-13	0	0.376297*	1.71656E-12	0.376297
PFO @381.0 °C	9.66500E-14	0	0.332665*	4.49662E-13	0.332665
PFO @394.0 °C	2.70631E-14	0	0.311076*	1.25910E-13	0.311076
PFO @407.3 °C	8.12119E-15	0	0.324602*	3.77836E-14	0.324602
PFO @420.1 °C	2.83342E-15	0	0.383431*	1.31824E-14	0.383431
PFO @436.3 °C	7.89015E-16	0	0.507351*	3.67087E-15	0.507351
PFO @455.8 °C	1.01602E-16	0	0.435468*	4.72702E-16	0.435468
PFO @475.4 °C	1.09435E-17	0	0.315759*	5.09144E-17	0.315759
PFO @494.4 °C	8.72733E-19	0	0.166050*	4.06037E-18	0.166050
PFO @516.2 °C	6.79429E-20	0	0.100709*	3.16103E-19	0.100709
PFO @537.3 °C	2.06655E-20	0	0.211065*	9.61457E-20	0.211065
PFO (Unidentified)	0	0	0*	0	0
Mass Fraction	%	%	%	%	%
1,3-Butadiene	0.611007	0.600964	0.01*	0.611007	0.00981974
Benzene	9.89655	10.0464	1.68*	9.89655	1.67754
n-Hexane	0.0233552	0.0240063	0.007*	0.0233552	0.00699509
Toluene	5.91959	6.12590	3.909*	5.91959	3.90840
Ethylbenzene	0.663710	0.699744	1.53*	0.663710	1.53026
Styrene	3.81921	4.03148	10.11*	3.81921	10.1119
m-Xylene	0.193813	0.204519	0.501*	0.193813	0.501092
o-Xylene	0.231552	0.244523	0.644*	0.231552	0.644124

p-Xylene	0.200413	0.211251	0.501*	0.200413	0.501090
Naphthalene	0.0352709	0.0383257	1.013*	0.0352709	1.01329
n-Butane	0.340114	0.335772	0.007*	0.340114	0.00690009
Isoprene	0.0146089	0.0146691	0.001*	0.0146089	0.000995918
n-Pentane	0.0124419	0.0125346	0.001*	0.0124419	0.000996568
Cyclopentene	0.0329580	0.0329703	0.002*	0.0329580	0.00199071
Cyclopentane	0.0127000	0.0127522	0.001*	0.0127000	0.000996491
2-Methyl-2-Butene	0.0114160	0.0115220	0.001*	0.0114160	0.000996876
cis-1,3-Pentadiene	0.0715438	0.0722822	0.007*	0.0715438	0.00698064
trans-1,3-Pentadiene	0.0652170	0.0657862	0.006*	0.0652170	0.00598224
Cyclopentadiene	77.7252	77.0862	3.605*	77.7252	3.58277
Dicyclopentadiene	0.109430	0.116883	0.845*	0.109430	0.845221
PFO @224.7 °C	0.00581753	0.00669592	4.14122*	0.00581753	4.14246
PFO @237.5 °C	0.00239576	0.00279574	4.07776*	0.00239576	4.07898
PFO @250.7 °C	0.000957952	0.00113353	4.05763*	0.000957952	4.05885
PFO @263.7 °C	0.000433398	0.000519977	4.54529*	0.000433398	4.54666
PFO @276.3 °C	0.000188370	0.000229175	4.93137*	0.000188370	4.93285
PFO @289.5 °C	4.34975E-05	5.37374E-05	3.11306*	4.34975E-05	3.11399
PFO @302.6 °C	1.47138E-05	1.84500E-05	2.78981*	1.47138E-05	2.79065
PFO @315.9 °C	4.47067E-06	5.70567E-06	2.64104*	4.47067E-06	2.64183
PFO @328.9 °C	1.58006E-06	2.05078E-06	2.81528*	1.58006E-06	2.81613
PFO @342.0 °C	5.46747E-07	7.21850E-07	2.99860*	5.46747E-07	2.99950
PFO @355.0 °C	1.95689E-07	2.62840E-07	3.34744*	1.95689E-07	3.34844
PFO @367.8 °C	5.58607E-08	7.63388E-08	3.02211*	5.58607E-08	3.02302
PFO @381.0 °C	1.53822E-08	2.14075E-08	2.80849*	1.53822E-08	2.80933
PFO @394.0 °C	4.52975E-09	6.41819E-09	2.76193*	4.52975E-09	2.76275
PFO @407.3 °C	1.42427E-09	2.05565E-09	3.01977*	1.42427E-09	3.02068
PFO @420.1 °C	5.21689E-10	7.66580E-10	3.74487*	5.21689E-10	3.74599
PFO @436.3 °C	1.54654E-10	2.32483E-10	5.27513*	1.54654E-10	5.27671
PFO @455.8 °C	2.14248E-11	3.31028E-11	4.87100*	2.14248E-11	4.87246
PFO @475.4 °C	2.48342E-12	3.94304E-12	3.80100*	2.48342E-12	3.80214
PFO @494.4 °C	2.18199E-13	3.55759E-13	2.20221*	2.18199E-13	2.20287
PFO @516.2 °C	1.81672E-14	3.04738E-14	1.42843*	1.81672E-14	1.42886
PFO @537.3 °C	5.95371E-15	1.02501E-14	3.22557*	5.95371E-15	3.22654
PFO (Unidentified)	0	0	0*	0	0
Mass Flow	lb/h	lb/h	lb/h	lb/h	lb/h
1,3-Butadiene	0.000761703	0	0.235013*	0.00354380	0.230707
Benzene	0.0123374	0	39.4821*	0.0573995	39.4124
n-Hexane	2.91154E-05	0	0.164509*	0.000135459	0.164344
Toluene	0.00737958	0	91.8665*	0.0343333	91.8248
Ethylbenzene	0.000827405	0	35.9570*	0.00384948	35.9523
Styrene	0.00476117	0	237.598*	0.0221512	237.571
m-Xylene	0.000241615	0	11.7741*	0.00112411	11.7728
o-Xylene	0.000288662	0	15.1348*	0.00134299	15.1332
p-Xylene	0.000249842	0	11.7741*	0.00116238	11.7727
Naphthalene	4.39700E-05	0	23.8068*	0.000204569	23.8065
n-Butane	0.000423998	0	0.164509*	0.00197264	0.162112
Isoprene	1.82120E-05	0	0.0235013*	8.47308E-05	0.0233983
n-Pentane	1.55105E-05	0	0.0235013*	7.21622E-05	0.0234136
Cyclopentene	4.10866E-05	0	0.0470026*	0.000191155	0.0467703
Cyclopentane	1.58322E-05	0	0.0235013*	7.36591E-05	0.0234118
2-Methyl-2-Butene	1.42316E-05	0	0.0235013*	6.62124E-05	0.0234208
cis-1,3-Pentadiene	8.91890E-05	0	0.164509*	0.000414950	0.164005
trans-1,3-Pentadiene	8.13018E-05	0	0.141008*	0.000378255	0.140548
Cyclopentadiene	0.0968951	0	84.7221*	0.450802	84.1744
Dicyclopentadiene	0.000136420	0	19.8586*	0.000634690	19.8578
PFO @224.7 °C	7.25234E-06	0	97.3238*	3.37413E-05	97.3238
PFO @237.5 °C	2.98664E-06	0	95.8325*	1.38953E-05	95.8324
PFO @250.7 °C	1.19422E-06	0	95.3595*	5.55607E-06	95.3595
PFO @263.7 °C	5.40289E-07	0	106.820*	2.51368E-06	106.820
PFO @276.3 °C	2.34829E-07	0	115.893*	1.09254E-06	115.893
PFO @289.5 °C	5.42255E-08	0	73.1608*	2.52283E-07	73.1608
PFO @302.6 °C	1.83427E-08	0	65.5642*	8.53390E-08	65.5642
PFO @315.9 °C	5.57330E-09	0	62.0677*	2.59296E-08	62.0677
PFO @328.9 °C	1.96975E-09	0	66.1627*	9.16423E-09	66.1627
PFO @342.0 °C	6.81595E-10	0	70.4710*	3.17110E-09	70.4710
PFO @355.0 °C	2.43952E-10	0	78.6690*	1.13498E-09	78.6690
PFO @367.8 °C	6.96380E-11	0	71.0235*	3.23989E-10	71.0235
PFO @381.0 °C	1.91760E-11	0	66.0031*	8.92160E-11	66.0031
PFO @394.0 °C	5.64695E-12	0	64.9088*	2.62723E-11	64.9088
PFO @407.3 °C	1.77555E-12	0	70.9685*	8.26071E-12	70.9685
PFO @420.1 °C	6.50357E-13	0	88.0093*	3.02577E-12	88.0093
PFO @436.3 °C	1.92797E-13	0	123.972*	8.96985E-13	123.972
PFO @455.8 °C	2.67089E-14	0	114.475*	1.24263E-13	114.475
PFO @475.4 °C	3.09592E-15	0	89.3283*	1.44037E-14	89.3283

PFO @494.4 °C	2.72015E-16	0	51.7548*	1.26554E-15	51.7548
PFO @516.2 °C	2.26479E-17	0	33.5699*	1.05369E-16	33.5699
PFO @537.3 °C	7.42210E-18	0	75.8051*	3.45312E-17	75.8051
PFO (Unidentified)	0	0	0*	0	0

Process Streams		Breathing	Flashing	PFO Distillation Curve	Light Ends Supplied	Working	4
Properties		Solved	Solved	Solved	Solved	Solved	Solved
Phase: Total	Status: From Block: To Block:	PFO Fixed Roof Tank	PFO Fixed Roof Tank	--	PFO Fixed Roof Tank	PFO Fixed Roof Tank	PFO Fixed Roof Tank
Property	Units	--	--	PFO Fixed Roof Tank	--	--	--
Temperature	°F	58.0824	58.0824	153.122*	58.0824	58.0824	58.0824
Pressure	psia	14.1	14.1	14.7786*	14.1	14.1	14.1
Mole Fraction Vapor	%	0		0	0	0	0
Mole Fraction Light Liquid	%	100		100	100	100	100
Mole Fraction Heavy Liquid	%	0	0	0	0	0	0
Phase Mole Fraction	%	100	100	100	100	100	100
Molecular Weight	lb/lbmol	69.5678	69.7105	142.550	69.5678	142.595	142.595
Mass Density	lb/ft^3	51.3795		46.9052	51.3795	49.3189	49.3189
Molar Flow	lbmol/h	0.00179197	0	16.4863	0.00833711	16.4762	16.4762
Mass Flow	lb/h	0.124664	0	2350.13*	0.579994	2349.42	2349.42
Vapor Volumetric Flow	ft^3/h	0.00242633	0	50.1038	0.0112884	47.6374	47.6374
Liquid Volumetric Flow	gpm	0.000302504	0	6.24671	0.00140739	5.93921	5.93921
Std Vapor Volumetric Flow	MMSCFD	1.63206E-05	0	0.150151	7.59312E-05	0.150059	0.150059
Std Liquid Volumetric Flow	sgpm	0.000303752	0	5.81616	0.00141320	5.81445	5.81445
Compressibility		0.00343599		0.00682973	0.00343599	0.00733710	0.00733710
Specific Gravity		0.823802		0.752063	0.823802	0.790763	0.790763
API Gravity		40.4995		47.6138	40.4995	47.6153	47.6153
Enthalpy	Btu/h	71.1460?	0	-1.33217E+06	331.005?	-1.45348E+06?	-1.45348E+06?
Mass Enthalpy	Btu/lb	570.704?		-566.848	570.704?	-618.656?	-618.656?
Mass Cp	Btu/(lb*°F)	0.338804?		0.567960	0.338804?	0.514955?	0.514955?
Ideal Gas CpCv Ratio		1.12262	1.12234	1.03381	1.12262	1.03932	1.03932
Dynamic Viscosity	cP	0.390819		1.27014	0.390819	3.37407	3.37407
Kinematic Viscosity	cSt	0.474859		1.69048	0.474859	4.27090	4.27090
Thermal Conductivity	Btu/(h*ft*°F)	0.0793100?		0.0706273?	0.0793100?	0.0751076?	0.0751076?
Surface Tension	lbf/ft	0.00166537?		0.00151519?	0.00166537?	0.00179148?	0.00179148?
Net Ideal Gas Heating Value	Btu/ft^3	3335.64	3341.44	6981.06	3335.64	6983.30	6983.30
Net Liquid Heating Value	Btu/lb	18028.8	18023.4	18405.2	18028.8	18405.3	18405.3
Gross Ideal Gas Heating Value	Btu/ft^3	3491.54	3497.55	7419.07	3491.54	7421.49	7421.49
Gross Liquid Heating Value	Btu/lb	18879.1	18873.1	19571.1	18879.1	19571.3	19571.3

Process Streams		Breathing	Flashing	PFO Distillation Curve	Light Ends Supplied	Working	4
Composition		Solved	Solved	Solved	Solved	Solved	Solved
Phase: Nonspecific Liquid	Status: From Block: To Block:	PFO Fixed Roof Tank	PFO Fixed Roof Tank	--	PFO Fixed Roof Tank	PFO Fixed Roof Tank	PFO Fixed Roof Tank
Mole Fraction		%	--	PFO Fixed Roof Tank	%	--	--
1,3-Butadiene		0.785840		0.0263540	0.785840	0.0258871	0.0258871
Benzene		8.81405		3.06591	8.81405	3.06238	3.06238
n-Hexane		0.0188542		0.0115793	0.0188542	0.0115748	0.0115748
Toluene		4.46951		6.04773	4.46951	6.04870	6.04870
Ethylbenzene		0.434916		2.05436	0.434916	2.05536	2.05536
Styrene		2.55109		13.8377	2.55109	13.8446	13.8446
m-Xylene		0.127002		0.672704	0.127002	0.673039	0.673039
o-Xylene		0.151732		0.864713	0.151732	0.865151	0.865151
p-Xylene		0.131327		0.672704	0.131327	0.673036	0.673036
Naphthalene		0.0191442		1.12665	0.0191442	1.12733	1.12733
n-Butane		0.407090		0.0171681	0.407090	0.0169284	0.0169284
Isoprene		0.0149200		0.00209272	0.0149200	0.00208484	0.00208484
n-Pentane		0.0119968		0.00197578	0.0119968	0.00196962	0.00196962
Cyclopentene		0.0336600		0.00418545	0.0336600	0.00416733	0.00416733
Cyclopentane		0.0125976		0.00203257	0.0125976	0.00202608	0.00202608
2-Methyl-2-Butene		0.0113241		0.00203257	0.0113241	0.00202686	0.00202686
cis-1,3-Pentadiene		0.0730676		0.0146491	0.0730676	0.0146131	0.0146131
trans-1,3-Pentadiene		0.0666060		0.0125563	0.0666060	0.0125231	0.0125231
Cyclopentadiene		81.8016		7.77434	81.8016	7.72883	7.72883
Dicyclopentadiene		0.0575848		0.911140	0.0575848	0.911665	0.911665
PFO @224.7 °C		0.00373012		5.44091	0.00373012	5.44425	5.44425
PFO @237.5 °C		0.00147425		5.14173	0.00147425	5.14489	5.14489
PFO @250.7 °C		0.000558404		4.84659	0.000558404	4.84957	4.84957
PFO @263.7 °C		0.000239975		5.15704	0.000239975	5.16021	5.16021
PFO @276.3 °C		9.90968E-05		5.31586	9.90968E-05	5.31912	5.31912
PFO @289.5 °C		2.16645E-05		3.17709	2.16645E-05	3.17904	3.17904
PFO @302.6 °C		6.96720E-06		2.70688	6.96720E-06	2.70854	2.70854
PFO @315.9 °C		2.01439E-06		2.43839	2.01439E-06	2.43989	2.43989
PFO @328.9 °C		6.76833E-07		2.47110	6.76833E-07	2.47262	2.47262
PFO @342.0 °C		2.22914E-07		2.50512	2.22914E-07	2.50666	2.50666

PFO @355.0 °C	7.59608E-08	2.66254	7.59608E-08	2.66417
PFO @367.8 °C	2.05894E-08	2.28248	2.05894E-08	2.28388
PFO @381.0 °C	5.39350E-09	2.01783	5.39350E-09	2.01907
PFO @394.0 °C	1.51024E-09	1.88687	1.51024E-09	1.88803
PFO @407.3 °C	4.53198E-10	1.96892	4.53198E-10	1.97013
PFO @420.1 °C	1.58117E-10	2.32575	1.58117E-10	2.32718
PFO @436.3 °C	4.40306E-11	3.07741	4.40306E-11	3.07930
PFO @455.8 °C	5.66985E-12	2.64139	5.66985E-12	2.64301
PFO @475.4 °C	6.10696E-13	1.91527	6.10696E-13	1.91645
PFO @494.4 °C	4.87024E-14	1.00720	4.87024E-14	1.00782
PFO @516.2 °C	3.79152E-15	0.610861	3.79152E-15	0.611236
PFO @537.3 °C	1.15323E-15	1.28024	1.15323E-15	1.28103
PFO (Unidentified)	0	0	0	0
Molar Flow	lbmol/h	lbmol/h	lbmol/h	lbmol/h
1,3-Butadiene	1.40820E-05	0.00434481	6.55163E-05	0.00426521
Benzene	0.000157945	0.505457	0.000734837	0.504564
n-Hexane	3.37862E-07	0.00190900	1.57190E-06	0.00190709
Toluene	8.00923E-05	0.997049	0.000372627	0.996596
Ethylbenzene	7.79358E-06	0.338689	3.62594E-05	0.338645
Styrene	4.57149E-05	2.28132	0.000212688	2.28107
m-Xylene	2.27584E-06	0.110904	1.05883E-05	0.110891
o-Xylene	2.71899E-06	0.142559	1.26500E-05	0.142544
p-Xylene	2.35334E-06	0.110904	1.09488E-05	0.110891
Naphthalene	3.43059E-07	0.185743	1.59607E-06	0.185741
n-Butane	7.29495E-06	0.00283040	3.39396E-05	0.00278916
Isoprene	2.67363E-07	0.000345013	1.24390E-06	0.000343502
n-Pentane	2.14979E-07	0.000325734	1.00019E-06	0.000324518
Cyclopentene	6.03177E-07	0.000690027	2.80627E-06	0.000686617
Cyclopentane	2.25746E-07	0.000335096	1.05028E-06	0.000333820
2-Methyl-2-Butene	2.02924E-07	0.000335096	9.44099E-07	0.000333949
cis-1,3-Pentadiene	1.30935E-06	0.00241509	6.09172E-06	0.00240769
trans-1,3-Pentadiene	1.19356E-06	0.00207008	5.55301E-06	0.00206333
Cyclopentadiene	0.00146586	1.28170	0.00681988	1.27342
Dicyclopentadiene	1.03190E-06	0.150214	4.80090E-06	0.150208
PFO @224.7 °C	6.68428E-08	0.897006	3.10984E-07	0.897006
PFO @237.5 °C	2.64182E-08	0.847683	1.22910E-07	0.847682
PFO @250.7 °C	1.00064E-08	0.799025	4.65548E-08	0.799025
PFO @263.7 °C	4.30029E-09	0.850206	2.00070E-08	0.850206
PFO @276.3 °C	1.77579E-09	0.876390	8.26181E-09	0.876390
PFO @289.5 °C	3.88221E-10	0.523786	1.80619E-09	0.523786
PFO @302.6 °C	1.24850E-10	0.446265	5.80863E-10	0.446265
PFO @315.9 °C	3.60973E-11	0.402002	1.67942E-10	0.402002
PFO @328.9 °C	1.21287E-11	0.407393	5.64283E-11	0.407393
PFO @342.0 °C	3.99456E-12	0.413003	1.85846E-11	0.413003
PFO @355.0 °C	1.36120E-12	0.438955	6.33294E-12	0.438955
PFO @367.8 °C	3.68956E-13	0.376297	1.71656E-12	0.376297
PFO @381.0 °C	9.66500E-14	0.332665	4.49662E-13	0.332665
PFO @394.0 °C	2.70631E-14	0.311076	1.25910E-13	0.311076
PFO @407.3 °C	8.12119E-15	0.324602	3.77836E-14	0.324602
PFO @420.1 °C	2.83342E-15	0.383431	1.31824E-14	0.383431
PFO @436.3 °C	7.89015E-16	0.507351	3.67087E-15	0.507351
PFO @455.8 °C	1.01602E-16	0.435468	4.72702E-16	0.435468
PFO @475.4 °C	1.09435E-17	0.315759	5.09144E-17	0.315759
PFO @494.4 °C	8.72733E-19	0.166050	4.06037E-18	0.166050
PFO @516.2 °C	6.79429E-20	0.100709	3.16103E-19	0.100709
PFO @537.3 °C	2.06655E-20	0.211065	9.61457E-20	0.211065
PFO (Unidentified)	0	0	0	0
Mass Fraction	%	%	%	%
1,3-Butadiene	0.611007	0.01	0.611007	0.00981974
Benzene	9.89655	1.68	9.89655	1.67754
n-Hexane	0.0233552	0.007	0.0233552	0.00699509
Toluene	5.91959	3.909	5.91959	3.90840
Ethylbenzene	0.663710	1.53	0.663710	1.53026
Styrene	3.81921	10.11	3.81921	10.1119
m-Xylene	0.193813	0.501	0.193813	0.501092
o-Xylene	0.231552	0.644	0.231552	0.644124
p-Xylene	0.200413	0.501	0.200413	0.501090
Naphthalene	0.0352709	1.013	0.0352709	1.01329
n-Butane	0.340114	0.007	0.340114	0.00690009
Isoprene	0.0146089	0.001	0.0146089	0.000995918
n-Pentane	0.0124419	0.001	0.0124419	0.000996568
Cyclopentene	0.0329580	0.002	0.0329580	0.00199071
Cyclopentane	0.0127000	0.001	0.0127000	0.000996491
2-Methyl-2-Butene	0.0114160	0.001	0.0114160	0.000996876
cis-1,3-Pentadiene	0.0715438	0.007	0.0715438	0.00698064

trans-1,3-Pentadiene	0.0652170	0.006	0.0652170	0.00598224
Cyclopentadiene	77.7252	3.605	77.7252	3.58277
Dicyclopentadiene	0.109430	0.845	0.109430	0.845221
PFO @224.7 °C	0.00581753	4.14122	0.00581753	4.14246
PFO @237.5 °C	0.00239576	4.07776	0.00239576	4.07898
PFO @250.7 °C	0.000957952	4.05763	0.000957952	4.05885
PFO @263.7 °C	0.000433398	4.54529	0.000433398	4.54666
PFO @276.3 °C	0.000188370	4.93137	0.000188370	4.93285
PFO @289.5 °C	4.34975E-05	3.11306	4.34975E-05	3.11399
PFO @302.6 °C	1.47138E-05	2.78981	1.47138E-05	2.79065
PFO @315.9 °C	4.47067E-06	2.64104	4.47067E-06	2.64183
PFO @328.9 °C	1.58006E-06	2.81528	1.58006E-06	2.81613
PFO @342.0 °C	5.46747E-07	2.99860	5.46747E-07	2.99950
PFO @355.0 °C	1.95689E-07	3.34744	1.95689E-07	3.34844
PFO @367.8 °C	5.58607E-08	3.02211	5.58607E-08	3.02302
PFO @381.0 °C	1.53822E-08	2.80849	1.53822E-08	2.80933
PFO @394.0 °C	4.52975E-09	2.76193	4.52975E-09	2.76275
PFO @407.3 °C	1.42427E-09	3.01977	1.42427E-09	3.02068
PFO @420.1 °C	5.21689E-10	3.74487	5.21689E-10	3.74599
PFO @436.3 °C	1.54654E-10	5.27513	1.54654E-10	5.27671
PFO @455.8 °C	2.14248E-11	4.87100	2.14248E-11	4.87246
PFO @475.4 °C	2.48342E-12	3.80100	2.48342E-12	3.80214
PFO @494.4 °C	2.18199E-13	2.20221	2.18199E-13	2.20287
PFO @516.2 °C	1.81672E-14	1.42843	1.81672E-14	1.42886
PFO @537.3 °C	5.95371E-15	3.22557	5.95371E-15	3.22654
PFO (Unidentified)	0	0	0	0
Mass Flow	lb/h	lb/h	lb/h	lb/h
1,3-Butadiene	0.000761703	0.235013	0.00354380	0.230707
Benzene	0.0123374	39.4821	0.0573995	39.4124
n-Hexane	2.91154E-05	0.164509	0.000135459	0.164344
Toluene	0.00737958	91.8665	0.0343333	91.8248
Ethylbenzene	0.000827405	35.9570	0.00384948	35.9523
Styrene	0.00476117	237.598	0.0221512	237.571
m-Xylene	0.000241615	11.7741	0.00112411	11.7728
o-Xylene	0.000288662	15.1348	0.00134299	15.1332
p-Xylene	0.000249842	11.7741	0.00116238	11.7727
Naphthalene	4.39700E-05	23.8068	0.000204569	23.8065
n-Butane	0.000423998	0.164509	0.00197264	0.162112
Isoprene	1.82120E-05	0.0235013	8.47308E-05	0.0233983
n-Pentane	1.55105E-05	0.0235013	7.21622E-05	0.0234136
Cyclopentene	4.10866E-05	0.0470026	0.000191155	0.0467703
Cyclopentane	1.58322E-05	0.0235013	7.36591E-05	0.0234118
2-Methyl-2-Butene	1.42316E-05	0.0235013	6.62124E-05	0.0234208
cis-1,3-Pentadiene	8.91890E-05	0.164509	0.000414950	0.164005
trans-1,3-Pentadiene	8.13018E-05	0.141008	0.000378255	0.140548
Cyclopentadiene	0.0968951	84.7221	0.450802	84.1744
Dicyclopentadiene	0.000136420	19.8586	0.000634690	19.8578
PFO @224.7 °C	7.25234E-06	97.3238	3.37413E-05	97.3238
PFO @237.5 °C	2.98664E-06	95.8325	1.38953E-05	95.8324
PFO @250.7 °C	1.19422E-06	95.3595	5.55607E-06	95.3595
PFO @263.7 °C	5.40289E-07	106.820	2.51368E-06	106.820
PFO @276.3 °C	2.34829E-07	115.893	1.09254E-06	115.893
PFO @289.5 °C	5.42255E-08	73.1608	2.52283E-07	73.1608
PFO @302.6 °C	1.83427E-08	65.5642	8.53390E-08	65.5642
PFO @315.9 °C	5.57330E-09	62.0677	2.59296E-08	62.0677
PFO @328.9 °C	1.96975E-09	66.1627	9.16423E-09	66.1627
PFO @342.0 °C	6.81595E-10	70.4710	3.17110E-09	70.4710
PFO @355.0 °C	2.43952E-10	78.6690	1.13498E-09	78.6690
PFO @367.8 °C	6.96380E-11	71.0235	3.23989E-10	71.0235
PFO @381.0 °C	1.91760E-11	66.0031	8.92160E-11	66.0031
PFO @394.0 °C	5.64695E-12	64.9088	2.62723E-11	64.9088
PFO @407.3 °C	1.77555E-12	70.9685	8.26071E-12	70.9685
PFO @420.1 °C	6.50357E-13	88.0093	3.02577E-12	88.0093
PFO @436.3 °C	1.92797E-13	123.972	8.96985E-13	123.972
PFO @455.8 °C	2.67089E-14	114.475	1.24263E-13	114.475
PFO @475.4 °C	3.09592E-15	89.3283	1.44037E-14	89.3283
PFO @494.4 °C	2.72015E-16	51.7548	1.26554E-15	51.7548
PFO @516.2 °C	2.26479E-17	33.5699	1.05369E-16	33.5699
PFO @537.3 °C	7.42210E-18	75.8051	3.45312E-17	75.8051
PFO (Unidentified)	0	0	0	0

Process Streams	Breathing	Flashing	PFO Distillation Curve Light Ends Supplied	Working	4
Properties	Status: Solved	Solved	Solved	Solved	Solved
Phase: Nonspecific Liquid	From Block: PFO Fixed Roof Tank	PFO Fixed Roof Tank	--	PFO Fixed Roof Tank	PFO Fixed Roof Tank
	To Block: --	--	PFO Fixed Roof Tank	--	--

Property	Units				
Temperature	°F	58.0824	153.122	58.0824	58.0824
Pressure	psia	14.1	14.7786	14.1	14.1
Mole Fraction Vapor	%	0	0	0	0
Mole Fraction Light Liquid	%	100	100	100	100
Mole Fraction Heavy Liquid	%	0	0	0	0
Phase Mole Fraction	%	100	100	100	100
Molecular Weight	lb/lbmol	69.5678	142.550	69.5678	142.595
Mass Density	lb/ft^3	51.3795	46.9052	51.3795	49.3189
Molar Flow	lbmol/h	0.00179197	16.4863	0.00833711	16.4762
Mass Flow	lb/h	0.124664	2350.13	0.579994	2349.42
Vapor Volumetric Flow	ft^3/h	0.00242633	50.1038	0.0112884	47.6374
Liquid Volumetric Flow	gpm	0.000302504	6.24671	0.00140739	5.93921
Std Vapor Volumetric Flow	MMSCFD	1.63206E-05	0.150151	7.59312E-05	0.150059
Std Liquid Volumetric Flow	sgpm	0.000303752	5.81616	0.00141320	5.81445
Compressibility		0.00343599	0.00682973	0.00343599	0.00733710
Specific Gravity		0.823802	0.752063	0.823802	0.790763
API Gravity		40.4995	47.6138	40.4995	47.6153
Enthalpy	Btu/h	71.1460?	-1.33217E+06	331.005?	-1.45348E+06?
Mass Enthalpy	Btu/lb	570.704?	-566.848	570.704?	-618.656?
Mass Cp	Btu/(lb*°F)	0.338804?	0.567960	0.338804?	0.514955?
Ideal Gas CpCv Ratio		1.12262	1.03381	1.12262	1.03932
Dynamic Viscosity	cP	0.390819	1.27014	0.390819	3.37407
Kinematic Viscosity	cSt	0.474859	1.69048	0.474859	4.27090
Thermal Conductivity	Btu/(h*ft*°F)	0.0793100?	0.0706273?	0.0793100?	0.0751076?
Surface Tension	lbf/ft	0.00166537?	0.00151519?	0.00166537?	0.00179148?
Net Ideal Gas Heating Value	Btu/ft^3	3335.64	6981.06	3335.64	6983.30
Net Liquid Heating Value	Btu/lb	18028.8	18405.2	18028.8	18405.3
Gross Ideal Gas Heating Value	Btu/ft^3	3491.54	7419.07	3491.54	7421.49
Gross Liquid Heating Value	Btu/lb	18879.1	19571.1	18879.1	19571.3

Hexene ProMax Input Assumptions and Emissions Output
Shell Polymers Monaca

Tank Data/Sample Data

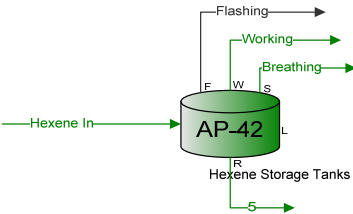
Tank Name	Tank ID	Contents	Length/ Height (m)	Diameter (m)	Temp (C)	Pressure (barg)	Flow Rate (m3/hr)	Reference:
Hexene Storage Tank	T-64302 A/B	Hexene	14.63	16.256	27.29	0.004285	11.2	Storage Tank Directory Air Inventory Data.xlsx

Sample Data

Constituent	Hexene Tank
	% by weight
Hexene	100

Emissions

	Annual Working Losses (lb/h)	Annual Breathing Losses (lb/h)	Annual Total Losses (lb/h)	Annual Total Losses (tpy)
Hexene T-64302A	0.036646849	0.016161542	0.052808391	0.231300754
Hexene T-64302B	0.036646849	0.016161542	0.052808391	0.231300754
Hexene Total	0.073293698	0.032323085	0.105616783	0.462601507



Process Streams		Breathing	Flashing	Hexene In	Working	5
Composition		Status: Solved	Solved	Solved	Solved	Solved
Phase: Total		From Block: Hexene Storage Tanks	Hexene Storage Tanks	--	Hexene Storage Tanks	Hexene Storage Tanks
		To Block: --	--	Hexene Storage Tanks	--	--
Mole Fraction		%		%	%	%
Hexene-1		100		100*	100	100
Molar Flow		lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h
Hexene-1		0.000192035	0	199.019*	0.000435445	199.019
Mass Fraction		%		%	%	%
Hexene-1		100		100*	100	100
Mass Flow		lb/h	lb/h	lb/h	lb/h	lb/h
Hexene-1		0.0161615	0	16749.4*	0.0366468	16749.3

Process Streams		Breathing	Flashing	Hexene In	Working	5
Properties		Status: Solved	Solved	Solved	Solved	Solved
Phase: Total		From Block: Hexene Storage Tanks	Hexene Storage Tanks	--	Hexene Storage Tanks	Hexene Storage Tanks
		To Block: --	--	Hexene Storage Tanks	--	--
Property		Units				
Temperature	°F	58.0110	58.0110	81.122*	58.0110	58.0110
Pressure	psia	14.1	14.1	14.7581*	14.1	14.1
Mole Fraction Vapor	%	0		0	0	0
Mole Fraction Light Liquid	%	100		100	100	100
Mole Fraction Heavy Liquid	%	0		0	0	0
Phase Mole Fraction	%	100		100	100	100
Molecular Weight	lb/lbmol	84.1595		84.1595	84.1595	84.1595
Mass Density	lb/ft^3	42.3607		41.6017	42.3607	42.3607
Molar Flow	lbmol/h	0.000192035	0	199.019	0.000435445	199.019
Mass Flow	lb/h	0.0161615	0	16749.4	0.0366468	16749.3
Vapor Volumetric Flow	ft^3/h	0.000381523	0	402.612	0.000865115	395.398
Liquid Volumetric Flow	gpm	4.75664E-05	0	50.1958	0.000107859	49.2963
Std Vapor Volumetric Flow	MMSCFD	1.74898E-06	0	1.81259	3.96587E-06	1.81259
Std Liquid Volumetric Flow	sgpm	4.75815E-05	0	49.3121*	0.000107893	49.3120
Compressibility		0.00504236		0.00514433	0.00504236	0.00504236
Specific Gravity		0.679197		0.667028	0.679197	0.679197
API Gravity		77.1529		77.1511	77.1529	77.1529
Enthalpy	Btu/h	-6.16130		-6.19246E+06	-13.9710	-6.38537E+06
Mass Enthalpy	Btu/lb	-381.232		-369.713	-381.232	-381.232
Mass Cp	Btu/(lb*°F)	0.491108		0.505712	0.491108	0.491108
Ideal Gas CpCv Ratio		1.06996		1.06743	1.06996	1.06996
Dynamic Viscosity	cP	0.279899		0.246967	0.279899	0.279899
Kinematic Viscosity	cSt	0.412495		0.370602	0.412495	0.412495
Thermal Conductivity	Btu/(h*ft*°F)	0.0716989		0.0691551	0.0716989	0.0716989
Surface Tension	lbf/ft	0.00130148		0.00120987	0.00130148	0.00130148
Net Ideal Gas Heating Value	Btu/ft^3	4271.43		4271.43	4271.43	4271.43
Net Liquid Heating Value	Btu/lb	19101.6		19101.6	19101.6	19101.6
Gross Ideal Gas Heating Value	Btu/ft^3	4572.98		4572.98	4572.98	4572.98
Gross Liquid Heating Value	Btu/lb	20461.4		20461.4	20461.4	20461.4

Process Streams		Breathing	Flashing	Hexene In	Working	5
Composition		Status: Solved	Solved	Solved	Solved	Solved
Phase: Nonaspecific Liquid		From Block: Hexene Storage Tanks	Hexene Storage Tanks	--	Hexene Storage Tanks	Hexene Storage Tanks
		To Block: --	--	Hexene Storage Tanks	--	--
Mole Fraction		%		%	%	%
Hexene-1		100		100	100	100
Molar Flow		lbmol/h		lbmol/h	lbmol/h	lbmol/h
Hexene-1		0.000192035		199.019	0.000435445	199.019
Mass Fraction		%		%	%	%
Hexene-1		100		100	100	100
Mass Flow		lb/h		lb/h	lb/h	lb/h
Hexene-1		0.0161615		16749.4	0.0366468	16749.3

Process Streams		Breathing	Flashing	Hexene In	Working	5
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Properties		Status:	Solved	Solved	Solved	Solved	Solved
Phase: Nonspecific Liquid		From Block:	Hexene Storage Tanks	Hexene Storage Tanks	--	Hexene Storage Tanks	Hexene Storage Tanks
To Block:		--	--	Hexene Storage Tanks	--	--	--
Property	Units						
Temperature	°F	58.0110		81.122	58.0110	58.0110	
Pressure	psia	14.1		14.7581	14.1	14.1	
Mole Fraction Vapor	%	0		0	0	0	
Mole Fraction Light Liquid	%	100		100	100	100	
Mole Fraction Heavy Liquid	%	0		0	0	0	
Phase Mole Fraction	%	100		100	100	100	
Molecular Weight	lb/lbmol	84.1595		84.1595	84.1595	84.1595	
Mass Density	lb/ft^3	42.3607		41.6017	42.3607	42.3607	
Molar Flow	lbmol/h	0.000192035		199.019	0.000435445	199.019	
Mass Flow	lb/h	0.0161615		16749.4	0.0366468	16749.3	
Vapor Volumetric Flow	ft^3/h	0.000381523		402.612	0.000865115	395.398	
Liquid Volumetric Flow	gpm	4.75664E-05		50.1958	0.000107859	49.2963	
Std Vapor Volumetric Flow	MMSCFD	1.74898E-06		1.81259	3.96587E-06	1.81259	
Std Liquid Volumetric Flow	sgpm	4.75815E-05		49.3121	0.000107893	49.3120	
Compressibility		0.00504236		0.00514433	0.00504236	0.00504236	
Specific Gravity		0.679197		0.667028	0.679197	0.679197	
API Gravity		77.1529		77.1511	77.1529	77.1529	
Enthalpy	Btu/h	-6.16130		-6.19246E+06	-13.9710	-6.38537E+06	
Mass Enthalpy	Btu/lb	-381.232		-369.713	-381.232	-381.232	
Mass Cp	Btu/(lb*°F)	0.491108		0.505712	0.491108	0.491108	
Ideal Gas CpCv Ratio		1.06996		1.06743	1.06996	1.06996	
Dynamic Viscosity	cP	0.279899		0.246967	0.279899	0.279899	
Kinematic Viscosity	cSt	0.412495		0.370602	0.412495	0.412495	
Thermal Conductivity	Btu/(h*ft*°F)	0.0716989		0.0691551	0.0716989	0.0716989	
Surface Tension	lbf/ft	0.00130148		0.00120987	0.00130148	0.00130148	
Net Ideal Gas Heating Value	Btu/ft^3	4271.43		4271.43	4271.43	4271.43	
Net Liquid Heating Value	Btu/lb	19101.6		19101.6	19101.6	19101.6	
Gross Ideal Gas Heating Value	Btu/ft^3	4572.98		4572.98	4572.98	4572.98	
Gross Liquid Heating Value	Btu/lb	20461.4		20461.4	20461.4	20461.4	

Organic Liquid Loadout Operations				
Parameter	Pyrolysis Fuel Oil (PFO) Loading	Light Gasoline (LGO) Loading	Units	Source / Basis
Material Loaded	Pyrolysis Fuel Oil	Light Gasoline Oil		
Material Temperature	80	40	°C	PFO is heated; LGO is ≈ maximum daily avg temperature in July
Material Temperature	636	564	°R	= (Material Temperature - °C) x (1.8) + (32) + (460)
VOC Vapor Pressure	1.603	6.303	psia	ProMax calculated vapor pressure at 100F
VOC Vapor MW	133	84	lb/lb-mole	Heat and material balance for PFO and LGO
Type of Loadout Operation	RAIL	RAIL		Design
Type of Loading System	SUBMERGED	SUBMERGED		Design
Annual Loading Rate	5,611	6,025	10 ³ gal/yr	Loading rates are from ECU overall material balance mass estimates
Saturation Factor	0.60	0.60		S from AP-42 equation (see below)
VOC Loading Loss Factor	2.952	7.916	lbs/10 ³ gal	L _L from AP-42 equation (see below)
VOC Uncontrolled Rate	1.89	5.44	lb/hr	= (VOC Loading Loss Factor) x (Annual Loading Rate) / (8760)
HAP Fraction	20%	76%	wt. %	Sample Data
HAP Uncontrolled Rate	0.38	4.14	lb/hr	= (VOC Uncontrolled Rate) x (HAP Fraction)

Emissions Estimates based on Equation 1 in AP-42, Chapter 5, Section 2 (Jan-1995 version):

$$L_L = 12.46 \frac{SPM}{T}$$

where:

L_L = loading loss, pounds per 1000 gallons (lb/10³ gal) of liquid loaded

S = a saturation factor (see Table 5.2-1)

P = true vapor pressure of liquid loaded, pounds per square inch absolute (psia)
(see Figure 7.1-5, Figure 7.1-6, and Table 7.1-2)

M = molecular weight of vapors, pounds per pound-mole (lb/lb-mole) (see Table 7.1-2)

T = temperature of bulk liquid loaded, °R (°F + 460)

<i>Source ID</i>		=	<i>C208</i>	<i>Multi-Point Ground Flare (MPGF) Ethylene Tank</i>												
VOC to Flare	Basis			NSR POLLUTANT EMISSION FACTORS (lb/MMBtu)												
	MMBtu/hr	VOC to Flare	VOC DRE	NOx	SO2	PM2.5	VOC	CO2	CH4	N2O	CO2e	CO	PM	PM10	H2SO4	Pb
MPGF Ethylene Tank Header Vent Gas / Short-Term Max	27.6	0.61 t/hr	-	0.068	-	-	-	-	-	-	-	0.31	-	0.0075	-	-
MPGF Ethylene Tank Header Vent Gas / Annual Avg	1.2	0.03 t/hr	98%	0.068	0.0015	0.0075	0.9242	145.0	0.0066	0.0013	145.5	0.31	0.0019	0.0075	7.2E-05	4.9E-07
MPGF Ethylene Tank Header / Pilots	1.11	NA	NA	0.0980	0.0015	0.0075	0.0054	116.9	0.0022	0.0002	117.1	0.0824	0.0019	0.0075	7.2E-05	4.9E-07
FLARE / FLARING MODE		Basis		NSR POLLUTANT RATES USED IN AMBIENT IMPACT MODELING (lb/hr)												
		MMBtu/hr	NOTES	NOx	SO2	PM2.5	VOC	CO2	CH4	N2O	CO2e	CO	PM	PM10	H2SO4	Pb
MPGF Ethylene Tank Header Total / Short-Term Max		28.71	[A]	0.19	-	-	-	-	-	-	-	8.65	-	0.21	-	-
MPGF Ethylene Tank Header Total / Annual Avg		2.34	[B]	0.19	-	-	-	-	-	-	-	0.47	-	0.02	-	-
FLARE / FLARING MODE		Basis		NSR POLLUTANT PTE (T/yr)												
		Hours/yr	MMBtu/yr	NOx	SO2	PM2.5	VOC	CO2	CH4	N2O	CO2e	CO	PM	PM10	H2SO4	Pb
MPGF Ethylene Tank Header Total / Annual Avg		8,760	20,497	0.84	0.02	0.08	5.00	1,350	0.05	0.01	1,353	2.07	0.02	0.08	7.41E-04	5.02E-06

FLARE EMISSION CALCULATIONS NOTES:
<i>General:</i>
- VOC mass rates are based on vendor data associated with various potential operating scenarios and actual process data. - Short-term VOC mass rate represents maximum expected short-term rate excluding emergency flaring. - Annual average VOC mass rate represents annual average anticipated rate excluding emergency flaring. - VOC destruction efficiency represents LAER or beyond-LAER control levels.
<i>Calculation Methodology:</i>
- Hourly Emissions = (Heat Input - MMBtu/hr) x (Emission Factor - lb/MMBtu) - Annual Emissions = (Heat Input - MMBtu/hr) x (Annual Hours) x (Emission Factor - lb/MMBtu) x (1 ton/2,000 lb)
<i>Basis for Emission Factors:</i>
- NOx and CO = AP-42, Tables 13.5-1 and 13.5-2, respectively. - Pilots NOx and CO = AP-42, Table 1.4-1. - SO2 = AP-42, Table 1.4-2. - PM10/2.5 = AP-42, Table 1.4-2; filterable + condensable emission factor used as conservative estimate since flare is smokeless. Smokeless flares have zero filterable PM (see AP-42, Table 13.5-1). - VOC based on 98% DRE for incoming C3- VOC and 98% DRE for incoming C4+ VOC. - Pilots VOC = AP-42, Table 1.4-2. - CO2 is derived from mass balance of total carbon to flare converted to CO2. - CH4 and N2O is assumed to result from fuel gas flaring = fuel gas emission factors from 40 CFR 98, Table C-2. - Pilots CO2, CH4, N2O = 40 CFR 98, Tables C-1 and C-2 for natural gas. - CO2e = sum of CO2, CH4 and N2O emissions adjusted for global warming potentials. - PM = AP-42, Table 1.4-2 (filterable only) as conservative estimate since flare is smokeless. - H2SO4 based on SO3-to-SO2 emission factor ratio in AP-42, Table 1.3-1 for distillate oil combustion in boilers > 100 MMBtu/hr.
<i>[A] - MPGF Ethylene Tank Header / Short-Term Maximum Emission Rates:</i>
- Short-term max heat input based on actual process data. - The 1-hr maximum NOx rate is set equal to the annual rate as the BOG compressors are spared and both compressors would only go down due to an upset condition. - Short-term max. heat input also includes 1.11 MMBtu/hr of pilot gas at all times. Seventeen pilots (one per burner) at 0.065 MMBtu/hr per pilot.
<i>[B] - MPGF Ethylene Tank Header / Annual Average Emission Rates:</i>
- Annual average heat input based on 405 hours of venting above baseline rate of zero flow. - Annual average heat input also includes 1.11 MMBtu/hr of pilot gas at all times. Seventeen pilots (one per burner) at 0.065 MMBtu/hr per pilot.

Source ID = C208 Multi-Point Ground Flare (MPGF) Ethylene Tank										
Short-Term Max Heat Input (HHV)		28.71	MMBtu/hr - Maximum expected short term rates based on design and process data							
Annual Avg Heat Input (HHV)		2.34	MMBtu/hr - Represents reasonably anticipated venting, maintenance events, startups and shutdowns, sweep gas, and pilots							
Annual Hours =		8,760 hr/yr								
Short-Term Max Hourly Emission Rate =		(Short-Term Max Heat Input - MMBtu/hr) x (EF - lb/MMBtu)								
Annual Emission Rate =		(Annual Avg Heat Input - MMBtu/hr) x (EF - lb/MMBtu) x (Annual Hours) / (2,000 lb/T)								
Pollutant	§112 HAP?	EF (lb/MMscf)	EF (lb/MMBtu)	EF Source	Combustion Pollutants*		Waste Gas Pollutants**		Total	
					Short-Term Max (lb/hr)	Annual (tpy)	Short-Term Max (lb/hr)	Annual (tpy)	Short-Term Max (lb/hr)	Annual (tpy)
2-Methylnaphthalene	YES	2.40E-05	2.35E-08	AP-42, Table 1.4-3	6.76E-07	2.41E-07	-	-	6.76E-07	2.41E-07
3-Methylcholanthrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.07E-08	1.81E-08	-	-	5.07E-08	1.81E-08
7,12-Dimethylbenz(a)anthracene	YES	<1.6E-05	<1.57E-08	AP-42, Table 1.4-3	4.50E-07	1.61E-07	-	-	4.50E-07	1.61E-07
Acenaphthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.07E-08	1.81E-08	-	-	5.07E-08	1.81E-08
Acenaphthylene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.07E-08	1.81E-08	-	-	5.07E-08	1.81E-08
Anthracene	YES	<2.4E-06	<2.35E-09	AP-42, Table 1.4-3	6.76E-08	2.41E-08	-	-	6.76E-08	2.41E-08
Benzo(a)anthracene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.07E-08	1.81E-08	-	-	5.07E-08	1.81E-08
Benzene	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-3	5.91E-05	2.11E-05	-	-	5.91E-05	2.11E-05
Benzo(a)pyrene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	3.38E-08	1.21E-08	-	-	3.38E-08	1.21E-08
Benzo(b)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.07E-08	1.81E-08	-	-	5.07E-08	1.81E-08
Benzo(g,h,i)perylene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	3.38E-08	1.21E-08	-	-	3.38E-08	1.21E-08
Benzo(k)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.07E-08	1.81E-08	-	-	5.07E-08	1.81E-08
Butane	NO	2.10E+00	2.06E-03	AP-42, Table 1.4-3	5.91E-02	2.11E-02	-	-	5.91E-02	2.11E-02
Chrysene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.07E-08	1.81E-08	-	-	5.07E-08	1.81E-08
Dibenzo(a,h)anthracene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	3.38E-08	1.21E-08	-	-	3.38E-08	1.21E-08
Dichlorobenzene	YES	1.20E-03	1.18E-06	AP-42, Table 1.4-3	3.38E-05	1.21E-05	-	-	3.38E-05	1.21E-05
Ethane	NO	3.10E+00	3.04E-03	AP-42, Table 1.4-3	8.73E-02	3.11E-02	-	-	8.73E-02	3.11E-02
Fluoranthene	YES	3.00E-06	2.94E-09	AP-42, Table 1.4-3	8.44E-08	3.01E-08	-	-	8.44E-08	3.01E-08
Fluorene	YES	2.80E-06	2.75E-09	AP-42, Table 1.4-3	7.88E-08	2.81E-08	-	-	7.88E-08	2.81E-08
Formaldehyde	YES	7.50E-02	7.35E-05	AP-42, Table 1.4-3	2.11E-03	7.54E-04	-	-	2.11E-03	7.54E-04
				Ventura County APCD, AB 2588 Combustions EF, May 2001						
Hexane	YES	2.90E-02	2.84E-05		8.16E-04	2.91E-04	-	-	8.16E-04	2.91E-04
Indeno(1,2,3-cd)pyrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.07E-08	1.81E-08	-	-	5.07E-08	1.81E-08
Naphthalene	YES	6.10E-04	5.98E-07	AP-42, Table 1.4-3	1.72E-05	6.13E-06	-	-	1.72E-05	6.13E-06
Pentane	NO	2.60E+00	2.55E-03	AP-42, Table 1.4-3	7.32E-02	2.61E-02	-	-	7.32E-02	2.61E-02
Phenanthrene	YES	1.70E-05	1.67E-08	AP-42, Table 1.4-3	4.79E-07	1.71E-07	-	-	4.79E-07	1.71E-07
Propane	NO	1.60E+00	1.57E-03	AP-42, Table 1.4-3	4.50E-02	1.61E-02	-	-	4.50E-02	1.61E-02
Pyrene	YES	5.00E-06	4.90E-09	AP-42, Table 1.4-3	1.41E-07	5.02E-08	-	-	1.41E-07	5.02E-08
Toluene	YES	3.40E-03	3.33E-06	AP-42, Table 1.4-3	9.57E-05	3.42E-05	-	-	9.57E-05	3.42E-05
Arsenic	YES	2.00E-04	1.96E-07	AP-42, Table 1.4-4	5.63E-06	2.01E-06	-	-	5.63E-06	2.01E-06
Barium	NO	4.40E-03	4.31E-06	AP-42, Table 1.4-4	1.24E-04	4.42E-05	-	-	1.24E-04	4.42E-05

Source ID = C208 Multi-Point Ground Flare (MPGF) Ethylene Tank										
Short-Term Max Heat Input (HHV)		28.71	MMBtu/hr - Maximum expected short term rates based on design and process data							
Annual Avg Heat Input (HHV)		2.34	MMBtu/hr - Represents reasonably anticipated venting, maintenance events, startups and shutdowns, sweep gas, and pilots							
Annual Hours =		8,760 hr/yr								
Short-Term Max Hourly Emission Rate =		(Short-Term Max Heat Input - MMBtu/hr) x (EF - lb/MMBtu)								
Annual Emission Rate =		(Annual Avg Heat Input - MMBtu/hr) x (EF - lb/MMBtu) x (Annual Hours) / (2,000 lb/T)								
Pollutant	§112 HAP?	EF (lb/MMscf)	EF (lb/MMBtu)	EF Source	Combustion Pollutants*		Waste Gas Pollutants**		Total	
					Short-Term Max (lb/hr)	Annual (tpy)	Short-Term Max (lb/hr)	Annual (tpy)	Short-Term Max (lb/hr)	Annual (tpy)
Beryllium	YES	<1.2E-05	<1.18E-08	AP-42, Table 1.4-4	3.38E-07	1.21E-07	-	-	3.38E-07	1.21E-07
Cadmium	YES	1.10E-03	1.08E-06	AP-42, Table 1.4-4	3.10E-05	1.11E-05	-	-	3.10E-05	1.11E-05
Chromium	YES	1.40E-03	1.37E-06	AP-42, Table 1.4-4	3.94E-05	1.41E-05	-	-	3.94E-05	1.41E-05
Chromium (VI)***	YES / Cr Cmpds	5.60E-05	5.49E-08	AP-42, Table 1.4-4/NEI	1.58E-06	5.63E-07	-	-	1.58E-06	5.63E-07
Cobalt	YES	8.40E-05	8.24E-08	AP-42, Table 1.4-4	2.36E-06	8.44E-07	-	-	2.36E-06	8.44E-07
Copper	NO	8.50E-04	8.33E-07	AP-42, Table 1.4-4	2.39E-05	8.54E-06	-	-	2.39E-05	8.54E-06
Lead	YES	5.00E-04	4.90E-07	AP-42, Table 1.4-2	1.41E-05	5.02E-06	-	-	1.41E-05	5.02E-06
Manganese	YES	3.80E-04	3.73E-07	AP-42, Table 1.4-4	1.07E-05	3.82E-06	-	-	1.07E-05	3.82E-06
Mercury	YES	2.60E-04	2.55E-07	AP-42, Table 1.4-4	7.32E-06	2.61E-06	-	-	7.32E-06	2.61E-06
Molybdenum	NO	1.10E-03	1.08E-06	AP-42, Table 1.4-4	3.10E-05	1.11E-05	-	-	3.10E-05	1.11E-05
Nickel	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-4	5.91E-05	2.11E-05	-	-	5.91E-05	2.11E-05
Selenium	YES	<2.4E-05	<2.35E-08	AP-42, Table 1.4-4	6.76E-07	2.41E-07	-	-	6.76E-07	2.41E-07
Vanadium	NO	2.30E-03	2.25E-06	AP-42, Table 1.4-4	6.47E-05	2.31E-05	-	-	6.47E-05	2.31E-05
Zinc	NO	2.90E-02	2.84E-05	AP-42, Table 1.4-4	8.16E-04	2.91E-04	-	-	8.16E-04	2.91E-04
Total §112 HAPs					0.003	0.001	0	0	0.003	0.001

* Emissions from the combustion of natural gas and waste gas based on natural gas combustion emission factors.

** Waste gas consists of ethylene only (i.e., no HAPs).

*** Based on NEI data for SCC 39000699 (In-Process Fuel Use: Natural Gas, General), 4% of the chromium emission factor found in AP-42, Section 1.4, Table 1.4-4 was estimated to equal chromium (VI).

MPGF Ethylene Tank Potential to Emit Calculation Vent/Gas Stream Flow Rate and Composition Data

Vent/Gas Stream to MPGF Ethylene Tank	Ethylene	Background Information
Ethylene Vent (kg/hr)	558	The vent to the MPGF Ethylene Tank is due to periodic venting from the Refrigerated Ethylene Storage Tank and associated ethylene boil off gas (BOG) recovery system. Ethylene is stored as a liquid in the Refrigerated Ethylene Storage Tank but still boils off under actual storage conditions. BOG is captured by a closed piping system and recompressed by one of two redundant compressors to return ethylene to the tank and minimize flaring. Periodic venting to the MPGF Ethylene Tank occurs due to transient process conditions and to maintain stable BOG recovery operations. The tank contents and BOG recovery system streams are pure ethylene. No other equipment is routed to the MPGF Ethylene Tank. Prior to September 18, 2024, and at the time of development of PTE for this application, BOG compressor primary seal gas and supplemental gas were present and accounted for in baseline flow to the MPGF Ethylene Tank. BOG compressor primary seal gas consists of mostly nitrogen and small amounts of ethylene, which requires supplemental gas to maintain the minimum NHVcz > 500 Btu/scf. On September 17, 2024, at approximately 23:00, this BOG compressor primary seal gas was permanently rerouted to the HP Flare System and accounted for in the baseline flow to those relevant flares. On October 2, 2024, at approximately 00:00, the temporary supplemental gas connection was removed. This was also identified in the most recent 40 CFR Part 60 Subpart Kb semi-annual report dated January 17, 2025. This change has reduced the annual heat input and product of combustion emissions (both PTE and actual) for the MPGF Ethylene Tank.
Heat of Combustion (Btu/lb)	21,460	Standard or averaged gross calorific values for purposes of heat input calculation.
Annual Heat Input (MMBtu/hr)	2.3	The annual heat input (and PTE) is estimated based upon the MPGF Ethylene Tank receiving the Ethylene Vent at the rate indicated in the table for 405 hours (a period that is <5% of annual hours and covers reasonably anticipated periodic events including maintenance) and the pilots operating at 1.11 MMBtu/hr for 8,760 hours.

Source ID		=	C209	Multi-Point Ground Flare (MPGF) PE Units 1/2 Episodic Vent												
VOC to Flare	Basis			NSR POLLUTANT EMISSION FACTORS (lb/MMBtu)												
	MMBtu/hr	VOC to Flare	VOC DRE	NOx	SO2	PM2.5	VOC	CO2	CH4	N2O	CO2e	CO	PM	PM10	H2SO4	Pb
MPGF PE1/2 Episodic Header Vent Gas / Short-Term Max	180	6.50 t/hr	-	0.068	-	-	-	-	-	-	-	0.31	-	0.0075	-	-
MPG PE1/2 Episodic Header Vent Gas / Annual Avg	77.8	0.04 t/hr	98%	0.068	0.0015	0.0075	0.0183	116.8	0.7579	0.0013	138.4	0.31	0.0019	0.0075	7.2E-05	4.9E-07
MPG PE1/2 Episodic Header / Pilots	0.91	NA	NA	0.0980	0.0015	0.0075	0.0054	116.9	0.0022	0.0002	117.1	0.0824	0.0019	0.0075	7.2E-05	4.9E-07
FLARE / FLARING MODE		Basis		NSR POLLUTANT RATES USED IN AMBIENT IMPACT MODELING (lb/hr)												
		MMBtu/hr	NOTES	NOx	SO2	PM2.5	VOC	CO2	CH4	N2O	CO2e	CO	PM	PM10	H2SO4	Pb
MPGF PE1/2 Episodic Header Total / Short-Term Max		180.91	[A]	5.38	-	-	-	-	-	-	-	55.87	-	1.35	-	-
MPG PE1/2 Episodic Header Total / Annual Avg		78.71	[B]	5.38	-	-	-	-	-	-	-	24.19	-	0.59	-	-
FLARE / FLARING MODE		Basis		NSR POLLUTANT PTE (T/yr)												
		Hours/yr	MMBtu/yr	NOx	SO2	PM2.5	VOC	CO2	CH4	N2O	CO2e	CO	PM	PM10	H2SO4	Pb
MPG PE1/2 Episodic Header Total / Annual Avg		8,760	689,534	23.56	0.51	2.57	6.27	40,262	258.29	0.45	47,614	105.97	0.64	2.57	0.02	1.69E-04

FLARE EMISSION CALCULATIONS NOTES:
General:
- VOC mass rates are based on vendor data associated with various potential operating scenarios and actual process data. - Short-term VOC mass rate represents maximum expected short-term rate excluding emergency flaring. - Annual average VOC mass rate represents annual average anticipated rate excluding emergency flaring. - VOC destruction efficiency represents LAER or beyond-LAER control levels.
Calculation Methodology:
- Hourly Emissions = (Heat Input - MMBtu/hr) x (Emission Factor - lb/MMBtu) - Annual Emissions = (Heat Input - MMBtu/hr) x (Annual Hours) x (Emission Factor - lb/MMBtu) x (1 ton/2,000 lb)
Basis for Emission Factors:
- NOx and CO = AP-42, Tables 13.5-1 and 13.5-2, respectively. - Pilots NOx and CO = AP-42, Table 1.4-1. - SO2 = AP-42, Table 1.4-2. - PM10/2.5 = AP-42, Table 1.4-2; filterable + condensable emission factor used as conservative estimate since flare is smokeless. Smokeless flares have zero filterable PM (see AP-42, Table 13.5-1). - VOC based on 98% DRE for incoming C3- VOC and 98% DRE for incoming C4+ VOC. - Pilots VOC = AP-42, Table 1.4-2. - CO2 is derived from mass balance of total carbon to flare converted to CO2. - CH4 emission factor is from total methane input to the flare + VOC flaring as fuel gas factor from 40 CFR 98, Table C-2 - N2O from VOC flaring is assumed to result from fuel gas flaring = fuel gas emissions factors from 40 CFR 98, Table C-2. - Pilots CO2, CH4, N2O = 40 CFR 98, Tables C-1 and C-2 for natural gas. - CO2e = sum of CO2, CH4 and N2O emissions adjusted for global warming potentials. - PM = AP-42, Table 1.4-2 (filterable only) as conservative estimate since flare is smokeless. - H2SO4 based on SO3-to-SO2 emission factor ratio in AP-42, Table 1.3-1 for distillate oil combustion in boilers > 100 MMBtu/hr.
[A] - MPGF PE Units 1/2 Episodic Vent Header / Short-Term Maximum Emission Rates:
- Short-term max. heat input based on actual process data. - The 1-hr maximum NOx rate is is set equal to the annual rate as SU/SD events are expected to occur at most once per year per unit (i.e., PE1 and PE2) and last less than 24 hours (i.e., not likely to contribute significantly to the annual distribution of the daily maximum concentrations). - Short-term max. heat input also includes 0.91 MMBtu/hr of pilot gas at all times. Fourteen pilots (one per burner) at 0.065 MMBtu/hr per pilot.
[B] - MPGF PE Units 1/2 Episodic Vent Header / Annual Average Emission Rates:
- Annual average heat input based on 1 PE1 and 1 PE2 vent recovery shutdown in a year. - Annual average heat input also includes flaring events associated with reasonably anticipated maintenance events. - Annual average heat input also includes supplemental gas needed to maintain a combustion zone heating value of 500 Btu/scf with compliance margin. - Annual average heat input also includes 0.91 MMBtu/hr of pilot gas at all times. Fourteen pilots (one per burner) at 0.065 MMBtu/hr per pilot.

Source ID = C209 Multi-Point Ground Flare (MPGF) PE Units 1/2 Episodic Vent										
Short-Term Max Heat Input (HHV)		180.91	MMBtu/hr - Maximum expected short term rate based on design and process data							
Annual Avg Heat Input (HHV)		78.71	MMBtu/hr - Represents reasonably anticipated venting, maintenance events, startups and shutdowns, supplemental gas, and sweep gas							
VOC DRE		98%	DRE for VOC							
Annual Hours =		8,760 hr/yr								
Short-Term Max Hourly Emission Rate =		(Short-Term Max Heat Input - MMBtu/hr) x (EF - lb/MMBtu)								
Annual Emission Rate =		(Annual Avg Heat Input - MMBtu/hr) x (EF - lb/MMBtu) x (Annual Hours) / (2,000 lb/T)								
Pollutant	§112 HAP?	EF (lb/MMscf)	EF (lb/MMBtu)	EF Source	Combustion Pollutants*		Waste Gas Pollutants**		Total	
					Short-Term Max (lb/hr)	Annual (tpy)	Short-Term Max (lb/hr)	Annual (tpy)	Short-Term Max (lb/hr)	Annual (tpy)
2-Methylnaphthalene	YES	2.40E-05	2.35E-08	AP-42, Table 1.4-3	4.26E-06	8.11E-06	-	-	4.26E-06	8.11E-06
3-Methylcholanthrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.19E-07	6.08E-07	-	-	3.19E-07	6.08E-07
7,12-Dimethylbenz(a)anthracene	YES	<1.6E-05	<1.57E-08	AP-42, Table 1.4-3	2.84E-06	5.41E-06	-	-	2.84E-06	5.41E-06
Acenaphthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.19E-07	6.08E-07	-	-	3.19E-07	6.08E-07
Acenaphthylene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.19E-07	6.08E-07	-	-	3.19E-07	6.08E-07
Anthracene	YES	<2.4E-06	<2.35E-09	AP-42, Table 1.4-3	4.26E-07	8.11E-07	-	-	4.26E-07	8.11E-07
Benzo(a)anthracene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.19E-07	6.08E-07	-	-	3.19E-07	6.08E-07
Benzene	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-3	3.72E-04	7.10E-04	-	-	3.72E-04	7.10E-04
Benzo(a)pyrene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	2.13E-07	4.06E-07	-	-	2.13E-07	4.06E-07
Benzo(b)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.19E-07	6.08E-07	-	-	3.19E-07	6.08E-07
Benzo(g,h,i)perylene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	2.13E-07	4.06E-07	-	-	2.13E-07	4.06E-07
Benzo(k)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.19E-07	6.08E-07	-	-	3.19E-07	6.08E-07
Butane	NO	2.10E+00	2.06E-03	AP-42, Table 1.4-3	3.72E-01	7.10E-01	-	-	3.72E-01	7.10E-01
Chrysene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.19E-07	6.08E-07	-	-	3.19E-07	6.08E-07
Dibenzo(a,h)anthracene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	2.13E-07	4.06E-07	-	-	2.13E-07	4.06E-07
Dichlorobenzene	YES	1.20E-03	1.18E-06	AP-42, Table 1.4-3	2.13E-04	4.06E-04	-	-	2.13E-04	4.06E-04
Ethane	NO	3.10E+00	3.04E-03	AP-42, Table 1.4-3	5.50E-01	1.05E+00	5.81E+00	2.53E+01	6.36E+00	2.64E+01
Fluoranthene	YES	3.00E-06	2.94E-09	AP-42, Table 1.4-3	5.32E-07	1.01E-06	-	-	5.32E-07	1.01E-06
Fluorene	YES	2.80E-06	2.75E-09	AP-42, Table 1.4-3	4.97E-07	9.46E-07	-	-	4.97E-07	9.46E-07
Formaldehyde	YES	7.50E-02	7.35E-05	AP-42, Table 1.4-3	1.33E-02	2.54E-02	-	-	1.33E-02	2.54E-02
Hexane	YES	2.90E-02	2.84E-05	Ventura County APCD, AB 2588 Combustions EF, May 2001	5.14E-03	9.80E-03	-	-	5.14E-03	9.80E-03
Indeno(1,2,3-cd)pyrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.19E-07	6.08E-07	-	-	3.19E-07	6.08E-07
Naphthalene	YES	6.10E-04	5.98E-07	AP-42, Table 1.4-3	1.08E-04	2.06E-04	-	-	1.08E-04	2.06E-04
Pentane	NO	2.60E+00	2.55E-03	AP-42, Table 1.4-3	4.61E-01	8.79E-01	1.61E+02	3.87E+00	1.62E+02	4.75E+00
Phenanthrene	YES	1.70E-05	1.67E-08	AP-42, Table 1.4-3	3.02E-06	5.75E-06	-	-	3.02E-06	5.75E-06
Propane	NO	1.60E+00	1.57E-03	AP-42, Table 1.4-3	2.84E-01	5.41E-01	-	-	2.84E-01	5.41E-01
Pyrene	YES	5.00E-06	4.90E-09	AP-42, Table 1.4-3	8.87E-07	1.69E-06	-	-	8.87E-07	1.69E-06
Toluene	YES	3.40E-03	3.33E-06	AP-42, Table 1.4-3	6.03E-04	1.15E-03	-	-	6.03E-04	1.15E-03
Arsenic	YES	2.00E-04	1.96E-07	AP-42, Table 1.4-4	3.55E-05	6.76E-05	-	-	3.55E-05	6.76E-05

Source ID = C209 Multi-Point Ground Flare (MPGF) PE Units 1/2 Episodic Vent										
Short-Term Max Heat Input (HHV)		180.91	MMBtu/hr - Maximum expected short term rate based on design and process data							
Annual Avg Heat Input (HHV)		78.71	MMBtu/hr - Represents reasonably anticipated venting, maintenance events, startups and shutdowns, supplemental gas, and sweep gas							
VOC DRE		98%	DRE for VOC							
Annual Hours =		8,760 hr/yr								
Short-Term Max Hourly Emission Rate =		(Short-Term Max Heat Input - MMBtu/hr) x (EF - lb/MMBtu)								
Annual Emission Rate =		(Annual Avg Heat Input - MMBtu/hr) x (EF - lb/MMBtu) x (Annual Hours) / (2,000 lb/T)								
Pollutant	§112 HAP?	EF (lb/MMscf)	EF (lb/MMBtu)	EF Source	Combustion Pollutants*		Waste Gas Pollutants**		Total	
					Short-Term Max (lb/hr)	Annual (tpy)	Short-Term Max (lb/hr)	Annual (tpy)	Short-Term Max (lb/hr)	Annual (tpy)
Barium	NO	4.40E-03	4.31E-06	AP-42, Table 1.4-4	7.80E-04	1.49E-03	-	-	7.80E-04	1.49E-03
Beryllium	YES	<1.2E-05	<1.18E-08	AP-42, Table 1.4-4	2.13E-06	4.06E-06	-	-	2.13E-06	4.06E-06
Cadmium	YES	1.10E-03	1.08E-06	AP-42, Table 1.4-4	1.95E-04	3.72E-04	-	-	1.95E-04	3.72E-04
Chromium	YES	1.40E-03	1.37E-06	AP-42, Table 1.4-4	2.48E-04	4.73E-04	-	-	2.48E-04	4.73E-04
Chromium (VI)***	YES / Cr Cmpds	5.60E-05	5.49E-08	AP-42, Table 1.4-4/NEI	9.93E-06	1.89E-05	-	-	9.93E-06	1.89E-05
Cobalt	YES	8.40E-05	8.24E-08	AP-42, Table 1.4-4	1.49E-05	2.84E-05	-	-	1.49E-05	2.84E-05
Copper	NO	8.50E-04	8.33E-07	AP-42, Table 1.4-4	1.51E-04	2.87E-04	-	-	1.51E-04	2.87E-04
Lead	YES	5.00E-04	4.90E-07	AP-42, Table 1.4-2	8.87E-05	1.69E-04	-	-	8.87E-05	1.69E-04
Manganese	YES	3.80E-04	3.73E-07	AP-42, Table 1.4-4	6.74E-05	1.28E-04	-	-	6.74E-05	1.28E-04
Mercury	YES	2.60E-04	2.55E-07	AP-42, Table 1.4-4	4.61E-05	8.79E-05	-	-	4.61E-05	8.79E-05
Molybdenum	NO	1.10E-03	1.08E-06	AP-42, Table 1.4-4	1.95E-04	3.72E-04	-	-	1.95E-04	3.72E-04
Nickel	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-4	3.72E-04	7.10E-04	-	-	3.72E-04	7.10E-04
Selenium	YES	<2.4E-05	<2.35E-08	AP-42, Table 1.4-4	4.26E-06	8.11E-06	-	-	4.26E-06	8.11E-06
Vanadium	NO	2.30E-03	2.25E-06	AP-42, Table 1.4-4	4.08E-04	7.77E-04	-	-	4.08E-04	7.77E-04
Zinc	NO	2.90E-02	2.84E-05	AP-42, Table 1.4-4	5.14E-03	9.80E-03	-	-	5.14E-03	9.80E-03
Total §112 HAPs					0.02	0.04	0	0	0.02	0.04

* Emissions from the combustion of natural gas and waste gas based on natural gas combustion emission factors.

** Waste gas from PE Units 1 and 2 do not contain HAPs.

*** Based on NEI data for SCC 39000699 (In-Process Fuel Use: Natural Gas, General), 4% of the chromium emission factor found in AP-42, Section 1.4, Table 1.4-4 was estimated to equal chromium (VI).

MPGF PE Units 1/2 Episodic Vent Potential to Emit Calculation Vent/Gas Stream Flow Rate and Composition Data

Vent/Gas Stream to MPGF PE Units 1/2 Episodic Vent	Nitrogen	Methane	Non-VOC/HAP Hydrocarbon	Non-HAP VOC ^a	Background Information
Baseline N2 (2023) (kg/hr)	770	-	-	-	The continuous baseline vent gas flowing through the MPGF PE Units 1/2 Episodic Vent Header is primarily comprised of nitrogen with relatively small amounts of hydrocarbons present. The 2023 annual average nitrogen flow rate in the header, which was determined using in-line GC measurements and vent gas flow rate measurements, was used to establish a potential to emit basis baseline nitrogen flow rate in the header.
Sweep Gas (kg/hr)	-	32	4	-	The sweep gas is a continuous flow of natural gas through the MPGF PE1/2 Episodic Vent Header to maintain a constant minimum flow of gas and/or pressure to prevent oxygen infiltration into the flare header system and back to the flare tip. Sweep gas flow rates are set at the minimum design and engineering practice standard determination for each PE Unit to perform this safety function.
Supplemental Gas (kg/hr)	-	1,299	128	-	The supplemental gas is natural gas that is used to maintain the flare's NHVcz above 500 Btu/scf. The amount of supplemental gas was calculated by using a target NHVcz of ~708 Btu/scf for the flare to accommodate increases in nitrogen vent gas composition due to episodic venting from PE Units 1 and 2.

MPGF PE Units 1/2 Episodic Vent Potential to Emit Calculation Vent/Gas Stream Flow Rate and Composition Data

Vent/Gas Stream to MPGF PE Units 1/2 Episodic Vent	Nitrogen	Methane	Non-VOC/HAP Hydrocarbon	Non-HAP VOC^a	Background Information
PE Units 1 and 2 Vents ^b (kg/hr)	7,398	337	37	5,901	Shell operates PE Units 1 and 2 under license from Univation, which covers the “core plant” of these units, including process vents. Design process vent flow rates and compositions are provided by the referenced licensor and are unique to the technology. The licensing agreement specifies that all technical information, data, experience, and know-how (including process information and licensor improvement) related to process design, manufacturing techniques, and product properties is confidential. Shell maintains the confidentiality of this information by adhering to the conditions set forth in the licensing agreement. This includes non-disclosure of utility consumption figures, quality of nitrogen and hydrogen supplied to the process, and quantity and contents of all effluent streams. In addition, as further required by the licensing agreement, Shell obtains Univation’s approval before disclosing any information to a third party, including government agencies. Shell’s claim of confidential business information extends to critical operating data and process flow schematics within the PE Units. This information constitutes production methods and processes which are clearly covered under the licensing agreement between Shell and Univation and are thus unique to Shell. Furthermore, disclosure of this information would negatively affect Shell’s competitive position in that it would provide a third party with the information needed to identify production capabilities and key grades of polyethylene manufactured at the unit as well as to reverse-engineer low pressure solvent and vent recovery capabilities of the PE Units. The combination of specific individual vent identifications with flow rate and compositional data are claimed as confidential proprietary information as defined by the Pennsylvania Right to Know Law and pursuant to Section 13.2 of the Air Pollution Control Act, 35 P.S. 4013.2. In consideration of these limitations, Shell is providing total combined GHG, VOC, and heat content information for the PE Unit vents that are routed to the MPGF PE Units 1/2 Episodic Vent. PE Unit 3, SPM's ethylene manufacturing unit, and SPM's storage tank and hydrocarbon loading activities are not routed to the MPGF PE Units 1/2 Episodic Vent.
Heat of Combustion (Btu/lb)	0	23,891	22,333	~21,417	Standard or averaged gross calorific values for purposes of heat input calculation.
Annual Heat Input (MMBtu/hr)	78.7				The annual heat input (and PTE) is estimated based upon the MPGF PE Units 1/2 Episodic Vent receiving the PE Units 1 and 2 vents at the rates indicated in the table for 48 hours, the Baseline N2 (2023) and Sweep Gas at the rates indicated in the table for 8,760 hours, and the Supplemental Gas at the rates indicated in the table for 8,712 hours, plus the pilots operating at 0.91 MMBtu/hr for 8,760 hours.

^a There is no HAP present in the gases combusted at the flare, but HAP products of combustion are calculated for the flare using established emissions factors.

^b Worst-case short-term episodic event.

Source ID = 301 Polyethylene Pellet Material Storage/Handling/Loadout (Particulate Emissions)							
Parameter	Units	Blending Silos	Railcar Handling & Storage Silos	Truck Handling & Storage Silos	Railcar Loading	Truck Loading	Source / Basis
Calculation Inputs: (rates for all three lines)							
Annual PE Pellet Rate	MT/yr	2,400,000	1,600,000	685,714	1,600,000	685,714	Based on actual process data and expected production/loading rates.
Max PE Pellet Rate	MT/hr	300	300	300	300	300	Based on actual design/process data: 24-hr average max rates.
Normal PE Pellet Rate	MT/hr	300	300	300	300	300	Based on actual design/process data: annual average.
PE Pellet-to-Air Ratio	lb/lb	10	9.55	6.99	467	467	Based on actual design/process data.
PM Exit Grain Loading	gr/dscf	0.005	0.005	0.005	0.005	0.005	LAER limit.
PM10/2.5 Exit Grain Loading	gr/dscf	0.0017	0.0017	0.0017	0.005	0.005	Based on actual design data and engineering judgement.
Annual Operating Hours	hr/yr	8,000	5,333	2,286	5,333	2,286	Annual operating hours at normal rates. Hours may be higher if rates are lower.
Calculated Values:							
Max Exhaust Rate	scfh	1,233,188	1,487,454	2,396,454	18,934	18,934	= (Max PE Pellet Rate) x (2,204.6 lb/MT) / (PE Pellet-to-Air Ratio) / (28.84 lb/lb-mol) x (385.57 scf/lb-mol)+Elutriator exhaust*
Normal Exhaust Rate	scfh	1,233,188	1,487,454	2,396,454	18,934	18,934	= (Normal PE Pellet Rate) x (2,204.6 lb/MT) / (PE Pellet-to-Air Ratio) / (28.84 lb/lb-mol) x (385.57 scf/lb-mol)+Elutriator exhaust*
24-hr PM10/2.5 Rate	lb/hr	0.30	0.36	0.58	0.01	0.01	= (PM10/2.5 Exit Grain Loading) x (Max Exhaust Rate) / (7,000 gr/lb)
Annual Average PM10/2.5 Rate	lb/hr	0.27	0.22	0.15	0.01	0.004	= (PM10/2.5 Exit Grain Loading) x (Normal Exhaust Rate) / (7,000 gr/lb) x (Annual Operating Hours) / (8,760 hr/yr)
Annual PM PTE	T/yr	3.52	2.83	1.96	0.04	0.02	= (Normal Exhaust Rate) x (Annual Operating Hours) x (PM Exit Grain Loading) / (7,000 gr/lb) / (2,000 lb/T)
Annual PM10/2.5 PTE	T/yr	1.20	0.96	0.67	0.04	0.02	= (Normal Exhaust Rate) x (Annual Operating Hours) x (PM10/2.5 Exit Grain Loading) / (7,000 gr/lb) / (2,000 lb/T)
Notes:							
Blending Silos: PE1BLEND A/B/C/D/E; PE2BLEND A/B/C/D/E; PE3: V7001A, V7001B, V7001C, V7001D							
Railcar Handling & Storage Silos: PE1RAILSILO A/B/C/D, PE2RAILSILO A/B/C/D; PE3RAILSILO A/B/C/D							
Truck Handling & Storage Silos: PE1TRUCKSILO A/B/C/D/E/F/G/H/I/J; PE2TRUCKSILO A/B/C/D/E/F/G/H/I/J; PE3TRUCKSILO A/B/C/D/E/F/G/H/I/J/K/L/M/N/O/P/Q/R							
Railcar Loading: PE1RAILLOADA/B; PE2RAILLOADA/B; PE3RAILLOADA/B							
Truck Loading: PE1TRUCKLOAD A/B/C/D/E; PE2TRUCKLOAD A/B/C/D/E; PE3TRUCKLOAD A/B/C/D/E/F/G/H/I							

<i>Source ID = 301 Polyethylene Pellet Material Storage/Handling/Loadout (VOC Emissions)</i>		
Parameter	Value	Units
<u>Calculation Inputs</u>		
Annual PE Pellet Production Rate =	2,073,265 tons/yr	Total as-built design basis for PE Units 1-3
PE Pellet Residual VOC Concentration Emitted =	35.08 ppmw	LAER limit (PE pellet residual VOC concentration at last point before VOC emissions are uncontrolled minus PE pellet residual VOC concentration at PE pellet storage)
<u>Annual Emission Calculation</u>		
VOC PTE =	72.73 tons/yr	= (Annual PE Pellet Production Rate - tons/yr) x (PE Pellet Residual VOC Concentration Emitted - ppmw) / (1,000,000 ppmw)

NOTES:

- Residual VOC in PE pellets contains no OHAP.

Source ID = 302 Liquid Loadout (Recovered Oil)			
Parameter	Recovered Oil Loading	Units	Source / Basis
Material Loaded	Recovered Oil		
Material Temperature	30	°C	Process data
Material Temperature	545.67	°R	
VOC Vapor Pressure (VP)	0.5	psia	Conservative estimate
VOC Vapor MW	130	lb/lb-mole	AP-42, Section 7.1 - Table 7.1-2 value for jet kerosene (surrogate material)
Type of Loadout Operation	TRUCK		
Type of Loading System	SUBMERGED		Design/work practice
Annual Loading Rate	210	10 ³ gal/yr	Loading rate is based on ethylene manufacturing unit material balance data
Hourly Loading Rate	3.96	10 ³ gal/hr	Loading rate is based on the maximum rate for the loading pump
Saturation Factor	0.60		S from AP-42, Table 5.2-1 (Submerged loading: dedicated normal service)
VOC Loading Loss Factor	0.992	lb/10 ³ gal	L _L from AP-42 equation (see below) using VP indicated above
Control Efficiency	95%	wt. %	Carbon adsorption system VOC and organic HAP control efficiency
Annual VOC Emission Rate	0.005	T/yr	= (Ann. Loading Rate) x (VOC LL Factor) x (1 - Control Eff.) / (2000 lb/T)
VOC Vapor Pressure	3.45	kPa	= (6.895 kPa/psi) x (VOC Vapor Pressure (VP) (psia))
Annual HAP Emission Rate	1.04E-05	T/yr	Sum of HAP emission rates calculated below

Emissions Estimates based on Equation 1 in AP-42, 5.2 - Transportation and Marketing of Petroleum Liquids:

$$L_L = 12.46 \frac{SPM}{T}$$

where:

L_L = loading loss, pounds per 1000 gallons (lb/10³ gal) of liquid loaded

S = a saturation factor (see Table 5.2-1)

P = true vapor pressure of liquid loaded, pounds per square inch absolute (psia)
(see Figure 7.1-5, Figure 7.1-6, and Table 7.1-2)

M = molecular weight of vapors, pounds per pound-mole (lb/lb-mole) (see Table 7.1-2)

T = temperature of bulk liquid loaded, °R (°F + 460)

Liquid Composition				
Compound	Liquid Wt % ¹	Molecular Wt. (lb/lbmol)	lbmol/lb liquid solution	Liquid Mole %
Benzene	0.010%	78.11	1.28E-06	0.021%
1,3-Butadiene	0.0010%	54.09	1.85E-07	0.0030%
Phenol	0.0010%	94.11	1.06E-07	0.0017%
Toluene	0.010%	92.14	1.09E-06	0.018%
Ethylbenzene	0.0010%	106.17	9.42E-08	0.0015%
Xylenes	0.0010%	106.17	9.42E-08	0.0015%
Styrene	0.010%	104.15	9.60E-07	0.016%
Naphthalene	0.010%	128.17	7.80E-07	0.013%
Acenaphthene	0.0010%	154.21	6.48E-08	0.0011%
Acenaphthylene	0.0010%	152.19	6.57E-08	0.0011%
Fluorene	0.0010%	166.22	6.02E-08	0.0010%
Anthracene	0.0010%	178.23	5.61E-08	0.00091%
Phenanthrene	0.0010%	178.23	5.61E-08	0.00091%
Fluoranthene	0.0010%	202.25	4.94E-08	0.00080%
Pyrene	0.0010%	202.25	4.94E-08	0.00080%
Other VOC ²	99.949%	162	6.17E-03	99.92%
Total	100%	-	0.01	100%

1. The liquid weight fraction indicated for each HAP represents a conservative estimate based on recovered oil composition analysis results.

2. The liquid molecular weight for Other VOC was estimated to equal the liquid molecular weight indicated for jet kerosene in AP-42, Section 7.1 - Table 7.1-2.

Vapor Pressure Equation Constants				
Compound	A	B	C	Notes
Benzene ¹	6.906	1,211	220.79	$\log_{10}(P) = A - (B / (T + C))$; where, $P = VP$ (mmHg) and $T = \text{temp. } (^{\circ}\text{C})$
1,3-Butadiene ¹	6.873	941.7	240.4	$\log_{10}(P) = A - (B / (T + C))$; where, $P = VP$ (mmHg) and $T = \text{temp. } (^{\circ}\text{C})$
Phenol ¹	7.122	1,509.7	174.2	$\log_{10}(P) = A - (B / (T + C))$; where, $P = VP$ (mmHg) and $T = \text{temp. } (^{\circ}\text{C})$
Toluene ¹	7.017	1,377.6	222.64	$\log_{10}(P) = A - (B / (T + C))$; where, $P = VP$ (mmHg) and $T = \text{temp. } (^{\circ}\text{C})$
Ethylbenzene ¹	6.95	1,419.3	212.61	$\log_{10}(P) = A - (B / (T + C))$; where, $P = VP$ (mmHg) and $T = \text{temp. } (^{\circ}\text{C})$
Xylenes ¹ (conservatively used <i>p</i> -Xylene VP as VP for all Xylene isomers)	7.021	1,474.4	217.77	$\log_{10}(P) = A - (B / (T + C))$; where, $P = VP$ (mmHg) and $T = \text{temp. } (^{\circ}\text{C})$
Styrene ¹	7.095	1,525.1	216.77	$\log_{10}(P) = A - (B / (T + C))$; where, $P = VP$ (mmHg) and $T = \text{temp. } (^{\circ}\text{C})$
Naphthalene ¹	11.4	3,724.1	273.15	$\log_{10}(P) = A - (B / (T + C))$; where, $P = VP$ (mmHg) and $T = \text{temp. } (^{\circ}\text{C})$
Acenaphthene ²	4.32236	2,062.099	-73.146	$\log_{10}(P) = A - (B / (T + C))$; where, $P = VP$ (bar) and $T = \text{temp. } (K)$
Acenaphthylene ² (assumed VP equals Acenaphthene VP)	4.32236	2,062.099	-73.146	$\log_{10}(P) = A - (B / (T + C))$; where, $P = VP$ (bar) and $T = \text{temp. } (K)$
Fluorene ²	5.25103	3,011.076	3.857	$\log_{10}(P) = A - (B / (T + C))$; where, $P = VP$ (bar) and $T = \text{temp. } (K)$
Anthracene ²	4.72997	2,759.53	-30.753	$\log_{10}(P) = A - (B / (T + C))$; where, $P = VP$ (bar) and $T = \text{temp. } (K)$
Phenanthrene ¹	19.813	10,088.9	400	$\log_{10}(P) = A - (B / (T + C))$; where, $P = VP$ (mmHg) and $T = \text{temp. } (^{\circ}\text{C})$
Fluoranthene ¹	12.836	5,348.1	273.15	$\log_{10}(P) = A - (B / (T + C))$; where, $P = VP$ (mmHg) and $T = \text{temp. } (^{\circ}\text{C})$
Pyrene ²	2.68713	1,086.824	-262.849	$\log_{10}(P) = A - (B / (T + C))$; where, $P = VP$ (bar) and $T = \text{temp. } (K)$

1. The vapor pressure equation constants were obtained from AP-42, Section 7.1 - Table 7.1-3.

2. The vapor pressure equation constants were obtained from <https://webbook.nist.gov>.

Vapor Composition					
Compound	Molecular Wt. (lb/lbmol)	Partial Pressure (psia)	Vapor Mole % ¹	lb/ lbmol vapor mixture	Vapor Wt %
Benzene	78.11	4.79E-04	0.10%	7.48E-02	0.058%
1,3-Butadiene	54.09	1.42E-03	0.28%	1.54E-01	0.12%
Phenol	94.11	1.78E-07	0.000036%	3.35E-05	0.000026%
Toluene	92.14	1.25E-04	0.025%	2.30E-02	0.018%
Ethylbenzene	106.17	3.71E-06	0.00074%	7.88E-04	0.00061%
Xylenes	106.17	3.47E-06	0.00069%	7.36E-04	0.00057%
Styrene	104.15	2.47E-05	0.0049%	5.15E-03	0.0040%
Naphthalene	128.17	3.19E-07	0.000064%	8.17E-05	0.000063%
Acenaphthene	154.21	3.46E-09	0.00000069%	1.07E-06	0.00000082%
Acenaphthylene	152.19	3.51E-09	0.00000070%	1.07E-06	0.00000082%
Fluorene	166.22	3.92E-09	0.00000078%	1.30E-06	0.0000010%
Anthracene	178.23	5.24E-10	0.00000010%	1.87E-07	0.00000014%
Phenanthrene	178.23	3.94E-11	0.0000000079%	1.40E-08	0.000000011%
Fluoranthene	202.25	2.42E-12	0.00000000048%	9.80E-10	0.00000000076%
Pyrene	202.25	6.09E-29	0.0000000000000000%	2.46E-26	0.0000000000000000%
Other VOC	130	0.498	99.59%	129.46	99.80%
Total	-	0.500	100%	130	100%

1. The vapor mole fraction was calculated using Raoult's law.

HAP Emission Rate Calculation

Pollutant	Short-Term Max. Emission Rate (lb/hr)	Annual Emission Rate (tpy)
Benzene	1.13E-04	3.00E-06
1,3-Butadiene	2.33E-04	6.18E-06
Phenol	5.08E-08	1.35E-09
Toluene	3.48E-05	9.22E-07
Ethylbenzene	1.19E-06	3.16E-08
Xylenes	1.12E-06	2.96E-08
Styrene	7.80E-06	2.07E-07
Naphthalene	1.24E-07	3.28E-09
Acenaphthene	1.62E-09	4.29E-11
Acenaphthylene	1.62E-09	4.29E-11
Fluorene	1.97E-09	5.23E-11
Anthracene	2.83E-10	7.50E-12
Phenanthrene	2.13E-11	5.63E-13
Fluoranthene	1.48E-12	3.93E-14
Pyrene	3.73E-29	9.88E-31

Source ID = 304 C3+ Railcar Loading and C3 Railcar Unloading		
Parameter	Value	Units
Source / Basis		
Calculation Inputs:		
Annual Railcars Loaded and/or Unloaded =	3,944 event/yr	As-built design basis
No. of Hose Coupling Disconnects per Event =	3 couplings/event	3 hoses in each loading arm (2 product, 1 vapor return)
H ₂ O Emission Factor =	0.35 ml/coupling	2 inch TODO Gas DN50 coupling (vendor data)
H ₂ O Density =	8.34 lb/gal	
C3+ Density =	4.88 lb/gal	Basis C3+ compositions
C3+ to H ₂ O =	0.59 lb C3+/lb H ₂ O	Ratio of C3+ density to H ₂ O density
VOC Emission Factor =	0.00045 lb C3+/coupling	= H ₂ O Emission Factor (ml/coupling) x 1 (g/ml) / 453.6 (g/lb) x 0.59 lb C3+/lb H ₂ O
Annual PTE Calculation:		
VOC PTE =	0.003 tpy	= VOC Emission Factor (lb/coupling) x Annual Railcars Loaded and/or Unloaded (event/yr) x No. of Hose Coupling Disconnects per Event (couplings/event) / 2,000 (lb/ton)

Source ID = 304 Butene and Isobutane Railcar Unloading		
Parameter	Value	Units
Source / Basis		
Calculation Inputs:		
Annual Railcars Unloaded =	1,023 event/yr	As-built design basis
No. of Hose Coupling Disconnects per Event =	3 couplings/event	3 hoses in each loading arm (2 product, 1 vapor return)
H ₂ O Emission Factor =	0.35 ml/coupling	2 inch TODO Gas DN50 coupling (vendor data)
H ₂ O Density =	8.34 lb/gal	
C4 Density =	4.84 lb/gal	AP-42, Appendix A
C4 to H ₂ O =	0.58 lb C4/lb H ₂ O	Ratio of C4 density to H ₂ O density
VOC Emission Factor =	0.00045 lb C4/coupling	= H ₂ O Emission Factor (ml/coupling) x 1 (g/ml) / 453.6 (g/lb) x 0.58 lb C4/lb H ₂ O
Annual PTE Calculation:		
VOC PTE =	0.001 tpy	= VOC Emission Factor (lb/coupling) x Annual Railcars Unloaded (event/yr) x No. of Hose Coupling Disconnects per Event (couplings/event) / 2,000 (lb/ton)

NOTES:

- Butene and Isobutane liquids contain no OHAP.

Source ID = 304 Hexene and Isopentane Railcar Unloading		
Parameter	Value	Units
Source / Basis		
Calculation Inputs:		
Annual Railcars Unloaded =	1,135 event/yr	As-built design basis
No. of Hose Coupling Disconnects per Event =	3 couplings/event	3 hoses in each loading arm (2 product, 1 vapor return)
H ₂ O Emission Factor =	0.63 ml/coupling	2 inch TODO Matic DN50 coupling (vendor data)
H ₂ O Density =	8.34 lb/gal	
C6 Density =	5.46 lb/gal	Websearch liquid hexane
C6 to H ₂ O =	0.65 lb C6/lb H ₂ O	Ratio of C6 density to H ₂ O density
VOC Emission Factor =	0.00091 lb C6/coupling	= H ₂ O Emission Factor (ml/coupling) x 1 (g/ml) / 453.6 (g/lb) x 0.65 lb C6/lb H ₂ O
Annual PTE Calculation:		
VOC PTE =	0.002 tpy	= VOC Emission Factor (lb/coupling) x Annual Railcars Unloaded (event/yr) x No. of Hose Coupling Disconnects per Event (couplings/event) / 2,000 (lb/ton)

NOTES:

- Hexene and Isopentane liquids contain no OHAP.

Source ID = 304 C3+ Railcar Loading and C3 Railcar Unloading		
Parameter	Value	Units
Source / Basis		
Calculation Inputs:		
Annual Railcars Loaded and/or Unloaded =	3,944 event/yr	As-built design basis
No. of Hose Coupling Disconnects per Event =	3 couplings/event	3 hoses in each loading arm (2 product, 1 vapor return)
H ₂ O Emission Factor =	0.35 ml/coupling	2 inch TODO Gas DN50 coupling (vendor data)
H ₂ O Density =	8.34 lb/gal	
C3+ Density =	4.88 lb/gal	Basis C3+ compositions
C3+ to H ₂ O =	0.59 lb C3+/lb H ₂ O	Ratio of C3+ density to H ₂ O density
VOC Emission Factor =	0.00045 lb C3+/coupling	= H ₂ O Emission Factor (ml/coupling) x 1 (g/ml) / 453.6 (g/lb) x 0.59 lb C3+/lb H ₂ O
Annual PTE Calculation:		
VOC PTE =	0.003 tpy	= VOC Emission Factor (lb/coupling) x Annual Railcars Loaded and/or Unloaded (event/yr) x No. of Hose Coupling Disconnects per Event (couplings/event) / 2,000 (lb/ton)

Hourly HAP PTE Calculations:		
C3+ HAP Concentrations:		
1,3-Butadiene =	39.0 wt%	
Benzene =	12.0 wt%	
Toluene =	1.0 wt%	
Hourly PTE Emission Rates:		
1,3-Butadiene =	2.38E-04 lb/hr	
Benzene =	7.32E-05 lb/hr	
Toluene =	6.10E-06 lb/hr	

<i>Source ID</i> = <i>406</i> <i>Storage Tanks (Diesel Fuel > 150 Gallons)</i>										
Tank Name	EU ID	Tank Type	Volume [m3]	Diameter [m]	Height / Length [m]	Operating Temperature [°C]	Surrogate Liquid	Annual Throughput (gal/yr)	Emission Control	VOC/HAP Emissions* (T/yr)
Emergency Generator Diesel Fuel	NA	Horizontal Fixed Roof	1.9	1.5	1.5	38.0	No. 2 Oil	2,000	N/A	3.8E-05
Emergency Generator Diesel Fuel	NA	Horizontal Fixed Roof	1.9	1.5	1.5	38.0	No. 2 Oil	2,000	N/A	3.8E-05
Fire Water Pump Diesel Fuel	T-59101A	Horizontal Fixed Roof	7.4	1.6	3.7	38.0	No. 2 Oil	7,200	N/A	1.8E-04
Fire Water Pump Diesel Fuel	T-59101B	Horizontal Fixed Roof	7	1.6	3.7	38.0	No. 2 Oil	7,200	N/A	1.8E-04
									Total =	4.25E-04

*** NOTES:**

- As a conservative assumption, 100% of VOC is assumed to be HAP.

<i>Source ID = 501 Equipment Components</i>				
Unit/Area	VOC PTE (tpy)	HAP PTE (tpy)	CO PTE (tpy)	CO2e PTE (tpy)
Ethylene Manufacturing Unit	11.36	2.06	0.03	248.7
Polyethylene Manufacturing Units 1 and 2	11.18	0	0	5.5
Polyethylene Manufacturing Unit 3	5.41	0.012	2.78	7.5
OSBL	7.33	1.05	0	139.4
Total	35.28	3.12	2.81	401

Source ID = 501 Equipment Components (Ethylene Manufacturing Unit)																															
AERMOD ID	Area	Class	State	Stream ID	SOCMI Average Emission Factor lb/hr/ component	LAER Control Efficiency %	VOC wt%	HAP wt%	CH4 wt%	CO wt%	CO2 wt%	Component Count	VOC (tpy)	Ethane (tpy)	Propylene (tpy)	Propane (tpy)	1,3-Butadiene (tpy)	Butane (tpy)	Benzene (tpy)	Toluene (tpy)	Xylenes (tpy)	Ethylbenzene (tpy)	Styrene (tpy)	Naphthalene (tpy)	n-Hexane (tpy)	Methanol (tpy)	Heptane (tpy)	HAP (tpy)	CO (tpy)	CO2e (tpy)	
ECFUG1	101	Valve	GV	ECU Cracked Gas	0.0132	97	56.94	5.35	5.9	0.03	0	24	2.37E-02	1.37E-02	5.00E-04	8.33E-05	7.49E-04	8.33E-05	1.12E-03	3.33E-04	0.00E+00	4.16E-06	8.33E-06	8.33E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.23E-03	1.25E-05	6.88E-02
ECFUG1	101	Valve	GV	ECU Ethane Gas	0.0132	97	3.5	0	1.8	0	0	64	3.89E-03	1.05E-01	2.22E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.59E-02
ECFUG1	101	Valve	GV	ECU Flare Gas	0.0132	97	1	0	69	0	0	2	3.47E-05	1.73E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.70E-02
ECFUG1	101	Valve	GV	ECU Fuel Gas	0.0132	97	0.24	0	65.06	0.45	0.26	216	8.99E-04	1.35E-03	0.00E+00	3.37E-04	0.00E+00	1.12E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-03	6.83E+00
ECFUG1	101	Valve	GV	ECU GN	0.0132	97	2.38	0	95.295	0	0	53	2.19E-03	2.14E-03	0.00E+00	8.04E-04	0.00E+00	2.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.45E+00
ECFUG1	101	Valve	GV	ECU Warm Flare	0.0132	97	1	0	69	0	0	1	1.73E-05	8.67E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.35E-02
ECFUG1	101	Valve	GV	Natural Gas	0.0132	97	2.38	0	95.295	0	0	6	2.48E-04	2.42E-04	0.00E+00	9.11E-05	0.00E+00	2.50E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.78E-01
ECFUG1	102	Valve	GV	ECU Cracked Gas	0.0132	97	56.94	5.35	5.9	0.03	0	12	1.19E-02	6.85E-03	2.50E-04	4.16E-05	3.75E-04	4.16E-05	5.62E-04	1.67E-04	0.00E+00	2.08E-06	4.16E-06	4.16E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-03	6.24E-06	3.44E-02
ECFUG1	102	Valve	GV	ECU Ethane Gas	0.0132	97	3.5	0	1.8	0	0	48	2.91E-03	7.88E-02	1.67E-04	1.67E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.20E-02
ECFUG1	102	Valve	GV	ECU Fuel Gas	0.0132	97	0.24	0	65.06	0.45	0.26	255	1.06E-03	1.59E-03	0.00E+00	3.98E-04	0.00E+00	1.33E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.99E-03	8.06E+00
ECFUG1	102	Valve	GV	ECU Hydrocarbon Gas	0.0132	97	38.7	0	61.3	0	0	1	6.71E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.98E-02
ECFUG1	102	Valve	GV	ECU Warm Flare	0.0132	97	1	0	69	0	0	2	3.47E-05	1.73E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.70E-02
ECFUG1	102	Valve	GV	Natural Gas	0.0132	97	2.38	0	95.295	0	0	23	9.49E-04	9.28E-04	0.00E+00	3.49E-04	0.00E+00	9.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E+00
ECFUG1	103	Valve	GV	ECU Cracked Gas	0.0132	97	56.94	5.35	5.9	0.03	0	33	3.26E-02	1.88E-02	6.87E-04	1.14E-04	1.03E-03	1.14E-04	1.55E-03	4.58E-04	0.00E+00	5.72E-06	1.14E-05	1.14E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.06E-03	1.72E-05	9.46E-02
ECFUG1	103	Valve	GV	ECU Ethane Gas	0.0132	97	3.5	0	1.8	0	0	47	2.85E-03	7.72E-02	1.63E-04	1.63E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.11E-02
ECFUG1	103	Valve	GV	ECU Fuel Gas	0.0132	97	0.24	0	65.06	0.45	0.26	231	9.62E-04	1.44E-03	0.00E+00	3.61E-04	0.00E+00	1.20E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-03	7.30E+00
ECFUG1	103	Valve	GV	ECU GN	0.0132	97	2.38	0	95.295	0	0	2	8.26E-05	8.07E-05	0.00E+00	3.04E-05	0.00E+00	8.33E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.26E-02
ECFUG1	103	Valve	GV	ECU Warm Flare	0.0132	97	1	0	69	0	0	3	5.20E-05	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-01
ECFUG1	103	Valve	GV	Natural Gas	0.0132	97	2.38	0	95.295	0	0	26	1.07E-03	1.05E-03	0.00E+00	3.95E-04	0.00E+00	1.08E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E+00
ECFUG1	104	Valve	GV	ECU Cracked Gas	0.0132	97	56.94	5.35	5.9	0.03	0	35	3.46E-02	2.00E-02	7.28E-04	1.21E-04	1.09E-03	1.21E-04	1.64E-03	4.86E-04	0.00E+00	6.07E-06	1.21E-05	1.21E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.25E-03	1.92E-05	1.00E-01
ECFUG1	104	Valve	GV	ECU Ethane Gas	0.0132	97	3.5	0	1.8	0	0	76	4.61E-03	1.25E-01	2.64E-04	2.64E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.64E-02
ECFUG1	104	Valve	GV	ECU Fuel Gas	0.0132	97	0.24	0	65.06	0.45	0.26	174	7.24E-04	1.09E-03	0.00E+00	2.72E-04	0.00E+00	9.05E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.36E-03	5.50E+00
ECFUG1	104	Valve	GV	ECU GN	0.0132	97	2.38	0	95.295	0	0	33	1.36E-03	1.33E-03	0.00E+00	5.01E-04	0.00E+00	1.37E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E+00
ECFUG1	104	Valve	GV	ECU Warm Flare	0.0132	97	1	0	69	0	0	1	1.73E-05	8.67E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.35E-02
ECFUG1	104	Valve	GV	ECU Worse-case Unit Speciation	0.0132	97	90	47	5	0	0	1	1.56E-03	8.67E-05	3.47E-04	4.34E-04	0.00E+00	2.60E-04	8.67E-06	8.67E-06	8.67E-06	8.67E-06	8.67E-06	8.67E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.15E-04	1.92E-05	2.43E-03
ECFUG1	104	Valve	GV	Ethane	0.0132	97	3.5	0	1.8	0	0	1	6.07E-05	1.64E-03	3.47E-06	3.47E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.74E-04
ECFUG1	104	Valve	GV	Natural Gas	0.0132	97	2.38	0	95.295	0	0	20	8.26E-04	8.07E-04	0.00E+00	3.04E-04	0.00E+00	8.33E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.26E-01
ECFUG1	105	Valve	GV	ECU Cracked Gas	0.0132	97	56.94	5.35	5.9	0.03	0	33	3.26E-02	1.88E-02	6.87E-04	1.14E-04	1.03E-03	1.14E-04	1.55E-03	4.58E-04	0.00E+00	5.72E-06	1.14E-05	1.14E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.06E-03	1.72E-05	9.46E-02
ECFUG1	105	Valve	GV	ECU Ethane Gas	0.0132	97	3.5	0	1.8	0	0	76	4.61E-03	1.25E-01	2.64E-04	2.64E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.64E-02
ECFUG1	105	Valve	GV	ECU Fuel Gas	0.0132	97	0.24	0	65.06	0.45	0.26	220	9.16E-04	1.37E-03	0.00E+00	3.43E-04	0.00E+00	1.14E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E-03	6.95E+00
ECFUG1	105	Valve	GV	ECU GN	0.0132	97	2.38	0	95.295	0	0	33	1.36E-03	1.33E-03	0.00E+00	5.01E-04	0.00E+00	1.37E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E+00
ECFUG1	105	Valve	GV	ECU Hydrocarbon Gas	0.0132	97	38.7	0	61.3	0	0	27	1.81E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.04E-01
ECFUG1	105	Valve	GV	Natural Gas	0.0132	97	2.38	0	95.295	0	0	21	8.67E-04	8.47E-04	0.00E+00	3.19E-04	0.00E+00	8.74E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.72E-01
ECFUG1	106	Valve	GV	ECU Cracked Gas	0.0132	97	56.94	5.35	5.9	0.03	0	31	3.																		

Source ID = 501 Equipment Components (Ethylene Manufacturing Unit)																															
AERMOD ID	Area	Class	State	Stream ID	SOCMI Average Emission Factor lb/hr/ component	LAER Control Efficiency %	VOC wt%	HAP wt%	CH4 wt%	CO wt%	CO2 wt%	Component Count	VOC (tpy)	Ethane (tpy)	Propylene (tpy)	Propane (tpy)	1,3-Butadiene (tpy)	Butane (tpy)	Benzene (tpy)	Toluene (tpy)	Xylenes (tpy)	Ethylbenzene (tpy)	Styrene (tpy)	Naphthalene (tpy)	n-Hexane (tpy)	Methanol (tpy)	Heptane (tpy)	HAP (tpy)	CO (tpy)	CO2e (tpy)	
ECFUG11	190	Valve	GV	Ethylene	0.0132	97	99.84	0	0.1	0	0	2	3.46E-03	2.08E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.71E-05	
ECFUG11	190	Valve	GV	Warm Flare	0.0132	97	1	0	69	0	0	7	1.21E-04	6.07E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.35E-01	
ECFUG11	190	Valve	GV	ECU Worse-case Unit Speciation	0.0132	97	90	47	5	0	0	4	6.24E-03	3.47E-04	3.47E-04	1.39E-03	1.73E-03	0.00E+00	1.04E-03	3.47E-05	3.47E-05	3.47E-05	3.47E-05	3.47E-04	0.00E+00	0.00E+00	0.00E+00	3.26E-03	0.00E+00	9.71E-03	
ECFUG12	590	Valve	GV	Natural Gas	0.0132	97	2.38	0	95.295	0	0	9	3.72E-04	3.63E-04	0.00E+00	1.37E-04	0.00E+00	3.75E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.17E-01	
ECFUG1	101	Valve	LL	ECU Dimethylsulfide	0.0089	97	100	0	0	0	0	7	8.19E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
ECFUG1	102	Valve	LL	ECU Dimethylsulfide	0.0089	97	100	0	0	0	0	23	2.69E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
ECFUG1	103	Valve	LL	ECU Cracked Gas Condensate	0.0089	97	99.17	31.99	0.03	0	0	1	1.16E-03	9.36E-06	1.29E-06	2.34E-07	6.55E-06	0.00E+00	1.76E-04	1.49E-04	2.69E-06	3.16E-05	0.00E+00	7.84E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.74E-04	0.00E+00	9.82E-06
ECFUG1	103	Valve	LL	ECU Dimethylsulfide	0.0089	97	100	0	0	0	0	8	9.36E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG1	104	Valve	LL	ECU Dimethylsulfide	0.0089	97	100	0	0	0	0	7	8.19E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
ECFUG1	105	Valve	LL	ECU Contaminated Process Water	0.0089	97	99.5	3.5	0.5	0	0	4	4.65E-03	0.00E+00	0.00E+00	0.00E+00	2.34E-05	2.34E-05	2.34E-05	2.34E-05	2.34E-05	2.34E-05	2.34E-05	2.34E-05	0.00E+00	0.00E+00	0.00E+00	1.64E-04	0.00E+00	6.55E-04	
ECFUG1	105	Valve	LL	ECU Dimethylsulfide	0.0089	97	100	0	0	0	0	7	8.19E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG1	106	Valve	LL	ECU Contaminated Process Water	0.0089	97	99.5	3.5	0.5	0	0	2	2.33E-03	0.00E+00	0.00E+00	0.00E+00	1.17E-05	0.00E+00	1.17E-05	1.17E-05	1.17E-05	1.17E-05	1.17E-05	1.17E-05	0.00E+00	0.00E+00	0.00E+00	8.19E-05	0.00E+00	3.27E-04	
ECFUG1	106	Valve	LL	ECU Dimethylsulfide	0.0089	97	100	0	0	0	0	7	8.19E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG1	106	Valve	LL	ECU Warm Flare	0.0089	97	1	0	69	0	0	1	1.17E-05	5.85E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.26E-02	
ECFUG1	106	Valve	LL	Pyrolysis Fuel Oil	0.0089	97	100	43.85	0	0	0	2	2.34E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.34E-07	2.13E-05	1.71E-05	4.21E-05	2.02E-04	7.43E-04	0.00E+00	0.00E+00	0.00E+00	1.03E-03	0.00E+00	0.00E+00	
ECFUG1	107	Valve	LL	ECU Dimethylsulfide	0.0089	97	100	0	0	0	0	5	5.85E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG2	136	Valve	LL	ECU Contaminated Process Water	0.0089	97	99.5	3.5	0.5	0	0	33	3.84E-02	0.00E+00	0.00E+00	0.00E+00	1.93E-04	0.00E+00	1.93E-04	1.93E-04	1.93E-04	1.93E-04	1.93E-04	1.93E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.35E-03	0.00E+00	5.40E-03
ECFUG2	136	Valve	LL	ECU Light Gasoline	0.0089	97	98.94	90.85	0	0	0	4	4.63E-03	5.15E-06	2.34E-06	4.68E-07	3.04E-05	2.81E-06	2.31E-03	1.84E-03	5.61E-06	3.46E-05	2.67E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.25E-03	0.00E+00	0.00E+00
ECFUG2	136	Valve	LL	ECU Methanol	0.0089	97	100	100	0	0	0	1	1.17E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-03	0.00E+00	1.17E-03	0.00E+00	0.00E+00	
ECFUG2	136	Valve	LL	ECU Quench Water	0.0089	97	99.5	3.5	0.5	0	0	12	1.40E-02	0.00E+00	0.00E+00	0.00E+00	7.02E-05	7.02E-05	7.02E-05	7.02E-05	7.02E-05	7.02E-05	7.02E-05	7.02E-05	0.00E+00	0.00E+00	0.00E+00	4.91E-04	0.00E+00	1.96E-03	
ECFUG3	128	Valve	LL	Coke/Tar/Water	0.0089	97	99.5	3.5	0.5	0	0	222	2.58E-01	0.00E+00	0.00E+00	0.00E+00	1.30E-03	0.00E+00	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	0.00E+00	0.00E+00	0.00E+00	9.09E-03	0.00E+00	3.63E-02	
ECFUG3	128	Valve	LL	Contaminated Process Water	0.0089	97	99.5	3.5	0.5	0	0	32	3.72E-02	0.00E+00	0.00E+00	0.00E+00	1.87E-04	0.00E+00	1.87E-04	1.87E-04	1.87E-04	1.87E-04	1.87E-04	1.87E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-03	0.00E+00	5.24E-03
ECFUG3	128	Valve	LL	ECU Contaminated Process Water	0.0089	97	99.5	3.5	0.5	0	0	83	9.66E-02	0.00E+00	0.00E+00	0.00E+00	4.85E-04	0.00E+00	4.85E-04	4.85E-04	4.85E-04	4.85E-04	4.85E-04	4.85E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.40E-03	0.00E+00	1.36E-02
ECFUG3	128	Valve	LL	ECU Cracked Gas	0.0089	97	56.94	5.35	5.9	0.03	0	51	3.40E-02	1.96E-02	7.16E-04	1.19E-04	1.07E-03	1.19E-04	1.61E-03	4.77E-04	0.00E+00	5.96E-06	1.19E-05	1.19E-05	0.00E+00	0.00E+00	0.00E+00	3.19E-03	1.79E-05	9.85E-02	
ECFUG3	128	Valve	LL	ECU Gasoline	0.0089	97	98.94	90.85	0	0	0	4	4.63E-03	5.15E-06	2.34E-06	4.68E-07	3.04E-05	2.81E-06	2.31E-03	1.84E-03	5.61E-06	3.46E-05	2.67E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.25E-03	0.00E+00	0.00E+00	
ECFUG3	128	Valve	LL	ECU Light Gasoline	0.0089	97	98.94	90.85	0	0	0	86	9.95E-02	1.11E-04	5.03E-05	1.01E-05	6.54E-04	6.03E-05	4.97E-02	3.96E-02	1.21E-04	7.44E-04	5.73E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.14E-02	0.00E+00	0.00E+00	
ECFUG3	128	Valve	LL	ECU Methanol	0.0089	97	100	100	0	0	0	4	4.68E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.68E-03	0.00E+00	4.68E-03	0.00E+00	0.00E+00	
ECFUG3	128	Valve	LL	ECU Process Water	0.0089	97	99.5	3.5	0.5	0	0	6	6.98E-03	0.00E+00	0.00E+00	0.00E+00	3.51E-05	0.00E+00	3.51E-05	3.51E-05	3.51E-05	3.51E-05	3.51E-05	3.51E-05	0.00E+00	0.00E+00	0.00E+00	2.46E-04	0.00E+00	9.82E-04	
ECFUG3	128	Valve	LL	ECU Pyrolysis Oil	0.0089	97	100	43.85	0	0	0	1	1.17E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-07	1.06E-05	8.54E-06	2.11E-05	1.01E-04	3.71E-04	0.00E+00	0.00E+00	0.00E+00	5.13E-04	0.00E+00	0.00E+00	
ECFUG3	128	Valve	LL	ECU Quench Water	0.0089	97	99.5	3.5	0.5	0	0	190	2.21E-01	0.00E+00	0.00E+00	0.00E+00	1.11E-03	0.00E+00	1.11E-03	1.11E-03	1.11E-03	1.11E-03	1.11E-03	1.11E-03	0.00E+00	0.00E+00	0.00E+00	1.78E-03	0.00E+00	3.11E-02	
ECFUG3	128	Valve	LL	ECU Slop	0.0089	97	64.7	9.7	0	0	0	84	6.36E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.91E-03	9.82E-04	4.91E-04	4.91E-04	4.91E-04	2.16E-03	0.00E+00	0.00E+00	0.00E+00	9.53E-03	0.00E+00	0.00E+00	
ECFUG3	128	Valve	LL	ECU Waste Water	0.0089	97	99.5	3.5	0.5	0	0	2	2.33E-03	0.00E+00	0.00E+00	0.00E+00	1.17E-05	0.00E+00	1.17E-05	1.17E-05	1.17E-05	1.17E-05	1.17E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.19E-05	0.00E+00	3.27E-04	
ECFUG3	128	Valve	LL	Light Gasoline	0.0089	97	98.94	90.85	0	0	0	4	4.63E-03	5.15E-06	2.34E-06	4.68E-07	3.04E-05	2.81E-06	2.31E-03	1.84E-03	5.61E-06	3.46E-05	2.67E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.25E-03	0.00E+00	0.00E+00	
ECFUG4	131	Valve	LL	ECU Cracked Gas	0.0089	97	56.94	5.35	5.9	0.03	0	29	1.93E-02	1.12E-02	4.07E-04	6.78E-05	6.10E-04	6.78E-05	9.16E-04	2.71E-04	0.00E+00	3.39E-06	6.78E-06	6.78E-06	0.00E+00	0.00E+00	0.00E+00	1.81E-03	1.02E-05	5.60E-02	
ECFUG4	131	Valve	LL	ECU Cracked Gas Condensate	0.0089	97	99.17	31.99	0.03	0	0																				

Source ID = 501 Equipment Components (Ethylene Manufacturing Unit)																															
AERMOD ID	Area	Class	State	Stream ID	SOCMI Average Emission Factor lb/hr/ component	LAER Control Efficiency %	VOC wt%	HAP wt%	CH4 wt%	CO wt%	CO2 wt%	Component Count	VOC (tpy)	Ethane (tpy)	Propylene (tpy)	Propane (tpy)	1,3-Butadiene (tpy)	Butane (tpy)	Benzene (tpy)	Toluene (tpy)	Xylenes (tpy)	Ethylbenzene (tpy)	Styrene (tpy)	Naphthalene (tpy)	n-Hexane (tpy)	Methanol (tpy)	Heptane (tpy)	HAP (tpy)	CO (tpy)	CO2e (tpy)	
ECFUG9	143	Valve	LL	ECU Cold Gas Flare	0.0089	97	1	0	69	0	0	1	1.17E-05	5.85E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.26E-02	
ECFUG9	143	Valve	LL	ECU Ethylene	0.0089	97	99.84	0	0.1	0	0	3	3.50E-03	2.11E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.82E-05	
ECFUG9	143	Valve	LL	ECU Flare Liquid	0.0089	97	67.46	20.08	0.93	0	0	6	4.73E-03	2.22E-03	3.71E-04	6.53E-05	9.99E-04	1.31E-04	3.97E-04	1.26E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-03	0.00E+00	1.83E-03
ECFUG9	144	Valve	LL	ECU Cold Gas Flare	0.0089	97	1	0	69	0	0	3	3.51E-05	1.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.78E-02	
ECFUG9	144	Valve	LL	ECU Flare Liquid	0.0089	97	67.46	20.08	0.93	0	0	28	2.21E-02	1.04E-02	1.73E-03	3.05E-04	4.66E-03	6.12E-04	1.85E-03	5.89E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.58E-03	0.00E+00	8.53E-03
ECFUG9	144	Valve	LL	ECU Methanol	0.0089	97	100	100	0	0	0	10	1.17E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-02	0.00E+00	1.17E-02	0.00E+00	0.00E+00
ECFUG9	146	Valve	LL	ECU Cold Gas Flare	0.0089	97	1	0	69	0	0	9	1.05E-04	5.26E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.03E-01	
ECFUG11	125	Valve	LL	ECU Gasoline	0.0089	97	98.94	90.85	0	0	0	2	2.31E-03	2.57E-06	1.17E-06	2.34E-07	1.52E-05	1.40E-06	1.16E-03	9.21E-04	2.81E-06	1.73E-05	1.33E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.12E-03	0.00E+00	0.00E+00	
ECFUG11	125	Valve	LL	ECU Methanol	0.0089	97	100	100	0	0	0	4	4.68E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.68E-03	0.00E+00	4.68E-03	0.00E+00	0.00E+00	
ECFUG11	125	Valve	LL	ECU Quench Water	0.0089	97	99.5	3.5	0.5	0	0	92	1.07E-01	0.00E+00	0.00E+00	0.00E+00	5.38E-04	0.00E+00	5.38E-04	5.38E-04	5.38E-04	5.38E-04	5.38E-04	5.38E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-03	0.00E+00	1.51E-02
ECFUG11	190	Valve	LL	ECU Flare Liquid	0.0089	97	67.46	20.08	0.93	0	0	3	2.37E-03	1.11E-03	1.86E-04	3.26E-05	5.00E-04	6.56E-05	1.99E-04	6.32E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.04E-04	0.00E+00	9.14E-04
ECFUG11	190	Valve	LL	ECU Light Gasoline	0.0089	97	98.94	90.85	0	0	0	7	8.10E-03	9.00E-06	4.09E-06	8.19E-07	5.32E-05	4.91E-06	4.04E-03	3.22E-03	9.82E-06	6.06E-05	4.67E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.44E-03	0.00E+00	0.00E+00	
ECFUG11	190	Valve	LL	ECU Methanol	0.0089	97	100	100	0	0	0	4	4.68E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.68E-03	0.00E+00	4.68E-03	0.00E+00	0.00E+00	
ECFUG11	190	Valve	LL	ECU Spent Caustic	0.0089	97	0.2	0.2	0	0	0	18	4.21E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.11E-05	0.00E+00	0.00E+00	0.00E+00	2.11E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
ECFUG1	101	Connector/Flange	GV	Cracked Gas	0.0039	97	56.94	5.35	5.9	0.03	0	61	1.78E-02	1.03E-02	3.75E-04	6.25E-05	5.63E-04	6.25E-05	8.44E-04	2.50E-04	0.00E+00	3.13E-06	6.25E-06	6.25E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.21E-05	9.38E-06	5.16E-02
ECFUG1	101	Connector/Flange	GV	ECU Ethane Gas	0.0039	97	3.5	0	1.8	0	0	14	2.51E-04	6.79E-03	1.43E-05	1.43E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.62E-03
ECFUG1	101	Connector/Flange	GV	ECU Fuel Gas	0.0039	97	0.24	0	65.06	0.45	0.26	4	4.92E-06	7.38E-06	0.00E+00	1.84E-06	0.00E+00	6.15E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.22E-06	3.73E-02	
ECFUG1	101	Connector/Flange	GV	Ethane	0.0039	97	3.5	0	1.8	0	0	92	1.65E-03	4.46E-02	9.43E-05	9.43E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.38E-02
ECFUG1	101	Connector/Flange	GV	Flare Gas	0.0039	97	1	0	69	0	0	2	1.02E-05	5.12E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.98E-02
ECFUG1	101	Connector/Flange	GV	Fuel Gas	0.0039	97	0.24	0	65.06	0.45	0.26	805	9.90E-04	1.49E-03	0.00E+00	3.71E-04	0.00E+00	1.24E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.86E-03	7.52E+00
ECFUG1	101	Connector/Flange	GV	Natural Gas	0.0039	97	2.38	0	95.295	0	0	122	1.49E-03	1.45E-03	0.00E+00	5.47E-04	0.00E+00	1.50E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E+00
ECFUG1	102	Connector/Flange	GV	Cracked Gas	0.0039	97	56.94	5.35	5.9	0.03	0	40	1.17E-02	6.74E-03	2.46E-04	4.10E-05	3.69E-04	4.10E-05	5.53E-04	1.64E-04	0.00E+00	2.05E-06	4.10E-06	4.10E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-03	6.15E-06	3.39E-02
ECFUG1	102	Connector/Flange	GV	Dimethidisulfide	0.0039	97	100	0	0	0	0	2	1.02E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG1	102	Connector/Flange	GV	ECU Ethane Gas	0.0039	97	3.5	0	1.8	0	0	14	2.51E-04	6.79E-03	1.43E-05	1.43E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.62E-03
ECFUG1	102	Connector/Flange	GV	ECU Fuel Gas	0.0039	97	0.24	0	65.06	0.45	0.26	5	6.15E-06	9.22E-06	0.00E+00	2.31E-06	0.00E+00	7.69E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-05	4.67E-02
ECFUG1	102	Connector/Flange	GV	ECU GN	0.0039	97	2.38	0	95.295	0	0	1	1.22E-05	1.19E-05	0.00E+00	4.48E-06	0.00E+00	1.23E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E-02
ECFUG1	102	Connector/Flange	GV	ECU Hydrocarbon Gas	0.0039	97	38.7	0	61.3	0	0	2	3.97E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.76E-02	
ECFUG1	102	Connector/Flange	GV	Ethane	0.0039	97	3.5	0	1.8	0	0	81	1.45E-03	3.93E-02	8.30E-05	8.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.09E-02	
ECFUG1	102	Connector/Flange	GV	Fuel Gas	0.0039	97	0.24	0	65.06	0.45	0.26	842	1.04E-03	1.55E-03	0.00E+00	3.88E-04	0.00E+00	1.29E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.94E-03	7.86E+00
ECFUG1	102	Connector/Flange	GV	Natural Gas	0.0039	97	2.38	0	95.295	0	0	5	6.10E-05	5.96E-05	0.00E+00	2.24E-05	0.00E+00	6.15E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.84E-02
ECFUG1	103	Connector/Flange	GV	Cracked Gas	0.0039	97	56.94	5.35	5.9	0.03	0	39	1.14E-02	6.58E-03	2.40E-04	4.00E-05	3.60E-04	4.00E-05	5.40E-04	1.60E-04	0.00E+00	2.00E-06	4.00E-06	4.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-03	6.00E-06	3.30E-02
ECFUG1	103	Connector/Flange	GV	ECU Cracked Gas	0.0039	97	56.94	5.35	5.9	0.03	0	17	4.96E-03	2.87E-03	1.05E-04	1.74E-05	1.57E-04	1.74E-05	2.35E-04	6.97E-05	0.00E+00	8.71E-07	1.74E-06	1.74E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.66E-04	2.61E-06	1.44E-02
ECFUG1	103	Connector/Flange	GV	ECU Ethane Gas	0.0039	97	3.5	0	1.8	0	0	15	2.69E-04	7.28E-03	1.54E-05	1.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-03
ECFUG1	103	Connector/Flange	GV	ECU Fuel Gas	0.0039	97	0.24	0	65.06	0.45	0.26	3	3.69E-06	5.53E-06	0.00E+00	1.38E-06	0.00E+00	4.61E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00									

Source ID = 501 Equipment Components (Ethylene Manufacturing Unit)																																
AERMOD ID	Area	Class	State	Stream ID	SOCMI Average Emission Factor lb/hr/ component	LAER Control Efficiency %	VOC wt%	HAP wt%	CH4 wt%	CO wt%	CO2 wt%	Component Count	VOC (tpy)	Ethane (tpy)	Propylene (tpy)	Propane (tpy)	1,3-Butadiene (tpy)	Butane (tpy)	Benzene (tpy)	Toluene (tpy)	Xylenes (tpy)	Ethylbenzene (tpy)	Styrene (tpy)	Naphthalene (tpy)	n-Hexane (tpy)	Methanol (tpy)	Heptane (tpy)	HAP (tpy)	CO (tpy)	CO2e (tpy)		
ECFUG9	146	Connector/Flange	GV	Propane	0.0039	97	99.6	0	0	0	0	699	3.57E-01	1.43E-03	0.00E+00	3.48E-01	0.00E+00	3.83E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
ECFUG9	146	Connector/Flange	GV	Regen Gas	0.0039	97	0.06	0	61.31	0.53	0	1	3.07E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.72E-06	8.80E-03	
ECFUG9	148	Connector/Flange	GV	ECU Tail Gas/ Exhaust Gas	0.0039	97	1	0	61	0.08	0	1	5.12E-06	5.12E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.10E-07	8.75E-03	
ECFUG9	148	Connector/Flange	GV	Flare Gas	0.0039	97	1	0	69	0	0	135	6.92E-04	3.46E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.34E+00	
ECFUG9	148	Connector/Flange	GV	Natural Gas	0.0039	97	2.38	0	95.295	0	0	13	1.59E-04	1.55E-04	0.00E+00	5.83E-05	0.00E+00	1.60E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.78E-01		
ECFUG9	148	Connector/Flange	GV	Tail Gas	0.0039	97	1	0	61	0.08	0	185	9.48E-04	9.48E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.58E-05	1.62E+00	
ECFUG11	125	Connector/Flange	GV	Ethane	0.0039	97	3.5	0	1.8	0	0	448	8.04E-03	2.17E-01	4.59E-04	4.59E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-01	
ECFUG11	125	Connector/Flange	GV	Ethylene	0.0039	97	99.84	0	0.1	0	0	8	4.09E-03	2.46E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-04		
ECFUG11	125	Connector/Flange	GV	Flare Gas	0.0039	97	1	0	69	0	0	66	3.38E-04	1.69E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.53E-01	
ECFUG11	190	Connector/Flange	GV	ECU Ethylene	0.0039	97	99.84	0	0.1	0	0	1	5.12E-04	3.07E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-05	
ECFUG11	190	Connector/Flange	GV	ECU GN	0.0039	97	2.38	0	95.295	0	0	1	1.22E-05	1.19E-05	0.00E+00	4.48E-06	0.00E+00	1.23E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E-02	
ECFUG11	190	Connector/Flange	GV	Flare Gas	0.0039	97	1	0	69	0	0	115	5.89E-04	2.95E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E+00	
ECFUG12	590	Connector/Flange	GV	Natural Gas	0.0039	97	2.38	0	95.295	0	0	23	2.81E-04	2.74E-04	0.00E+00	1.03E-04	0.00E+00	2.83E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.14E-01	
ECFUG1	101	Connector/Flange	LL	Dimethidisulfide	0.0005	97	100	0	0	0	0	11	7.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
ECFUG1	102	Connector/Flange	LL	Dimethidisulfide	0.0005	97	100	0	0	0	0	13	8.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
ECFUG1	102	Connector/Flange	LL	ECU Dimethyisulfide	0.0005	97	100	0	0	0	0	4	2.63E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
ECFUG1	103	Connector/Flange	LL	ECU Dimethyisulfide	0.0005	97	100	0	0	0	0	1	6.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
ECFUG1	105	Connector/Flange	LL	ECU Contaminated Process Water	0.0005	97	99.5	3.5	0.5	0	0	11	7.19E-04	0.00E+00	0.00E+00	0.00E+00	3.61E-06	3.61E-06	3.61E-06	3.61E-06	3.61E-06	3.61E-06	3.61E-06	3.61E-06	3.61E-06	3.61E-06	3.61E-06	3.61E-06	2.53E-05	0.00E+00	1.01E-04	
ECFUG1	106	Connector/Flange	LL	Coke/Tar/Water	0.0005	97	99.5	3.5	0.5	0	0	6	3.92E-04	0.00E+00	0.00E+00	0.00E+00	1.97E-06	0.00E+00	1.97E-06	1.97E-06	1.97E-06	1.97E-06	1.97E-06	1.97E-06	1.97E-06	1.97E-06	1.97E-06	1.97E-06	1.38E-05	0.00E+00	5.52E-05	
ECFUG1	106	Connector/Flange	LL	Pyrolysis Fuel Oil	0.0005	97	100	43.85	0	0	0	7	4.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.60E-08	4.36E-06	4.19E-06	8.28E-06	3.98E-05	1.46E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E-04	0.00E+00	0.00E+00	
ECFUG2	136	Connector/Flange	LL	Contaminated Process Water	0.0005	97	99.5	3.5	0.5	0	0	79	5.16E-03	0.00E+00	0.00E+00	0.00E+00	2.60E-05	0.00E+00	2.60E-05	2.60E-05	2.60E-05	2.60E-05	2.60E-05	2.60E-05	2.60E-05	2.60E-05	2.60E-05	2.60E-05	1.82E-04	0.00E+00	7.27E-04	
ECFUG2	136	Connector/Flange	LL	Light Gasoline	0.0005	97	98.94	90.85	0	0	0	18	1.17E-03	1.30E-06	5.91E-07	1.18E-07	7.69E-06	7.10E-07	5.84E-04	4.65E-04	1.42E-06	8.75E-06	6.74E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-03	0.00E+00	0.00E+00
ECFUG2	136	Connector/Flange	LL	Methanol	0.0005	97	100	100	0	0	0	1	6.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.57E-05	0.00E+00	0.00E+00	
ECFUG2	136	Connector/Flange	LL	Quench Water	0.0005	97	99.5	3.5	0.5	0	0	39	2.55E-03	0.00E+00	0.00E+00	0.00E+00	1.28E-05	0.00E+00	1.28E-05	1.28E-05	1.28E-05	1.28E-05	1.28E-05	1.28E-05	1.28E-05	1.28E-05	1.28E-05	1.28E-05	0.00E+00	0.00E+00	3.59E-04	
ECFUG3	128	Connector/Flange	LL	Coke/Tar/Water	0.0005	97	99.5	3.5	0.5	0	0	396	2.59E-02	0.00E+00	0.00E+00	0.00E+00	1.30E-04	0.00E+00	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	9.11E-04	0.00E+00	3.64E-03	
ECFUG3	128	Connector/Flange	LL	Contaminated Process Water	0.0005	97	99.5	3.5	0.5	0	0	38	2.48E-03	0.00E+00	0.00E+00	0.00E+00	1.25E-05	0.00E+00	1.25E-05	1.25E-05	1.25E-05	1.25E-05	1.25E-05	1.25E-05	1.25E-05	1.25E-05	1.25E-05	1.25E-05	8.74E-05	0.00E+00	3.50E-04	
ECFUG3	128	Connector/Flange	LL	ECU Contaminated Process Water	0.0005	97	99.5	3.5	0.5	0	0	4	2.61E-04	0.00E+00	0.00E+00	0.00E+00	1.31E-06	0.00E+00	1.31E-06	1.31E-06	1.31E-06	1.31E-06	1.31E-06	1.31E-06	1.31E-06	1.31E-06	1.31E-06	1.31E-06	0.00E+00	0.00E+00	3.68E-05	
ECFUG3	128	Connector/Flange	LL	ECU Cracked Gas	0.0005	97	56.94	5.35	5.9	0.03	0	16	5.99E-04	3.46E-04	1.26E-05	2.10E-06	1.89E-05	2.10E-06	2.84E-05	8.41E-06	0.00E+00	1.05E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	5.62E-05	3.15E-07	1.74E-03	
ECFUG3	128	Connector/Flange	LL	ECU Light Gasoline	0.0005	97	98.94	90.85	0	0	0	134	8.71E-03	9.68E-06	4.40E-06	8.80E-07	5.72E-05	5.28E-06	4.35E-03	3.47E-03	1.06E-05	6.51E-05	5.02E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.00E-03	0.00E+00	0.00E+00	
ECFUG3	128	Connector/Flange	LL	ECU Process Water	0.0005	97	99.5	3.5	0.5	0	0	7	4.58E-04	0.00E+00	0.00E+00	0.00E+00	2.30E-06	0.00E+00	2.30E-06	2.30E-06	2.30E-06	2.30E-06	2.30E-06	2.30E-06	2.30E-06	2.30E-06	2.30E-06	2.30E-06	1.61E-05	0.00E+00	6.44E-05	
ECFUG3	128	Connector/Flange	LL	ECU Pyrolysis Oil	0.0005	97	100	43.85	0	0	0	2	1.31E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-08	1.20E-06	9.59E-07	2.37E-06	1.14E-05	4.17E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.76E-05	0.00E+00	0.00E+00	
ECFUG3	128	Connector/Flange	LL	ECU Quench Water	0.0005	97	99.5	3.5	0.5	0	0	313	2.05E-02	0.00E+00	0.00E+00	0.00E+00	1.03E-04	0.00E+00	1.03E-04	1.03E-04	1.03E-04	1.03E-04	1.03E-04	1.03E-04	1.03E-04	1.03E-04	1.03E-04	0.00E+00	0.00E+00	2.88E-03		
ECFUG3	128	Connector/Flange	LL	ECU Slop	0.0005	97	64.7	9.7	0	0	0	62	2.64E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.04E-04	4.07E-05	2.04E-05	2.04E-05	2.04E-05	2.04E-05	2.04E-05	2.04E-05	2.04E-05	8.96E-05	0.00E+00	3.95E-04	0.00E+00	
ECFUG3	128	Connector/Flange	LL	ECU Waste Water	0.0005	97	99.5	3.5	0.5	0	0	8	5.23E-04																			

Source ID = 501 Equipment Components (Ethylene Manufacturing Unit)																														
AERMOD ID	Area	Class	State	Stream ID	SOCMI Average Emission Factor lb/hr/ component	LAER Control Efficiency %	VOC wt%	HAP wt%	CH4 wt%	CO wt%	CO2 wt%	Component Count	VOC (tpy)	Ethane (tpy)	Propylene (tpy)	Propane (tpy)	1,3-Butadiene (tpy)	Butane (tpy)	Benzene (tpy)	Toluene (tpy)	Xylenes (tpy)	Ethylbenzene (tpy)	Styrene (tpy)	Naphthalene (tpy)	n-Hexane (tpy)	Methanol (tpy)	Heptane (tpy)	HAP (tpy)	CO (tpy)	CO2e (tpy)
ECFUG11	125	Connector/Flange	LL	Dimethidisulfide	0.0005	97	100	0	0	0	0	14	9.20E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG11	125	Connector/Flange	LL	Gasoline	0.0005	97	98.94	90.85	0	0	0	8	5.20E-04	5.78E-07	2.63E-07	5.26E-08	3.42E-06	3.15E-07	2.60E-04	2.07E-04	6.31E-07	3.89E-06	3.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG11	125	Connector/Flange	LL	Methanol	0.0005	97	100	100	0	0	0	10	6.57E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG11	125	Connector/Flange	LL	Quench Water	0.0005	97	99.5	3.5	0.5	0	0	132	8.63E-03	0.00E+00	0.00E+00	0.00E+00	4.34E-05	0.00E+00	4.34E-05	4.34E-05	4.34E-05	4.34E-05	4.34E-05	4.34E-05	4.34E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG11	190	Connector/Flange	LL	Methanol	0.0005	97	100	100	0	0	0	9	5.91E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG1	105	Relief Valve	GV	ECU Hydrocarbon Gas	0.2293	100	38.7	0	61.3	0	0	6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG1	106	Relief Valve	GV	ECU Worse-case Unit Speciation	0.2293	100	90	47	5	0	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG1	107	Relief Valve	GV	ECU Flare Gas	0.2293	97	1	0	69	0	0	1	3.01E-04	1.51E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG1	107	Relief Valve	GV	ECU Flare Gas	0.2293	100	1	0	69	0	0	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG1	107	Relief Valve	GV	ECU Warm Flare	0.2293	100	1	0	69	0	0	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG2	136	Relief Valve	GV	ECU Gas to Flare CVS	0.2293	97	1	0	69	0	0	2	6.03E-04	3.01E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG2	136	Relief Valve	GV	ECU Gas to Flare CVS	0.2293	100	1	0	69	0	0	9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG2	184	Relief Valve	GV	ECU Gas to Flare CVS	0.2293	97	1	0	69	0	0	1	3.01E-04	1.51E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG2	184	Relief Valve	GV	ECU Gas to Flare CVS	0.2293	100	1	0	69	0	0	8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG3	128	Relief Valve	GV	ECU Flare Gas	0.2293	97	1	0	69	0	0	3	9.04E-04	4.52E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG3	128	Relief Valve	GV	ECU Flare Gas	0.2293	100	1	0	69	0	0	12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG3	174	Relief Valve	GV	ECU Cracked Gas	0.2293	100	56.94	5.35	5.9	0.03	0	17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG4	131	Relief Valve	GV	ECU C2 Fraction	0.2293	97	89.98	4.44	0	0	0	1	2.71E-02	3.01E-03	2.41E-05	1.51E-05	1.51E-04	4.22E-05	3.01E-06	5.63E-04	5.66E-04	5.42E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG4	131	Relief Valve	GV	ECU C2 Fraction	0.2293	100	89.98	4.44	0	0	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG4	131	Relief Valve	GV	ECU Cracked Gas	0.2293	97	56.94	5.35	5.9	0.03	0	6	1.03E-01	5.95E-02	2.17E-03	3.62E-04	3.25E-03	3.62E-04	4.88E-03	1.45E-03	5.66E-04	1.81E-05	3.62E-05	3.62E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG4	131	Relief Valve	GV	ECU Cracked Gas	0.2293	100	56.94	5.35	5.9	0.03	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG4	131	Relief Valve	GV	ECU Flare Gas	0.2293	97	1	0	69	0	0	3	9.04E-04	4.52E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG4	131	Relief Valve	GV	ECU Gas to Flare CVS	0.2293	100	1	0	69	0	0	15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG4	131	Relief Valve	GV	ECU Warm Flare	0.2293	100	1	0	69	0	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG5	188	Relief Valve	GV	ECU Flare Gas	0.2293	97	1	0	69	0	0	1	3.01E-04	1.51E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG5	188	Relief Valve	GV	ECU Flare Gas	0.2293	100	1	0	69	0	0	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG6	158	Relief Valve	GV	ECU Flare Gas	0.2293	100	1	0	69	0	0	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG7	138	Relief Valve	GV	ECU Flare Gas	0.2293	97	1	0	69	0	0	6	1.81E-03	9.04E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG7	138	Relief Valve	GV	ECU Gas to Flare CVS	0.2293	97	1	0	69	0	0	1	3.01E-04	1.51E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG9	143	Relief Valve	GV	ECU Flare Gas	0.2293	97	1	0	69	0	0	5	1.51E-03	7.53E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG9	143	Relief Valve	GV	ECU Flare Gas	0.2293	100	1	0	69	0	0	21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG9	144	Relief Valve	GV	ECU Ethylene	0.2293	97	99.84	0	0.1	0	0	1	3.01E-02	1.81E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
ECFUG9	144	Relief Valve	GV	ECU Flare Gas	0.2293	97	1	0	69	0	0	2	6.03E-04	3.01E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG9	144	Relief Valve	GV	ECU Flare Gas	0.2293	100	1	0	69	0	0	11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ECFUG9	146	Relief Valve	GV	ECU C2 Fraction	0.2293	97	89.98	4.44	0	0	0	1	2.71E-02	3.04E-03	2.41E-05	1.51E-05	1.51E-04	4.22E-05	3.01E-06	5.63E-04	5.66E-04	5.42E-05	0.00E+00	0.00E+00	0.00E+00	0.00E				

Source ID = 501 Equipment Components (Polyethylene Manufacturing Units 1 and 2)																
AERMOD ID	Area	Equipment	State	Stream ID	SOCMI Average Emission Factor lb/hr/ component	LAER Control Efficiency %	VOC wt%	HAP wt%	CH4 wt%	CO wt%	CO2 wt%	Component Count	VOC (tpy)	HAP (tpy)	CO (tpy)	CO2e (tpy)
-	-	Valve	GV	Conveying Gas	0.0132	97	97.945	0	0.565	0	0	18	3.06E-02	0.00E+00	0.00E+00	4.94E-03
-	-	Valve	GV	Cycle Gas	0.0132	97	93.79	0	1.45	0	0	201	3.27E-01	0.00E+00	0.00E+00	1.42E-01
-	-	Valve	GV	Ethylene	0.0132	97	100	0	0	0	0	159	2.76E-01	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	GV	Hexene	0.0132	97	100	0	0	0	0	4	6.94E-03	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	GV	Natural Gas	0.0132	97	2.38	0	95.295	0	0	9	3.72E-04	0.00E+00	0.00E+00	4.17E-01
-	-	Valve	GV	PE12 Blowdown	0.0132	97	98.724	0	0.291	0	0	1	1.71E-03	0.00E+00	0.00E+00	1.41E-04
-	-	Valve	GV	PE12 Butene	0.0132	97	100	0	0	0	0	5	8.67E-03	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	GV	PE12 Butene Reaction	0.0132	97	100	0	0	0	0	35	6.07E-02	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	GV	PE12 Conveying Gas	0.0132	97	97.945	0	0.565	0	0	111	1.89E-01	0.00E+00	0.00E+00	3.05E-02
-	-	Valve	GV	PE12 Cycle Gas	0.0132	97	93.79	0	1.45	0	0	182	2.96E-01	0.00E+00	0.00E+00	1.28E-01
-	-	Valve	GV	PE12 Ethylene	0.0132	97	100	0	0	0	0	247	4.28E-01	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	GV	PE12 Flare	0.0132	97	98.724	0	0.291	0	0	157	2.69E-01	0.00E+00	0.00E+00	2.22E-02
-	-	Valve	GV	PE12 Flare Gas CVS	0.0132	97	98.724	0	0.291	0	0	976	1.67E+00	0.00E+00	0.00E+00	1.38E-01
-	-	Valve	GV	PE12 GN	0.0132	97	2.38	0	95.295	0	0	45	1.86E-03	0.00E+00	0.00E+00	2.08E+00
-	-	Valve	GV	PE12 Hydrocarbon Gas	0.0132	97	93.79	0	1.45	0	0	51	8.30E-02	0.00E+00	0.00E+00	3.59E-02
-	-	Valve	GV	PE12 ICA	0.0132	97	100	0	0	0	0	1	1.73E-03	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	GV	PE12 Process Gas	0.0132	97	93.79	0	1.45	0	0	56	9.11E-02	0.00E+00	0.00E+00	3.94E-02
-	-	Valve	GV	PE12 Propane	0.0132	97	100	0	0	0	0	6	1.04E-02	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	GV	PE12 Recovered Gas	0.0132	97	99.48	0	0.02	0	0	27	4.66E-02	0.00E+00	0.00E+00	2.62E-04
-	-	Valve	GV	PE12 Recovery Gas	0.0132	97	99.48	0	0.02	0	0	138	2.38E-01	0.00E+00	0.00E+00	1.34E-03
-	-	Valve	GV	PE12 Recycle Gas	0.0132	97	99.491	0	0.02	0	0	15	2.59E-02	0.00E+00	0.00E+00	1.46E-04
-	-	Valve	GV	PE12 Vent Gas	0.0132	97	98.724	0	0.291	0	0	8	1.37E-02	0.00E+00	0.00E+00	1.13E-03
-	-	Valve	GV	PE12 Worse-case Unit Speciation	0.0132	97	100	0	0	0	0	63	1.09E-01	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	LL	Butene	0.0089	97	100	0	0	0	0	203	2.37E-01	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	LL	Flare	0.0089	97	98.724	0	0.291	0	0	34	3.93E-02	0.00E+00	0.00E+00	3.24E-03
-	-	Valve	LL	Hexene	0.0089	97	100	0	0	0	0	179	2.09E-01	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	LL	ICA	0.0089	97	100	0	0	0	0	184	2.15E-01	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	LL	Isopentane	0.0089	97	100	0	0	0	0	41	4.79E-02	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	LL	PE12 Blowdown	0.0089	97	98.724	0	0.291	0	0	5	5.77E-03	0.00E+00	0.00E+00	4.76E-04
-	-	Valve	LL	PE12 Butene	0.0089	97	100	0	0	0	0	9	1.05E-02	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	LL	PE12 Comonomer	0.0089	97	100	0	0	0	0	119	1.39E-01	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	LL	PE12 Cycle Gas	0.0089	97	93.79	0	1.45	0	0	140	1.54E-01	0.00E+00	0.00E+00	6.65E-02
-	-	Valve	LL	PE12 Ethylene	0.0089	97	100	0	0	0	0	20	2.34E-02	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	LL	PE12 Flare	0.0089	97	98.724	0	0.291	0	0	99	1.14E-01	0.00E+00	0.00E+00	9.43E-03
-	-	Valve	LL	PE12 Flare Gas CVS	0.0089	97	98.724	0	0.291	0	0	1	1.15E-03	0.00E+00	0.00E+00	9.53E-05
-	-	Valve	LL	PE12 ICA	0.0089	97	100	0	0	0	0	125	1.46E-01	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	LL	PE12 Isopentane	0.0089	97	100	0	0	0	0	7	8.19E-03	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	LL	PE12 Process Gas	0.0089	97	93.79	0	1.45	0	0	57	6.25E-02	0.00E+00	0.00E+00	2.71E-02
-	-	Valve	LL	PE12 Propane	0.0089	97	100	0	0	0	0	1	1.17E-03	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	LL	PE12 Recovered Liquid	0.0089	97	99.48	0	0.02	0	0	240	2.79E-01	0.00E+00	0.00E+00	1.57E-03
-	-	Valve	LL	PE12 Recycle Ethylene	0.0089	97	100	0	0	0	0	2	2.34E-03	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	LL	Process Gas	0.0089	97	93.79	0	1.45	0	0	160	1.75E-01	0.00E+00	0.00E+00	7.60E-02
-	-	Valve	LL	Process Hydrocarbon	0.0089	97	93.79	0	1.45	0	0	10	1.10E-02	0.00E+00	0.00E+00	4.75E-03
-	-	Valve	LL	Propane	0.0089	97	100	0	0	0	0	104	1.22E-01	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	LL	Recovered Liquid	0.0089	97	98.23	0	0.02	0	0	391	4.49E-01	0.00E+00	0.00E+00	2.56E-03
-	-	Valve	LL	PE12 Worse-case Unit Speciation	0.0089	97	100	0	0	0	0	36	4.21E-02	0.00E+00	0.00E+00	0.00E+00

Source ID = 501 Equipment Components (Polyethylene Manufacturing Units 1 and 2)																
AERMOD ID	Area	Equipment	State	Stream ID	SOCMI Average Emission Factor lb/hr/ component	LAER Control Efficiency %	VOC wt%	HAP wt%	CH4 wt%	CO wt%	CO2 wt%	Component Count	VOC (tpy)	HAP (tpy)	CO (tpy)	CO2e (tpy)
-	-	Connector/Flange	GV	Butene Reaction	0.0039	97	100	0	0	0	0	73	3.74E-02	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	GV	Conveying Gas	0.0039	97	97.945	0	0.565	0	0	188	9.44E-02	0.00E+00	0.00E+00	1.52E-02
-	-	Connector/Flange	GV	Cycle Gas	0.0039	97	93.79	0	1.45	0	0	565	2.72E-01	0.00E+00	0.00E+00	1.18E-01
-	-	Connector/Flange	GV	Ethylene	0.0039	97	100	0	0	0	0	254	1.30E-01	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	GV	Flare	0.0039	97	98.724	0	0.291	0	0	422	2.13E-01	0.00E+00	0.00E+00	1.76E-02
-	-	Connector/Flange	GV	Hexene	0.0039	97	100	0	0	0	0	9	4.61E-03	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	GV	Hydrocarbon Gas	0.0039	97	93.79	0	1.45	0	0	42	2.02E-02	0.00E+00	0.00E+00	8.74E-03
-	-	Connector/Flange	GV	PE12 Blowdown	0.0039	97	98.724	0	0.291	0	0	19	9.61E-03	0.00E+00	0.00E+00	7.93E-04
-	-	Connector/Flange	GV	PE12 Butene	0.0039	97	100	0	0	0	0	93	4.77E-02	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	GV	PE12 Comonomer	0.0039	97	99.8	0	0	0	0	173	8.85E-02	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	GV	PE12 Conveying Gas	0.0039	97	97.945	0	0.565	0	0	86	4.32E-02	0.00E+00	0.00E+00	6.97E-03
-	-	Connector/Flange	GV	PE12 Cycle Gas	0.0039	97	93.79	0	1.45	0	0	410	1.97E-01	0.00E+00	0.00E+00	8.53E-02
-	-	Connector/Flange	GV	PE12 Flare	0.0039	97	98.724	0	0.291	0	0	963	4.87E-01	0.00E+00	0.00E+00	4.02E-02
-	-	Connector/Flange	GV	PE12 Ethylene	0.0039	97	100	0	0	0	0	341	1.75E-01	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	GV	PE12 Flare Gas CVS	0.0039	97	98.724	0	0.291	0	0	1,055	5.34E-01	0.00E+00	0.00E+00	4.41E-02
-	-	Connector/Flange	GV	PE12 GN	0.0039	97	2.38	0	95.295	0	0	74	9.03E-04	0.00E+00	0.00E+00	1.01E+00
-	-	Connector/Flange	GV	PE12 Hydrocarbon Gas	0.0039	97	93.79	0	1.45	0	0	54	2.60E-02	0.00E+00	0.00E+00	1.12E-02
-	-	Connector/Flange	GV	PE12 ICA	0.0039	97	100	0	0	0	0	136	6.97E-02	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	GV	PE12 Isopentane	0.0039	97	100	0	0	0	0	2	1.02E-03	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	GV	PE12 Process Gas	0.0039	97	93.79	0	1.45	0	0	696	3.35E-01	0.00E+00	0.00E+00	1.45E-01
-	-	Connector/Flange	GV	PE12 Process Hydrocarbon	0.0039	97	93.79	0	1.45	0	0	2	9.61E-04	0.00E+00	0.00E+00	4.16E-04
-	-	Connector/Flange	GV	PE12 Propane	0.0039	97	100	0	0	0	0	44	2.25E-02	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	GV	PE12 Recovered Gas	0.0039	97	99.48	0	0.02	0	0	103	5.25E-02	0.00E+00	0.00E+00	2.96E-04
-	-	Connector/Flange	GV	PE12 Recovery Gas	0.0039	97	99.48	0	0.02	0	0	218	1.11E-01	0.00E+00	0.00E+00	6.26E-04
-	-	Connector/Flange	GV	PE12 Recycle Gas	0.0039	97	99.491	0	0.02	0	0	3	1.53E-03	0.00E+00	0.00E+00	8.61E-06
-	-	Connector/Flange	GV	PE12 Vent Gas	0.0039	97	98.724	0	0.291	0	0	42	2.12E-02	0.00E+00	0.00E+00	1.75E-03
-	-	Connector/Flange	GV	Natural Gas	0.0039	97	2.38	0	95.295	0	0	41	5.00E-04	0.00E+00	0.00E+00	5.61E-01
-	-	Connector/Flange	GV	PE12 Worse-case Unit Speciation	0.0039	97	100	0	0	0	0	311	1.59E-01	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	GV	Process Gas	0.0039	97	93.79	0	1.45	0	0	238	1.14E-01	0.00E+00	0.00E+00	4.95E-02
-	-	Connector/Flange	GV	Process Hydrocarbon	0.0039	97	93.79	0	1.45	0	0	9	4.33E-03	0.00E+00	0.00E+00	1.87E-03
-	-	Connector/Flange	GV	Recycle Gas	0.0039	97	99.491	0	0.02	0	0	33	1.68E-02	0.00E+00	0.00E+00	9.47E-05
-	-	Connector/Flange	GV	Vent Gas	0.0039	97	98.724	0	0.291	0	0	16	8.09E-03	0.00E+00	0.00E+00	6.68E-04
-	-	Connector/Flange	LL	Butene	0.0005	97	100	0	0	0	0	272	1.79E-02	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	LL	Ethylene	0.0005	97	100	0	0	0	0	229	1.50E-02	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	LL	Flare	0.0005	97	98.724	0	0.291	0	0	4	2.59E-04	0.00E+00	0.00E+00	2.14E-05
-	-	Connector/Flange	LL	Hexene	0.0005	97	100	0	0	0	0	281	1.85E-02	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	LL	ICA	0.0005	97	100	0	0	0	0	439	2.88E-02	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	LL	Isopentane	0.0005	97	100	0	0	0	0	89	5.85E-03	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	LL	PE12 Blowdown	0.0005	97	98.724	0	0.291	0	0	12	7.78E-04	0.00E+00	0.00E+00	6.42E-05
-	-	Connector/Flange	LL	PE12 Butene	0.0005	97	100	0	0	0	0	79	5.19E-03	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	LL	PE12 Comonomer	0.0005	97	99.8	0	0	0	0	60	3.93E-03	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	LL	PE12 Cycle Gas	0.0005	97	93.79	0	1.45	0	0	7	4.31E-04	0.00E+00	0.00E+00	1.87E-04
-	-	Connector/Flange	LL	PE12 Hexene LL	0.0005	97	100	0	0	0	0	65	4.27E-03	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	LL	PE12 ICA	0.0005	97	100	0	0	0	0	41	2.69E-03	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	LL	PE12 Isopentane	0.0005	97	100	0	0	0	0	5	3.29E-04	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	LL	PE12 Process Gas	0.0005	97	93.79	0	1.45	0	0	1	6.16E-05	0.00E+00	0.00E+00	2.67E-05
-	-	Connector/Flange	LL	PE12 Propane	0.0005	97	100	0	0	0	0	17	1.12E-03	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	LL	PE12 Recovered Liquid	0.0005	97	99.48	0	0.02	0	0	753	4.92E-02	0.00E+00	0.00E+00	2.77E-04
-	-	Connector/Flange	LL	PE12 Recovered Oil	0.0005	97	100	0	0	0	0	9	5.91E-04	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	LL	Propane	0.0005	97	100	0	0	0	0	205	1.35E-02	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	LL	Recovered Liquid	0.0005	97	98.23	0	0.02	0	0	301	1.94E-02	0.00E+00	0.00E+00	1.11E-04
-	-	Connector/Flange	LL	PE12 Worse-case Unit Speciation	0.0005	97	100	0	0	0	0	4	2.63E-04	0.00E+00	0.00E+00	0.00E+00

Source ID = 501 Equipment Components (Polyethylene Manufacturing Units 1 and 2)																	
AERMOD ID	Area	Equipment	State	Stream ID	SOCMI Average Emission Factor lb/hr/ component	LAER Control Efficiency %	VOC wt%	HAP wt%	CH4 wt%	CO wt%	CO2 wt%	Component Count	VOC (tpy)	HAP (tpy)	CO (tpy)	CO2e (tpy)	
-	-	Relief Valve	GV	Cycle Gas	0.2293	97	93.79	0	1.45	0	0	5	1.41E-01	0.00E+00	0.00E+00	6.12E-02	
-	-	Relief Valve	GV	PE12 Ethylene	0.2293	97	100	0	0	0	0	1	3.01E-02	0.00E+00	0.00E+00	0.00E+00	
-	-	Relief Valve	GV	PE12 Ethylene	0.2293	100	100	0	0	0	0	3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
-	-	Relief Valve	GV	PE12 Butene Reaction	0.2293	100	100	0	0	0	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
-	-	Relief Valve	GV	PE12 Cycle Gas	0.2293	97	93.79	0	1.45	0	0	1	2.83E-02	0.00E+00	0.00E+00	1.22E-02	
-	-	Relief Valve	GV	PE12 Cycle Gas	0.2293	100	93.79	0	1.45	0	0	3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
-	-	Relief Valve	GV	PE12 Flare	0.2293	97	98.724	0	0.291	0	0	2	5.95E-02	0.00E+00	0.00E+00	4.91E-03	
-	-	Relief Valve	GV	PE12 Flare	0.2293	100	98.724	0	0.291	0	0	3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
-	-	Relief Valve	GV	PE12 Flare Gas CVS	0.2293	97	98.724	0	0.291	0	0	2	5.95E-02	0.00E+00	0.00E+00	4.91E-03	
-	-	Relief Valve	GV	PE12 Flare Gas CVS	0.2293	100	98.724	0	0.291	0	0	66	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
-	-	Relief Valve	GV	PE12 Hydrocarbon Gas	0.2293	97	93.79	0	1.45	0	0	1	2.83E-02	0.00E+00	0.00E+00	1.22E-02	
-	-	Relief Valve	GV	PE12 Recovered Gas	0.2293	97	99.48	0	0.02	0	0	4	1.20E-01	0.00E+00	0.00E+00	6.75E-04	
-	-	Relief Valve	GV	PE12 Recovery Gas	0.2293	97	99.48	0	0.02	0	0	1	3.00E-02	0.00E+00	0.00E+00	1.69E-04	
-	-	Relief Valve	GV	PE12 Vent Gas	0.2293	97	98.724	0	0.291	0	0	1	2.97E-02	0.00E+00	0.00E+00	2.45E-03	
-	-	Relief Valve	GV	Process Gas	0.2293	97	93.79	0	1.45	0	0	3	8.48E-02	0.00E+00	0.00E+00	3.67E-02	
-	-	Relief Valve	GV	Process Gas	0.2293	100	93.79	0	1.45	0	0	11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
-	-	Relief Valve	LL	Flare	0.2293	100	98.724	0	0.291	0	0	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
-	-	Relief Valve	LL	ICA	0.2293	97	100	0	0	0	0	3	9.04E-02	0.00E+00	0.00E+00	0.00E+00	
-	-	Relief Valve	LL	PE12 Cycle Gas	0.2293	97	93.79	0	1.45	0	0	2	5.65E-02	0.00E+00	0.00E+00	2.45E-02	
-	-	Relief Valve	LL	PE12 Flare	0.2293	100	98.724	0	0.291	0	0	8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
-	-	Relief Valve	LL	PE12 ICA	0.2293	97	100	0	0	0	0	2	6.03E-02	0.00E+00	0.00E+00	0.00E+00	
-	-	Relief Valve	LL	PE12 Worse-case Unit Speciation	0.2293	97	100	0	0	0	0	2	6.03E-02	0.00E+00	0.00E+00	0.00E+00	
-	-	Relief Valve	LL	Propane	0.2293	100	100	0	0	0	0	4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
-	-	Pump	LL	Butene	0.0439	93	100	0	0	0	0	1	1.35E-02	0.00E+00	0.00E+00	0.00E+00	
-	-	Pump	LL	ICA	0.0439	93	100	0	0	0	0	1	1.35E-02	0.00E+00	0.00E+00	0.00E+00	
-	-	Pump	LL	PE12 ICA	0.0439	93	100	0	0	0	0	2	2.69E-02	0.00E+00	0.00E+00	0.00E+00	
-	-	Pump	LL	PE12 Recovered Liquid	0.0439	93	99.48	0	0.02	0	0	3	4.02E-02	0.00E+00	0.00E+00	2.26E-04	
-	-	Pump	LL	PE12 Recovered Oil	0.0439	93	100	0	0	0	0	1	1.35E-02	0.00E+00	0.00E+00	0.00E+00	
-	-	Pump	LL	Recovered Liquid	0.0439	93	98.23	0	0.02	0	0	2	2.64E-02	0.00E+00	0.00E+00	1.51E-04	
-	-	Compressor	GV	PE12 Propane	0.5027	100	100	0	0	0	0	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
-	-	Compressor	GV	PE12 Flare	0.5027	100	98.724	0	0.291	0	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
-	-	Compressor	GV	PE12 Process Gas	0.5027	100	93.79	0	1.45	0	0	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
													14,416	11.18	0.00E+00	0.00E+00	5.5

Source ID = 501 Equipment Components (Polyethylene Manufacturing Unit 3)																	
AERMOD ID	Area	Equipment	State	Stream ID	SOCMI Average Emission Factor lb/hr/ component	LAER Control Efficiency %	VOC wt%	HAP wt%	CH4 wt%	CO wt%	CO2 wt%	Component Count	VOC (tpy)	n-Hexane (tpy)	HAP (tpy)	CO (tpy)	CO2e (tpy)
-	-	Valve	GV	Cycle Gas	0.0132	97	93.79	0	1.45	0	0	15	2.44E-02	0.00E+00	0.00E+00	0.00E+00	1.06E-02
-	-	Valve	GV	Ethylene	0.0132	97	100	0	0	0	0	168	2.91E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	GV	Flare	0.0132	97	98.724	0	0.291	0	0	573	9.81E-01	0.00E+00	0.00E+00	0.00E+00	8.10E-02
-	-	Valve	GV	Natural Gas	0.0132	97	2.38	0	95.295	0	0	81	3.34E-03	0.00E+00	0.00E+00	0.00E+00	3.75E+00
-	-	Valve	GV	Hydrocarbon Gas	0.0132	97	93.79	0	1.45	0	0	86	1.40E-01	0.00E+00	0.00E+00	0.00E+00	6.06E-02
PE3FUG1	430	Valve	GV	Kill Gas	0.0132	0	0	0	0	10	0	257	0.00E+00	0.00E+00	0.00E+00	1.49E+00	0.00E+00
-	-	Valve	GV	LSR	0.0132	97	99.27	0	0.03	0	0	1	1.72E-03	0.00E+00	0.00E+00	0.00E+00	1.46E-05
-	-	Valve	GV	PE3 Flare Gas	0.0132	97	98.724	0	0.291	0	0	50	8.56E-02	0.00E+00	0.00E+00	0.00E+00	7.07E-03
-	-	Valve	GV	Process Hydrocarbon	0.0132	97	93.79	0	1.45	0	0	51	8.30E-02	0.00E+00	0.00E+00	0.00E+00	3.59E-02
-	-	Valve	GV	Process Hydrocarbon Gas	0.0132	97	93.79	0	1.45	0	0	38	6.18E-02	0.00E+00	0.00E+00	0.00E+00	2.68E-02
PE3FUG2	420	Valve	GV	Tail Gas	0.0132	97	57.71	0.01	1.73	0	0	37	3.70E-02	6.42E-06	6.42E-06	0.00E+00	3.11E-02
-	-	Valve	LL	Butene L/L	0.0089	97	100	0	0	0	0	14	1.64E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	LL	Flare	0.0089	97	98.724	0	0.291	0	0	2	2.31E-03	0.00E+00	0.00E+00	0.00E+00	1.91E-04
PE3FUG2	450	Valve	LL	Heavies Removal	0.0089	97	100	43	0	0	0	18	2.11E-02	9.05E-03	9.05E-03	0.00E+00	0.00E+00
-	-	Valve	LL	Hexene Liquid	0.0089	97	100	0	0	0	0	16	1.87E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	LL	HSR	0.0089	97	99.29	0	0.03	0	0	24	2.79E-02	0.00E+00	0.00E+00	0.00E+00	2.36E-04
-	-	Valve	LL	Hydrocarbon Gas	0.0089	97	93.79	0	1.45	0	0	308	3.38E-01	0.00E+00	0.00E+00	0.00E+00	1.46E-01
-	-	Valve	LL	Isobutane L/L	0.0089	97	100	0	0	0	0	27	3.16E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
-	-	Valve	LL	LSR	0.0089	97	99.27	0	0.03	0	0	122	1.42E-01	0.00E+00	0.00E+00	0.00E+00	1.20E-03
-	-	Valve	LL	LSR-Isobutane	0.0089	97	99.27	0	0.03	0	0	4	4.64E-03	0.00E+00	0.00E+00	0.00E+00	3.93E-05
-	-	Valve	LL	Process Hydrocarbon	0.0089	97	93.79	0	1.45	0	0	124	1.36E-01	0.00E+00	0.00E+00	0.00E+00	5.89E-02
-	-	Connector/Flange	GV	Cycle Gas	0.0039	97	93.79	0	1.45	0	0	47	2.26E-02	0.00E+00	0.00E+00	0.00E+00	9.78E-03
-	-	Connector/Flange	GV	Ethylene	0.0039	97	100	0	0	0	0	348	1.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	GV	Flare	0.0039	97	98.724	0	0.291	0	0	1,278	6.47E-01	0.00E+00	0.00E+00	0.00E+00	5.34E-02
-	-	Connector/Flange	GV	Natural Gas	0.0039	97	2.38	0	95.295	0	0	208	2.54E-03	0.00E+00	0.00E+00	0.00E+00	2.84E+00
-	-	Connector/Flange	GV	Hydrocarbon Gas	0.0039	97	93.79	0	1.45	0	0	262	1.26E-01	0.00E+00	0.00E+00	0.00E+00	5.45E-02
PE3FUG1	430	Connector/Flange	GV	Kill Gas	0.0039	0	0	0	0	10	0	525	0.00E+00	0.00E+00	0.00E+00	8.97E-01	0.00E+00
-	-	Connector/Flange	GV	Process Hydrocarbon	0.0039	97	93.79	0	1.45	0	0	139	6.68E-02	0.00E+00	0.00E+00	0.00E+00	2.89E-02
PE3FUG2	420	Connector/Flange	GV	Tail Gas	0.0039	97	57.71	0.01	1.73	0	0	115	3.40E-02	5.89E-06	5.89E-06	0.00E+00	2.85E-02
-	-	Connector/Flange	GV	Process Hydrocarbon Gas	0.0039	97	93.79	0	1.45	0	0	94	4.52E-02	0.00E+00	0.00E+00	0.00E+00	1.96E-02
-	-	Connector/Flange	LL	Butene L/L	0.0005	97	100	0	0	0	0	38	2.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	LL	Flare	0.0005	97	98.724	0	0.291	0	0	4	2.59E-04	0.00E+00	0.00E+00	0.00E+00	2.14E-05
PE3FUG2	450	Connector/Flange	LL	Heavies Removal	0.0005	97	100	43	0	0	0	87	5.72E-03	2.46E-03	2.46E-03	0.00E+00	0.00E+00
-	-	Connector/Flange	LL	Hexene	0.0005	97	100	0	0	0	0	54	3.55E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	LL	HSR	0.0005	97	99.29	0	0.03	0	0	51	3.33E-03	0.00E+00	0.00E+00	0.00E+00	2.81E-05
-	-	Connector/Flange	LL	Hydrocarbon Gas	0.0005	97	93.79	0	1.45	0	0	603	3.72E-02	0.00E+00	0.00E+00	0.00E+00	1.61E-02
-	-	Connector/Flange	LL	Isobutane L/L	0.0005	97	100	0	0	0	0	126	8.28E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
-	-	Connector/Flange	LL	LSR	0.0005	97	99.27	0	0.03	0	0	266	1.73E-02	0.00E+00	0.00E+00	0.00E+00	1.47E-04
-	-	Connector/Flange	LL	LSR-Isobutane	0.0005	97	99.27	0	0.03	0	0	15	9.78E-04	0.00E+00	0.00E+00	0.00E+00	8.28E-06
-	-	Connector/Flange	LL	Process Hydrocarbon	0.0005	97	93.79	0	1.45	0	0	222	1.37E-02	0.00E+00	0.00E+00	0.00E+00	5.92E-03

Source ID = 501 Equipment Components (Polyethylene Manufacturing Unit 3)																	
AERMOD ID	Area	Equipment	State	Stream ID	SOCMI Average Emission Factor lb/hr/ component	LAER Control Efficiency %	VOC wt%	HAP wt%	CH4 wt%	CO wt%	CO2 wt%	Component Count	VOC (tpy)	n-Hexane (tpy)	HAP (tpy)	CO (tpy)	CO2e (tpy)
-	-	Relief Valve	GV	Ethylene	0.2293	97	100	0	0	0	0	1	3.01E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
-	-	Relief Valve	GV	Flare	0.2293	97	98.724	0	0.291	0	0	47	1.40E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-01
-	-	Relief Valve	GV	Hydrocarbon Gas	0.2293	97	93.79	0	1.45	0	0	4	1.13E-01	0.00E+00	0.00E+00	0.00E+00	4.89E-02
-	-	Relief Valve	GV	Isobutane L/L	0.2293	97	100	0	0	0	0	1	3.01E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PE3FUG1	430	Relief Valve	GV	Kill Gas	0.2293	0	0	0	0	10	0	4	0.00E+00	0.00E+00	0.00E+00	4.02E-01	0.00E+00
-	-	Relief Valve	GV	Process Hydrocarbon	0.2293	97	93.79	0	1.45	0	0	2	5.65E-02	0.00E+00	0.00E+00	0.00E+00	2.45E-02
-	-	Relief Valve	GV	Process Hydrocarbon Gas	0.2293	97	93.79	0	1.45	0	0	2	5.65E-02	0.00E+00	0.00E+00	0.00E+00	2.45E-02
PE3FUG2	420	Relief Valve	GV	Tail Gas	0.2293	97	57.71	0.01	1.73	0	0	2	3.48E-02	6.03E-06	6.03E-06	0.00E+00	2.92E-02
-	-	Pump	LL	Process Hydrocarbon	0.0439	93	93.79	0	1.45	0	0	2	2.52E-02	0.00E+00	0.00E+00	0.00E+00	1.09E-02
-	-	Compressor	GV	Hydrocarbon Gas	0.5027	100	93.79	0	1.45	0	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
												6,564	5.41	1.15E-02	1.15E-02	2.78E+00	7.5

Source ID		=		501		Equipment Components (OSBL)																									
AERMOD ID	Area	Equipment	State	Stream ID	SOCMI Average Emission Factor lb/hr/ component	LAER Control Efficiency %	VOC wt%	HAP wt%	CH4 wt%	CO wt%	CO2 wt%	Component Count	VOC (tpv)	Ethane (tpv)	Propylene (tpv)	Propane (tpv)	1,3-Butadiene (tpv)	Butane (tpv)	Benzene (tpv)	Toluene (tpv)	Xylenes (tpv)	Ethylbenzene (tpv)	Styrene (tpv)	Naphthalene (tpv)	n-Hexane (tpv)	Methanol (tpv)	Heptane (tpv)	HAP (tpv)	CO (tpv)	CO2e (tpv)	
OSBLFUG1	597	Connector/Flange	GV	Waste Gas	0.0039	97	4.29	1.66	80.14	0	0	174	3.83E-03	1.96E-03	0.00E+00	5.08E-04	0.00E+00	1.61E-04	1.18E-03	2.85E-04	0.00E+00	8.92E-06	8.92E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.48E-03	0.00E+00	2.00E+00
OSBLFUG2	500	Connector/Flange	GV	Natural Gas	0.0039	97	2.38	0	95.295	0	0	86	1.05E-03	1.02E-03	0.00E+00	3.86E-04	0.00E+00	1.06E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E+00
OSBLFUG2	501	Connector/Flange	GV	Natural Gas	0.0039	97	2.38	0	95.295	0	0	18	2.20E-04	2.14E-04	0.00E+00	8.07E-05	0.00E+00	2.21E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E-01
OSBLFUG2	GTG1	Connector/Flange	GV	Natural Gas	0.0039	97	2.38	0	95.295	0	0	58	7.07E-04	6.91E-04	0.00E+00	2.60E-04	0.00E+00	7.13E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.93E-01
OSBLFUG2	GTG2	Connector/Flange	GV	Natural Gas	0.0039	97	2.38	0	95.295	0	0	62	7.56E-04	7.39E-04	0.00E+00	2.78E-04	0.00E+00	7.63E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.48E-01
OSBLFUG2	GTG3	Connector/Flange	GV	Natural Gas	0.0039	97	2.38	0	95.295	0	0	61	7.44E-04	7.27E-04	0.00E+00	2.74E-04	0.00E+00	7.50E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.34E-01
OSBLFUG2	584	Connector/Flange	GV	Natural Gas	0.0039	97	2.38	0	95.295	0	0	1,531	1.87E-02	1.82E-02	0.00E+00	6.87E-03	0.00E+00	1.88E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.09E+01
OSBLFUG4	643	Connector/Flange	GV	Flare	0.0039	97	1	0	69	0	0	138	7.07E-04	3.54E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E+00
OSBLFUG4	643	Connector/Flange	GV	OSBL Hexene	0.0039	97	100	0	0	0	0	41	2.10E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OSBLFUG4	644	Connector/Flange	GV	Isopentane	0.0039	97	100	0	0	0	0	46	2.36E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OSBLFUG4	644	Connector/Flange	GV	OSBL Isopentane	0.0039	97	100	0	0	0	0	1	5.12E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OSBLFUG4	645	Connector/Flange	GV	Flare	0.0039	97	1	0	69	0	0	37	1.90E-04	9.48E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.66E-01
OSBLFUG4	645	Connector/Flange	GV	Hydrocarbon Gas	0.0039	97	93.79	0	1.45	0	0	4	1.92E-03	9.76E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.32E-04
OSBLFUG5	642R	Connector/Flange	GV	Butene Vapor	0.0039	97	100	0	0	0	0	62	3.18E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OSBLFUG5	642R	Connector/Flange	GV	C3 Refrigerant Vapor	0.0039	97	99.6	0	0	0	0	13	6.64E-03	2.66E-05	0.00E+00	6.47E-03	0.00E+00	7.13E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OSBLFUG5	642R	Connector/Flange	GV	C3+ Product	0.0039	97	100	49.79	0	0	0	10	5.12E-03	1.02E-06	1.37E-03	2.25E-04	1.96E-03	2.57E-04	5.74E-04	1.79E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.55E-03	0.00E+00	0.00E+00
OSBLFUG5	642R	Connector/Flange	GV	C3+ Product RC Vapor	0.0039	97	100	49.79	0	0	0	195	9.99E-02	2.00E-05	2.67E-02	4.39E-03	3.82E-02	5.02E-03	1.12E-02	3.50E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.98E-02	0.00E+00	0.00E+00
OSBLFUG5	642R	Connector/Flange	GV	C3+ Vapor	0.0039	97	100	49.79	0	0	0	20	1.02E-02	2.05E-06	2.74E-03	4.50E-04	3.92E-03	5.15E-04	1.15E-03	3.59E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.10E-03	0.00E+00	0.00E+00
OSBLFUG5	642R	Connector/Flange	GV	Flare	0.0039	97	1	0	69	0	0	153	7.84E-04	3.92E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.51E+00
OSBLFUG5	642R	Connector/Flange	GV	Hexene Vapor	0.0039	97	100	0	0	0	0	88	4.51E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OSBLFUG5	642R	Connector/Flange	GV	Isobutane Vapor	0.0039	97	100	0	0	0	0	35	1.79E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OSBLFUG5	642R	Connector/Flange	GV	Isopentane Vapor	0.0039	97	100	0	0	0	0	16	8.20E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OSBLFUG5	642R	Connector/Flange	GV	LGO Vapor	0.0039	97	99	90.91	0	0	0	35	1.78E-02	1.97E-05	8.97E-06	1.79E-06	1.17E-04	1.08E-05	8.86E-03	7.06E-03	2.15E-05	1.33E-04	1.02E-04	1.08E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E-02	0.00E+00	0.00E+00
OSBLFUG5	642R	Connector/Flange	GV	Light Gasoline Vapor	0.0039	97	99	90.91	0	0	0	37	1.88E-02	2.09E-05	9.48E-06	1.90E-06	1.23E-04	1.14E-05	9.37E-03	7.46E-03	2.28E-05	1.40E-04	1.08E-04	1.14E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E-02	0.00E+00	0.00E+00
OSBLFUG5	642R	Connector/Flange	GV	PFO Vapor	0.0039	97	100	43.85	0	0	0	10	5.12E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.12E-07	4.66E-05	3.74E-05	9.22E-05	4.43E-04	1.63E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.25E-03	0.00E+00	0.00E+00
OSBLFUG5	642R	Connector/Flange	GV	Pyrolysis Fuel Oil VP	0.0039	97	100	43.85	0	0	0	38	1.95E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E-06	1.77E-04	1.42E-04	3.51E-04	1.68E-03	6.18E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.54E-03	0.00E+00	0.00E+00
OSBLFUG6	584B	Connector/Flange	GV	Natural Gas	0.0039	97	2.38	0	95.295	0	0	67	8.17E-04	7.98E-04	0.00E+00	3.00E-04	0.00E+00	8.24E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.16E-01
OSBLFUG6	646	Connector/Flange	GV	OSBL Ethane	0.0039	97	3.5	0	1.8	0	0	33	5.92E-04	1.60E-02	3.38E-05	3.38E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.52E-03	
OSBLFUG7-14	642	Connector/Flange	GV	C3 Fraction	0.0039	97	100	49.79	0	0	0	289	1.48E-01	2.96E-05	3.95E-02	6.50E-03	5.66E-02	7.43E-03	1.66E-02	5.18E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OSBLFUG7-14	642	Connector/Flange	GV	Ethylene	0.0039	97	99.84	0	0.1	0	0	1,581	8.09E-01	4.86E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.27E-02	
OSBLFUG7-14	642	Connector/Flange	GV	Flare	0.0039	97	1	0	69	0	0	553	2.83E-03	1.42E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.48E+00	
OSBLFUG7-14	642	Connector/Flange	GV	Methanol	0.0039	97	100	100	0	0	0	45	2.31E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.31E-02	0.00E+00	2.31E-02	0.00E+00	
OSBLFUG7-14	642	Connector/Flange	GV	Nitrogen Purge	0.0039	97	0	0	0	0	0	17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OSBLFUG7-14	642	Connector/Flange	GV	OSBL Ethylene	0.0039	97	99.84	0	0.1	0	0	3																			

Source ID		=		501		Equipment Components (OSBL)																									
AERMOD ID	Area	Equipment	State	Stream ID	SOCMI Average Emission Factor lb/hr/ component	LAER Control Efficiency %	VOC wt%	HAP wt%	CH4 wt%	CO wt%	CO2 wt%	Component Count	VOC (tpv)	Ethane (tpv)	Propylene (tpv)	Propane (tpv)	1,3-Butadiene (tpv)	Butane (tpv)	Benzene (tpv)	Toluene (tpv)	Xylenes (tpv)	Ethylbenzene (tpv)	Styrene (tpv)	Naphthalene (tpv)	n-Hexane (tpv)	Methanol (tpv)	Heptane (tpv)	HAP (tpv)	CO (tpv)	CO2e (tpv)	
OSBLFUG4	643	Connector/Flange	LL	Hexene Liquid	0.0005	97	100	0	0	0	0	214	1.41E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
OSBLFUG4	643	Connector/Flange	LL	OSBL Butene	0.0005	97	100	0	0	0	0	90	5.91E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
OSBLFUG4	643	Connector/Flange	LL	OSBL Hexene	0.0005	97	100	0	0	0	0	133	8.74E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
OSBLFUG4	643	Connector/Flange	LL	OSBL Hexene Liquid	0.0005	97	100	0	0	0	0	1	6.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
OSBLFUG4	644	Connector/Flange	LL	Isopentane	0.0005	97	100	0	0	0	0	215	1.41E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
OSBLFUG4	644	Connector/Flange	LL	OSBL Isopentane	0.0005	97	100	0	0	0	0	1	6.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
OSBLFUG4	645	Connector/Flange	LL	Isobutane	0.0005	97	100	0	0	0	0	85	5.58E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
OSBLFUG4	645	Connector/Flange	LL	Isopentane	0.0005	97	100	0	0	0	0	48	3.15E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
OSBLFUG4	649	Connector/Flange	LL	OSBL Heavies	0.0005	97	100	43	0	0	0	41	2.69E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-03	0.00E+00	0.00E+00	1.16E-03	0.00E+00	
OSBLFUG5	642R	Connector/Flange	LL	Butene	0.0005	97	100	0	0	0	0	176	1.16E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
OSBLFUG5	642R	Connector/Flange	LL	C3 Refrigerant	0.0005	97	99.6	0	0	0	0	110	7.20E-03	2.89E-05	0.00E+00	7.01E-03	0.00E+00	7.73E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
OSBLFUG5	642R	Connector/Flange	LL	C3+ Product	0.0005	97	100	49.79	0	0	0	360	2.37E-02	4.73E-06	6.31E-03	1.04E-03	9.04E-03	1.19E-03	2.65E-03	8.28E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-02	0.00E+00
OSBLFUG5	642R	Connector/Flange	LL	Hexene	0.0005	97	100	0	0	0	0	163	1.07E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
OSBLFUG5	642R	Connector/Flange	LL	Isobutane	0.0005	97	100	0	0	0	0	10	6.57E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
OSBLFUG5	642R	Connector/Flange	LL	Isopentane	0.0005	97	100	0	0	0	0	10	6.57E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
OSBLFUG5	642R	Connector/Flange	LL	LGO	0.0005	97	99	90.91	0	0	0	24	1.56E-03	1.73E-06	7.88E-07	1.58E-07	1.02E-05	9.46E-07	7.79E-04	6.21E-04	1.89E-06	1.17E-05	8.99E-06	9.46E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-03	0.00E+00	0.00E+00
OSBLFUG5	642R	Connector/Flange	LL	Light Gasoline L/L	0.0005	97	99	90.91	0	0	0	63	4.10E-03	4.55E-06	2.07E-06	4.14E-07	2.69E-05	2.48E-06	2.05E-03	1.63E-03	4.97E-06	3.06E-05	2.36E-05	2.48E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.76E-03	0.00E+00	0.00E+00
OSBLFUG5	642R	Connector/Flange	LL	Pyrolysis Fuel Oil	0.0005	97	100	43.85	0	0	0	63	4.14E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.14E-07	3.77E-05	3.02E-05	7.45E-05	3.58E-04	1.31E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-03	0.00E+00
OSBLFUG7-14	642	Connector/Flange	LL	Butene	0.0005	97	100	0	0	0	0	3	1.97E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
OSBLFUG7-14	642	Connector/Flange	LL	C3 Fraction	0.0005	97	100	49.79	0	0	0	23	1.51E-03	3.02E-07	4.03E-04	6.63E-05	5.78E-04	7.59E-05	1.69E-04	5.29E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.52E-04	0.00E+00
OSBLFUG7-14	642	Connector/Flange	LL	C3+ Product	0.0005	97	100	49.79	0	0	0	4	2.63E-04	5.26E-08	7.01E-05	1.15E-05	1.00E-04	1.32E-05	2.95E-05	9.20E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-04	0.00E+00
OSBLFUG7-14	642	Connector/Flange	LL	ECU Ethylene	0.0005	97	99.84	0	0.1	0	0	70	4.59E-03	2.76E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
OSBLFUG7-14	642	Connector/Flange	LL	Ethylene	0.0005	97	99.84	0	0.1	0	0	50	3.28E-03	1.97E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
OSBLFUG7-14	642	Connector/Flange	LL	Light Gasoline L/L	0.0005	97	99	90.91	0	0	0	117	7.61E-03	8.46E-06	3.84E-06	7.69E-07	5.00E-05	4.61E-06	3.80E-03	3.03E-03	9.22E-06	5.69E-05	4.38E-05	4.61E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.99E-03	0.00E+00	0.00E+00
OSBLFUG7-14	642	Connector/Flange	LL	Methanol	0.0005	97	100	100	0	0	0	129	8.48E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.48E-03	0.00E+00	8.48E-03	0.00E+00
OSBLFUG7-14	642	Connector/Flange	LL	OSBL C3 Product	0.0005	97	100	49.79	0	0	0	72	4.73E-03	9.46E-07	1.26E-03	2.08E-04	1.81E-03	2.37E-04	5.30E-04	1.66E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E-03	0.00E+00
OSBLFUG7-14	642	Connector/Flange	LL	OSBL Pyrolysis Oil	0.0005	97	100	43.85	0	0	0	2	1.31E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-08	1.20E-06	9.59E-07	2.37E-06	1.14E-05	4.17E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.76E-05	0.00E+00
ECFUG10	535	Connector/Flange	LL	OSBL Spent Caustic	0.0005	97	0.21	0.21	0	0	0	2	2.76E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-07	1.31E-08	0.00E+00	0.00E+00	1.31E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.76E-07	0.00E+00
ECFUG10	535	Connector/Flange	LL	Spent Caustic	0.0005	97	0.21	0.21	0	0	0	659	9.09E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.33E-05	4.33E-06	0.00E+00	0.00E+00	4.33E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.09E-05	0.00E+00
ECFUG10	535	Connector/Flange	LL	Waste Gas	0.0005	97	4.29	1.66	80.14	0	0	336	9.47E-04	4.86E-04	0.00E+00	1.26E-04	0.00E+00	3.97E-05	2.91E-04	7.06E-05	0.00E+00	2.21E-06	2.21E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.66E-04	0.00E+00	4.95E-01
ECFUG10	535	Connector/Flange	LL	Wastewater	0.0005	97	4	3.5	0	0	0	41	1.08E-04	1.35E-05	0.00E+00	0.00E+00	1.35E-05	0.00E+00	1.35E-05	1.35E-05	1.35E-05	1.35E-05	1.35E-05	1.35E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.43E-05	0.00E+00	0.00E+00
ECFUG12	590	Connector/Flange	LL	OSBL Light Gasoline	0.0005	97	99	90.91	0	0	0	1	6.50E-05	7.23E-08	3.29E-08	6.57E-09	4.27E-07	3.94E-08	3.25E-05	2.59E-05	7.88E-08	4.86E-07	3.74E-07	3.94E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.97E-05	0.00E+00	0.00E+00
ECFUG12	590	Connector/Flange	LL	Wastewater	0.0005	97	4	3.5	0	0	0	12	3.15E-05	3.94E-06	0.00E+00	0.00E+00	3.94E-06	0.00E+00	3.94E-06	3.94E-06	3.94E-06	3.94E-06	3.94E-06	3.94E-06	3.94E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.76E-05	0.00E+00
ECFUG12	590	Connector/Flange	LL	Recovered Oil	0.0005	97	100	0	0	0	0	31	2.04E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-03	0.00E+00	0.00E+00	
OSBLFUG1	59																														

Source ID = 501 Equipment Components (OSBL)																															
AERMOD ID	Area	Equipment	State	Stream ID	SOCMI Average Emission Factor lb/hr/ component	LAER Control Efficiency %	VOC wt%	HAP wt%	CH4 wt%	CO wt%	CO2 wt%	Component Count	VOC (tpy)	Ethane (tpy)	Propylene (tpy)	Propane (tpy)	1,3-Butadiene (tpy)	Butane (tpy)	Benzene (tpy)	Toluene (tpy)	Xylenes (tpy)	Ethylbenzene (tpy)	Styrene (tpy)	Naphthalene (tpy)	n-Hexane (tpy)	Methanol (tpy)	Heptane (tpy)	HAP (tpy)	CO (tpy)	CO2e (tpy)	
OSBLFUG1	597	Compressor	GV	OSBL Waste Gas	0.5027	100	4.29	1.66	80.14	0	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
OSBLFUG4	643	Compressor	GV	OSBL Flare	0.5027	100	1	0	69	0	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OSBLFUG7-14	642	Compressor	GV	OSBL Ethylene	0.5027	100	99.84	0	0.1	0	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OSBLFUG7-14	642	Compressor	GV	OSBL Flare	0.5027	100	1	0	69	0	0	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OSBLFUG7-14	642	Compressor	GV	OSBL Light Gasoline	0.5027	100	99	90.91	0	0	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
OSBLFUG7-14	642	Compressor	GV	OSBL Propane Refrigerant	0.5027	100	99.6	0	0	0	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14,122													7.33	2.37E-01	2.42E-01	1.15E+00	3.49E-01	6.65E-02	2.90E-01	1.49E-01	1.71E-03	5.31E-03	1.35E-02	3.90E-02	2.17E-02	1.79E-01	3.91E-02	1.05E+00	0.00E+00	139.4	

Source ID = 502 Wastewater Treatment Plant (Secondary and Tertiary Treatment)						
	Toxchem Output Emissions	Annualized Emissions			Calculation/ Estimation	Emission Factor Reference
Pollutant	lb/hr	lb/hr	hr/year	tpy		
VOC	0.065	0.065	8,760	0.28	Emissions model	Toxchem
Benzene	8.41E-03	8.41E-03	8,760	3.68E-02	Emissions model	Toxchem
Phenol	1.28E-07	1.28E-07	8,760	5.59E-07	Emissions model	Toxchem
Toluene	2.58E-02	2.58E-02	8,760	1.13E-01	Emissions model	Toxchem
Ethylbenzene	1.35E-03	1.35E-03	8,760	5.91E-03	Emissions model	Toxchem
Xylene	3.70E-03	3.70E-03	8,760	1.62E-02	Emissions model	Toxchem
Styrene	2.53E-02	2.53E-02	8,760	1.11E-01	Emissions model	Toxchem
Naphthalene	2.10E-04	2.10E-04	8,760	9.20E-04	Emissions model	Toxchem
Dibutylphthalate	2.01E-07	2.01E-07	8,760	8.81E-07	Emissions model	Toxchem
Chloroform (Trichloromethane)	3.33E-05	3.33E-05	8,760	1.46E-04	Emissions model	Toxchem
Acenaphthene	3.23E-05	3.23E-05	8,760	1.42E-04	Emissions model	Toxchem
Acenaphthylene	1.64E-05	1.64E-05	8,760	7.19E-05	Emissions model	Toxchem
Fluorene	1.32E-05	1.32E-05	8,760	5.76E-05	Emissions model	Toxchem
Anthracene	1.62E-05	1.62E-05	8,760	7.10E-05	Emissions model	Toxchem
Phenanthrene	8.45E-06	8.45E-06	8,760	3.70E-05	Emissions model	Toxchem
Fluoranthene	2.77E-06	2.77E-06	8,760	1.21E-05	Emissions model	Toxchem
Pyrene	1.65E-06	1.65E-06	8,760	7.24E-06	Emissions model	Toxchem
The WWTP includes two Flow Equalization and Oil Removal (FEOR) Tanks, a Recovered Oil Storage Tank, two temporary Induced Nitrogen Flotation (INF) Vessels, two Biotreater Aeration Tanks, two Secondary Clarifiers, two Biosludge Holding Tanks, a Centrifuge, a Sand Filter, a Sump (for centrate and sand filter backwash), and a Treated Effluent Sump. The WWTP Permanent Controls Project proposes the installation of a Settlement Drum, two Dissolved Nitrogen Flotation (DNF) Units, a Float/Sludge Drum, and a Steam Stripper to replace the two temporary INF Vessels. The two FEOR Tanks and Recovered Oil Storage Tank are separately permitted under Source ID 401 and vent to the Spent Caustic Thermal Oxidizer (SCTO); therefore, their emissions are not included in the table above. Additionally, the new Settlement Drum, two DNF Units, Float/Sludge Drum, and Steam Stripper are separately permitted under Source ID 505 and will vent to the SCTO; therefore, their emissions are not included in the table. Lastly, the two temporary INF Vessels vent to the SCTO, and they will be removed after the successful commissioning of the WWTP Permanent Controls Project; therefore, their emissions are not included in the table.						
Basis: Emissions were modeled under worst-case conditions of dry weather flow. The Biotreater Aeration Tanks' inlet concentrations were based on actual sample data for the 1/10/23-3/31/24 time period, excluding ethylene manufacturing unit downtime and abnormal conditions.						
Example Calculations: 0.28 tpy VOC = (0.065 lb/hr) x (8,760 hr/year) / (2,000 lb/ton)						

Pollutant	Biotreater Aeration Tank A (lb/hr, avg.)	Biotreater Aeration Tank B (lb/hr, avg.)	Secondary Clarifier A (lb/hr, avg.)	Secondary Clarifier B (lb/hr, avg.)	Biosludge Holding Tank (T-59701A/B) (lb/hr, avg.)	Centrifuge (lb/hr, avg.)	Sand Filter (lb/hr, avg.)	Sump (T-59712) (lb/hr, avg.)	Treated Effluent Sump (T-59717) (lb/hr, avg.)	Outfall (lb/hr, avg.)	WWTP (lb/hr, avg.)
Benzene	4.18E-03	4.18E-03	9.40E-06	9.40E-06	2.05E-06	6.19E-09	2.99E-06	5.64E-07	1.70E-06	1.65E-05	8.41E-03
Phenol	4.31E-08	4.31E-08	1.27E-08	1.27E-08	4.20E-09	4.01E-14	5.37E-09	1.25E-09	3.06E-09	2.28E-09	1.28E-07
Toluene	1.28E-02	1.28E-02	2.39E-05	2.39E-05	5.67E-06	2.09E-08	7.72E-06	1.57E-06	4.38E-06	3.99E-05	2.58E-02
Ethylbenzene	6.73E-04	6.73E-04	1.04E-06	1.04E-06	2.59E-07	1.18E-09	3.42E-07	7.24E-08	1.94E-07	1.68E-06	1.35E-03
Xylene	1.84E-03	1.84E-03	4.27E-06	4.28E-06	1.05E-06	3.03E-09	1.38E-06	2.92E-07	7.85E-07	7.14E-06	3.70E-03
Styrene	1.25E-02	1.25E-02	5.41E-05	5.41E-05	1.33E-05	1.97E-08	1.78E-05	3.71E-06	1.01E-05	8.52E-05	2.53E-02
Naphthalene	1.01E-04	1.01E-04	2.09E-06	2.09E-06	5.60E-07	1.55E-10	7.31E-07	1.57E-07	4.15E-07	2.66E-06	2.10E-04
Dibutylphthalate	7.18E-08	7.18E-08	1.78E-08	1.78E-08	6.04E-09	7.82E-14	7.58E-09	1.81E-09	4.32E-09	2.26E-09	2.01E-07
Chloroform (Trichloromethane)	1.65E-05	1.65E-05	4.93E-08	4.94E-08	1.05E-08	2.34E-11	1.55E-08	2.87E-09	8.83E-09	8.82E-08	3.33E-05
Acenaphthene	1.51E-05	1.51E-05	5.46E-07	5.46E-07	1.58E-07	2.35E-11	2.02E-07	4.54E-08	1.15E-07	5.33E-07	3.23E-05
Acenaphthylene	7.38E-06	7.38E-06	4.56E-07	4.56E-07	1.40E-07	1.12E-11	1.78E-07	4.07E-08	1.01E-07	2.92E-07	1.64E-05
Fluorene	5.89E-06	5.89E-06	3.70E-07	3.70E-07	1.13E-07	8.88E-12	1.44E-07	3.29E-08	8.16E-08	2.59E-07	1.32E-05
Anthracene	7.11E-06	7.11E-06	5.53E-07	5.53E-07	1.73E-07	1.05E-11	2.18E-07	5.05E-08	1.24E-07	3.29E-07	1.62E-05
Phenanthrene	3.48E-06	3.48E-06	4.33E-07	4.33E-07	1.40E-07	4.76E-12	1.77E-07	4.12E-08	1.00E-07	1.68E-07	8.45E-06
Fluoranthene	1.01E-06	1.01E-06	2.27E-07	2.28E-07	7.64E-08	1.14E-12	9.58E-08	2.28E-08	5.45E-08	4.36E-08	2.77E-06
Pyrene	5.97E-07	5.97E-07	1.40E-07	1.40E-07	4.70E-08	6.62E-13	5.90E-08	1.40E-08	3.36E-08	2.56E-08	1.65E-06
Total	3.22E-02	3.22E-02	9.76E-05	9.76E-05	2.38E-05	5.13E-08	3.21E-05	6.61E-06	1.82E-05	1.55E-04	6.49E-02

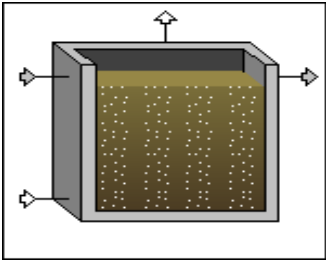
Pollutant	Biotreater Aeration Tank A (tpy)	Biotreater Aeration Tank B (tpy)	Secondary Clarifier A (tpy)	Secondary Clarifier B (tpy)	Biosludge Holding Tank (T-59701A/B) (tpy)	Centrifuge (tpy)	Sand Filter (tpy)	Sump (T-59712) (tpy)	Treated Effluent Sump (T-59717) (tpy)	Outfall (tpy)	WWTP (tpy)
Benzene	1.83E-02	1.83E-02	4.12E-05	4.12E-05	8.99E-06	2.71E-08	1.31E-05	2.47E-06	7.43E-06	7.21E-05	3.68E-02
Phenol	1.89E-07	1.89E-07	5.57E-08	5.57E-08	1.84E-08	1.75E-13	2.35E-08	5.49E-09	1.34E-08	9.97E-09	5.59E-07
Toluene	5.62E-02	5.62E-02	1.05E-04	1.05E-04	2.48E-05	9.17E-08	3.38E-05	6.86E-06	1.92E-05	1.75E-04	1.13E-01
Ethylbenzene	2.95E-03	2.95E-03	4.57E-06	4.57E-06	1.14E-06	5.16E-09	1.50E-06	3.17E-07	8.50E-07	7.35E-06	5.91E-03
Xylene	8.06E-03	8.06E-03	1.87E-05	1.87E-05	4.59E-06	1.33E-08	6.05E-06	1.28E-06	3.44E-06	3.13E-05	1.62E-02
Styrene	5.49E-02	5.49E-02	2.37E-04	2.37E-04	5.85E-05	8.63E-08	7.81E-05	1.62E-05	4.44E-05	3.73E-04	1.11E-01
Naphthalene	4.41E-04	4.41E-04	9.15E-06	9.16E-06	2.45E-06	6.81E-10	3.20E-06	6.87E-07	1.82E-06	1.16E-05	9.20E-04
Dibutylphthalate	3.14E-07	3.15E-07	7.80E-08	7.80E-08	2.65E-08	3.42E-13	3.32E-08	7.93E-09	1.89E-08	9.90E-09	8.81E-07
Chloroform (Trichloromethane)	7.24E-05	7.24E-05	2.16E-07	2.16E-07	4.58E-08	1.02E-10	6.81E-08	1.26E-08	3.87E-08	3.86E-07	1.46E-04
Acenaphthene	6.61E-05	6.61E-05	2.39E-06	2.39E-06	6.93E-07	1.03E-10	8.83E-07	1.99E-07	5.02E-07	2.34E-06	1.42E-04
Acenaphthylene	3.23E-05	3.23E-05	2.00E-06	2.00E-06	6.15E-07	4.89E-11	7.81E-07	1.78E-07	4.44E-07	1.28E-06	7.19E-05
Fluorene	2.58E-05	2.58E-05	1.62E-06	1.62E-06	4.96E-07	3.89E-11	6.29E-07	1.44E-07	3.57E-07	1.14E-06	5.76E-05
Anthracene	3.11E-05	3.11E-05	2.42E-06	2.42E-06	7.57E-07	4.61E-11	9.55E-07	2.21E-07	5.43E-07	1.44E-06	7.10E-05
Phenanthrene	1.52E-05	1.52E-05	1.90E-06	1.90E-06	6.14E-07	2.09E-11	7.74E-07	1.80E-07	4.40E-07	7.34E-07	3.70E-05
Fluoranthene	4.43E-06	4.43E-06	9.96E-07	9.97E-07	3.35E-07	5.01E-12	4.20E-07	1.00E-07	2.39E-07	1.91E-07	1.21E-05
Pyrene	2.61E-06	2.62E-06	6.12E-07	6.12E-07	2.06E-07	2.90E-12	2.58E-07	6.15E-08	1.47E-07	1.12E-07	7.24E-06
Total	1.41E-01	1.41E-01	4.27E-04	4.27E-04	1.04E-04	2.25E-07	1.41E-04	2.90E-05	7.99E-05	6.78E-04	2.84E-01

Date	Biotreater Inlet Stream Sample Concentrations (mg/L), Excluding Ethylene Manufacturing Unit Downtime and Abnormal Conditions															
	Benzene	Phenol	Toluene	Ethylbenzene	Xylene	Styrene	Naphthalene	Chloroform (Trichloromethane)	Dibutylphthalate	Acenaphthene	Acenaphthylene	Fluorene	Anthracene	Phenanthrene	Fluoranthene	Pyrene
1/10/2023	1.2000	0.0260	0.9300	-	-	-	0.2700	-	-	0.0056	0.0019	0.0043	-	0.0043	-	0.0007
1/10/2023	0.3000	0.0065	0.2325	-	-	-	0.0675	-	-	0.0014	0.0005	0.0011	-	0.0011	-	0.0002
3/7/2023	-	-	0.0230	-	-	-	0.0003	-	0.0088	0.0009	0.0003	0.0006	-	0.0004	-	-
3/14/2023	1.0000	0.0390	-	-	-	-	0.0160	-	0.0160	0.0013	-	-	-	0.0010	-	-
6/5/2023	0.9600	0.0450	3.0000	-	-	-	0.1900	-	-	0.0068	-	0.0044	0.0004	0.0040	-	0.0007
6/12/2023	0.8400	0.0810	3.8000	-	-	0.7200	0.1500	-	-	0.0045	0.0028	0.0036	0.0004	0.0034	-	0.0007
6/20/2023	0.2900	0.0019	1.5000	-	-	-	0.1400	-	-	0.0024	0.0016	0.0021	-	0.0023	-	0.0005
6/27/2023	0.6700	-	1.6000	-	-	0.4800	0.0110	-	0.0150	-	-	-	-	-	-	-
7/4/2023	0.3200	0.0270	1.3000	0.1600	-	-	0.0850	-	0.0039	0.0016	0.0008	0.0012	-	0.0015	-	0.0003
7/11/2023	0.5300	0.0043	0.7800	0.0640	-	-	0.0006	-	-	0.0042	0.0036	0.0049	0.0007	0.0069	0.0006	0.0016
7/18/2023	0.1500	0.0016	0.8400	0.0880	-	-	0.0013	-	-	0.0056	0.0062	0.0062	0.0012	0.0097	0.0013	0.0025
7/25/2023	0.1000	-	0.6800	0.0730	0.0730	0.0970	-	-	-	-	-	-	-	-	-	-
8/1/2023	0.1400	0.0052	0.9400	0.1100	0.0960	0.1600	-	-	-	0.0025	0.0012	0.0024	-	0.0029	-	-
8/8/2023	0.0800	-	0.1500	-	-	0.0260	-	-	-	0.0022	0.0010	0.0020	-	0.0026	-	-
8/15/2023	0.1000	0.0057	0.3900	0.0045	-	0.0330	0.0012	-	-	0.0021	0.0015	0.0021	-	-	-	0.0007
8/22/2023	0.0750	-	0.3800	0.0610	0.0530	0.0660	0.0038	-	-	0.0015	-	0.0015	-	0.0015	-	-
8/29/2023	0.1400	0.0680	0.4800	0.0650	0.0570	0.0660	0.1400	-	-	0.0044	0.0028	0.0045	-	0.0044	-	-
9/5/2023	0.3500	0.0400	0.4400	0.0410	-	0.0600	0.2100	-	-	0.0060	0.0052	0.0058	-	0.0062	-	-
9/12/2023	0.0890	-	0.1600	0.0130	-	0.0150	-	-	-	0.0013	-	0.0011	-	0.0010	-	0.0008
9/19/2023	0.0670	-	0.2300	0.0760	0.0650	0.0430	0.0570	-	-	0.0030	0.0024	0.0029	-	0.0042	-	-
9/26/2023	0.1300	-	0.1900	0.0350	-	0.0280	0.0490	-	-	0.0023	0.0029	0.0028	-	0.0052	-	-
10/3/2023	0.2000	0.0029	0.2200	0.0320	-	-	0.0075	-	-	0.0020	0.0025	0.0021	0.0005	0.0037	0.0004	0.0008
12/27/2023	0.5700	-	0.4900	-	-	0.0650	0.1600	-	-	0.0110	0.0065	0.0110	-	0.0160	-	-
1/2/2024	1.6000	0.0320	0.7900	0.0500	-	0.0850	0.0690	-	-	0.0017	0.0015	0.0015	-	0.0023	-	0.0004
1/9/2024	0.5800	0.0039	0.3300	-	-	-	0.0510	-	0.0021	0.0016	0.0013	0.0015	-	0.0025	-	0.0005
1/16/2024	0.7200	0.0032	0.2300	-	-	-	0.0011	-	-	0.0005	0.0007	0.0005	-	0.0010	-	0.0004
1/23/2024	0.5200	0.0020	0.3700	-	-	-	0.0078	-	-	0.0006	0.0006	0.0006	-	0.0009	-	-
1/30/2024	0.4800	-	0.1650	-	-	-	0.0950	-	-	0.0064	0.0067	0.0073	-	0.0110	-	0.0032
2/6/2024	0.4000	-	0.2600	-	-	0.0290	0.0470	-	-	0.0037	0.0030	0.0037	-	0.0040	-	-
2/14/2024	2.3000	0.0340	0.9900	-	-	0.1300	0.1500	-	-	0.0130	0.0089	0.0120	-	0.0150	-	0.0029
2/20/2024	0.3500	0.0250	0.3400	-	-	-	0.1300	-	-	0.0120	0.0077	0.0098	-	0.0150	-	-
2/27/2024	0.3000	-	0.2500	-	-	-	0.0900	-	0.0180	0.0120	0.0079	0.0120	-	0.0200	-	0.0032
3/12/2024	0.5800	0.0042	0.7200	-	-	0.0680	0.0350	-	-	0.0035	0.0034	0.0038	0.0007	0.0060	0.0006	0.0012
3/19/2024	0.5400	-	0.7900	-	-	0.0630	-	-	-	0.0018	0.0011	0.0016	-	0.0014	-	-
3/26/2024	0.2000	-	0.2400	-	-	-	0.0510	-	-	0.0047	0.0057	0.0055	-	0.0095	-	-

The new Steam Stripper will treat wastewater before it is routed to the Biotreaters. The Steam Stripper is expected to achieve a hydrocarbon removal efficiency >98%. However, as indicated below, Shell conservatively estimated the Biotreater inlet stream hydrocarbon concentrations input into Toxchem on the basis that the Steam Stripper will achieve lower hydrocarbon removal efficiencies in order to estimate worst-case emissions from the Biotreaters and WWTP equipment downstream of the Biotreaters during normal operations.

Compound	Biotreater Inlet Stream Concentration Input into Toxchem (mg/L)	Comment
Benzene	0.35	For each of these hydrocarbons, the concentration was estimated by multiplying the average of the 1/10/23-3/31/24 Biotreater inlet stream sample concentrations (when excluding ethylene manufacturing unit downtime and abnormal condition concentrations) of the hydrocarbon by (1 - 0.7) to account for the new Steam Stripper achieving a 30% removal efficiency of the hydrocarbon.
Phenol	0.015	
Toluene	0.499	
Ethylbenzene	0.044	
Xylene	0.048	
Styrene	0.087	
Naphthalene	0.053	
Chloroform (Trichloromethane)	0.00012	The concentration was estimated by multiplying the minimum detection limit (MDL) of 0.0006 mg/L for the hydrocarbon (as none of the 1/10/23-3/31/24 Biotreater inlet stream samples indicated a concentration of the hydrocarbon above the MDL during normal conditions) by (1 - 0.2) to account for the new Steam Stripper achieving a 80% removal efficiency of the hydrocarbon.
Dibutylphthalate	0.01	Based on an evaluation of the 1/10/23-3/31/24 Biotreater inlet stream sample concentrations (when excluding ethylene manufacturing unit downtime and abnormal condition concentrations), the concentration of each of these hydrocarbons was conservatively set equal to 0.01 mg/L.
Acenaphthene	0.01	
Acenaphthylene	0.01	
Fluorene	0.01	
Anthracene	0.01	
Phenanthrene	0.01	
Fluoranthene	0.01	
Pyrene	0.01	

WWTP - Biotreater Aeration Tank A



Input Parameters

Data Entry

Liquid Depth	6.1 m
Surface Area	344.24 m2
Number of CSTRs	1
SRT	31 d
MLSS	3300 mg/L
VSS to SS Ratio	53 %
Dissolved Oxygen	2 mg/L
Process Air Flow Rate	3891 cuft/min
Oxygen Transfer Efficiency	7 %
Mole Fraction of Oxygen in Gas Source	0.209 O2/Air
Removal Efficiency - Wastewater DOC	0 %
Covered	false
Ventilation Rate	-
Local pH value	-
Advanced	
Kg/Kl Ratio for Diffused System	3

Output Data

Contaminant : Benzene

Incoming Stream

	Combined_eff to BIO-A	RAS-A
Flow Rate (m3/d)	3024.17	1219.45
Total Suspended Solids (mg/L)	48.9867	11230
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	1050.04	3.8803
Organic Chemical - Cl (ug/L)	343.331	1.32001
Organic Chemical - Ct (ug/L)	347.217	3.18201
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.988806	0.414834
Fraction of Sorbed Chemical - Organic Solid (-)	0.00822017	0.585166
Fraction of Sorbed Chemical - Oil (-)	0.00297345	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOA_eff	BIOA_air
Flow Rate (m3/d)	4243.6	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	7.9993	45.5402
Organic Chemical - Cl (ug/L)	1.33263	-
Organic Chemical - Ct (ug/L)	1.88503	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.706957	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.293043	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.0102944 m/hr
Mass Transfer Coefficient for Diffused Aeration	4.126 m/hr
Biodegradation Rate in First Order Kinetics	14.8955 1/hr

Contaminant : Phenol**Incoming Stream**

	Combined_eff to BIO-A	RAS-A
Flow Rate (m3/d)	3024.17	1219.45
Total Suspended Solids (mg/L)	48.9867	11230
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	45.0015	0.0619006
Organic Chemical - Cl (ug/L)	14.8207	0.0321816
Organic Chemical - Ct (ug/L)	14.8806	0.0507611
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.995971	0.633981
Fraction of Sorbed Chemical - Organic Solid (-)	0.00338875	0.366019
Fraction of Sorbed Chemical - Oil (-)	0.000640319	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOA_eff	BIOA_air
Flow Rate (m3/d)	4243.6	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.159869	0.000468739
Organic Chemical - Cl (ug/L)	0.0322087	-
Organic Chemical - Ct (ug/L)	0.0376731	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.854954	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.145046	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.000752751 m/hr
Mass Transfer Coefficient for Diffused Aeration	0.00101103 m/hr
Biodegradation Rate in First Order Kinetics	27.663 1/hr

Contaminant : Toluene**Incoming Stream**

	Combined_eff to BIO-A	RAS-A
Flow Rate (m3/d)	3024.17	1219.45
Total Suspended Solids (mg/L)	48.9867	11230
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	1497.11	17.8203
Organic Chemical - Cl (ug/L)	480.876	3.52253
Organic Chemical - Ct (ug/L)	495.05	14.6134
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.97137	0.241048
Fraction of Sorbed Chemical - Organic Solid (-)	0.0180244	0.758952
Fraction of Sorbed Chemical - Oil (-)	0.0106056	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOA_eff	BIOA_air
Flow Rate (m3/d)	4243.6	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	28.9742	139.607
Organic Chemical - Cl (ug/L)	3.54647	-
Organic Chemical - Ct (ug/L)	6.82775	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.519421	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.480579	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00995697 m/hr
Mass Transfer Coefficient for Diffused Aeration	4.75478 m/hr
Biodegradation Rate in First Order Kinetics	7.53286 1/hr

Contaminant : Ethylbenzene**Incoming Stream**

	Combined_eff to BIO-A	RAS-A
Flow Rate (m3/d)	3024.17	1219.45
Total Suspended Solids (mg/L)	48.9867	11230
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	132.007	1.2719
Organic Chemical - Cl (ug/L)	41.0249	0.160034
Organic Chemical - Ct (ug/L)	43.6507	1.04301
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.939846	0.153435
Fraction of Sorbed Chemical - Organic Solid (-)	0.0305603	0.846565
Fraction of Sorbed Chemical - Oil (-)	0.0295942	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOA_eff	BIOA_air
Flow Rate (m3/d)	4243.6	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	1.78886	7.32158
Organic Chemical - Cl (ug/L)	0.160813	-
Organic Chemical - Ct (ug/L)	0.421542	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.381487	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.618513	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00969969 m/hr
Mass Transfer Coefficient for Diffused Aeration	5.50107 m/hr
Biodegradation Rate in First Order Kinetics	15.3211 1/hr

Contaminant : Xylene**Incoming Stream**

	Combined_eff to BIO-A	RAS-A
Flow Rate (m3/d)	3024.17	1219.45
Total Suspended Solids (mg/L)	48.9867	11230
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	144.022	4.99524
Organic Chemical - Cl (ug/L)	44.759	0.628615
Organic Chemical - Ct (ug/L)	47.6236	4.0963
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.939851	0.153459
Fraction of Sorbed Chemical - Organic Solid (-)	0.0305548	0.846541
Fraction of Sorbed Chemical - Oil (-)	0.0295943	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOA_eff	BIOA_air
Flow Rate (m3/d)	4243.6	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	7.02685	20.0388
Organic Chemical - Cl (ug/L)	0.631764	-
Organic Chemical - Ct (ug/L)	1.65587	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.38153	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.61847	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00999027 m/hr
Mass Transfer Coefficient for Diffused Aeration	3.82924 m/hr
Biodegradation Rate in First Order Kinetics	3.83027 1/hr

Contaminant : Styrene**Incoming Stream**

	Combined_eff to BIO-A	RAS-A
Flow Rate (m3/d)	3024.17	1219.45
Total Suspended Solids (mg/L)	48.9867	11230
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	261.238	52.8189
Organic Chemical - Cl (ug/L)	81.7152	8.28836
Organic Chemical - Ct (ug/L)	86.3833	43.3137
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.945961	0.191356
Fraction of Sorbed Chemical - Organic Solid (-)	0.0235588	0.808644
Fraction of Sorbed Chemical - Oil (-)	0.0304805	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOA_eff	BIOA_air
Flow Rate (m3/d)	4243.6	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	79.3012	136.421
Organic Chemical - Cl (ug/L)	8.33585	-
Organic Chemical - Ct (ug/L)	18.6872	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.446072	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.553928	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00977401 m/hr
Mass Transfer Coefficient for Diffused Aeration	1.9711 m/hr
Biodegradation Rate in First Order Kinetics	0.234072 1/hr

Contaminant : Naphthalene**Incoming Stream**

	Combined_eff to BIO-A	RAS-A
Flow Rate (m3/d)	3024.17	1219.45
Total Suspended Solids (mg/L)	48.9867	11230
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	159.014	3.26565
Organic Chemical - Cl (ug/L)	48.1559	0.346633
Organic Chemical - Ct (ug/L)	52.5811	2.67797
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.915839	0.129439
Fraction of Sorbed Chemical - Organic Solid (-)	0.036301	0.870561
Fraction of Sorbed Chemical - Oil (-)	0.0478596	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOA_eff	BIOA_air
Flow Rate (m3/d)	4243.6	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	4.39666	1.09636
Organic Chemical - Cl (ug/L)	0.348098	-
Organic Chemical - Ct (ug/L)	1.03607	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.33598	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.66402	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00956646 m/hr
Mass Transfer Coefficient for Diffused Aeration	0.371657 m/hr
Biodegradation Rate in First Order Kinetics	8.93729 1/hr

Contaminant : Dibutylphthalate**Incoming Stream**

	Combined_eff to BIO-A	RAS-A
Flow Rate (m3/d)	3024.17	1219.46
Total Suspended Solids (mg/L)	48.9871	11230
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716047	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	30.0532	28.0645
Organic Chemical - Cl (ug/L)	1.97356	0.266852
Organic Chemical - Ct (ug/L)	9.93767	23.0139
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.198593	0.0115952
Fraction of Sorbed Chemical - Organic Solid (-)	0.0997673	0.988405
Fraction of Sorbed Chemical - Oil (-)	0.701639	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOA_eff	BIOA_air
Flow Rate (m3/d)	4243.63	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	29.4985	0.00078138
Organic Chemical - Cl (ug/L)	0.266853	-
Organic Chemical - Ct (ug/L)	6.95125	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.0383892	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.961611	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.000127782 m/hr
Mass Transfer Coefficient for Diffused Aeration	0.000226637 m/hr
Biodegradation Rate in First Order Kinetics	2.12793 1/hr

Contaminant : Chloroform (Trichloromethane)**Incoming Stream**

	Combined_eff to BIO-A	RAS-A
Flow Rate (m3/d)	3024.17	1219.45
Total Suspended Solids (mg/L)	48.9867	11230
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	0.360142	0.0176154
Organic Chemical - Cl (ug/L)	0.118047	0.00674146
Organic Chemical - Ct (ug/L)	0.119088	0.0144454
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.991262	0.466687
Fraction of Sorbed Chemical - Organic Solid (-)	0.00667591	0.533313
Fraction of Sorbed Chemical - Oil (-)	0.00206223	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOA_eff	BIOA_air
Flow Rate (m3/d)	4243.6	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.0386096	0.179915
Organic Chemical - Cl (ug/L)	0.0068111	-
Organic Chemical - Ct (ug/L)	0.00909832	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.748611	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.251389	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.010498 m/hr
Mass Transfer Coefficient for Diffused Aeration	3.18676 m/hr
Biodegradation Rate in First Order Kinetics	0.463888 1/hr

Contaminant : Acenaphthene**Incoming Stream**

	Combined_eff to BIO-A	RAS-A
Flow Rate (m3/d)	3024.17	1219.45
Total Suspended Solids (mg/L)	48.9867	11230
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	30.0058	2.04163
Organic Chemical - Cl (ug/L)	7.77423	0.101991
Organic Chemical - Ct (ug/L)	9.92199	1.67422
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.783536	0.0609183
Fraction of Sorbed Chemical - Organic Solid (-)	0.0711835	0.939082
Fraction of Sorbed Chemical - Oil (-)	0.145281	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOA_eff	BIOA_air
Flow Rate (m3/d)	4243.6	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	2.39849	0.164248
Organic Chemical - Cl (ug/L)	0.102208	-
Organic Chemical - Ct (ug/L)	0.565201	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.180835	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.819165	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00895291 m/hr
Mass Transfer Coefficient for Diffused Aeration	0.185558 m/hr
Biodegradation Rate in First Order Kinetics	5.72412 1/hr

Contaminant : Acenaphthylene**Incoming Stream**

	Combined_eff to BIO-A	RAS-A
Flow Rate (m3/d)	3024.17	1219.45
Total Suspended Solids (mg/L)	48.9867	11230
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	30.0065	2.46949
Organic Chemical - Cl (ug/L)	7.22615	0.101929
Organic Chemical - Ct (ug/L)	9.92224	2.02508
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.728278	0.0503334
Fraction of Sorbed Chemical - Organic Solid (-)	0.0809799	0.949667
Fraction of Sorbed Chemical - Oil (-)	0.190742	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOA_eff	BIOA_air
Flow Rate (m3/d)	4243.6	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	2.83523	0.0803054
Organic Chemical - Cl (ug/L)	0.102091	-
Organic Chemical - Ct (ug/L)	0.668118	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.152804	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.847196	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00790551 m/hr
Mass Transfer Coefficient for Diffused Aeration	0.0873048 m/hr
Biodegradation Rate in First Order Kinetics	5.7454 1/hr

Contaminant : Fluorene**Incoming Stream**

	Combined_eff to BIO-A	RAS-A
Flow Rate (m3/d)	3024.17	1219.45
Total Suspended Solids (mg/L)	48.9867	11230
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	30.0056	2.19744
Organic Chemical - Cl (ug/L)	6.76741	0.0788845
Organic Chemical - Ct (ug/L)	9.92194	1.802
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.682065	0.0437762
Fraction of Sorbed Chemical - Organic Solid (-)	0.0878037	0.956224
Fraction of Sorbed Chemical - Oil (-)	0.230131	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOA_eff	BIOA_air
Flow Rate (m3/d)	4243.6	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	2.48711	0.0641178
Organic Chemical - Cl (ug/L)	0.0789995	-
Organic Chemical - Ct (ug/L)	0.586084	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.134792	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.865208	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00822677 m/hr
Mass Transfer Coefficient for Diffused Aeration	0.0900117 m/hr
Biodegradation Rate in First Order Kinetics	7.44774 1/hr

Contaminant : Anthracene**Incoming Stream**

	Combined_eff to BIO-A	RAS-A
Flow Rate (m3/d)	3024.17	1219.45
Total Suspended Solids (mg/L)	48.9867	11230
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	30.0112	4.97851
Organic Chemical - Cl (ug/L)	5.47435	0.126369
Organic Chemical - Ct (ug/L)	9.92378	4.08259
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.551639	0.030953
Fraction of Sorbed Chemical - Organic Solid (-)	0.10178	0.969047
Fraction of Sorbed Chemical - Oil (-)	0.346581	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOA_eff	BIOA_air
Flow Rate (m3/d)	4243.6	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	5.47519	0.0773934
Organic Chemical - Cl (ug/L)	0.126496	-
Organic Chemical - Ct (ug/L)	1.29022	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.0980417	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.901958	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00779633 m/hr
Mass Transfer Coefficient for Diffused Aeration	0.0662589 m/hr
Biodegradation Rate in First Order Kinetics	4.6176 1/hr

Contaminant : Phenanthrene**Incoming Stream**

	Combined_eff to BIO-A	RAS-A
Flow Rate (m3/d)	3024.17	1219.45
Total Suspended Solids (mg/L)	48.9867	11230
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	30.0112	4.98252
Organic Chemical - Cl (ug/L)	5.42323	0.12486
Organic Chemical - Ct (ug/L)	9.9238	4.08587
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.546487	0.030559
Fraction of Sorbed Chemical - Organic Solid (-)	0.102171	0.969441
Fraction of Sorbed Chemical - Oil (-)	0.351342	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOA_eff	BIOA_air
Flow Rate (m3/d)	4243.6	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	5.47371	0.0378516
Organic Chemical - Cl (ug/L)	0.124962	-
Organic Chemical - Ct (ug/L)	1.28987	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.0968789	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.903121	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00638597 m/hr
Mass Transfer Coefficient for Diffused Aeration	0.0302776 m/hr
Biodegradation Rate in First Order Kinetics	4.68144 1/hr

Contaminant : Fluoranthene**Incoming Stream**

	Combined_eff to BIO-A	RAS-A
Flow Rate (m3/d)	3024.17	1219.46
Total Suspended Solids (mg/L)	48.9871	11230
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716047	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	30.0418	22.4466
Organic Chemical - Cl (ug/L)	1.56138	0.180139
Organic Chemical - Ct (ug/L)	9.93389	18.407
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.157177	0.00978643
Fraction of Sorbed Chemical - Organic Solid (-)	0.0937262	0.990214
Fraction of Sorbed Chemical - Oil (-)	0.749097	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOA_eff	BIOA_air
Flow Rate (m3/d)	4243.63	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	23.496	0.0110012
Organic Chemical - Cl (ug/L)	0.180158	-
Organic Chemical - Ct (ug/L)	5.53678	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.0325383	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.967462	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.0023958 m/hr
Mass Transfer Coefficient for Diffused Aeration	0.00499539 m/hr
Biodegradation Rate in First Order Kinetics	3.19189 1/hr

Contaminant : Pyrene**Incoming Stream**

	Combined_eff to BIO-A	RAS-A
Flow Rate (m3/d)	3024.17	1219.45
Total Suspended Solids (mg/L)	48.987	11230
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716048	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	30.0261	13.6545
Organic Chemical - Cl (ug/L)	2.04162	0.133307
Organic Chemical - Ct (ug/L)	9.92871	11.1972
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.205628	0.0119054
Fraction of Sorbed Chemical - Organic Solid (-)	0.100578	0.988095
Fraction of Sorbed Chemical - Oil (-)	0.693794	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOA_eff	BIOA_air
Flow Rate (m3/d)	4243.62	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	14.364	0.00649814
Organic Chemical - Cl (ug/L)	0.133321	-
Organic Chemical - Ct (ug/L)	3.38484	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.0393875	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.960612	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00199181 m/hr
Mass Transfer Coefficient for Diffused Aeration	0.00390775 m/hr
Biodegradation Rate in First Order Kinetics	4.36225 1/hr

Fate Summary

Contaminant : Benzene

Total Air Emissions	2.16855 %
Contribution from Surface Volatilization	0.00539709 %
Contribution from Diffused Aeration	2.16315 %
Biodegradation	47.6366 %

* as a percentage of the total contaminant in the system

Total Air Emissions	45.5402 g/d
Contribution from Surface Volatilization	0.113341 g/d
Contribution from Diffused Aeration	45.4269 g/d
Biodegradation	1000.39 g/d

Contaminant : Phenol

Total Air Emissions	0.000520812 %
Contribution from Surface Volatilization	0.000222274 %
Contribution from Diffused Aeration	0.000298538 %
Biodegradation	49.8915 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.000468739 g/d
Contribution from Surface Volatilization	0.00020005 g/d
Contribution from Diffused Aeration	0.000268689 g/d
Biodegradation	44.9031 g/d

Contaminant : Toluene

Total Air Emissions	4.66283 %
Contribution from Surface Volatilization	0.00974401 %
Contribution from Diffused Aeration	4.65308 %
Biodegradation	44.9676 %

* as a percentage of the total contaminant in the system

Total Air Emissions	139.607 g/d
Contribution from Surface Volatilization	0.29174 g/d
Contribution from Diffused Aeration	139.316 g/d
Biodegradation	1346.35 g/d

Contaminant : Ethylbenzene

Total Air Emissions	2.77328 %
Contribution from Surface Volatilization	0.00488135 %
Contribution from Diffused Aeration	2.7684 %
Biodegradation	47.0328 %

* as a percentage of the total contaminant in the system

Total Air Emissions	7.32158 g/d
Contribution from Surface Volatilization	0.012887 g/d
Contribution from Diffused Aeration	7.30869 g/d
Biodegradation	124.169 g/d

Contaminant : Xylene

Total Air Emissions	6.9578 %
Contribution from Surface Volatilization	0.0181053 %
Contribution from Diffused Aeration	6.93969 %
Biodegradation	42.3435 %

* as a percentage of the total contaminant in the system

Total Air Emissions	20.0388 g/d
Contribution from Surface Volatilization	0.052144 g/d
Contribution from Diffused Aeration	19.9866 g/d
Biodegradation	121.951 g/d

Contaminant : Styrene

Total Air Emissions	26.1338 %
Contribution from Surface Volatilization	0.128949 %
Contribution from Diffused Aeration	26.0049 %
Biodegradation	18.8375 %

* as a percentage of the total contaminant in the system

Total Air Emissions	136.421 g/d
Contribution from Surface Volatilization	0.673124 g/d
Contribution from Diffused Aeration	135.748 g/d
Biodegradation	98.3335 g/d

Contaminant : Naphthalene

Total Air Emissions	0.344762 %
Contribution from Surface Volatilization	0.00865149 %
Contribution from Diffused Aeration	0.33611 %
Biodegradation	49.3032 %

* as a percentage of the total contaminant in the system

Total Air Emissions	1.09636 g/d
Contribution from Surface Volatilization	0.0275122 g/d
Contribution from Diffused Aeration	1.06885 g/d
Biodegradation	156.787 g/d

Contaminant : Dibutylphthalate

Total Air Emissions	0.00130228 %
Contribution from Surface Volatilization	0.000469523 %
Contribution from Diffused Aeration	0.000832756 %
Biodegradation	47.695 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00078138 g/d
Contribution from Surface Volatilization	0.000281719 g/d
Contribution from Diffused Aeration	0.000499661 g/d
Biodegradation	28.6175 g/d

Contaminant : Chloroform (Trichloromethane)

Total Air Emissions	24.9878 %
Contribution from Surface Volatilization	0.082046 %
Contribution from Diffused Aeration	24.9057 %
Biodegradation	22.1153 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.179915 g/d
Contribution from Surface Volatilization	0.000590741 g/d
Contribution from Diffused Aeration	0.179324 g/d
Biodegradation	0.159233 g/d

Contaminant : Acenaphthene

Total Air Emissions	0.273743 %
Contribution from Surface Volatilization	0.0125998 %
Contribution from Diffused Aeration	0.261143 %
Biodegradation	49.1403 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.164248 g/d
Contribution from Surface Volatilization	0.00755999 g/d
Contribution from Diffused Aeration	0.156688 g/d
Biodegradation	29.4846 g/d

Contaminant : Acenaphthylene

Total Air Emissions	0.13384 %
Contribution from Surface Volatilization	0.011113 %
Contribution from Diffused Aeration	0.122727 %
Biodegradation	49.2666 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0803054 g/d
Contribution from Surface Volatilization	0.00666792 g/d
Contribution from Diffused Aeration	0.0736375 g/d
Biodegradation	29.5604 g/d

Contaminant : Fluorene

Total Air Emissions	0.106861 %
Contribution from Surface Volatilization	0.00894887 %
Contribution from Diffused Aeration	0.0979125 %
Biodegradation	49.4189 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0641178 g/d
Contribution from Surface Volatilization	0.00536941 g/d
Contribution from Diffused Aeration	0.0587484 g/d
Biodegradation	29.6518 g/d

Contaminant : Anthracene

Total Air Emissions	0.128987 %
Contribution from Surface Volatilization	0.0135794 %
Contribution from Diffused Aeration	0.115408 %
Biodegradation	49.0609 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0773934 g/d
Contribution from Surface Volatilization	0.00814775 g/d
Contribution from Diffused Aeration	0.0692456 g/d
Biodegradation	29.437 g/d

Contaminant : Phenanthrene

Total Air Emissions	0.0630849 %
Contribution from Surface Volatilization	0.010988 %
Contribution from Diffused Aeration	0.052097 %
Biodegradation	49.136 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0378516 g/d
Contribution from Surface Volatilization	0.00659289 g/d
Contribution from Diffused Aeration	0.0312587 g/d
Biodegradation	29.4821 g/d

Contaminant : Fluoranthene

Total Air Emissions	0.018335 %
Contribution from Surface Volatilization	0.00594316 %
Contribution from Diffused Aeration	0.0123919 %
Biodegradation	48.2997 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0110012 g/d
Contribution from Surface Volatilization	0.00356595 g/d
Contribution from Diffused Aeration	0.00743524 g/d
Biodegradation	28.9803 g/d

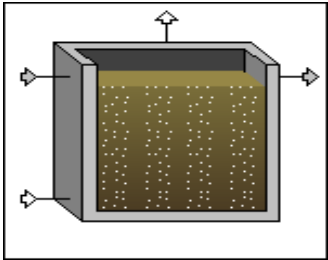
Contaminant : Pyrene

Total Air Emissions	0.0108301 %
Contribution from Surface Volatilization	0.00365644 %
Contribution from Diffused Aeration	0.00717362 %
Biodegradation	48.8485 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00649814 g/d
Contribution from Surface Volatilization	0.0021939 g/d
Contribution from Diffused Aeration	0.00430424 g/d
Biodegradation	29.3096 g/d

WWTP - Biotreater Aeration Tank B



Input Parameters

Data Entry

Liquid Depth	6.1 m
Surface Area	344.24 m2
Number of CSTRs	1
SRT	31 d
MLSS	3300 mg/L
VSS to SS Ratio	53 %
Dissolved Oxygen	2 mg/L
Process Air Flow Rate	3891 cuft/min
Oxygen Transfer Efficiency	7 %
Mole Fraction of Oxygen in Gas Source	0.209 O2/Air
Removal Efficiency - Wastewater DOC	0 %
Covered	false
Ventilation Rate	-
Local pH value	-
Advanced	
Kg/Kl Ratio for Diffused System	3

Output Data

Contaminant : Benzene

Incoming Stream

	Combined_eff to BIO-B	RAS-B
Flow Rate (m3/d)	3024.17	1055.73
Total Suspended Solids (mg/L)	48.9867	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	1050.04	3.57505
Organic Chemical - Cl (ug/L)	343.331	1.31951
Organic Chemical - Ct (ug/L)	347.217	3.38633
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.988806	0.389657
Fraction of Sorbed Chemical - Organic Solid (-)	0.00822017	0.610343
Fraction of Sorbed Chemical - Oil (-)	0.00297345	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOB_eff	BIOB_air
Flow Rate (m3/d)	4079.89	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	7.69073	45.5403
Organic Chemical - Cl (ug/L)	1.33264	-
Organic Chemical - Ct (ug/L)	1.88503	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.706957	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.293043	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.0102944 m/hr
Mass Transfer Coefficient for Diffused Aeration	4.126 m/hr
Biodegradation Rate in First Order Kinetics	14.8955 1/hr

Contaminant : Phenol**Incoming Stream**

	Combined_eff to BIO-B RAS-B	
Flow Rate (m3/d)	3024.17	1055.73
Total Suspended Solids (mg/L)	48.9867	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	45.0015	0.0557539
Organic Chemical - Cl (ug/L)	14.8207	0.0321805
Organic Chemical - Ct (ug/L)	14.8806	0.0528108
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.995971	0.609354
Fraction of Sorbed Chemical - Organic Solid (-)	0.00338875	0.390646
Fraction of Sorbed Chemical - Oil (-)	0.000640319	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOB_eff	BIOB_air
Flow Rate (m3/d)	4079.89	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.153702	0.000468739
Organic Chemical - Cl (ug/L)	0.0322088	-
Organic Chemical - Ct (ug/L)	0.0376731	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.854954	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.145046	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.000752751 m/hr
Mass Transfer Coefficient for Diffused Aeration	0.00101103 m/hr
Biodegradation Rate in First Order Kinetics	27.663 1/hr

Contaminant : Toluene**Incoming Stream**

	Combined_eff to BIO-B RAS-B	
Flow Rate (m3/d)	3024.17	1055.73
Total Suspended Solids (mg/L)	48.9867	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	1497.11	16.7163
Organic Chemical - Cl (ug/L)	480.876	3.52161
Organic Chemical - Ct (ug/L)	495.05	15.8339
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.97137	0.222409
Fraction of Sorbed Chemical - Organic Solid (-)	0.0180244	0.777591
Fraction of Sorbed Chemical - Oil (-)	0.0106056	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOB_eff	BIOB_air
Flow Rate (m3/d)	4079.89	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	27.8567	139.609
Organic Chemical - Cl (ug/L)	3.54651	-
Organic Chemical - Ct (ug/L)	6.82781	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.519421	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.480579	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00995697 m/hr
Mass Transfer Coefficient for Diffused Aeration	4.75478 m/hr
Biodegradation Rate in First Order Kinetics	7.53286 1/hr

Contaminant : Ethylbenzene**Incoming Stream**

	Combined_eff to BIO-B RAS-B	
Flow Rate (m3/d)	3024.17	1055.73
Total Suspended Solids (mg/L)	48.9867	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	132.007	1.20384
Organic Chemical - Cl (ug/L)	41.0249	0.160004
Organic Chemical - Ct (ug/L)	43.6507	1.14029
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.939846	0.140319
Fraction of Sorbed Chemical - Organic Solid (-)	0.0305603	0.859681
Fraction of Sorbed Chemical - Oil (-)	0.0295942	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOB_eff	BIOB_air
Flow Rate (m3/d)	4079.89	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	1.71986	7.32163
Organic Chemical - Cl (ug/L)	0.160814	-
Organic Chemical - Ct (ug/L)	0.421545	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.381487	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.618513	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00969969 m/hr
Mass Transfer Coefficient for Diffused Aeration	5.50107 m/hr
Biodegradation Rate in First Order Kinetics	15.3211 1/hr

Contaminant : Xylene**Incoming Stream**

	Combined_eff to BIO-B RAS-B	
Flow Rate (m3/d)	3024.17	1055.73
Total Suspended Solids (mg/L)	48.9867	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	144.022	4.728
Organic Chemical - Cl (ug/L)	44.759	0.628506
Organic Chemical - Ct (ug/L)	47.6236	4.47842
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.939851	0.140341
Fraction of Sorbed Chemical - Organic Solid (-)	0.0305548	0.859659
Fraction of Sorbed Chemical - Oil (-)	0.0295943	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOB_eff	BIOB_air
Flow Rate (m3/d)	4079.89	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	6.75594	20.0393
Organic Chemical - Cl (ug/L)	0.631781	-
Organic Chemical - Ct (ug/L)	1.65591	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.38153	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.61847	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00999027 m/hr
Mass Transfer Coefficient for Diffused Aeration	3.82924 m/hr
Biodegradation Rate in First Order Kinetics	3.83027 1/hr

Contaminant : Styrene**Incoming Stream**

	Combined_eff to BIO-B RAS-B	
Flow Rate (m3/d)	3024.17	1055.73
Total Suspended Solids (mg/L)	48.9867	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	261.238	49.8068
Organic Chemical - Cl (ug/L)	81.7152	8.28774
Organic Chemical - Ct (ug/L)	86.3833	47.1776
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.945961	0.175671
Fraction of Sorbed Chemical - Organic Solid (-)	0.0235588	0.824329
Fraction of Sorbed Chemical - Oil (-)	0.0304805	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOB_eff	BIOB_air
Flow Rate (m3/d)	4079.89	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	76.2536	136.442
Organic Chemical - Cl (ug/L)	8.33714	-
Organic Chemical - Ct (ug/L)	18.6901	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.446072	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.553928	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00977401 m/hr
Mass Transfer Coefficient for Diffused Aeration	1.9711 m/hr
Biodegradation Rate in First Order Kinetics	0.234072 1/hr

Contaminant : Naphthalene**Incoming Stream**

	Combined_eff to BIO-B RAS-B	
Flow Rate (m3/d)	3024.17	1055.73
Total Suspended Solids (mg/L)	48.9867	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	159.014	3.0985
Organic Chemical - Cl (ug/L)	48.1559	0.34658
Organic Chemical - Ct (ug/L)	52.5811	2.93494
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.915839	0.118088
Fraction of Sorbed Chemical - Organic Solid (-)	0.036301	0.881912
Fraction of Sorbed Chemical - Oil (-)	0.0478596	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOB_eff	BIOB_air
Flow Rate (m3/d)	4079.89	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	4.22711	1.09638
Organic Chemical - Cl (ug/L)	0.348103	-
Organic Chemical - Ct (ug/L)	1.03608	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.33598	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.66402	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00956646 m/hr
Mass Transfer Coefficient for Diffused Aeration	0.371657 m/hr
Biodegradation Rate in First Order Kinetics	8.93729 1/hr

Contaminant : Dibutylphthalate**Incoming Stream**

	Combined_eff to BIO-B RAS-B	
Flow Rate (m3/d)	3024.17	1055.73
Total Suspended Solids (mg/L)	48.9871	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716047	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	30.0532	26.968
Organic Chemical - Cl (ug/L)	1.97356	0.267048
Organic Chemical - Ct (ug/L)	9.93767	25.5444
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.198593	0.0104543
Fraction of Sorbed Chemical - Organic Solid (-)	0.0997673	0.989546
Fraction of Sorbed Chemical - Oil (-)	0.701639	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOB_eff	BIOB_air
Flow Rate (m3/d)	4079.9	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	28.3813	0.000781955
Organic Chemical - Cl (ug/L)	0.26705	-
Organic Chemical - Ct (ug/L)	6.95637	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.0383892	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.961611	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.000127782 m/hr
Mass Transfer Coefficient for Diffused Aeration	0.000226637 m/hr
Biodegradation Rate in First Order Kinetics	2.12793 1/hr

Contaminant : Chloroform (Trichloromethane)**Incoming Stream**

	Combined_eff to BIO-B RAS-B	
Flow Rate (m3/d)	3024.17	1055.73
Total Suspended Solids (mg/L)	48.9867	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	0.360142	0.0161425
Organic Chemical - Cl (ug/L)	0.118047	0.006739
Organic Chemical - Ct (ug/L)	0.119088	0.0152904
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.991262	0.440733
Fraction of Sorbed Chemical - Organic Solid (-)	0.00667591	0.559267
Fraction of Sorbed Chemical - Oil (-)	0.00206223	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOB_eff	BIOB_air
Flow Rate (m3/d)	4079.89	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.0371218	0.179923
Organic Chemical - Cl (ug/L)	0.0068114	-
Organic Chemical - Ct (ug/L)	0.00909872	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.748611	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.251389	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.010498 m/hr
Mass Transfer Coefficient for Diffused Aeration	3.18676 m/hr
Biodegradation Rate in First Order Kinetics	0.463888 1/hr

Contaminant : Acenaphthene**Incoming Stream**

	Combined_eff to BIO-B RAS-B	
Flow Rate (m3/d)	3024.17	1055.73
Total Suspended Solids (mg/L)	48.9867	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	30.0058	1.95074
Organic Chemical - Cl (ug/L)	7.77423	0.101988
Organic Chemical - Ct (ug/L)	9.92199	1.84777
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.783536	0.055195
Fraction of Sorbed Chemical - Organic Solid (-)	0.0711835	0.944805
Fraction of Sorbed Chemical - Oil (-)	0.145281	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOB_eff	BIOB_air
Flow Rate (m3/d)	4079.89	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	2.30608	0.164257
Organic Chemical - Cl (ug/L)	0.102213	-
Organic Chemical - Ct (ug/L)	0.56523	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.180835	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.819165	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00895291 m/hr
Mass Transfer Coefficient for Diffused Aeration	0.185558 m/hr
Biodegradation Rate in First Order Kinetics	5.72412 1/hr

Contaminant : Acenaphthylene**Incoming Stream**

	Combined_eff to BIO-B RAS-B	
Flow Rate (m3/d)	3024.17	1055.73
Total Suspended Solids (mg/L)	48.9867	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	30.0065	2.36212
Organic Chemical - Cl (ug/L)	7.22615	0.101929
Organic Chemical - Ct (ug/L)	9.92224	2.23743
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.728278	0.0455563
Fraction of Sorbed Chemical - Organic Solid (-)	0.0809799	0.954444
Fraction of Sorbed Chemical - Oil (-)	0.190742	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOB_eff	BIOB_air
Flow Rate (m3/d)	4079.89	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	2.72602	0.0803104
Organic Chemical - Cl (ug/L)	0.102098	-
Organic Chemical - Ct (ug/L)	0.668161	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.152804	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.847196	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00790551 m/hr
Mass Transfer Coefficient for Diffused Aeration	0.0873048 m/hr
Biodegradation Rate in First Order Kinetics	5.7454 1/hr

Contaminant : Fluorene**Incoming Stream**

	Combined_eff to BIO-B RAS-B	
Flow Rate (m3/d)	3024.17	1055.73
Total Suspended Solids (mg/L)	48.9867	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	30.0056	2.10328
Organic Chemical - Cl (ug/L)	6.76741	0.0788844
Organic Chemical - Ct (ug/L)	9.92194	1.99226
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.682065	0.0395955
Fraction of Sorbed Chemical - Organic Solid (-)	0.0878037	0.960405
Fraction of Sorbed Chemical - Oil (-)	0.230131	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOB_eff	BIOB_air
Flow Rate (m3/d)	4079.89	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	2.39129	0.0641214
Organic Chemical - Cl (ug/L)	0.0790039	-
Organic Chemical - Ct (ug/L)	0.586117	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.134792	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.865208	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00822677 m/hr
Mass Transfer Coefficient for Diffused Aeration	0.0900117 m/hr
Biodegradation Rate in First Order Kinetics	7.44774 1/hr

Contaminant : Anthracene**Incoming Stream**

	Combined_eff to BIO-B RAS-B	
Flow Rate (m3/d)	3024.17	1055.73
Total Suspended Solids (mg/L)	48.9867	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	30.0112	4.77172
Organic Chemical - Cl (ug/L)	5.47435	0.12638
Organic Chemical - Ct (ug/L)	9.92378	4.51983
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.551639	0.0279612
Fraction of Sorbed Chemical - Organic Solid (-)	0.10178	0.972039
Fraction of Sorbed Chemical - Oil (-)	0.346581	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOB_eff	BIOB_air
Flow Rate (m3/d)	4079.89	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	5.26464	0.0774033
Organic Chemical - Cl (ug/L)	0.126512	-
Organic Chemical - Ct (ug/L)	1.29039	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.0980417	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.901958	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00779633 m/hr
Mass Transfer Coefficient for Diffused Aeration	0.0662589 m/hr
Biodegradation Rate in First Order Kinetics	4.6176 1/hr

Contaminant : Phenanthrene**Incoming Stream**

	Combined_eff to BIO-B RAS-B	
Flow Rate (m3/d)	3024.17	1055.73
Total Suspended Solids (mg/L)	48.9867	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716049	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	30.0112	4.77578
Organic Chemical - Cl (ug/L)	5.42323	0.124872
Organic Chemical - Ct (ug/L)	9.9238	4.52368
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.546487	0.0276041
Fraction of Sorbed Chemical - Organic Solid (-)	0.102171	0.972396
Fraction of Sorbed Chemical - Oil (-)	0.351342	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOB_eff	BIOB_air
Flow Rate (m3/d)	4079.89	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	5.26323	0.0378564
Organic Chemical - Cl (ug/L)	0.124978	-
Organic Chemical - Ct (ug/L)	1.29004	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.0968789	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.903121	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00638597 m/hr
Mass Transfer Coefficient for Diffused Aeration	0.0302776 m/hr
Biodegradation Rate in First Order Kinetics	4.68144 1/hr

Contaminant : Fluoranthene**Incoming Stream**

	Combined_eff to BIO-B RAS-B	
Flow Rate (m3/d)	3024.17	1055.73
Total Suspended Solids (mg/L)	48.9871	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716047	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	30.0418	21.5703
Organic Chemical - Cl (ug/L)	1.56138	0.180245
Organic Chemical - Ct (ug/L)	9.93389	20.4316
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.157177	0.00882187
Fraction of Sorbed Chemical - Organic Solid (-)	0.0937262	0.991178
Fraction of Sorbed Chemical - Oil (-)	0.749097	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOB_eff	BIOB_air
Flow Rate (m3/d)	4079.9	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	22.6029	0.0110077
Organic Chemical - Cl (ug/L)	0.180264	-
Organic Chemical - Ct (ug/L)	5.54007	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.0325383	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.967462	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.0023958 m/hr
Mass Transfer Coefficient for Diffused Aeration	0.00499539 m/hr
Biodegradation Rate in First Order Kinetics	3.19189 1/hr

Contaminant : Pyrene**Incoming Stream**

	Combined_eff to BIO-B RAS-B	
Flow Rate (m3/d)	3024.17	1055.73
Total Suspended Solids (mg/L)	48.987	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.716048	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	19.3941	0
Organic Chemical Mass (g/d)	30.0261	13.1156
Organic Chemical - Cl (ug/L)	2.04162	0.133354
Organic Chemical - Ct (ug/L)	9.92871	12.4233
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.205628	0.0107342
Fraction of Sorbed Chemical - Organic Solid (-)	0.100578	0.989266
Fraction of Sorbed Chemical - Oil (-)	0.693794	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	BIOB_eff	BIOB_air
Flow Rate (m3/d)	4079.9	Infinite
Total Suspended Solids (mg/L)	3300	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	13.8148	0.00650048
Organic Chemical - Cl (ug/L)	0.133369	-
Organic Chemical - Ct (ug/L)	3.38606	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.0393875	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.960612	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00199181 m/hr
Mass Transfer Coefficient for Diffused Aeration	0.00390775 m/hr
Biodegradation Rate in First Order Kinetics	4.36225 1/hr

Fate Summary

Contaminant : Benzene

Total Air Emissions	2.16855 %
Contribution from Surface Volatilization	0.0053971 %
Contribution from Diffused Aeration	2.16316 %
Biodegradation	47.6368 %

* as a percentage of the total contaminant in the system

Total Air Emissions	45.5403 g/d
Contribution from Surface Volatilization	0.113341 g/d
Contribution from Diffused Aeration	45.427 g/d
Biodegradation	1000.39 g/d

Contaminant : Phenol

Total Air Emissions	0.000520813 %
Contribution from Surface Volatilization	0.000222274 %
Contribution from Diffused Aeration	0.000298538 %
Biodegradation	49.8915 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.000468739 g/d
Contribution from Surface Volatilization	0.00020005 g/d
Contribution from Diffused Aeration	0.000268689 g/d
Biodegradation	44.9031 g/d

Contaminant : Toluene

Total Air Emissions	4.66287 %
Contribution from Surface Volatilization	0.0097441 %
Contribution from Diffused Aeration	4.65313 %
Biodegradation	44.9681 %

* as a percentage of the total contaminant in the system

Total Air Emissions	139.609 g/d
Contribution from Surface Volatilization	0.291743 g/d
Contribution from Diffused Aeration	139.317 g/d
Biodegradation	1346.37 g/d

Contaminant : Ethylbenzene

Total Air Emissions	2.7733 %
Contribution from Surface Volatilization	0.00488138 %
Contribution from Diffused Aeration	2.76842 %
Biodegradation	47.0331 %

* as a percentage of the total contaminant in the system

Total Air Emissions	7.32163 g/d
Contribution from Surface Volatilization	0.0128871 g/d
Contribution from Diffused Aeration	7.30875 g/d
Biodegradation	124.169 g/d

Contaminant : Xylene

Total Air Emissions	6.95798 %
Contribution from Surface Volatilization	0.0181058 %
Contribution from Diffused Aeration	6.93987 %
Biodegradation	42.3446 %

* as a percentage of the total contaminant in the system

Total Air Emissions	20.0393 g/d
Contribution from Surface Volatilization	0.0521454 g/d
Contribution from Diffused Aeration	19.9872 g/d
Biodegradation	121.954 g/d

Contaminant : Styrene

Total Air Emissions	26.1378 %
Contribution from Surface Volatilization	0.128969 %
Contribution from Diffused Aeration	26.0089 %
Biodegradation	18.8404 %

* as a percentage of the total contaminant in the system

Total Air Emissions	136.442 g/d
Contribution from Surface Volatilization	0.673228 g/d
Contribution from Diffused Aeration	135.768 g/d
Biodegradation	98.3487 g/d

Contaminant : Naphthalene

Total Air Emissions	0.344767 %
Contribution from Surface Volatilization	0.00865162 %
Contribution from Diffused Aeration	0.336116 %
Biodegradation	49.304 %

* as a percentage of the total contaminant in the system

Total Air Emissions	1.09638 g/d
Contribution from Surface Volatilization	0.0275126 g/d
Contribution from Diffused Aeration	1.06886 g/d
Biodegradation	156.789 g/d

Contaminant : Dibutylphthalate

Total Air Emissions	0.00130324 %
Contribution from Surface Volatilization	0.000469869 %
Contribution from Diffused Aeration	0.000833368 %
Biodegradation	47.7301 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.000781955 g/d
Contribution from Surface Volatilization	0.000281926 g/d
Contribution from Diffused Aeration	0.000500029 g/d
Biodegradation	28.6385 g/d

Contaminant : Chloroform (Trichloromethane)

Total Air Emissions	24.9889 %
Contribution from Surface Volatilization	0.0820497 %
Contribution from Diffused Aeration	24.9068 %
Biodegradation	22.1163 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.179923 g/d
Contribution from Surface Volatilization	0.000590767 g/d
Contribution from Diffused Aeration	0.179332 g/d
Biodegradation	0.15924 g/d

Contaminant : Acenaphthene

Total Air Emissions	0.273757 %
Contribution from Surface Volatilization	0.0126004 %
Contribution from Diffused Aeration	0.261157 %
Biodegradation	49.1428 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.164257 g/d
Contribution from Surface Volatilization	0.00756039 g/d
Contribution from Diffused Aeration	0.156697 g/d
Biodegradation	29.4862 g/d

Contaminant : Acenaphthylene

Total Air Emissions	0.133849 %
Contribution from Surface Volatilization	0.0111137 %
Contribution from Diffused Aeration	0.122735 %
Biodegradation	49.2697 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0803104 g/d
Contribution from Surface Volatilization	0.00666834 g/d
Contribution from Diffused Aeration	0.0736421 g/d
Biodegradation	29.5623 g/d

Contaminant : Fluorene

Total Air Emissions	0.106867 %
Contribution from Surface Volatilization	0.00894937 %
Contribution from Diffused Aeration	0.097918 %
Biodegradation	49.4217 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0641214 g/d
Contribution from Surface Volatilization	0.00536971 g/d
Contribution from Diffused Aeration	0.0587517 g/d
Biodegradation	29.6535 g/d

Contaminant : Anthracene

Total Air Emissions	0.129004 %
Contribution from Surface Volatilization	0.0135811 %
Contribution from Diffused Aeration	0.115422 %
Biodegradation	49.0672 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0774033 g/d
Contribution from Surface Volatilization	0.0081488 g/d
Contribution from Diffused Aeration	0.0692545 g/d
Biodegradation	29.4408 g/d

Contaminant : Phenanthrene

Total Air Emissions	0.0630931 %
Contribution from Surface Volatilization	0.0109894 %
Contribution from Diffused Aeration	0.0521037 %
Biodegradation	49.1424 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0378564 g/d
Contribution from Surface Volatilization	0.00659374 g/d
Contribution from Diffused Aeration	0.0312627 g/d
Biodegradation	29.4859 g/d

Contaminant : Fluoranthene

Total Air Emissions	0.0183459 %
Contribution from Surface Volatilization	0.00594669 %
Contribution from Diffused Aeration	0.0123992 %
Biodegradation	48.3284 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0110077 g/d
Contribution from Surface Volatilization	0.00356807 g/d
Contribution from Diffused Aeration	0.00743965 g/d
Biodegradation	28.9975 g/d

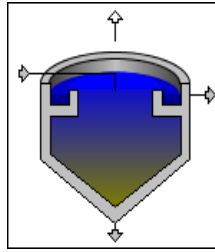
Contaminant : Pyrene

Total Air Emissions	0.010834 %
Contribution from Surface Volatilization	0.00365776 %
Contribution from Diffused Aeration	0.00717621 %
Biodegradation	48.8661 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00650048 g/d
Contribution from Surface Volatilization	0.00219469 g/d
Contribution from Diffused Aeration	0.00430579 g/d
Biodegradation	29.3202 g/d

WWTP - Secondary Clarifier A



Input Parameters

Data Entry

Liquid Depth		6.1 m
Surface Area		232.4 m ²
Weir Length		313.6 m
Waterfall Height		0.2 m
VSS to SS Ratio	-	%
Effluent SS Concentration		10 mg/L
Sludge SS Concentration		11230 mg/L
Removal Efficiency - Wastewater DOC		0 %
Covered	false	
Ventilation Rate	-	
Local pH value	-	
Advanced		
Kg/Kl Ratio for Weirs		100

Output Data

Contaminant : Benzene

Incoming Stream

	BIOA_eff
Flow Rate (m3/d)	4243.6
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	7.9993
Organic Chemical - Cl (ug/L)	1.33263
Organic Chemical - Ct (ug/L)	1.88503
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.706957
Fraction of Sorbed Chemical - Organic Solid (-)	0.293043
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	SC-A_eff	RAS-A	SC-A_air	WAS-A
Flow Rate (m3/d)	2999.27	1219.45	Infinite	24.8867
Total Suspended Solids (mg/L)	10	11230	-	11230
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	3.93748	3.8803	0.10233	0.0791897
Organic Chemical - Cl (ug/L)	1.31117	1.32001	-	1.32001
Organic Chemical - Ct (ug/L)	1.31282	3.18201	-	3.18201
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.998745	0.414834	-	0.414834
Fraction of Sorbed Chemical - Organic Solid (-)	0.00125452	0.585166	-	0.585166
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.0102944 m/hr
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Contaminant : Phenol**Incoming Stream**

	BIOA_eff
Flow Rate (m3/d)	4243.6
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.159869
Organic Chemical - Cl (ug/L)	0.0322087
Organic Chemical - Ct (ug/L)	0.0376731
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.854954
Fraction of Sorbed Chemical - Organic Solid (-)	0.145046
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	SC-A_eff	RAS-A	SC-A_air	WAS-A
Flow Rate (m3/d)	2999.27	1219.45	Infinite	24.8867
Total Suspended Solids (mg/L)	10	11230	-	11230
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	0.0965671	0.0619006	0.000138536	0.00126328
Organic Chemical - Cl (ug/L)	0.0321804	0.0321816	-	0.0321816
Organic Chemical - Ct (ug/L)	0.0321969	0.0507611	-	0.0507611
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.999486	0.633981	-	0.633981
Fraction of Sorbed Chemical - Organic Solid (-)	0.000513836	0.366019	-	0.366019
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.000752751 m/hr
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Contaminant : Toluene**Incoming Stream**

	BIOA_eff
Flow Rate (m3/d)	4243.6
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	28.9742
Organic Chemical - Cl (ug/L)	3.54647
Organic Chemical - Ct (ug/L)	6.82775
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.519421
Fraction of Sorbed Chemical - Organic Solid (-)	0.480579
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	SC-A_eff	RAS-A	SC-A_air	WAS-A
Flow Rate (m3/d)	2999.27	1219.45	Infinite	24.8867
Total Suspended Solids (mg/L)	10	11230	-	11230
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	10.5304	17.8203	0.259858	0.36368
Organic Chemical - Cl (ug/L)	3.50117	3.52253	-	3.52253
Organic Chemical - Ct (ug/L)	3.51099	14.6134	-	14.6134
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.997204	0.241048	-	0.241048
Fraction of Sorbed Chemical - Organic Solid (-)	0.00279586	0.758952	-	0.758952
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00995697 m/hr
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Contaminant : Ethylbenzene**Incoming Stream****BIOA_eff**

Flow Rate (m3/d)	4243.6
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	1.78886
Organic Chemical - Cl (ug/L)	0.160813
Organic Chemical - Ct (ug/L)	0.421542
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.381487
Fraction of Sorbed Chemical - Organic Solid (-)	0.618513
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream**SC-A_eff****RAS-A****SC-A_air****WAS-A**

Flow Rate (m3/d)	2999.27	1219.45	Infinite	24.8867
Total Suspended Solids (mg/L)	10	11230	-	11230
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	0.479643	1.2719	0.0113583	0.0259571
Organic Chemical - Cl (ug/L)	0.159138	0.160034	-	0.160034
Organic Chemical - Ct (ug/L)	0.15992	1.04301	-	1.04301
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.995111	0.153435	-	0.153435
Fraction of Sorbed Chemical - Organic Solid (-)	0.00488908	0.846565	-	0.846565
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00969969 m/hr
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Contaminant : Xylene**Incoming Stream****BIOA_eff**

Flow Rate (m3/d)	4243.6
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	7.02685
Organic Chemical - Cl (ug/L)	0.631764
Organic Chemical - Ct (ug/L)	1.65587
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.38153
Fraction of Sorbed Chemical - Organic Solid (-)	0.61847
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream**SC-A_eff****RAS-A****SC-A_air****WAS-A**

Flow Rate (m3/d)	2999.27	1219.45	Infinite	24.8867
Total Suspended Solids (mg/L)	10	11230	-	11230
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	1.88315	4.99524	0.0465261	0.101944
Organic Chemical - Cl (ug/L)	0.6248	0.628615	-	0.628615
Organic Chemical - Ct (ug/L)	0.627869	4.0963	-	4.0963
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.995112	0.153459	-	0.153459
Fraction of Sorbed Chemical - Organic Solid (-)	0.00488819	0.846541	-	0.846541
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00999027 m/hr
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Contaminant : Styrene**Incoming Stream**

	BIOA_eff
Flow Rate (m3/d)	4243.6
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	79.3012
Organic Chemical - Cl (ug/L)	8.33585
Organic Chemical - Ct (ug/L)	18.6872
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.446072
Fraction of Sorbed Chemical - Organic Solid (-)	0.553928
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	SC-A_eff	RAS-A	SC-A_air	WAS-A
Flow Rate (m3/d)	2999.27	1219.45	Infinite	24.8867
Total Suspended Solids (mg/L)	10	11230	-	11230
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	24.8156	52.8189	0.588746	1.07794
Organic Chemical - Cl (ug/L)	8.24288	8.28836	-	8.28836
Organic Chemical - Ct (ug/L)	8.2739	43.3137	-	43.3137
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.996251	0.191356	-	0.191356
Fraction of Sorbed Chemical - Organic Solid (-)	0.00374889	0.808644	-	0.808644
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00977401 m/hr
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Contaminant : Naphthalene**Incoming Stream**

	BIOA_eff
Flow Rate (m3/d)	4243.6
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	4.39666
Organic Chemical - Cl (ug/L)	0.348098
Organic Chemical - Ct (ug/L)	1.03607
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.33598
Fraction of Sorbed Chemical - Organic Solid (-)	0.66402
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	SC-A_eff	RAS-A	SC-A_air	WAS-A
Flow Rate (m3/d)	2999.27	1219.45	Infinite	24.8867
Total Suspended Solids (mg/L)	10	11230	-	11230
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	1.04162	3.26565	0.0227509	0.0666458
Organic Chemical - Cl (ug/L)	0.345223	0.346633	-	0.346633
Organic Chemical - Ct (ug/L)	0.347291	2.67797	-	2.67797
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.994047	0.129439	-	0.129439
Fraction of Sorbed Chemical - Organic Solid (-)	0.00595335	0.870561	-	0.870561
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00956646 m/hr
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Contaminant : Dibutylphthalate**Incoming Stream****BIOA_eff**

Flow Rate (m3/d)	4243.63
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	29.4985
Organic Chemical - Cl (ug/L)	0.266853
Organic Chemical - Ct (ug/L)	6.95125
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.0383892
Fraction of Sorbed Chemical - Organic Solid (-)	0.961611
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream**SC-A_eff****RAS-A****SC-A_air****WAS-A**

Flow Rate (m3/d)	2999.28	1219.46	Infinite	24.8869
Total Suspended Solids (mg/L)	10	11230	-	11230
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	0.861112	28.0645	0.000193758	0.572744
Organic Chemical - Cl (ug/L)	0.26685	0.266852	-	0.266852
Organic Chemical - Ct (ug/L)	0.287106	23.0139	-	23.0139
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.929449	0.0115952	-	0.0115952
Fraction of Sorbed Chemical - Organic Solid (-)	0.0705507	0.988405	-	0.988405
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.000127782 m/hr
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Contaminant : Chloroform (Trichloromethane)**Incoming Stream**

	BIOA_eff
Flow Rate (m3/d)	4243.6
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.0386096
Organic Chemical - Cl (ug/L)	0.0068111
Organic Chemical - Ct (ug/L)	0.00909832
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.748611
Fraction of Sorbed Chemical - Organic Solid (-)	0.251389
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	SC-A_eff	RAS-A	SC-A_air	WAS-A
Flow Rate (m3/d)	2999.27	1219.45	Infinite	24.8867
Total Suspended Solids (mg/L)	10	11230	-	11230
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	0.0200976	0.0176154	0.000537181	0.000359498
Organic Chemical - Cl (ug/L)	0.00669402	0.00674146	-	0.00674146
Organic Chemical - Ct (ug/L)	0.00670083	0.0144454	-	0.0144454
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.998983	0.466687	-	0.466687
Fraction of Sorbed Chemical - Organic Solid (-)	0.00101657	0.533313	-	0.533313
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.010498 m/hr
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Contaminant : Acenaphthene**Incoming Stream****BIOA_eff**

Flow Rate (m3/d)	4243.6
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	2.39849
Organic Chemical - Cl (ug/L)	0.102208
Organic Chemical - Ct (ug/L)	0.565201
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.180835
Fraction of Sorbed Chemical - Organic Solid (-)	0.819165
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream**SC-A_eff****RAS-A****SC-A_air****WAS-A**

Flow Rate (m3/d)	2999.27	1219.45	Infinite	24.8867
Total Suspended Solids (mg/L)	10	11230	-	11230
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	0.309245	2.04163	0.00594478	0.0416659
Organic Chemical - Cl (ug/L)	0.101711	0.101991	-	0.101991
Organic Chemical - Ct (ug/L)	0.103107	1.67422	-	1.67422
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.986459	0.0609183	-	0.0609183
Fraction of Sorbed Chemical - Organic Solid (-)	0.0135411	0.939082	-	0.939082
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00895291 m/hr
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Contaminant : Acenaphthylene**Incoming Stream****BIOA_eff**

Flow Rate (m3/d)	4243.6
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	2.83523
Organic Chemical - Cl (ug/L)	0.102091
Organic Chemical - Ct (ug/L)	0.668118
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.152804
Fraction of Sorbed Chemical - Organic Solid (-)	0.847196
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream**SC-A_eff****RAS-A****SC-A_air****WAS-A**

Flow Rate (m3/d)	2999.27	1219.45	Infinite	24.8867
Total Suspended Solids (mg/L)	10	11230	-	11230
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	0.310385	2.46949	0.00495924	0.0503977
Organic Chemical - Cl (ug/L)	0.101777	0.101929	-	0.101929
Organic Chemical - Ct (ug/L)	0.103487	2.02508	-	2.02508
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.983477	0.0503334	-	0.0503334
Fraction of Sorbed Chemical - Organic Solid (-)	0.0165234	0.949667	-	0.949667
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00790551 m/hr
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Contaminant : Fluorene**Incoming Stream****BIOA_eff**

Flow Rate (m3/d)	4243.6
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	2.48711
Organic Chemical - Cl (ug/L)	0.0789995
Organic Chemical - Ct (ug/L)	0.586084
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.134792
Fraction of Sorbed Chemical - Organic Solid (-)	0.865208
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream**SC-A_eff****RAS-A****SC-A_air****WAS-A**

Flow Rate (m3/d)	2999.27	1219.45	Infinite	24.8867
Total Suspended Solids (mg/L)	10	11230	-	11230
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	0.240785	2.19744	0.00403243	0.0448458
Organic Chemical - Cl (ug/L)	0.0787495	0.0788845	-	0.0788845
Organic Chemical - Ct (ug/L)	0.0802813	1.802	-	1.802
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.98092	0.0437762	-	0.0437762
Fraction of Sorbed Chemical - Organic Solid (-)	0.0190799	0.956224	-	0.956224
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00822677 m/hr
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Contaminant : Anthracene**Incoming Stream**

	BIOA_eff
Flow Rate (m3/d)	4243.6
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	5.47519
Organic Chemical - Cl (ug/L)	0.126496
Organic Chemical - Ct (ug/L)	1.29022
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.0980417
Fraction of Sorbed Chemical - Organic Solid (-)	0.901958
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	SC-A_eff	RAS-A	SC-A_air	WAS-A
Flow Rate (m3/d)	2999.27	1219.45	Infinite	24.8867
Total Suspended Solids (mg/L)	10	11230	-	11230
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	0.389056	4.97851	0.00601833	0.101602
Organic Chemical - Cl (ug/L)	0.126199	0.126369	-	0.126369
Organic Chemical - Ct (ug/L)	0.129717	4.08259	-	4.08259
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.972878	0.030953	-	0.030953
Fraction of Sorbed Chemical - Organic Solid (-)	0.0271219	0.969047	-	0.969047
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00779633 m/hr
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Contaminant : Phenanthrene**Incoming Stream****BIOA_eff**

Flow Rate (m3/d)	4243.6
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	5.47371
Organic Chemical - Cl (ug/L)	0.124962
Organic Chemical - Ct (ug/L)	1.28987
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.0968789
Fraction of Sorbed Chemical - Organic Solid (-)	0.903121
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream**SC-A_eff****RAS-A****SC-A_air****WAS-A**

Flow Rate (m3/d)	2999.27	1219.45	Infinite	24.8867
Total Suspended Solids (mg/L)	10	11230	-	11230
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	0.384801	4.98252	0.0047134	0.101684
Organic Chemical - Cl (ug/L)	0.124774	0.12486	-	0.12486
Organic Chemical - Ct (ug/L)	0.128299	4.08587	-	4.08587
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.972527	0.030559	-	0.030559
Fraction of Sorbed Chemical - Organic Solid (-)	0.0274729	0.969441	-	0.969441
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00638597 m/hr
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Contaminant : Fluoranthene**Incoming Stream**

	BIOA_eff
Flow Rate (m3/d)	4243.63
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	23.496
Organic Chemical - Cl (ug/L)	0.180158
Organic Chemical - Ct (ug/L)	5.53678
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.0325383
Fraction of Sorbed Chemical - Organic Solid (-)	0.967462
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	SC-A_eff	RAS-A	SC-A_air	WAS-A
Flow Rate (m3/d)	2999.28	1219.46	Infinite	24.8869
Total Suspended Solids (mg/L)	10	11230	-	11230
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	0.588899	22.4466	0.00247601	0.458093
Organic Chemical - Cl (ug/L)	0.180118	0.180139	-	0.180139
Organic Chemical - Ct (ug/L)	0.196347	18.407	-	18.407
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.917347	0.00978643	-	0.00978643
Fraction of Sorbed Chemical - Organic Solid (-)	0.082653	0.990214	-	0.990214
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.0023958 m/hr
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Contaminant : Pyrene**Incoming Stream****BIOA_eff**

Flow Rate (m3/d)	4243.62
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	14.364
Organic Chemical - Cl (ug/L)	0.133321
Organic Chemical - Ct (ug/L)	3.38484
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.0393875
Fraction of Sorbed Chemical - Organic Solid (-)	0.960612
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream**SC-A_eff****RAS-A****SC-A_air****WAS-A**

Flow Rate (m3/d)	2999.28	1219.45	Infinite	24.8868
Total Suspended Solids (mg/L)	10	11230	-	11230
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	0.429333	13.6545	0.0015214	0.278663
Organic Chemical - Cl (ug/L)	0.133294	0.133307	-	0.133307
Organic Chemical - Ct (ug/L)	0.143145	11.1972	-	11.1972
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.931181	0.0119054	-	0.0119054
Fraction of Sorbed Chemical - Organic Solid (-)	0.0688192	0.988095	-	0.988095
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00199181 m/hr
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Fate Summary

Contaminant : Benzene

Total Air Emissions	0.00487279 %
Contribution from Surface Volatilization	0.00360911 %
Contribution from Weir Volatilization	0.00126369 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.10233 g/d
Contribution from Surface Volatilization	0.0757924 g/d
Contribution from Weir Volatilization	0.0265379 g/d
Biodegradation	0 g/d

Contaminant : Phenol

Total Air Emissions	0.000153926 %
Contribution from Surface Volatilization	0.000149933 %
Contribution from Weir Volatilization	3.99312E-06 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.000138536 g/d
Contribution from Surface Volatilization	0.000134942 g/d
Contribution from Weir Volatilization	3.59386E-06 g/d
Biodegradation	0 g/d

Contaminant : Toluene

Total Air Emissions	0.00867914 %
Contribution from Surface Volatilization	0.00653387 %
Contribution from Weir Volatilization	0.00214527 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.259858 g/d
Contribution from Surface Volatilization	0.195627 g/d
Contribution from Weir Volatilization	0.0642304 g/d
Biodegradation	0 g/d

Contaminant : Ethylbenzene

Total Air Emissions	0.0043023 %
Contribution from Surface Volatilization	0.0032795 %
Contribution from Weir Volatilization	0.00102281 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0113583 g/d
Contribution from Surface Volatilization	0.00865801 g/d
Contribution from Weir Volatilization	0.00270026 g/d
Biodegradation	0 g/d

Contaminant : Xylene

Total Air Emissions	0.0161546 %
Contribution from Surface Volatilization	0.0121621 %
Contribution from Weir Volatilization	0.00399251 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0465261 g/d
Contribution from Surface Volatilization	0.0350275 g/d
Contribution from Weir Volatilization	0.0114986 g/d
Biodegradation	0 g/d

Contaminant : Styrene

Total Air Emissions	0.112785 %
Contribution from Surface Volatilization	0.0865588 %
Contribution from Weir Volatilization	0.026226 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.588746 g/d
Contribution from Surface Volatilization	0.451844 g/d
Contribution from Weir Volatilization	0.136902 g/d
Biodegradation	0 g/d

Contaminant : Naphthalene

Total Air Emissions	0.00715424 %
Contribution from Surface Volatilization	0.00581614 %
Contribution from Weir Volatilization	0.0013381 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0227509 g/d
Contribution from Surface Volatilization	0.0184956 g/d
Contribution from Weir Volatilization	0.00425523 g/d
Biodegradation	0 g/d

Contaminant : Dibutylphthalate

Total Air Emissions	0.000322925 %
Contribution from Surface Volatilization	0.000316978 %
Contribution from Weir Volatilization	5.94682E-06 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.000193758 g/d
Contribution from Surface Volatilization	0.00019019 g/d
Contribution from Weir Volatilization	3.56815E-06 g/d
Biodegradation	0 g/d

Contaminant : Chloroform (Trichloromethane)

Total Air Emissions	0.0746073 %
Contribution from Surface Volatilization	0.0548238 %
Contribution from Weir Volatilization	0.0197835 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.000537181 g/d
Contribution from Surface Volatilization	0.000394738 g/d
Contribution from Weir Volatilization	0.000142443 g/d
Biodegradation	0 g/d

Contaminant : Acenaphthene

Total Air Emissions	0.00990781 %
Contribution from Surface Volatilization	0.00848819 %
Contribution from Weir Volatilization	0.00141963 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00594478 g/d
Contribution from Surface Volatilization	0.00509299 g/d
Contribution from Weir Volatilization	0.000851789 g/d
Biodegradation	0 g/d

Contaminant : Acenaphthylene

Total Air Emissions	0.00826526 %
Contribution from Surface Volatilization	0.00749063 %
Contribution from Weir Volatilization	0.000774635 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00495924 g/d
Contribution from Surface Volatilization	0.00449445 g/d
Contribution from Weir Volatilization	0.000464788 g/d
Biodegradation	0 g/d

Contaminant : Fluorene

Total Air Emissions	0.0067206 %
Contribution from Surface Volatilization	0.00603268 %
Contribution from Weir Volatilization	0.000687918 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00403243 g/d
Contribution from Surface Volatilization	0.00361967 g/d
Contribution from Weir Volatilization	0.000412757 g/d
Biodegradation	0 g/d

Contaminant : Anthracene

Total Air Emissions	0.0100304 %
Contribution from Surface Volatilization	0.00915837 %
Contribution from Weir Volatilization	0.000872018 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00601833 g/d
Contribution from Surface Volatilization	0.00549511 g/d
Contribution from Weir Volatilization	0.000523219 g/d
Biodegradation	0 g/d

Contaminant : Phenanthrene

Total Air Emissions	0.00785554 %
Contribution from Surface Volatilization	0.00741207 %
Contribution from Weir Volatilization	0.000443472 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0047134 g/d
Contribution from Surface Volatilization	0.00444731 g/d
Contribution from Weir Volatilization	0.000266088 g/d
Biodegradation	0 g/d

Contaminant : Fluoranthene

Total Air Emissions	0.00412662 %
Contribution from Surface Volatilization	0.00401188 %
Contribution from Weir Volatilization	0.000114743 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00247601 g/d
Contribution from Surface Volatilization	0.00240716 g/d
Contribution from Weir Volatilization	0.000068847 g/d
Biodegradation	0 g/d

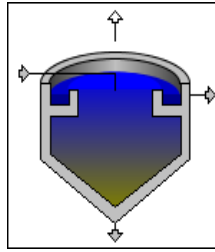
Contaminant : Pyrene

Total Air Emissions	0.00253563 %
Contribution from Surface Volatilization	0.00246825 %
Contribution from Weir Volatilization	6.73864E-05 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0015214 g/d
Contribution from Surface Volatilization	0.00148097 g/d
Contribution from Weir Volatilization	4.04325E-05 g/d
Biodegradation	0 g/d

WWTP - Secondary Clarifier B



Input Parameters

Data Entry

Liquid Depth		6.1 m
Surface Area		232.4 m ²
Weir Length		313.6 m
Waterfall Height		0.2 m
VSS to SS Ratio	-	%
Effluent SS Concentration		10 mg/L
Sludge SS Concentration		12470 mg/L
Removal Efficiency - Wastewater DOC		0 %
Covered	false	
Ventilation Rate	-	
Local pH value	-	
Advanced		
Kg/Kl Ratio for Weirs		100

Output Data

Contaminant : Benzene

Incoming Stream

	BIOB_eff
Flow Rate (m3/d)	4079.89
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	7.69073
Organic Chemical - Cl (ug/L)	1.33264
Organic Chemical - Ct (ug/L)	1.88503
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.706957
Fraction of Sorbed Chemical - Organic Solid (-)	0.293043
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	SC-B_eff	RAS-B	SC-B_air	WAS-B
Flow Rate (m3/d)	3002.62	1055.73	Infinite	21.5455
Total Suspended Solids (mg/L)	10	12470	-	12470
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	3.94038	3.57505	0.102341	0.0729601
Organic Chemical - Cl (ug/L)	1.31067	1.31951	-	1.31951
Organic Chemical - Ct (ug/L)	1.31231	3.38633	-	3.38633
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.998745	0.389657	-	0.389657
Fraction of Sorbed Chemical - Organic Solid (-)	0.00125452	0.610343	-	0.610343
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.0102944 m/hr
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Contaminant : Phenol**Incoming Stream**

	BIOB_eff
Flow Rate (m3/d)	4079.89
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.153702
Organic Chemical - Cl (ug/L)	0.0322088
Organic Chemical - Ct (ug/L)	0.0376731
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.854954
Fraction of Sorbed Chemical - Organic Solid (-)	0.145046
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	SC-B_eff	RAS-B	SC-B_air	WAS-B
Flow Rate (m3/d)	3002.62	1055.73	Infinite	21.5455
Total Suspended Solids (mg/L)	10	12470	-	12470
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	0.0966717	0.0557539	0.000138538	0.00113784
Organic Chemical - Cl (ug/L)	0.0321793	0.0321805	-	0.0321805
Organic Chemical - Ct (ug/L)	0.0321958	0.0528108	-	0.0528108
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.999486	0.609354	-	0.609354
Fraction of Sorbed Chemical - Organic Solid (-)	0.000513836	0.390646	-	0.390646
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.000752751 m/hr
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Contaminant : Toluene**Incoming Stream****BIOB_eff**

Flow Rate (m3/d)	4079.89
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	27.8567
Organic Chemical - Cl (ug/L)	3.54651
Organic Chemical - Ct (ug/L)	6.82781
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.519421
Fraction of Sorbed Chemical - Organic Solid (-)	0.480579
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream**SC-B_eff****RAS-B****SC-B_air****WAS-B**

Flow Rate (m3/d)	3002.62	1055.73	Infinite	21.5455
Total Suspended Solids (mg/L)	10	12470	-	12470
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	10.5393	16.7163	0.259909	0.341149
Organic Chemical - Cl (ug/L)	3.50024	3.52161	-	3.52161
Organic Chemical - Ct (ug/L)	3.51005	15.8339	-	15.8339
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.997204	0.222409	-	0.222409
Fraction of Sorbed Chemical - Organic Solid (-)	0.00279586	0.777591	-	0.777591
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00995697 m/hr
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Contaminant : Ethylbenzene**Incoming Stream****BIOB_eff**

Flow Rate (m3/d)	4079.89
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	1.71986
Organic Chemical - Cl (ug/L)	0.160814
Organic Chemical - Ct (ug/L)	0.421545
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.381487
Fraction of Sorbed Chemical - Organic Solid (-)	0.618513
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream**SC-B_eff****RAS-B****SC-B_air****WAS-B**

Flow Rate (m3/d)	3002.62	1055.73	Infinite	21.5455
Total Suspended Solids (mg/L)	10	12470	-	12470
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	0.480087	1.20384	0.0113611	0.0245682
Organic Chemical - Cl (ug/L)	0.159108	0.160004	-	0.160004
Organic Chemical - Ct (ug/L)	0.15989	1.14029	-	1.14029
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.995111	0.140319	-	0.140319
Fraction of Sorbed Chemical - Organic Solid (-)	0.00488908	0.859681	-	0.859681
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00969969 m/hr
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Contaminant : Xylene**Incoming Stream**

Flow Rate (m3/d)	4079.89
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	6.75594
Organic Chemical - Cl (ug/L)	0.631781
Organic Chemical - Ct (ug/L)	1.65591
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.38153
Fraction of Sorbed Chemical - Organic Solid (-)	0.61847
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

BIOB_eff**Outgoing Stream**

	SC-B_eff	RAS-B	SC-B_air	WAS-B
Flow Rate (m3/d)	3002.62	1055.73	Infinite	21.5455
Total Suspended Solids (mg/L)	10	12470	-	12470
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	1.88491	4.728	0.0465393	0.0964898
Organic Chemical - Cl (ug/L)	0.624688	0.628506	-	0.628506
Organic Chemical - Ct (ug/L)	0.627757	4.47842	-	4.47842
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.995112	0.140341	-	0.140341
Fraction of Sorbed Chemical - Organic Solid (-)	0.00488819	0.859659	-	0.859659
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00999027 m/hr
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Contaminant : Styrene**Incoming Stream**

	BIOB_eff
Flow Rate (m3/d)	4079.89
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	76.2536
Organic Chemical - Cl (ug/L)	8.33714
Organic Chemical - Ct (ug/L)	18.6901
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.446072
Fraction of Sorbed Chemical - Organic Solid (-)	0.553928
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	SC-B_eff	RAS-B	SC-B_air	WAS-B
Flow Rate (m3/d)	3002.62	1055.73	Infinite	21.5455
Total Suspended Solids (mg/L)	10	12470	-	12470
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	24.8414	49.8068	0.588956	1.01647
Organic Chemical - Cl (ug/L)	8.24223	8.28774	-	8.28774
Organic Chemical - Ct (ug/L)	8.27325	47.1776	-	47.1776
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.996251	0.175671	-	0.175671
Fraction of Sorbed Chemical - Organic Solid (-)	0.00374889	0.824329	-	0.824329
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00977401 m/hr
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Contaminant : Naphthalene**Incoming Stream**

	BIOB_eff
Flow Rate (m3/d)	4079.89
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	4.22711
Organic Chemical - Cl (ug/L)	0.348103
Organic Chemical - Ct (ug/L)	1.03608
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.33598
Fraction of Sorbed Chemical - Organic Solid (-)	0.66402
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	SC-B_eff	RAS-B	SC-B_air	WAS-B
Flow Rate (m3/d)	3002.62	1055.73	Infinite	21.5455
Total Suspended Solids (mg/L)	10	12470	-	12470
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	1.04262	3.0985	0.0227553	0.0632347
Organic Chemical - Cl (ug/L)	0.345169	0.34658	-	0.34658
Organic Chemical - Ct (ug/L)	0.347236	2.93494	-	2.93494
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.994047	0.118088	-	0.118088
Fraction of Sorbed Chemical - Organic Solid (-)	0.00595335	0.881912	-	0.881912
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00956646 m/hr
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Contaminant : Dibutylphthalate**Incoming Stream****BIOB_eff**

Flow Rate (m3/d)	4079.9
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	28.3813
Organic Chemical - Cl (ug/L)	0.26705
Organic Chemical - Ct (ug/L)	6.95637
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.0383892
Fraction of Sorbed Chemical - Organic Solid (-)	0.961611
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream**SC-B_eff****RAS-B****SC-B_air****WAS-B**

Flow Rate (m3/d)	3002.63	1055.73	Infinite	21.5456
Total Suspended Solids (mg/L)	10	12470	-	12470
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	0.862706	26.968	0.000193907	0.550368
Organic Chemical - Cl (ug/L)	0.267047	0.267048	-	0.267048
Organic Chemical - Ct (ug/L)	0.287317	25.5444	-	25.5444
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.929449	0.0104543	-	0.0104543
Fraction of Sorbed Chemical - Organic Solid (-)	0.0705507	0.989546	-	0.989546
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.000127782 m/hr
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Contaminant : Chloroform (Trichloromethane)**Incoming Stream**

	BIOB_eff
Flow Rate (m3/d)	4079.89
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.0371218
Organic Chemical - Cl (ug/L)	0.0068114
Organic Chemical - Ct (ug/L)	0.00909872
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.748611
Fraction of Sorbed Chemical - Organic Solid (-)	0.251389
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	SC-B_eff	RAS-B	SC-B_air	WAS-B
Flow Rate (m3/d)	3002.62	1055.73	Infinite	21.5455
Total Suspended Solids (mg/L)	10	12470	-	12470
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	0.0201126	0.0161425	0.000537249	0.00032944
Organic Chemical - Cl (ug/L)	0.00669153	0.006739	-	0.006739
Organic Chemical - Ct (ug/L)	0.00669834	0.0152904	-	0.0152904
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.998983	0.440733	-	0.440733
Fraction of Sorbed Chemical - Organic Solid (-)	0.00101657	0.559267	-	0.559267
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.010498 m/hr
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Contaminant : Acenaphthene**Incoming Stream**

	BIOB_eff
Flow Rate (m3/d)	4079.89
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	2.30608
Organic Chemical - Cl (ug/L)	0.102213
Organic Chemical - Ct (ug/L)	0.56523
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.180835
Fraction of Sorbed Chemical - Organic Solid (-)	0.819165
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	SC-B_eff	RAS-B	SC-B_air	WAS-B
Flow Rate (m3/d)	3002.62	1055.73	Infinite	21.5455
Total Suspended Solids (mg/L)	10	12470	-	12470
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	0.30958	1.95074	0.00594616	0.039811
Organic Chemical - Cl (ug/L)	0.101707	0.101988	-	0.101988
Organic Chemical - Ct (ug/L)	0.103103	1.84777	-	1.84777
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.986459	0.055195	-	0.055195
Fraction of Sorbed Chemical - Organic Solid (-)	0.0135411	0.944805	-	0.944805
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00895291 m/hr
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Contaminant : Acenaphthylene**Incoming Stream****BIOB_eff**

Flow Rate (m3/d)	4079.89
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	2.72602
Organic Chemical - Cl (ug/L)	0.102098
Organic Chemical - Ct (ug/L)	0.668161
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.152804
Fraction of Sorbed Chemical - Organic Solid (-)	0.847196
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream**SC-B_eff****RAS-B****SC-B_air****WAS-B**

Flow Rate (m3/d)	3002.62	1055.73	Infinite	21.5455
Total Suspended Solids (mg/L)	10	12470	-	12470
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	0.310731	2.36212	0.00496009	0.0482066
Organic Chemical - Cl (ug/L)	0.101777	0.101929	-	0.101929
Organic Chemical - Ct (ug/L)	0.103487	2.23743	-	2.23743
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.983477	0.0455563	-	0.0455563
Fraction of Sorbed Chemical - Organic Solid (-)	0.0165234	0.954444	-	0.954444
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00790551 m/hr
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Contaminant : Fluorene**Incoming Stream**

	BIOB_eff
Flow Rate (m3/d)	4079.89
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	2.39129
Organic Chemical - Cl (ug/L)	0.0790039
Organic Chemical - Ct (ug/L)	0.586117
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.134792
Fraction of Sorbed Chemical - Organic Solid (-)	0.865208
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	SC-B_eff	RAS-B	SC-B_air	WAS-B
Flow Rate (m3/d)	3002.62	1055.73	Infinite	21.5455
Total Suspended Solids (mg/L)	10	12470	-	12470
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	0.241053	2.10328	0.00403318	0.0429241
Organic Chemical - Cl (ug/L)	0.0787493	0.0788844	-	0.0788844
Organic Chemical - Ct (ug/L)	0.080281	1.99226	-	1.99226
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.98092	0.0395955	-	0.0395955
Fraction of Sorbed Chemical - Organic Solid (-)	0.0190799	0.960405	-	0.960405
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00822677 m/hr
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Contaminant : Anthracene**Incoming Stream**

	BIOB_eff
Flow Rate (m3/d)	4079.89
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	5.26464
Organic Chemical - Cl (ug/L)	0.126512
Organic Chemical - Ct (ug/L)	1.29039
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.0980417
Fraction of Sorbed Chemical - Organic Solid (-)	0.901958
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	SC-B_eff	RAS-B	SC-B_air	WAS-B
Flow Rate (m3/d)	3002.62	1055.73	Infinite	21.5455
Total Suspended Solids (mg/L)	10	12470	-	12470
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	0.389525	4.77172	0.00601983	0.097382
Organic Chemical - Cl (ug/L)	0.12621	0.12638	-	0.12638
Organic Chemical - Ct (ug/L)	0.129728	4.51983	-	4.51983
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.972878	0.0279612	-	0.0279612
Fraction of Sorbed Chemical - Organic Solid (-)	0.0271219	0.972039	-	0.972039
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00779633 m/hr
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Contaminant : Phenanthrene**Incoming Stream**

	BIOB_eff
Flow Rate (m3/d)	4079.89
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	5.26323
Organic Chemical - Cl (ug/L)	0.124978
Organic Chemical - Ct (ug/L)	1.29004
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.0968789
Fraction of Sorbed Chemical - Organic Solid (-)	0.903121
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	SC-B_eff	RAS-B	SC-B_air	WAS-B
Flow Rate (m3/d)	3002.62	1055.73	Infinite	21.5455
Total Suspended Solids (mg/L)	10	12470	-	12470
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	0.385268	4.77578	0.00471435	0.0974649
Organic Chemical - Cl (ug/L)	0.124786	0.124872	-	0.124872
Organic Chemical - Ct (ug/L)	0.128311	4.52368	-	4.52368
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.972527	0.0276041	-	0.0276041
Fraction of Sorbed Chemical - Organic Solid (-)	0.0274729	0.972396	-	0.972396
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00638597 m/hr
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Contaminant : Fluoranthene**Incoming Stream**

	BIOB_eff
Flow Rate (m3/d)	4079.9
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	22.6029
Organic Chemical - Cl (ug/L)	0.180264
Organic Chemical - Ct (ug/L)	5.54007
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.0325383
Fraction of Sorbed Chemical - Organic Solid (-)	0.967462
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	SC-B_eff	RAS-B	SC-B_air	WAS-B
Flow Rate (m3/d)	3002.63	1055.73	Infinite	21.5456
Total Suspended Solids (mg/L)	10	12470	-	12470
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	0.589903	21.5703	0.0024776	0.440211
Organic Chemical - Cl (ug/L)	0.180224	0.180245	-	0.180245
Organic Chemical - Ct (ug/L)	0.196462	20.4316	-	20.4316
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.917347	0.00882187	-	0.00882187
Fraction of Sorbed Chemical - Organic Solid (-)	0.082653	0.991178	-	0.991178
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.0023958 m/hr
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Contaminant : Pyrene**Incoming Stream****BIOB_eff**

Flow Rate (m3/d)	4079.9
Total Suspended Solids (mg/L)	3300
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	13.8148
Organic Chemical - Cl (ug/L)	0.133369
Organic Chemical - Ct (ug/L)	3.38606
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.0393875
Fraction of Sorbed Chemical - Organic Solid (-)	0.960612
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream**SC-B_eff****RAS-B****SC-B_air****WAS-B**

Flow Rate (m3/d)	3002.62	1055.73	Infinite	21.5455
Total Suspended Solids (mg/L)	10	12470	-	12470
Suspended Solids Mass (g/d)	-	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-	0.53
Wastewater DOC (mg/L)	0	0	-	0
Oil/Grease (mg/L)	0	0	-	0
Organic Chemical Mass (g/d)	0.429965	13.1156	0.00152202	0.267666
Organic Chemical - Cl (ug/L)	0.133342	0.133354	-	0.133354
Organic Chemical - Ct (ug/L)	0.143196	12.4233	-	12.4233
Metal - Cl (ug/L)	0	0	-	0
Metal - Ct (ug/L)	-	-	-	-
Metal Mass (g/d)	-	-	-	-
Precipitated Metal (mg/L)	0	0	-	0
Powdered Activated Carbon (mg/L)	0	0	-	0
Temperature (deg C)	25	25	-	25
MKp (L/g)	0	0	-	0
Solubility (mg/L)	0	0	-	0
pH (-)	7	7	-	7
Fraction of Soluble Chemical (-)	0.931181	0.0107342	-	0.0107342
Fraction of Sorbed Chemical - Organic Solid (-)	0.0688192	0.989266	-	0.989266
Fraction of Sorbed Chemical - Oil (-)	0	0	-	0
Fraction of Sorbed Chemical - DOC (-)	0	0	-	0
Fraction of Sorbed Chemical - PAC (-)	0	0	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00199181 m/hr
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Fate Summary

Contaminant : Benzene

Total Air Emissions	0.0048733 %
Contribution from Surface Volatilization	0.00360775 %
Contribution from Weir Volatilization	0.00126555 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.102341 g/d
Contribution from Surface Volatilization	0.0757639 g/d
Contribution from Weir Volatilization	0.026577 g/d
Biodegradation	0 g/d

Contaminant : Phenol

Total Air Emissions	0.000153928 %
Contribution from Surface Volatilization	0.000149928 %
Contribution from Weir Volatilization	4.00039E-06 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.000138538 g/d
Contribution from Surface Volatilization	0.000134937 g/d
Contribution from Weir Volatilization	3.60041E-06 g/d
Biodegradation	0 g/d

Contaminant : Toluene

Total Air Emissions	0.00868084 %
Contribution from Surface Volatilization	0.00653216 %
Contribution from Weir Volatilization	0.00214868 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.259909 g/d
Contribution from Surface Volatilization	0.195576 g/d
Contribution from Weir Volatilization	0.0643326 g/d
Biodegradation	0 g/d

Contaminant : Ethylbenzene

Total Air Emissions	0.0043034 %
Contribution from Surface Volatilization	0.00327888 %
Contribution from Weir Volatilization	0.00102451 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0113611 g/d
Contribution from Surface Volatilization	0.00865639 g/d
Contribution from Weir Volatilization	0.00270475 g/d
Biodegradation	0 g/d

Contaminant : Xylene

Total Air Emissions	0.0161592 %
Contribution from Surface Volatilization	0.01216 %
Contribution from Weir Volatilization	0.00399921 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0465393 g/d
Contribution from Surface Volatilization	0.0350214 g/d
Contribution from Weir Volatilization	0.0115179 g/d
Biodegradation	0 g/d

Contaminant : Styrene

Total Air Emissions	0.112825 %
Contribution from Surface Volatilization	0.0865523 %
Contribution from Weir Volatilization	0.0262726 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.588956 g/d
Contribution from Surface Volatilization	0.45181 g/d
Contribution from Weir Volatilization	0.137145 g/d
Biodegradation	0 g/d

Contaminant : Naphthalene

Total Air Emissions	0.00715562 %
Contribution from Surface Volatilization	0.00581525 %
Contribution from Weir Volatilization	0.00134038 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0227553 g/d
Contribution from Surface Volatilization	0.0184928 g/d
Contribution from Weir Volatilization	0.00426247 g/d
Biodegradation	0 g/d

Contaminant : Dibutylphthalate

Total Air Emissions	0.000323173 %
Contribution from Surface Volatilization	0.000317211 %
Contribution from Weir Volatilization	5.96221E-06 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.000193907 g/d
Contribution from Surface Volatilization	0.00019033 g/d
Contribution from Weir Volatilization	3.57738E-06 g/d
Biodegradation	0 g/d

Contaminant : Chloroform (Trichloromethane)

Total Air Emissions	0.0746167 %
Contribution from Surface Volatilization	0.0548038 %
Contribution from Weir Volatilization	0.0198129 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.000537249 g/d
Contribution from Surface Volatilization	0.000394594 g/d
Contribution from Weir Volatilization	0.000142655 g/d
Biodegradation	0 g/d

Contaminant : Acenaphthene

Total Air Emissions	0.00991011 %
Contribution from Surface Volatilization	0.0084879 %
Contribution from Weir Volatilization	0.00142221 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00594616 g/d
Contribution from Surface Volatilization	0.00509282 g/d
Contribution from Weir Volatilization	0.00085334 g/d
Biodegradation	0 g/d

Contaminant : Acenaphthylene

Total Air Emissions	0.00826669 %
Contribution from Surface Volatilization	0.00749062 %
Contribution from Weir Volatilization	0.000776071 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00496009 g/d
Contribution from Surface Volatilization	0.00449444 g/d
Contribution from Weir Volatilization	0.00046565 g/d
Biodegradation	0 g/d

Contaminant : Fluorene

Total Air Emissions	0.00672186 %
Contribution from Surface Volatilization	0.00603267 %
Contribution from Weir Volatilization	0.000689192 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00403318 g/d
Contribution from Surface Volatilization	0.00361966 g/d
Contribution from Weir Volatilization	0.000413522 g/d
Biodegradation	0 g/d

Contaminant : Anthracene

Total Air Emissions	0.0100329 %
Contribution from Surface Volatilization	0.00915918 %
Contribution from Weir Volatilization	0.000873713 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00601983 g/d
Contribution from Surface Volatilization	0.0054956 g/d
Contribution from Weir Volatilization	0.000524236 g/d
Biodegradation	0 g/d

Contaminant : Phenanthrene

Total Air Emissions	0.00785712 %
Contribution from Surface Volatilization	0.00741278 %
Contribution from Weir Volatilization	0.000444338 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00471435 g/d
Contribution from Surface Volatilization	0.00444774 g/d
Contribution from Weir Volatilization	0.000266607 g/d
Biodegradation	0 g/d

Contaminant : Fluoranthene

Total Air Emissions	0.00412926 %
Contribution from Surface Volatilization	0.00401424 %
Contribution from Weir Volatilization	0.000115023 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0024776 g/d
Contribution from Surface Volatilization	0.00240858 g/d
Contribution from Weir Volatilization	0.000069015 g/d
Biodegradation	0 g/d

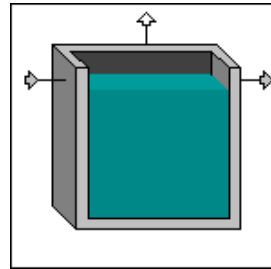
Contaminant : Pyrene

Total Air Emissions	0.00253666 %
Contribution from Surface Volatilization	0.00246913 %
Contribution from Weir Volatilization	6.75352E-05 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00152202 g/d
Contribution from Surface Volatilization	0.0014815 g/d
Contribution from Weir Volatilization	4.05218E-05 g/d
Biodegradation	0 g/d

WWTP - Biosludge Holding Tank (T-59701A/B)



Input Parameters

Data Entry

Liquid Depth	6 m
Surface Area	80.32 m ²
VSS to SS Ratio	- %
Removal Efficiency - Wastewater DOC	0 %
Covered	false
Ventilation Rate	-
Local pH value	-

Advanced

Water Surface Covered with Oil	0 %
Oil Layer Mass Transfer Coefficient	Hydromantis Method

Output Data

Contaminant : Benzene

Incoming Stream

	WAS-A	WAS-B
Flow Rate (m ³ /d)	24.8867	21.5455
Total Suspended Solids (mg/L)	11230	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.0791897	0.0729601
Organic Chemical - Cl (ug/L)	1.32001	1.31951
Organic Chemical - Ct (ug/L)	3.18201	3.38633
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.414834	0.389657
Fraction of Sorbed Chemical - Organic Solid (-)	0.585166	0.610343
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	WAS holding_eff	Sludge tk_air
Flow Rate (m3/d)	46.4322	Infinite
Total Suspended Solids (mg/L)	11805.4	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.129806	0.0223439
Organic Chemical - Cl (ug/L)	1.12595	-
Organic Chemical - Ct (ug/L)	2.7956	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.402759	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.597241	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.0102944 m/hr
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Contaminant : Phenol**Incoming Stream**

	WAS-A	WAS-B
Flow Rate (m3/d)	24.8867	21.5455
Total Suspended Solids (mg/L)	11230	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.00126328	0.00113784
Organic Chemical - Cl (ug/L)	0.0321816	0.0321805
Organic Chemical - Ct (ug/L)	0.0507611	0.0528108
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.633981	0.609354
Fraction of Sorbed Chemical - Organic Solid (-)	0.366019	0.390646
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	WAS holding_eff	Sludge tk_air
Flow Rate (m3/d)	46.4322	Infinite
Total Suspended Solids (mg/L)	11805.4	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.00235536	4.57481E-05
Organic Chemical - Cl (ug/L)	0.0315679	-
Organic Chemical - Ct (ug/L)	0.0507269	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.622311	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.377689	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.000752751 m/hr
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Contaminant : Toluene**Incoming Stream**

	WAS-A	WAS-B
Flow Rate (m3/d)	24.8867	21.5455
Total Suspended Solids (mg/L)	11230	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.36368	0.341149
Organic Chemical - Cl (ug/L)	3.52253	3.52161
Organic Chemical - Ct (ug/L)	14.6134	15.8339
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.241048	0.222409
Fraction of Sorbed Chemical - Organic Solid (-)	0.758952	0.777591
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	WAS holding_eff	Sludge tk_air
Flow Rate (m3/d)	46.4322	Infinite
Total Suspended Solids (mg/L)	11805.4	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.643143	0.0616858
Organic Chemical - Cl (ug/L)	3.21383	-
Organic Chemical - Ct (ug/L)	13.8512	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.232025	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.767975	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00995697 m/hr
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Contaminant : Ethylbenzene**Incoming Stream**

	WAS-A	WAS-B
Flow Rate (m3/d)	24.8867	21.5455
Total Suspended Solids (mg/L)	11230	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.0259571	0.0245682
Organic Chemical - Cl (ug/L)	0.160034	0.160004
Organic Chemical - Ct (ug/L)	1.04301	1.14029
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.153435	0.140319
Fraction of Sorbed Chemical - Organic Solid (-)	0.846565	0.859681
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	WAS holding_eff	Sludge tk_air
Flow Rate (m3/d)	46.4322	Infinite
Total Suspended Solids (mg/L)	11805.4	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.0477005	0.00282475
Organic Chemical - Cl (ug/L)	0.151073	-
Organic Chemical - Ct (ug/L)	1.02731	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.147057	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.852943	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00969969 m/hr
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Contaminant : Xylene**Incoming Stream**

	WAS-A	WAS-B
Flow Rate (m3/d)	24.8867	21.5455
Total Suspended Solids (mg/L)	11230	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.101944	0.0964898
Organic Chemical - Cl (ug/L)	0.628615	0.628506
Organic Chemical - Ct (ug/L)	4.0963	4.47842
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.153459	0.140341
Fraction of Sorbed Chemical - Organic Solid (-)	0.846541	0.859659
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	WAS holding_eff	Sludge tk_air
Flow Rate (m3/d)	46.4322	Infinite
Total Suspended Solids (mg/L)	11805.4	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.187025	0.0114089
Organic Chemical - Cl (ug/L)	0.592423	-
Organic Chemical - Ct (ug/L)	4.0279	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.14708	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.85292	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00999027 m/hr
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Contaminant : Styrene**Incoming Stream**

	WAS-A	WAS-B
Flow Rate (m3/d)	24.8867	21.5455
Total Suspended Solids (mg/L)	11230	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	1.07794	1.01647
Organic Chemical - Cl (ug/L)	8.28836	8.28774
Organic Chemical - Ct (ug/L)	43.3137	47.1776
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.191356	0.175671
Fraction of Sorbed Chemical - Organic Solid (-)	0.808644	0.824329
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	WAS holding_eff	Sludge tk_air
Flow Rate (m3/d)	46.4322	Infinite
Total Suspended Solids (mg/L)	11805.4	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	1.94908	0.145322
Organic Chemical - Cl (ug/L)	7.71298	-
Organic Chemical - Ct (ug/L)	41.9769	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.183744	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.816256	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00977401 m/hr
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Contaminant : Naphthalene**Incoming Stream**

	WAS-A	WAS-B
Flow Rate (m3/d)	24.8867	21.5455
Total Suspended Solids (mg/L)	11230	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.0666458	0.0632347
Organic Chemical - Cl (ug/L)	0.346633	0.34658
Organic Chemical - Ct (ug/L)	2.67797	2.93494
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.129439	0.118088
Fraction of Sorbed Chemical - Organic Solid (-)	0.870561	0.881912
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	WAS holding_eff	Sludge tk_air
Flow Rate (m3/d)	46.4322	Infinite
Total Suspended Solids (mg/L)	11805.4	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.123789	0.00609201
Organic Chemical - Cl (ug/L)	0.33035	-
Organic Chemical - Ct (ug/L)	2.66601	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.123912	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.876088	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00956646 m/hr
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Contaminant : Dibutylphthalate**Incoming Stream**

	WAS-A	WAS-B
Flow Rate (m3/d)	24.8869	21.5456
Total Suspended Solids (mg/L)	11230	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.572744	0.550368
Organic Chemical - Cl (ug/L)	0.266852	0.267048
Organic Chemical - Ct (ug/L)	23.0139	25.5444
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.0115952	0.0104543
Fraction of Sorbed Chemical - Organic Solid (-)	0.988405	0.989546
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	WAS holding_eff	Sludge tk_air
Flow Rate (m3/d)	46.4324	Infinite
Total Suspended Solids (mg/L)	11805.4	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	1.12305	6.57516E-05
Organic Chemical - Cl (ug/L)	0.266932	-
Organic Chemical - Ct (ug/L)	24.1867	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.0110363	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.988964	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.000127782 m/hr
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Contaminant : Chloroform (Trichloromethane)**Incoming Stream**

	WAS-A	WAS-B
Flow Rate (m3/d)	24.8867	21.5455
Total Suspended Solids (mg/L)	11230	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.000359498	0.00032944
Organic Chemical - Cl (ug/L)	0.00674146	0.006739
Organic Chemical - Ct (ug/L)	0.0144454	0.0152904
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.466687	0.440733
Fraction of Sorbed Chemical - Organic Solid (-)	0.533313	0.559267
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	WAS holding_eff	Sludge tk_air
Flow Rate (m3/d)	46.4322	Infinite
Total Suspended Solids (mg/L)	11805.4	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.000575078	0.000113859
Organic Chemical - Cl (ug/L)	0.00562633	-
Organic Chemical - Ct (ug/L)	0.0123853	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.454274	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.545726	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.010498 m/hr
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Contaminant : Acenaphthene**Incoming Stream**

	WAS-A	WAS-B
Flow Rate (m3/d)	24.8867	21.5455
Total Suspended Solids (mg/L)	11230	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.0416659	0.039811
Organic Chemical - Cl (ug/L)	0.101991	0.101988
Organic Chemical - Ct (ug/L)	1.67422	1.84777
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.0609183	0.055195
Fraction of Sorbed Chemical - Organic Solid (-)	0.939082	0.944805
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	WAS holding_eff	Sludge tk_air
Flow Rate (m3/d)	46.4322	Infinite
Total Suspended Solids (mg/L)	11805.4	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.079754	0.00172294
Organic Chemical - Cl (ug/L)	0.0998325	-
Organic Chemical - Ct (ug/L)	1.71764	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.0581218	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.941878	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00895291 m/hr
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Contaminant : Acenaphthylene**Incoming Stream**

	WAS-A	WAS-B
Flow Rate (m3/d)	24.8867	21.5455
Total Suspended Solids (mg/L)	11230	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.0503977	0.0482066
Organic Chemical - Cl (ug/L)	0.101929	0.101929
Organic Chemical - Ct (ug/L)	2.02508	2.23743
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.0503334	0.0455563
Fraction of Sorbed Chemical - Organic Solid (-)	0.949667	0.954444
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	WAS holding_eff	Sludge tk_air
Flow Rate (m3/d)	46.4322	Infinite
Total Suspended Solids (mg/L)	11805.4	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.0970751	0.00152924
Organic Chemical - Cl (ug/L)	0.100349	-
Organic Chemical - Ct (ug/L)	2.09068	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.0479979	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.952002	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00790551 m/hr
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Contaminant : Fluorene**Incoming Stream**

	WAS-A	WAS-B
Flow Rate (m3/d)	24.8867	21.5455
Total Suspended Solids (mg/L)	11230	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.0448458	0.0429241
Organic Chemical - Cl (ug/L)	0.0788845	0.0788844
Organic Chemical - Ct (ug/L)	1.802	1.99226
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.0437762	0.0395955
Fraction of Sorbed Chemical - Organic Solid (-)	0.956224	0.960405
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	WAS holding_eff	Sludge tk_air
Flow Rate (m3/d)	46.4322	Infinite
Total Suspended Solids (mg/L)	11805.4	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.0865365	0.00123342
Organic Chemical - Cl (ug/L)	0.0777759	-
Organic Chemical - Ct (ug/L)	1.86372	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.0417316	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.958268	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00822677 m/hr
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Contaminant : Anthracene**Incoming Stream**

	WAS-A	WAS-B
Flow Rate (m3/d)	24.8867	21.5455
Total Suspended Solids (mg/L)	11230	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.101602	0.097382
Organic Chemical - Cl (ug/L)	0.126369	0.12638
Organic Chemical - Ct (ug/L)	4.08259	4.51983
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.030953	0.0279612
Fraction of Sorbed Chemical - Organic Solid (-)	0.969047	0.972039
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	WAS holding_eff	Sludge tk_air
Flow Rate (m3/d)	46.4322	Infinite
Total Suspended Solids (mg/L)	11805.4	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.197103	0.0018813
Organic Chemical - Cl (ug/L)	0.125179	-
Organic Chemical - Ct (ug/L)	4.24496	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.0294889	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.970511	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00779633 m/hr
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Contaminant : Phenanthrene**Incoming Stream**

	WAS-A	WAS-B
Flow Rate (m3/d)	24.8867	21.5455
Total Suspended Solids (mg/L)	11230	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.101684	0.0974649
Organic Chemical - Cl (ug/L)	0.12486	0.124872
Organic Chemical - Ct (ug/L)	4.08587	4.52368
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.030559	0.0276041
Fraction of Sorbed Chemical - Organic Solid (-)	0.969441	0.972396
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	WAS holding_eff	Sludge tk_air
Flow Rate (m3/d)	46.4322	Infinite
Total Suspended Solids (mg/L)	11805.4	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.197624	0.00152534
Organic Chemical - Cl (ug/L)	0.12391	-
Organic Chemical - Ct (ug/L)	4.25617	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.0291129	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.970887	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00638597 m/hr
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Contaminant : Fluoranthene**Incoming Stream**

	WAS-A	WAS-B
Flow Rate (m3/d)	24.8869	21.5456
Total Suspended Solids (mg/L)	11230	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.458093	0.440211
Organic Chemical - Cl (ug/L)	0.180139	0.180245
Organic Chemical - Ct (ug/L)	18.407	20.4316
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.00978643	0.00882187
Fraction of Sorbed Chemical - Organic Solid (-)	0.990214	0.991178
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	WAS holding_eff	Sludge tk_air
Flow Rate (m3/d)	46.4324	Infinite
Total Suspended Solids (mg/L)	11805.4	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.897473	0.000831413
Organic Chemical - Cl (ug/L)	0.180024	-
Organic Chemical - Ct (ug/L)	19.3286	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.00931389	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.990686	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.0023958 m/hr
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Contaminant : Pyrene**Incoming Stream**

	WAS-A	WAS-B
Flow Rate (m3/d)	24.8868	21.5455
Total Suspended Solids (mg/L)	11230	12470
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.278663	0.267666
Organic Chemical - Cl (ug/L)	0.133307	0.133354
Organic Chemical - Ct (ug/L)	11.1972	12.4233
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.0119054	0.0107342
Fraction of Sorbed Chemical - Organic Solid (-)	0.988095	0.989266
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	WAS holding_eff	Sludge tk_air
Flow Rate (m3/d)	46.4324	Infinite
Total Suspended Solids (mg/L)	11805.4	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.545817	0.00051145
Organic Chemical - Cl (ug/L)	0.133205	-
Organic Chemical - Ct (ug/L)	11.7551	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.0113317	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.988668	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00199181 m/hr
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Fate Summary

Contaminant : Benzene

Total Air Emissions	0.00106398 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.0223439 g/d
Biodegradation	0 g/d

Contaminant : Phenol

Total Air Emissions	5.08304E-05 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	4.57481E-05 g/d
Biodegradation	0 g/d

Contaminant : Toluene

Total Air Emissions	0.00206028 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.0616858 g/d
Biodegradation	0 g/d

Contaminant : Ethylbenzene

Total Air Emissions	0.00106997 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.00282475 g/d
Biodegradation	0 g/d

Contaminant : Xylene

Total Air Emissions	0.00396136 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.0114089 g/d
Biodegradation	0 g/d

Contaminant : Styrene

Total Air Emissions	0.0278389 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.145322 g/d
Biodegradation	0 g/d

Contaminant : Naphthalene

Total Air Emissions	0.00191569 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.00609201 g/d
Biodegradation	0 g/d

Contaminant : Dibutylphthalate

Total Air Emissions	0.000109584 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	6.57516E-05 g/d
Biodegradation	0 g/d

Contaminant : Chloroform (Trichloromethane)

Total Air Emissions	0.0158135 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.000113859 g/d
Biodegradation	0 g/d

Contaminant : Acenaphthene

Total Air Emissions	0.00287153 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.00172294 g/d
Biodegradation	0 g/d

Contaminant : Acenaphthylene

Total Air Emissions	0.00254869 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.00152924 g/d
Biodegradation	0 g/d

Contaminant : Fluorene

Total Air Emissions	0.00205566 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.00123342 g/d
Biodegradation	0 g/d

Contaminant : Anthracene

Total Air Emissions	0.00313544 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.0018813 g/d
Biodegradation	0 g/d

Contaminant : Phenanthrene

Total Air Emissions	0.00254219 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.00152534 g/d
Biodegradation	0 g/d

Contaminant : Fluoranthene

Total Air Emissions	0.00138567 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

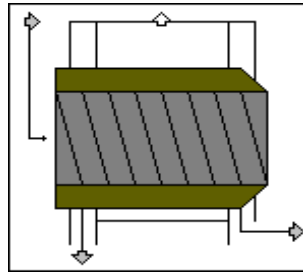
Total Air Emissions	0.000831413 g/d
Biodegradation	0 g/d

Contaminant : Pyrene

Total Air Emissions	0.000852403 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.00051145 g/d
Biodegradation	0 g/d

WWTP - Centrifuge



Input Parameters

Data Entry

Final Solids Concentration	12 %
Filtrate/Centrates SS Concentration	1081 mg/L
VSS to SS Ratio	- %
Removal Efficiency - Wastewater DOC	0 %
Local pH value	-

Output Data

Contaminant : Benzene

Incoming Stream

WAS holding_eff

Flow Rate (m3/d)	46.4322
Total Suspended Solids (mg/L)	11805.4
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.129806
Organic Chemical - Cl (ug/L)	1.12595
Organic Chemical - Ct (ug/L)	2.7956
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.402759
Fraction of Sorbed Chemical - Organic Solid (-)	0.597241
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

DW centrifuge_cake

DW centrifuge_filtrate

DW centrifuge_air

Flow Rate (m3/d)	4.18736	42.2448	Infinite
Total Suspended Solids (mg/L)	120000	1081	-
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-
Wastewater DOC (mg/L)	0	0	-
Oil/Grease (mg/L)	0	0	-
Organic Chemical Mass (g/d)	0.0757422	0.0539964	6.74158E-05
Organic Chemical - Cl (ug/L)	1.12537	1.12537	-
Organic Chemical - Ct (ug/L)	18.0883	1.27818	-
Metal - Cl (ug/L)	0	0	-
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	0	0	-
Powdered Activated Carbon (mg/L)	0	0	-
Temperature (deg C)	25	25	-
MKp (L/g)	0	0	-
Solubility (mg/L)	0	0	-
pH (-)	7	7	-
Fraction of Soluble Chemical (-)	0.0622154	0.880449	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.937785	0.119551	-
Fraction of Sorbed Chemical - Oil (-)	0	0	-
Fraction of Sorbed Chemical - DOC (-)	0	0	-
Fraction of Sorbed Chemical - PAC (-)	0	0	-

Contaminant : Phenol**Incoming Stream****WAS holding_eff**

Flow Rate (m3/d)		46.4322
Total Suspended Solids (mg/L)		11805.4
Suspended Solids Mass (g/d)	-	
Volatile SS Fraction (-)		0.53
Wastewater DOC (mg/L)		0
Oil/Grease (mg/L)		0
Organic Chemical Mass (g/d)		0.00235536
Organic Chemical - Cl (ug/L)		0.0315679
Organic Chemical - Ct (ug/L)		0.0507269
Metal - Cl (ug/L)		0
Metal - Ct (ug/L)	-	
Metal Mass (g/d)	-	
Precipitated Metal (mg/L)		0
Powdered Activated Carbon (mg/L)		0
Temperature (deg C)		25
MKp (L/g)		0
Solubility (mg/L)		0
pH (-)		7
Fraction of Soluble Chemical (-)		0.622311
Fraction of Sorbed Chemical - Organic Solid (-)		0.377689
Fraction of Sorbed Chemical - Oil (-)		0
Fraction of Sorbed Chemical - DOC (-)		0
Fraction of Sorbed Chemical - PAC (-)		0

Outgoing Stream**DW centrifuge_cake****DW centrifuge_filtrate****DW centrifuge_air**

Flow Rate (m3/d)	4.18736	42.2448	Infinite
Total Suspended Solids (mg/L)	120000	1081	-
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-
Wastewater DOC (mg/L)	0	0	-
Oil/Grease (mg/L)	0	0	-
Organic Chemical Mass (g/d)	0.00094767	0.00140769	4.3612E-10
Organic Chemical - Cl (ug/L)	0.0315679	0.0315679	-
Organic Chemical - Ct (ug/L)	0.226317	0.0333223	-
Metal - Cl (ug/L)	0	0	-
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	0	0	-
Powdered Activated Carbon (mg/L)	0	0	-
Temperature (deg C)	25	25	-
MKp (L/g)	0	0	-
Solubility (mg/L)	0	0	-
pH (-)	7	7	-
Fraction of Soluble Chemical (-)	0.139486	0.947352	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.860514	0.0526483	-
Fraction of Sorbed Chemical - Oil (-)	0	0	-
Fraction of Sorbed Chemical - DOC (-)	0	0	-
Fraction of Sorbed Chemical - PAC (-)	0	0	-

Contaminant : Toluene**Incoming Stream****WAS holding_eff**

Flow Rate (m3/d)	46.4322
Total Suspended Solids (mg/L)	11805.4
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.643143
Organic Chemical - Cl (ug/L)	3.21383
Organic Chemical - Ct (ug/L)	13.8512
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.232025
Fraction of Sorbed Chemical - Organic Solid (-)	0.767975
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream**DW centrifuge_cake****DW centrifuge_filtrate****DW centrifuge_air**

Flow Rate (m3/d)	4.18736	42.2448	Infinite
Total Suspended Solids (mg/L)	120000	1081	-
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-
Wastewater DOC (mg/L)	0	0	-
Oil/Grease (mg/L)	0	0	-
Organic Chemical Mass (g/d)	0.466061	0.176854	0.000227866
Organic Chemical - Cl (ug/L)	3.21269	3.21269	-
Organic Chemical - Ct (ug/L)	111.302	4.1864	-
Metal - Cl (ug/L)	0	0	-
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	0	0	-
Powdered Activated Carbon (mg/L)	0	0	-
Temperature (deg C)	25	25	-
MKp (L/g)	0	0	-
Solubility (mg/L)	0	0	-
pH (-)	7	7	-
Fraction of Soluble Chemical (-)	0.0288647	0.767413	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.971135	0.232587	-
Fraction of Sorbed Chemical - Oil (-)	0	0	-
Fraction of Sorbed Chemical - DOC (-)	0	0	-
Fraction of Sorbed Chemical - PAC (-)	0	0	-

Contaminant : Ethylbenzene**Incoming Stream****WAS holding_eff**

Flow Rate (m3/d)		46.4322
Total Suspended Solids (mg/L)		11805.4
Suspended Solids Mass (g/d)	-	
Volatile SS Fraction (-)		0.53
Wastewater DOC (mg/L)		0
Oil/Grease (mg/L)		0
Organic Chemical Mass (g/d)		0.0477005
Organic Chemical - Cl (ug/L)		0.151073
Organic Chemical - Ct (ug/L)		1.02731
Metal - Cl (ug/L)		0
Metal - Ct (ug/L)	-	
Metal Mass (g/d)	-	
Precipitated Metal (mg/L)		0
Powdered Activated Carbon (mg/L)		0
Temperature (deg C)		25
MKp (L/g)		0
Solubility (mg/L)		0
pH (-)		7
Fraction of Soluble Chemical (-)		0.147057
Fraction of Sorbed Chemical - Organic Solid (-)		0.852943
Fraction of Sorbed Chemical - Oil (-)		0
Fraction of Sorbed Chemical - DOC (-)		0
Fraction of Sorbed Chemical - PAC (-)		0

Outgoing Stream**DW centrifuge_cake****DW centrifuge_filtrate****DW centrifuge_air**

Flow Rate (m3/d)	4.18736	42.2448	Infinite
Total Suspended Solids (mg/L)	120000	1081	-
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-
Wastewater DOC (mg/L)	0	0	-
Oil/Grease (mg/L)	0	0	-
Organic Chemical Mass (g/d)	0.0379187	0.009769	1.28194E-05
Organic Chemical - Cl (ug/L)	0.151033	0.151033	-
Organic Chemical - Ct (ug/L)	9.0555	0.231247	-
Metal - Cl (ug/L)	0	0	-
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	0	0	-
Powdered Activated Carbon (mg/L)	0	0	-
Temperature (deg C)	25	25	-
MKp (L/g)	0	0	-
Solubility (mg/L)	0	0	-
pH (-)	7	7	-
Fraction of Soluble Chemical (-)	0.0166786	0.653123	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.983321	0.346877	-
Fraction of Sorbed Chemical - Oil (-)	0	0	-
Fraction of Sorbed Chemical - DOC (-)	0	0	-
Fraction of Sorbed Chemical - PAC (-)	0	0	-

Contaminant : Xylene**Incoming Stream****WAS holding_eff**

Flow Rate (m3/d)		46.4322
Total Suspended Solids (mg/L)		11805.4
Suspended Solids Mass (g/d)	-	
Volatile SS Fraction (-)		0.53
Wastewater DOC (mg/L)		0
Oil/Grease (mg/L)		0
Organic Chemical Mass (g/d)		0.187025
Organic Chemical - Cl (ug/L)		0.592423
Organic Chemical - Ct (ug/L)		4.0279
Metal - Cl (ug/L)		0
Metal - Ct (ug/L)	-	
Metal Mass (g/d)	-	
Precipitated Metal (mg/L)		0
Powdered Activated Carbon (mg/L)		0
Temperature (deg C)		25
MKp (L/g)		0
Solubility (mg/L)		0
pH (-)		7
Fraction of Soluble Chemical (-)		0.14708
Fraction of Sorbed Chemical - Organic Solid (-)		0.85292
Fraction of Sorbed Chemical - Oil (-)		0
Fraction of Sorbed Chemical - DOC (-)		0
Fraction of Sorbed Chemical - PAC (-)		0

Outgoing Stream**DW centrifuge_cake****DW centrifuge_filtrate****DW centrifuge_air**

Flow Rate (m3/d)		4.18736	42.2448	Infinite
Total Suspended Solids (mg/L)		120000	1081	-
Suspended Solids Mass (g/d)	-			-
Volatile SS Fraction (-)		0.53	0.53	-
Wastewater DOC (mg/L)		0	0	-
Oil/Grease (mg/L)		0	0	-
Organic Chemical Mass (g/d)		0.148682	0.0383095	3.30348E-05
Organic Chemical - Cl (ug/L)		0.592318	0.592318	-
Organic Chemical - Ct (ug/L)		35.5073	0.906844	-
Metal - Cl (ug/L)		0	0	-
Metal - Ct (ug/L)	-			-
Metal Mass (g/d)	-			-
Precipitated Metal (mg/L)		0	0	-
Powdered Activated Carbon (mg/L)		0	0	-
Temperature (deg C)		25	25	-
MKp (L/g)		0	0	-
Solubility (mg/L)		0	0	-
pH (-)		7	7	-
Fraction of Soluble Chemical (-)		0.0166816	0.653164	-
Fraction of Sorbed Chemical - Organic Solid (-)		0.983318	0.346836	-
Fraction of Sorbed Chemical - Oil (-)		0	0	-
Fraction of Sorbed Chemical - DOC (-)		0	0	-
Fraction of Sorbed Chemical - PAC (-)		0	0	-

Contaminant : Styrene**Incoming Stream****WAS holding_eff**

Flow Rate (m3/d)		46.4322
Total Suspended Solids (mg/L)		11805.4
Suspended Solids Mass (g/d)	-	
Volatile SS Fraction (-)		0.53
Wastewater DOC (mg/L)		0
Oil/Grease (mg/L)		0
Organic Chemical Mass (g/d)		1.94908
Organic Chemical - Cl (ug/L)		7.71298
Organic Chemical - Ct (ug/L)		41.9769
Metal - Cl (ug/L)		0
Metal - Ct (ug/L)	-	
Metal Mass (g/d)	-	
Precipitated Metal (mg/L)		0
Powdered Activated Carbon (mg/L)		0
Temperature (deg C)		25
MKp (L/g)		0
Solubility (mg/L)		0
pH (-)		7
Fraction of Soluble Chemical (-)		0.183744
Fraction of Sorbed Chemical - Organic Solid (-)		0.816256
Fraction of Sorbed Chemical - Oil (-)		0
Fraction of Sorbed Chemical - DOC (-)		0
Fraction of Sorbed Chemical - PAC (-)		0

Outgoing Stream**DW centrifuge_cake****DW centrifuge_filtrate****DW centrifuge_air**

Flow Rate (m3/d)		4.18736	42.2448	Infinite
Total Suspended Solids (mg/L)		120000	1081	-
Suspended Solids Mass (g/d)	-			-
Volatile SS Fraction (-)		0.53	0.53	-
Wastewater DOC (mg/L)		0	0	-
Oil/Grease (mg/L)		0	0	-
Organic Chemical Mass (g/d)		1.49054	0.458326	0.000214528
Organic Chemical - Cl (ug/L)		7.71214	7.71214	-
Organic Chemical - Ct (ug/L)		355.961	10.8493	-
Metal - Cl (ug/L)		0	0	-
Metal - Ct (ug/L)	-			-
Metal Mass (g/d)	-			-
Precipitated Metal (mg/L)		0	0	-
Powdered Activated Carbon (mg/L)		0	0	-
Temperature (deg C)		25	25	-
MKp (L/g)		0	0	-
Solubility (mg/L)		0	0	-
pH (-)		7	7	-
Fraction of Soluble Chemical (-)		0.0216657	0.710843	-
Fraction of Sorbed Chemical - Organic Solid (-)		0.978334	0.289157	-
Fraction of Sorbed Chemical - Oil (-)		0	0	-
Fraction of Sorbed Chemical - DOC (-)		0	0	-
Fraction of Sorbed Chemical - PAC (-)		0	0	-

Contaminant : Naphthalene**Incoming Stream****WAS holding_eff**

Flow Rate (m3/d)	46.4322
Total Suspended Solids (mg/L)	11805.4
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.123789
Organic Chemical - Cl (ug/L)	0.33035
Organic Chemical - Ct (ug/L)	2.66601
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.123912
Fraction of Sorbed Chemical - Organic Solid (-)	0.876088
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream**DW centrifuge_cake****DW centrifuge_filtrate****DW centrifuge_air**

Flow Rate (m3/d)	4.18736	42.2448	Infinite
Total Suspended Solids (mg/L)	120000	1081	-
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-
Wastewater DOC (mg/L)	0	0	-
Oil/Grease (mg/L)	0	0	-
Organic Chemical Mass (g/d)	0.100797	0.0229903	1.69209E-06
Organic Chemical - Cl (ug/L)	0.330346	0.330346	-
Organic Chemical - Ct (ug/L)	24.0716	0.544215	-
Metal - Cl (ug/L)	0	0	-
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	0	0	-
Powdered Activated Carbon (mg/L)	0	0	-
Temperature (deg C)	25	25	-
MKp (L/g)	0	0	-
Solubility (mg/L)	0	0	-
pH (-)	7	7	-
Fraction of Soluble Chemical (-)	0.0137234	0.607013	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.986277	0.392987	-
Fraction of Sorbed Chemical - Oil (-)	0	0	-
Fraction of Sorbed Chemical - DOC (-)	0	0	-
Fraction of Sorbed Chemical - PAC (-)	0	0	-

Contaminant : Dibutylphthalate**Incoming Stream****WAS holding_eff**

Flow Rate (m3/d)		46.4324
Total Suspended Solids (mg/L)		11805.4
Suspended Solids Mass (g/d)	-	
Volatile SS Fraction (-)		0.53
Wastewater DOC (mg/L)		0
Oil/Grease (mg/L)		0
Organic Chemical Mass (g/d)		1.12305
Organic Chemical - Cl (ug/L)		0.266932
Organic Chemical - Ct (ug/L)		24.1867
Metal - Cl (ug/L)		0
Metal - Ct (ug/L)	-	
Metal Mass (g/d)	-	
Precipitated Metal (mg/L)		0
Powdered Activated Carbon (mg/L)		0
Temperature (deg C)		25
MKp (L/g)		0
Solubility (mg/L)		0
pH (-)		7
Fraction of Soluble Chemical (-)		0.0110363
Fraction of Sorbed Chemical - Organic Solid (-)		0.988964
Fraction of Sorbed Chemical - Oil (-)		0
Fraction of Sorbed Chemical - DOC (-)		0
Fraction of Sorbed Chemical - PAC (-)		0

Outgoing Stream**DW centrifuge_cake****DW centrifuge_filtrate****DW centrifuge_air**

Flow Rate (m3/d)	4.18738	42.2451	Infinite
Total Suspended Solids (mg/L)	120000	1081	-
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-
Wastewater DOC (mg/L)	0	0	-
Oil/Grease (mg/L)	0	0	-
Organic Chemical Mass (g/d)	1.01924	0.103806	8.5107E-10
Organic Chemical - Cl (ug/L)	0.266932	0.266932	-
Organic Chemical - Ct (ug/L)	243.408	2.45723	-
Metal - Cl (ug/L)	0	0	-
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	0	0	-
Powdered Activated Carbon (mg/L)	0	0	-
Temperature (deg C)	25	25	-
MKp (L/g)	0	0	-
Solubility (mg/L)	0	0	-
pH (-)	7	7	-
Fraction of Soluble Chemical (-)	0.00109665	0.108631	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.998903	0.891369	-
Fraction of Sorbed Chemical - Oil (-)	0	0	-
Fraction of Sorbed Chemical - DOC (-)	0	0	-
Fraction of Sorbed Chemical - PAC (-)	0	0	-

Contaminant : Chloroform (Trichloromethane)

Incoming Stream	WAS holding_eff
Flow Rate (m3/d)	46.4322
Total Suspended Solids (mg/L)	11805.4
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.000575078
Organic Chemical - Cl (ug/L)	0.00562633
Organic Chemical - Ct (ug/L)	0.0123853
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.454274
Fraction of Sorbed Chemical - Organic Solid (-)	0.545726
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream	DW centrifuge_cake	DW centrifuge_filtrate	DW centrifuge_air
Flow Rate (m3/d)	4.18736	42.2448	Infinite
Total Suspended Solids (mg/L)	120000	1081	-
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-
Wastewater DOC (mg/L)	0	0	-
Oil/Grease (mg/L)	0	0	-
Organic Chemical Mass (g/d)	0.000311111	0.000263713	2.54194E-07
Organic Chemical - Cl (ug/L)	0.00562384	0.00562384	-
Organic Chemical - Ct (ug/L)	0.0742977	0.00624248	-
Metal - Cl (ug/L)	0	0	-
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	0	0	-
Powdered Activated Carbon (mg/L)	0	0	-
Temperature (deg C)	25	25	-
MKp (L/g)	0	0	-
Solubility (mg/L)	0	0	-
pH (-)	7	7	-
Fraction of Soluble Chemical (-)	0.0756934	0.900899	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.924307	0.0991012	-
Fraction of Sorbed Chemical - Oil (-)	0	0	-
Fraction of Sorbed Chemical - DOC (-)	0	0	-
Fraction of Sorbed Chemical - PAC (-)	0	0	-

Contaminant : Acenaphthene**Incoming Stream****WAS holding_eff**

Flow Rate (m3/d)		46.4322
Total Suspended Solids (mg/L)		11805.4
Suspended Solids Mass (g/d)	-	
Volatile SS Fraction (-)		0.53
Wastewater DOC (mg/L)		0
Oil/Grease (mg/L)		0
Organic Chemical Mass (g/d)		0.079754
Organic Chemical - Cl (ug/L)		0.0998325
Organic Chemical - Ct (ug/L)		1.71764
Metal - Cl (ug/L)		0
Metal - Ct (ug/L)	-	
Metal Mass (g/d)	-	
Precipitated Metal (mg/L)		0
Powdered Activated Carbon (mg/L)		0
Temperature (deg C)		25
MKp (L/g)		0
Solubility (mg/L)		0
pH (-)		7
Fraction of Soluble Chemical (-)		0.0581218
Fraction of Sorbed Chemical - Organic Solid (-)		0.941878
Fraction of Sorbed Chemical - Oil (-)		0
Fraction of Sorbed Chemical - DOC (-)		0
Fraction of Sorbed Chemical - PAC (-)		0

Outgoing Stream**DW centrifuge_cake****DW centrifuge_filtrate****DW centrifuge_air**

Flow Rate (m3/d)	4.18736	42.2448	Infinite
Total Suspended Solids (mg/L)	120000	1081	-
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-
Wastewater DOC (mg/L)	0	0	-
Oil/Grease (mg/L)	0	0	-
Organic Chemical Mass (g/d)	0.0692782	0.0104755	2.55684E-07
Organic Chemical - Cl (ug/L)	0.0998322	0.0998322	-
Organic Chemical - Ct (ug/L)	16.5446	0.247972	-
Metal - Cl (ug/L)	0	0	-
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	0	0	-
Powdered Activated Carbon (mg/L)	0	0	-
Temperature (deg C)	25	25	-
MKp (L/g)	0	0	-
Solubility (mg/L)	0	0	-
pH (-)	7	7	-
Fraction of Soluble Chemical (-)	0.00603413	0.402595	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.993966	0.597405	-
Fraction of Sorbed Chemical - Oil (-)	0	0	-
Fraction of Sorbed Chemical - DOC (-)	0	0	-
Fraction of Sorbed Chemical - PAC (-)	0	0	-

Contaminant : Acenaphthylene**Incoming Stream****WAS holding_eff**

Flow Rate (m3/d)	46.4322
Total Suspended Solids (mg/L)	11805.4
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.0970751
Organic Chemical - Cl (ug/L)	0.100349
Organic Chemical - Ct (ug/L)	2.09068
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.0479979
Fraction of Sorbed Chemical - Organic Solid (-)	0.952002
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream**DW centrifuge_cake****DW centrifuge_filtrate****DW centrifuge_air**

Flow Rate (m3/d)	4.18736	42.2448	Infinite
Total Suspended Solids (mg/L)	120000	1081	-
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-
Wastewater DOC (mg/L)	0	0	-
Oil/Grease (mg/L)	0	0	-
Organic Chemical Mass (g/d)	0.0851366	0.0119384	1.2159E-07
Organic Chemical - Cl (ug/L)	0.100348	0.100348	-
Organic Chemical - Ct (ug/L)	20.3318	0.2826	-
Metal - Cl (ug/L)	0	0	-
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	0	0	-
Powdered Activated Carbon (mg/L)	0	0	-
Temperature (deg C)	25	25	-
MKp (L/g)	0	0	-
Solubility (mg/L)	0	0	-
pH (-)	7	7	-
Fraction of Soluble Chemical (-)	0.00493554	0.35509	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.995064	0.64491	-
Fraction of Sorbed Chemical - Oil (-)	0	0	-
Fraction of Sorbed Chemical - DOC (-)	0	0	-
Fraction of Sorbed Chemical - PAC (-)	0	0	-

Contaminant : Fluorene**Incoming Stream****WAS holding_eff**

Flow Rate (m3/d)		46.4322
Total Suspended Solids (mg/L)		11805.4
Suspended Solids Mass (g/d)	-	
Volatile SS Fraction (-)		0.53
Wastewater DOC (mg/L)		0
Oil/Grease (mg/L)		0
Organic Chemical Mass (g/d)		0.0865365
Organic Chemical - Cl (ug/L)		0.0777759
Organic Chemical - Ct (ug/L)		1.86372
Metal - Cl (ug/L)		0
Metal - Ct (ug/L)	-	
Metal Mass (g/d)	-	
Precipitated Metal (mg/L)		0
Powdered Activated Carbon (mg/L)		0
Temperature (deg C)		25
MKp (L/g)		0
Solubility (mg/L)		0
pH (-)		7
Fraction of Soluble Chemical (-)		0.0417316
Fraction of Sorbed Chemical - Organic Solid (-)		0.958268
Fraction of Sorbed Chemical - Oil (-)		0
Fraction of Sorbed Chemical - DOC (-)		0
Fraction of Sorbed Chemical - PAC (-)		0

Outgoing Stream**DW centrifuge_cake****DW centrifuge_filtrate****DW centrifuge_air**

Flow Rate (m3/d)	4.18736	42.2448	Infinite
Total Suspended Solids (mg/L)	120000	1081	-
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-
Wastewater DOC (mg/L)	0	0	-
Oil/Grease (mg/L)	0	0	-
Organic Chemical Mass (g/d)	0.0763422	0.0101942	9.66662E-08
Organic Chemical - Cl (ug/L)	0.0777758	0.0777758	-
Organic Chemical - Ct (ug/L)	18.2316	0.241311	-
Metal - Cl (ug/L)	0	0	-
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	0	0	-
Powdered Activated Carbon (mg/L)	0	0	-
Temperature (deg C)	25	25	-
MKp (L/g)	0	0	-
Solubility (mg/L)	0	0	-
pH (-)	7	7	-
Fraction of Soluble Chemical (-)	0.00426599	0.322305	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.995734	0.677695	-
Fraction of Sorbed Chemical - Oil (-)	0	0	-
Fraction of Sorbed Chemical - DOC (-)	0	0	-
Fraction of Sorbed Chemical - PAC (-)	0	0	-

Contaminant : Anthracene**Incoming Stream****WAS holding_eff**

Flow Rate (m3/d)		46.4322
Total Suspended Solids (mg/L)		11805.4
Suspended Solids Mass (g/d)	-	
Volatile SS Fraction (-)		0.53
Wastewater DOC (mg/L)		0
Oil/Grease (mg/L)		0
Organic Chemical Mass (g/d)		0.197103
Organic Chemical - Cl (ug/L)		0.125179
Organic Chemical - Ct (ug/L)		4.24496
Metal - Cl (ug/L)		0
Metal - Ct (ug/L)	-	
Metal Mass (g/d)	-	
Precipitated Metal (mg/L)		0
Powdered Activated Carbon (mg/L)		0
Temperature (deg C)		25
MKp (L/g)		0
Solubility (mg/L)		0
pH (-)		7
Fraction of Soluble Chemical (-)		0.0294889
Fraction of Sorbed Chemical - Organic Solid (-)		0.970511
Fraction of Sorbed Chemical - Oil (-)		0
Fraction of Sorbed Chemical - DOC (-)		0
Fraction of Sorbed Chemical - PAC (-)		0

Outgoing Stream**DW centrifuge_cake****DW centrifuge_filtrate****DW centrifuge_air**

Flow Rate (m3/d)	4.18736	42.2448	Infinite
Total Suspended Solids (mg/L)	120000	1081	-
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-
Wastewater DOC (mg/L)	0	0	-
Oil/Grease (mg/L)	0	0	-
Organic Chemical Mass (g/d)	0.175878	0.0212247	1.14572E-07
Organic Chemical - Cl (ug/L)	0.125179	0.125179	-
Organic Chemical - Ct (ug/L)	42.0021	0.502421	-
Metal - Cl (ug/L)	0	0	-
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	0	0	-
Powdered Activated Carbon (mg/L)	0	0	-
Temperature (deg C)	25	25	-
MKp (L/g)	0	0	-
Solubility (mg/L)	0	0	-
pH (-)	7	7	-
Fraction of Soluble Chemical (-)	0.00298031	0.249152	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.99702	0.750848	-
Fraction of Sorbed Chemical - Oil (-)	0	0	-
Fraction of Sorbed Chemical - DOC (-)	0	0	-
Fraction of Sorbed Chemical - PAC (-)	0	0	-

Contaminant : Phenanthrene**Incoming Stream****WAS holding_eff**

Flow Rate (m3/d)		46.4322
Total Suspended Solids (mg/L)		11805.4
Suspended Solids Mass (g/d)	-	
Volatile SS Fraction (-)		0.53
Wastewater DOC (mg/L)		0
Oil/Grease (mg/L)		0
Organic Chemical Mass (g/d)		0.197624
Organic Chemical - Cl (ug/L)		0.12391
Organic Chemical - Ct (ug/L)		4.25617
Metal - Cl (ug/L)		0
Metal - Ct (ug/L)	-	
Metal Mass (g/d)	-	
Precipitated Metal (mg/L)		0
Powdered Activated Carbon (mg/L)		0
Temperature (deg C)		25
MKp (L/g)		0
Solubility (mg/L)		0
pH (-)		7
Fraction of Soluble Chemical (-)		0.0291129
Fraction of Sorbed Chemical - Organic Solid (-)		0.970887
Fraction of Sorbed Chemical - Oil (-)		0
Fraction of Sorbed Chemical - DOC (-)		0
Fraction of Sorbed Chemical - PAC (-)		0

Outgoing Stream**DW centrifuge_cake****DW centrifuge_filtrate****DW centrifuge_air**

Flow Rate (m3/d)	4.18736	42.2448	Infinite
Total Suspended Solids (mg/L)	120000	1081	-
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-
Wastewater DOC (mg/L)	0	0	-
Oil/Grease (mg/L)	0	0	-
Organic Chemical Mass (g/d)	0.176404	0.0212193	5.18724E-08
Organic Chemical - Cl (ug/L)	0.12391	0.12391	-
Organic Chemical - Ct (ug/L)	42.1278	0.502294	-
Metal - Cl (ug/L)	0	0	-
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	0	0	-
Powdered Activated Carbon (mg/L)	0	0	-
Temperature (deg C)	25	25	-
MKp (L/g)	0	0	-
Solubility (mg/L)	0	0	-
pH (-)	7	7	-
Fraction of Soluble Chemical (-)	0.00294128	0.246687	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.997059	0.753313	-
Fraction of Sorbed Chemical - Oil (-)	0	0	-
Fraction of Sorbed Chemical - DOC (-)	0	0	-
Fraction of Sorbed Chemical - PAC (-)	0	0	-

Contaminant : Fluoranthene**Incoming Stream****WAS holding_eff**

Flow Rate (m3/d)	46.4324
Total Suspended Solids (mg/L)	11805.4
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.897473
Organic Chemical - Cl (ug/L)	0.180024
Organic Chemical - Ct (ug/L)	19.3286
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.00931389
Fraction of Sorbed Chemical - Organic Solid (-)	0.990686
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream**DW centrifuge_cake****DW centrifuge_filtrate****DW centrifuge_air**

Flow Rate (m3/d)	4.18738	42.245	Infinite
Total Suspended Solids (mg/L)	120000	1081	-
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-
Wastewater DOC (mg/L)	0	0	-
Oil/Grease (mg/L)	0	0	-
Organic Chemical Mass (g/d)	0.815795	0.0816777	1.24515E-08
Organic Chemical - Cl (ug/L)	0.180024	0.180024	-
Organic Chemical - Ct (ug/L)	194.822	1.93343	-
Metal - Cl (ug/L)	0	0	-
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	0	0	-
Powdered Activated Carbon (mg/L)	0	0	-
Temperature (deg C)	25	25	-
MKp (L/g)	0	0	-
Solubility (mg/L)	0	0	-
pH (-)	7	7	-
Fraction of Soluble Chemical (-)	0.000924044	0.0931115	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.999076	0.906888	-
Fraction of Sorbed Chemical - Oil (-)	0	0	-
Fraction of Sorbed Chemical - DOC (-)	0	0	-
Fraction of Sorbed Chemical - PAC (-)	0	0	-

Contaminant : Pyrene**Incoming Stream****WAS holding_eff**

Flow Rate (m3/d)		46.4324
Total Suspended Solids (mg/L)		11805.4
Suspended Solids Mass (g/d)	-	
Volatile SS Fraction (-)		0.53
Wastewater DOC (mg/L)		0
Oil/Grease (mg/L)		0
Organic Chemical Mass (g/d)		0.545817
Organic Chemical - Cl (ug/L)		0.133205
Organic Chemical - Ct (ug/L)		11.7551
Metal - Cl (ug/L)		0
Metal - Ct (ug/L)	-	
Metal Mass (g/d)	-	
Precipitated Metal (mg/L)		0
Powdered Activated Carbon (mg/L)		0
Temperature (deg C)		25
MKp (L/g)		0
Solubility (mg/L)		0
pH (-)		7
Fraction of Soluble Chemical (-)		0.0113317
Fraction of Sorbed Chemical - Organic Solid (-)		0.988668
Fraction of Sorbed Chemical - Oil (-)		0
Fraction of Sorbed Chemical - DOC (-)		0
Fraction of Sorbed Chemical - PAC (-)		0

Outgoing Stream**DW centrifuge_cake****DW centrifuge_filtrate****DW centrifuge_air**

Flow Rate (m3/d)	4.18738	42.245	Infinite
Total Suspended Solids (mg/L)	120000	1081	-
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	0.53	0.53	-
Wastewater DOC (mg/L)	0	0	-
Oil/Grease (mg/L)	0	0	-
Organic Chemical Mass (g/d)	0.495233	0.0505843	7.20432E-09
Organic Chemical - Cl (ug/L)	0.133205	0.133205	-
Organic Chemical - Ct (ug/L)	118.268	1.1974	-
Metal - Cl (ug/L)	0	0	-
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	0	0	-
Powdered Activated Carbon (mg/L)	0	0	-
Temperature (deg C)	25	25	-
MKp (L/g)	0	0	-
Solubility (mg/L)	0	0	-
pH (-)	7	7	-
Fraction of Soluble Chemical (-)	0.0011263	0.111245	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.998874	0.888755	-
Fraction of Sorbed Chemical - Oil (-)	0	0	-
Fraction of Sorbed Chemical - DOC (-)	0	0	-
Fraction of Sorbed Chemical - PAC (-)	0	0	-

Fate Summary

Contaminant : Benzene

Total Air Emissions	3.21022E-06 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	6.74158E-05 g/d
Biodegradation	0 g/d

Contaminant : Phenol

Total Air Emissions	4.8457E-10 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	4.3612E-10 g/d
Biodegradation	0 g/d

Contaminant : Toluene

Total Air Emissions	7.61063E-06 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.000227866 g/d
Biodegradation	0 g/d

Contaminant : Ethylbenzene

Total Air Emissions	4.85577E-06 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	1.28194E-05 g/d
Biodegradation	0 g/d

Contaminant : Xylene

Total Air Emissions	1.14702E-05 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	3.30348E-05 g/d
Biodegradation	0 g/d

Contaminant : Styrene

Total Air Emissions	4.10966E-05 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.000214528 g/d
Biodegradation	0 g/d

Contaminant : Naphthalene

Total Air Emissions	5.32096E-07 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	1.69209E-06 g/d
Biodegradation	0 g/d

Contaminant : Dibutylphthalate

Total Air Emissions	1.41843E-09 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	8.5107E-10 g/d
Biodegradation	0 g/d

Contaminant : Chloroform (Trichloromethane)

Total Air Emissions	3.53041E-05 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	2.54194E-07 g/d
Biodegradation	0 g/d

Contaminant : Acenaphthene

Total Air Emissions	4.26133E-07 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	2.55684E-07 g/d
Biodegradation	0 g/d

Contaminant : Acenaphthylene

Total Air Emissions	2.02647E-07 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	1.2159E-07 g/d
Biodegradation	0 g/d

Contaminant : Fluorene

Total Air Emissions	1.61108E-07 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	9.66662E-08 g/d
Biodegradation	0 g/d

Contaminant : Anthracene

Total Air Emissions	1.9095E-07 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	1.14572E-07 g/d
Biodegradation	0 g/d

Contaminant : Phenanthrene

Total Air Emissions	8.64526E-08 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	5.18724E-08 g/d
Biodegradation	0 g/d

Contaminant : Fluoranthene

Total Air Emissions	2.07522E-08 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

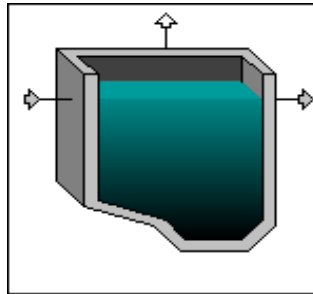
Total Air Emissions	1.24515E-08 g/d
Biodegradation	0 g/d

Contaminant : Pyrene

Total Air Emissions	1.2007E-08 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	7.20432E-09 g/d
Biodegradation	0 g/d

WWTP - Sand Filter



Input Parameters

Data Entry

Liquid Depth	3.7 m
Surface Area	100.8 m2
VSS to SS Ratio	- %
Process Air Flow Rate	0 m3/hr
Removal Efficiency - Wastewater DOC	0 %
Covered	false
Ventilation Rate	-
Local pH value	-

Advanced

Oxygen Transfer Efficiency	6 %
Mole Fraction of Oxygen in Gas Source	0.209 O2/Air
Kg/Kl Ratio for Diffused System	3
Water Surface Covered with Oil	0 %
Oil Layer Mass Transfer Coefficient	Hydromantis Method

Output Data

Contaminant : Benzene

Incoming Stream

	SC-A_eff	SC-B_eff
Flow Rate (m3/d)	2999.27	3002.62
Total Suspended Solids (mg/L)	10	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	3.93748	3.94038
Organic Chemical - Cl (ug/L)	1.31117	1.31067
Organic Chemical - Ct (ug/L)	1.31282	1.31231
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.998745	0.998745
Fraction of Sorbed Chemical - Organic Solid (-)	0.00125452	0.00125452
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Sand Filter_air	Sand Filter_eff	BW_waste
Flow Rate (m3/d)	Infinite	5995.86	6.00186
Total Suspended Solids (mg/L)	-	10	10
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	-	0.53	0.53
Wastewater DOC (mg/L)	-	0	0
Oil/Grease (mg/L)	-	0	0
Organic Chemical Mass (g/d)	0.0325128	7.83747	0.00784532
Organic Chemical - Cl (ug/L)	-	1.30551	1.30551
Organic Chemical - Ct (ug/L)	-	1.30715	1.30715
Metal - Cl (ug/L)	-	0	0
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	-	0	0
Powdered Activated Carbon (mg/L)	-	0	0
Temperature (deg C)	-	25	25
MKp (L/g)	-	0	0
Solubility (mg/L)	-	0	0
pH (-)	-	7	7
Fraction of Soluble Chemical (-)	-	0.998745	0.998745
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.00125452	0.00125452
Fraction of Sorbed Chemical - Oil (-)	-	0	0
Fraction of Sorbed Chemical - DOC (-)	-	0	0
Fraction of Sorbed Chemical - PAC (-)	-	0	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.0102944 m/hr

Mass Transfer Coefficient for Stripping

0 m/hr

Contaminant : Phenol**Incoming Stream**

	SC-A_eff	SC-B_eff
Flow Rate (m3/d)	2999.27	3002.62
Total Suspended Solids (mg/L)	10	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.0965671	0.0966717
Organic Chemical - Cl (ug/L)	0.0321804	0.0321793
Organic Chemical - Ct (ug/L)	0.0321969	0.0321958
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.999486	0.999486
Fraction of Sorbed Chemical - Organic Solid (-)	0.000513836	0.000513836
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Sand Filter_air	Sand Filter_eff	BW_waste
Flow Rate (m3/d)	Infinite	5995.86	6.00186
Total Suspended Solids (mg/L)	-	10	10
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	-	0.53	0.53
Wastewater DOC (mg/L)	-	0	0
Oil/Grease (mg/L)	-	0	0
Organic Chemical Mass (g/d)	5.85081E-05	0.192986	0.00019318
Organic Chemical - Cl (ug/L)	-	0.0321701	0.0321701
Organic Chemical - Ct (ug/L)	-	0.0321866	0.0321866
Metal - Cl (ug/L)	-	0	0
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	-	0	0
Powdered Activated Carbon (mg/L)	-	0	0
Temperature (deg C)	-	25	25
MKp (L/g)	-	0	0
Solubility (mg/L)	-	0	0
pH (-)	-	7	7
Fraction of Soluble Chemical (-)	-	0.999486	0.999486
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.000513836	0.000513836
Fraction of Sorbed Chemical - Oil (-)	-	0	0
Fraction of Sorbed Chemical - DOC (-)	-	0	0
Fraction of Sorbed Chemical - PAC (-)	-	0	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.000752751 m/hr
Mass Transfer Coefficient for Stripping	0 m/hr

Contaminant : Toluene**Incoming Stream**

	SC-A_eff	SC-B_eff
Flow Rate (m3/d)	2999.27	3002.62
Total Suspended Solids (mg/L)	10	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	10.5304	10.5393
Organic Chemical - Cl (ug/L)	3.50117	3.50024
Organic Chemical - Ct (ug/L)	3.51099	3.51005
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.997204	0.997204
Fraction of Sorbed Chemical - Organic Solid (-)	0.00279586	0.00279586
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Sand Filter_air	Sand Filter_eff	BW_waste
Flow Rate (m3/d)	Infinite	5995.86	6.00186
Total Suspended Solids (mg/L)	-	10	10
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	-	0.53	0.53
Wastewater DOC (mg/L)	-	0	0
Oil/Grease (mg/L)	-	0	0
Organic Chemical Mass (g/d)	0.0839885	20.9647	0.0209857
Organic Chemical - Cl (ug/L)	-	3.48675	3.48675
Organic Chemical - Ct (ug/L)	-	3.49653	3.49653
Metal - Cl (ug/L)	-	0	0
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	-	0	0
Powdered Activated Carbon (mg/L)	-	0	0
Temperature (deg C)	-	25	25
MKp (L/g)	-	0	0
Solubility (mg/L)	-	0	0
pH (-)	-	7	7
Fraction of Soluble Chemical (-)	-	0.997204	0.997204
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.00279586	0.00279586
Fraction of Sorbed Chemical - Oil (-)	-	0	0
Fraction of Sorbed Chemical - DOC (-)	-	0	0
Fraction of Sorbed Chemical - PAC (-)	-	0	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00995697 m/hr

Mass Transfer Coefficient for Stripping

0 m/hr

Contaminant : Ethylbenzene**Incoming Stream**

	SC-A_eff	SC-B_eff
Flow Rate (m3/d)	2999.27	3002.62
Total Suspended Solids (mg/L)	10	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.479643	0.480087
Organic Chemical - Cl (ug/L)	0.159138	0.159108
Organic Chemical - Ct (ug/L)	0.15992	0.15989
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.995111	0.995111
Fraction of Sorbed Chemical - Organic Solid (-)	0.00488908	0.00488908
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Sand Filter_air	Sand Filter_eff	BW_waste
Flow Rate (m3/d)	Infinite	5995.86	6.00186
Total Suspended Solids (mg/L)	-	10	10
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	-	0.53	0.53
Wastewater DOC (mg/L)	-	0	0
Oil/Grease (mg/L)	-	0	0
Organic Chemical Mass (g/d)	0.00371943	0.955051	0.000956007
Organic Chemical - Cl (ug/L)	-	0.158506	0.158506
Organic Chemical - Ct (ug/L)	-	0.159285	0.159285
Metal - Cl (ug/L)	-	0	0
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	-	0	0
Powdered Activated Carbon (mg/L)	-	0	0
Temperature (deg C)	-	25	25
MKp (L/g)	-	0	0
Solubility (mg/L)	-	0	0
pH (-)	-	7	7
Fraction of Soluble Chemical (-)	-	0.995111	0.995111
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.00488908	0.00488908
Fraction of Sorbed Chemical - Oil (-)	-	0	0
Fraction of Sorbed Chemical - DOC (-)	-	0	0
Fraction of Sorbed Chemical - PAC (-)	-	0	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00969969 m/hr

Mass Transfer Coefficient for Stripping

0 m/hr

Contaminant : Xylene**Incoming Stream**

	SC-A_eff	SC-B_eff
Flow Rate (m3/d)	2999.27	3002.62
Total Suspended Solids (mg/L)	10	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	1.88315	1.88491
Organic Chemical - Cl (ug/L)	0.6248	0.624688
Organic Chemical - Ct (ug/L)	0.627869	0.627757
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.995112	0.995112
Fraction of Sorbed Chemical - Organic Solid (-)	0.00488819	0.00488819
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Sand Filter_air	Sand Filter_eff	BW_waste
Flow Rate (m3/d)	Infinite	5995.86	6.00186
Total Suspended Solids (mg/L)	-	10	10
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	-	0.53	0.53
Wastewater DOC (mg/L)	-	0	0
Oil/Grease (mg/L)	-	0	0
Organic Chemical Mass (g/d)	0.0150388	3.74925	0.003753
Organic Chemical - Cl (ug/L)	-	0.62225	0.62225
Organic Chemical - Ct (ug/L)	-	0.625307	0.625307
Metal - Cl (ug/L)	-	0	0
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	-	0	0
Powdered Activated Carbon (mg/L)	-	0	0
Temperature (deg C)	-	25	25
MKp (L/g)	-	0	0
Solubility (mg/L)	-	0	0
pH (-)	-	7	7
Fraction of Soluble Chemical (-)	-	0.995112	0.995112
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.00488819	0.00488819
Fraction of Sorbed Chemical - Oil (-)	-	0	0
Fraction of Sorbed Chemical - DOC (-)	-	0	0
Fraction of Sorbed Chemical - PAC (-)	-	0	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00999027 m/hr

Mass Transfer Coefficient for Stripping

0 m/hr

Contaminant : Styrene**Incoming Stream**

	SC-A_eff	SC-B_eff
Flow Rate (m3/d)	2999.27	3002.62
Total Suspended Solids (mg/L)	10	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	24.8156	24.8414
Organic Chemical - Cl (ug/L)	8.24288	8.24223
Organic Chemical - Ct (ug/L)	8.2739	8.27325
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.996251	0.996251
Fraction of Sorbed Chemical - Organic Solid (-)	0.00374889	0.00374889
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Sand Filter_air	Sand Filter_eff	BW_waste
Flow Rate (m3/d)	Infinite	5995.86	6.00186
Total Suspended Solids (mg/L)	-	10	10
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	-	0.53	0.53
Wastewater DOC (mg/L)	-	0	0
Oil/Grease (mg/L)	-	0	0
Organic Chemical Mass (g/d)	0.194135	49.4131	0.0494626
Organic Chemical - Cl (ug/L)	-	8.21031	8.21031
Organic Chemical - Ct (ug/L)	-	8.2412	8.2412
Metal - Cl (ug/L)	-	0	0
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	-	0	0
Powdered Activated Carbon (mg/L)	-	0	0
Temperature (deg C)	-	25	25
MKp (L/g)	-	0	0
Solubility (mg/L)	-	0	0
pH (-)	-	7	7
Fraction of Soluble Chemical (-)	-	0.996251	0.996251
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.00374889	0.00374889
Fraction of Sorbed Chemical - Oil (-)	-	0	0
Fraction of Sorbed Chemical - DOC (-)	-	0	0
Fraction of Sorbed Chemical - PAC (-)	-	0	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00977401 m/hr

Mass Transfer Coefficient for Stripping

0 m/hr

Contaminant : Naphthalene**Incoming Stream**

	SC-A_eff	SC-B_eff
Flow Rate (m3/d)	2999.27	3002.62
Total Suspended Solids (mg/L)	10	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	1.04162	1.04262
Organic Chemical - Cl (ug/L)	0.345223	0.345169
Organic Chemical - Ct (ug/L)	0.347291	0.347236
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.994047	0.994047
Fraction of Sorbed Chemical - Organic Solid (-)	0.00595335	0.00595335
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Sand Filter_air	Sand Filter_eff	BW_waste
Flow Rate (m3/d)	Infinite	5995.86	6.00186
Total Suspended Solids (mg/L)	-	10	10
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	-	0.53	0.53
Wastewater DOC (mg/L)	-	0	0
Oil/Grease (mg/L)	-	0	0
Organic Chemical Mass (g/d)	0.00795843	2.07419	0.00207627
Organic Chemical - Cl (ug/L)	-	0.343878	0.343878
Organic Chemical - Ct (ug/L)	-	0.345937	0.345937
Metal - Cl (ug/L)	-	0	0
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	-	0	0
Powdered Activated Carbon (mg/L)	-	0	0
Temperature (deg C)	-	25	25
MKp (L/g)	-	0	0
Solubility (mg/L)	-	0	0
pH (-)	-	7	7
Fraction of Soluble Chemical (-)	-	0.994047	0.994047
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.00595335	0.00595335
Fraction of Sorbed Chemical - Oil (-)	-	0	0
Fraction of Sorbed Chemical - DOC (-)	-	0	0
Fraction of Sorbed Chemical - PAC (-)	-	0	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00956646 m/hr

Mass Transfer Coefficient for Stripping

0 m/hr

Contaminant : Dibutylphthalate**Incoming Stream**

	SC-A_eff	SC-B_eff
Flow Rate (m3/d)	2999.28	3002.63
Total Suspended Solids (mg/L)	10	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.861112	0.862706
Organic Chemical - Cl (ug/L)	0.26685	0.267047
Organic Chemical - Ct (ug/L)	0.287106	0.287317
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.929449	0.929449
Fraction of Sorbed Chemical - Organic Solid (-)	0.0705507	0.0705507
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Sand Filter_air	Sand Filter_eff	BW_waste
Flow Rate (m3/d)	Infinite	5995.91	6.00191
Total Suspended Solids (mg/L)	-	10	10
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	-	0.53	0.53
Wastewater DOC (mg/L)	-	0	0
Oil/Grease (mg/L)	-	0	0
Organic Chemical Mass (g/d)	8.25171E-05	1.72199	0.00172372
Organic Chemical - Cl (ug/L)	-	0.266933	0.266933
Organic Chemical - Ct (ug/L)	-	0.287194	0.287194
Metal - Cl (ug/L)	-	0	0
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	-	0	0
Powdered Activated Carbon (mg/L)	-	0	0
Temperature (deg C)	-	25	25
MKp (L/g)	-	0	0
Solubility (mg/L)	-	0	0
pH (-)	-	7	7
Fraction of Soluble Chemical (-)	-	0.929449	0.929449
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.0705507	0.0705507
Fraction of Sorbed Chemical - Oil (-)	-	0	0
Fraction of Sorbed Chemical - DOC (-)	-	0	0
Fraction of Sorbed Chemical - PAC (-)	-	0	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.000127782 m/hr
Mass Transfer Coefficient for Stripping	0 m/hr

Contaminant : Chloroform (Trichloromethane)**Incoming Stream**

	SC-A_eff	SC-B_eff
Flow Rate (m3/d)	2999.27	3002.62
Total Suspended Solids (mg/L)	10	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.0200976	0.0201126
Organic Chemical - Cl (ug/L)	0.00669402	0.00669153
Organic Chemical - Ct (ug/L)	0.00670083	0.00669834
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.998983	0.998983
Fraction of Sorbed Chemical - Organic Solid (-)	0.00101657	0.00101657
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Sand Filter_air	Sand Filter_eff	BW_waste
Flow Rate (m3/d)	Infinite	5995.86	6.00186
Total Suspended Solids (mg/L)	-	10	10
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	-	0.53	0.53
Wastewater DOC (mg/L)	-	0	0
Oil/Grease (mg/L)	-	0	0
Organic Chemical Mass (g/d)	0.00016926	0.0400006	4.00407E-05
Organic Chemical - Cl (ug/L)	-	0.0066646	0.0066646
Organic Chemical - Ct (ug/L)	-	0.00667138	0.00667138
Metal - Cl (ug/L)	-	0	0
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	-	0	0
Powdered Activated Carbon (mg/L)	-	0	0
Temperature (deg C)	-	25	25
MKp (L/g)	-	0	0
Solubility (mg/L)	-	0	0
pH (-)	-	7	7
Fraction of Soluble Chemical (-)	-	0.998983	0.998983
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.00101657	0.00101657
Fraction of Sorbed Chemical - Oil (-)	-	0	0
Fraction of Sorbed Chemical - DOC (-)	-	0	0
Fraction of Sorbed Chemical - PAC (-)	-	0	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.010498 m/hr

Mass Transfer Coefficient for Stripping

0 m/hr

Contaminant : Acenaphthene**Incoming Stream**

	SC-A_eff	SC-B_eff
Flow Rate (m3/d)	2999.27	3002.62
Total Suspended Solids (mg/L)	10	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.309245	0.30958
Organic Chemical - Cl (ug/L)	0.101711	0.101707
Organic Chemical - Ct (ug/L)	0.103107	0.103103
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.986459	0.986459
Fraction of Sorbed Chemical - Organic Solid (-)	0.0135411	0.0135411
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Sand Filter_air	Sand Filter_eff	BW_waste
Flow Rate (m3/d)	Infinite	5995.86	6.00186
Total Suspended Solids (mg/L)	-	10	10
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	-	0.53	0.53
Wastewater DOC (mg/L)	-	0	0
Oil/Grease (mg/L)	-	0	0
Organic Chemical Mass (g/d)	0.00219509	0.61601	0.000616627
Organic Chemical - Cl (ug/L)	-	0.101348	0.101348
Organic Chemical - Ct (ug/L)	-	0.102739	0.102739
Metal - Cl (ug/L)	-	0	0
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	-	0	0
Powdered Activated Carbon (mg/L)	-	0	0
Temperature (deg C)	-	25	25
MKp (L/g)	-	0	0
Solubility (mg/L)	-	0	0
pH (-)	-	7	7
Fraction of Soluble Chemical (-)	-	0.986459	0.986459
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.0135411	0.0135411
Fraction of Sorbed Chemical - Oil (-)	-	0	0
Fraction of Sorbed Chemical - DOC (-)	-	0	0
Fraction of Sorbed Chemical - PAC (-)	-	0	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00895291 m/hr

Mass Transfer Coefficient for Stripping

0 m/hr

Contaminant : Acenaphthylene**Incoming Stream**

	SC-A_eff	SC-B_eff
Flow Rate (m3/d)	2999.27	3002.62
Total Suspended Solids (mg/L)	10	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.310385	0.310731
Organic Chemical - Cl (ug/L)	0.101777	0.101777
Organic Chemical - Ct (ug/L)	0.103487	0.103487
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.983477	0.983477
Fraction of Sorbed Chemical - Organic Solid (-)	0.0165234	0.0165234
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Sand Filter_air	Sand Filter_eff	BW_waste
Flow Rate (m3/d)	Infinite	5995.86	6.00186
Total Suspended Solids (mg/L)	-	10	10
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	-	0.53	0.53
Wastewater DOC (mg/L)	-	0	0
Oil/Grease (mg/L)	-	0	0
Organic Chemical Mass (g/d)	0.0019404	0.618553	0.000619172
Organic Chemical - Cl (ug/L)	-	0.101459	0.101459
Organic Chemical - Ct (ug/L)	-	0.103163	0.103163
Metal - Cl (ug/L)	-	0	0
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	-	0	0
Powdered Activated Carbon (mg/L)	-	0	0
Temperature (deg C)	-	25	25
MKp (L/g)	-	0	0
Solubility (mg/L)	-	0	0
pH (-)	-	7	7
Fraction of Soluble Chemical (-)	-	0.983477	0.983477
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.0165234	0.0165234
Fraction of Sorbed Chemical - Oil (-)	-	0	0
Fraction of Sorbed Chemical - DOC (-)	-	0	0
Fraction of Sorbed Chemical - PAC (-)	-	0	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00790551 m/hr
Mass Transfer Coefficient for Stripping	0 m/hr

Contaminant : Fluorene**Incoming Stream**

	SC-A_eff	SC-B_eff
Flow Rate (m3/d)	2999.27	3002.62
Total Suspended Solids (mg/L)	10	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.240785	0.241053
Organic Chemical - Cl (ug/L)	0.0787495	0.0787493
Organic Chemical - Ct (ug/L)	0.0802813	0.080281
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.98092	0.98092
Fraction of Sorbed Chemical - Organic Solid (-)	0.0190799	0.0190799
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Sand Filter_air	Sand Filter_eff	BW_waste
Flow Rate (m3/d)	Infinite	5995.86	6.00186
Total Suspended Solids (mg/L)	-	10	10
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	-	0.53	0.53
Wastewater DOC (mg/L)	-	0	0
Oil/Grease (mg/L)	-	0	0
Organic Chemical Mass (g/d)	0.0015622	0.479793	0.000480274
Organic Chemical - Cl (ug/L)	-	0.078494	0.078494
Organic Chemical - Ct (ug/L)	-	0.0800208	0.0800208
Metal - Cl (ug/L)	-	0	0
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	-	0	0
Powdered Activated Carbon (mg/L)	-	0	0
Temperature (deg C)	-	25	25
MKp (L/g)	-	0	0
Solubility (mg/L)	-	0	0
pH (-)	-	7	7
Fraction of Soluble Chemical (-)	-	0.98092	0.98092
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.0190799	0.0190799
Fraction of Sorbed Chemical - Oil (-)	-	0	0
Fraction of Sorbed Chemical - DOC (-)	-	0	0
Fraction of Sorbed Chemical - PAC (-)	-	0	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00822677 m/hr

Mass Transfer Coefficient for Stripping

0 m/hr

Contaminant : Anthracene**Incoming Stream**

	SC-A_eff	SC-B_eff
Flow Rate (m3/d)	2999.27	3002.62
Total Suspended Solids (mg/L)	10	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.389056	0.389525
Organic Chemical - Cl (ug/L)	0.126199	0.12621
Organic Chemical - Ct (ug/L)	0.129717	0.129728
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.972878	0.972878
Fraction of Sorbed Chemical - Organic Solid (-)	0.0271219	0.0271219
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Sand Filter_air	Sand Filter_eff	BW_waste
Flow Rate (m3/d)	Infinite	5995.86	6.00186
Total Suspended Solids (mg/L)	-	10	10
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	-	0.53	0.53
Wastewater DOC (mg/L)	-	0	0
Oil/Grease (mg/L)	-	0	0
Organic Chemical Mass (g/d)	0.00237306	0.775426	0.000776202
Organic Chemical - Cl (ug/L)	-	0.125819	0.125819
Organic Chemical - Ct (ug/L)	-	0.129327	0.129327
Metal - Cl (ug/L)	-	0	0
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	-	0	0
Powdered Activated Carbon (mg/L)	-	0	0
Temperature (deg C)	-	25	25
MKp (L/g)	-	0	0
Solubility (mg/L)	-	0	0
pH (-)	-	7	7
Fraction of Soluble Chemical (-)	-	0.972878	0.972878
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.0271219	0.0271219
Fraction of Sorbed Chemical - Oil (-)	-	0	0
Fraction of Sorbed Chemical - DOC (-)	-	0	0
Fraction of Sorbed Chemical - PAC (-)	-	0	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00779633 m/hr

Mass Transfer Coefficient for Stripping

0 m/hr

Contaminant : Phenanthrene**Incoming Stream**

	SC-A_eff	SC-B_eff
Flow Rate (m3/d)	2999.27	3002.62
Total Suspended Solids (mg/L)	10	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.384801	0.385268
Organic Chemical - Cl (ug/L)	0.124774	0.124786
Organic Chemical - Ct (ug/L)	0.128299	0.128311
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.972527	0.972527
Fraction of Sorbed Chemical - Organic Solid (-)	0.0274729	0.0274729
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Sand Filter_air	Sand Filter_eff	BW_waste
Flow Rate (m3/d)	Infinite	5995.86	6.00186
Total Suspended Solids (mg/L)	-	10	10
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	-	0.53	0.53
Wastewater DOC (mg/L)	-	0	0
Oil/Grease (mg/L)	-	0	0
Organic Chemical Mass (g/d)	0.0019229	0.767374	0.000768142
Organic Chemical - Cl (ug/L)	-	0.124468	0.124468
Organic Chemical - Ct (ug/L)	-	0.127984	0.127984
Metal - Cl (ug/L)	-	0	0
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	-	0	0
Powdered Activated Carbon (mg/L)	-	0	0
Temperature (deg C)	-	25	25
MKp (L/g)	-	0	0
Solubility (mg/L)	-	0	0
pH (-)	-	7	7
Fraction of Soluble Chemical (-)	-	0.972527	0.972527
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.0274729	0.0274729
Fraction of Sorbed Chemical - Oil (-)	-	0	0
Fraction of Sorbed Chemical - DOC (-)	-	0	0
Fraction of Sorbed Chemical - PAC (-)	-	0	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00638597 m/hr

Mass Transfer Coefficient for Stripping

0 m/hr

Contaminant : Fluoranthene**Incoming Stream**

	SC-A_eff	SC-B_eff
Flow Rate (m3/d)	2999.28	3002.63
Total Suspended Solids (mg/L)	10	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.588899	0.589903
Organic Chemical - Cl (ug/L)	0.180118	0.180224
Organic Chemical - Ct (ug/L)	0.196347	0.196462
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.917347	0.917347
Fraction of Sorbed Chemical - Organic Solid (-)	0.082653	0.082653
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Sand Filter_air	Sand Filter_eff	BW_waste
Flow Rate (m3/d)	Infinite	5995.91	6.00191
Total Suspended Solids (mg/L)	-	10	10
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	-	0.53	0.53
Wastewater DOC (mg/L)	-	0	0
Oil/Grease (mg/L)	-	0	0
Organic Chemical Mass (g/d)	0.00104332	1.17656	0.00117774
Organic Chemical - Cl (ug/L)	-	0.180009	0.180009
Organic Chemical - Ct (ug/L)	-	0.196227	0.196227
Metal - Cl (ug/L)	-	0	0
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	-	0	0
Powdered Activated Carbon (mg/L)	-	0	0
Temperature (deg C)	-	25	25
MKp (L/g)	-	0	0
Solubility (mg/L)	-	0	0
pH (-)	-	7	7
Fraction of Soluble Chemical (-)	-	0.917347	0.917347
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.082653	0.082653
Fraction of Sorbed Chemical - Oil (-)	-	0	0
Fraction of Sorbed Chemical - DOC (-)	-	0	0
Fraction of Sorbed Chemical - PAC (-)	-	0	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.0023958 m/hr

Mass Transfer Coefficient for Stripping

0 m/hr

Contaminant : Pyrene**Incoming Stream**

	SC-A_eff	SC-B_eff
Flow Rate (m3/d)	2999.28	3002.62
Total Suspended Solids (mg/L)	10	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.429333	0.429965
Organic Chemical - CI (ug/L)	0.133294	0.133342
Organic Chemical - Ct (ug/L)	0.143145	0.143196
Metal - CI (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.931181	0.931181
Fraction of Sorbed Chemical - Organic Solid (-)	0.0688192	0.0688192
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Sand Filter_air	Sand Filter_eff	BW_waste
Flow Rate (m3/d)	Infinite	5995.89	6.0019
Total Suspended Solids (mg/L)	-	10	10
Suspended Solids Mass (g/d)	-	-	-
Volatile SS Fraction (-)	-	0.53	0.53
Wastewater DOC (mg/L)	-	0	0
Oil/Grease (mg/L)	-	0	0
Organic Chemical Mass (g/d)	0.000641916	0.857787	0.000858645
Organic Chemical - CI (ug/L)	-	0.133217	0.133217
Organic Chemical - Ct (ug/L)	-	0.143062	0.143062
Metal - CI (ug/L)	-	0	0
Metal - Ct (ug/L)	-	-	-
Metal Mass (g/d)	-	-	-
Precipitated Metal (mg/L)	-	0	0
Powdered Activated Carbon (mg/L)	-	0	0
Temperature (deg C)	-	25	25
MKp (L/g)	-	0	0
Solubility (mg/L)	-	0	0
pH (-)	-	7	7
Fraction of Soluble Chemical (-)	-	0.931181	0.931181
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.0688192	0.0688192
Fraction of Sorbed Chemical - Oil (-)	-	0	0
Fraction of Sorbed Chemical - DOC (-)	-	0	0
Fraction of Sorbed Chemical - PAC (-)	-	0	0

Process Values

Mass Transfer Coefficient for Surface Volatilization	0.00199181 m/hr
Mass Transfer Coefficient for Stripping	0 m/hr

Fate Summary

Contaminant : Benzene

Total Air Emissions	0.0015482 %
Contribution from Surface Volatilization	0.0015482 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0325128 g/d
Contribution from Surface Volatilization	0.0325128 g/d
Biodegradation	0 g/d

Contaminant : Phenol

Total Air Emissions	0.000065008 %
Contribution from Surface Volatilization	0.000065008 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	5.85081E-05 g/d
Contribution from Surface Volatilization	5.85081E-05 g/d
Biodegradation	0 g/d

Contaminant : Toluene

Total Air Emissions	0.00280518 %
Contribution from Surface Volatilization	0.00280518 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0839885 g/d
Contribution from Surface Volatilization	0.0839885 g/d
Biodegradation	0 g/d

Contaminant : Ethylbenzene

Total Air Emissions	0.00140885 %
Contribution from Surface Volatilization	0.00140885 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00371943 g/d
Contribution from Surface Volatilization	0.00371943 g/d
Biodegradation	0 g/d

Contaminant : Xylene

Total Air Emissions	0.00522173 %
Contribution from Surface Volatilization	0.00522173 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0150388 g/d
Contribution from Surface Volatilization	0.0150388 g/d
Biodegradation	0 g/d

Contaminant : Styrene

Total Air Emissions	0.03719 %
Contribution from Surface Volatilization	0.03719 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.194135 g/d
Contribution from Surface Volatilization	0.194135 g/d
Biodegradation	0 g/d

Contaminant : Naphthalene

Total Air Emissions	0.00250261 %
Contribution from Surface Volatilization	0.00250261 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00795843 g/d
Contribution from Surface Volatilization	0.00795843 g/d
Biodegradation	0 g/d

Contaminant : Dibutylphthalate

Total Air Emissions	0.000137526 %
Contribution from Surface Volatilization	0.000137526 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	8.25171E-05 g/d
Contribution from Surface Volatilization	8.25171E-05 g/d
Biodegradation	0 g/d

Contaminant : Chloroform (Trichloromethane)

Total Air Emissions	0.0235079 %
Contribution from Surface Volatilization	0.0235079 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00016926 g/d
Contribution from Surface Volatilization	0.00016926 g/d
Biodegradation	0 g/d

Contaminant : Acenaphthene

Total Air Emissions	0.00365842 %
Contribution from Surface Volatilization	0.00365842 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00219509 g/d
Contribution from Surface Volatilization	0.00219509 g/d
Biodegradation	0 g/d

Contaminant : Acenaphthylene

Total Air Emissions	0.00323395 %
Contribution from Surface Volatilization	0.00323395 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0019404 g/d
Contribution from Surface Volatilization	0.0019404 g/d
Biodegradation	0 g/d

Contaminant : Fluorene

Total Air Emissions	0.00260363 %
Contribution from Surface Volatilization	0.00260363 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0015622 g/d
Contribution from Surface Volatilization	0.0015622 g/d
Biodegradation	0 g/d

Contaminant : Anthracene

Total Air Emissions	0.00395504 %
Contribution from Surface Volatilization	0.00395504 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00237306 g/d
Contribution from Surface Volatilization	0.00237306 g/d
Biodegradation	0 g/d

Contaminant : Phenanthrene

Total Air Emissions	0.00320478 %
Contribution from Surface Volatilization	0.00320478 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0019229 g/d
Contribution from Surface Volatilization	0.0019229 g/d
Biodegradation	0 g/d

Contaminant : Fluoranthene

Total Air Emissions	0.00173883 %
Contribution from Surface Volatilization	0.00173883 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00104332 g/d
Contribution from Surface Volatilization	0.00104332 g/d
Biodegradation	0 g/d

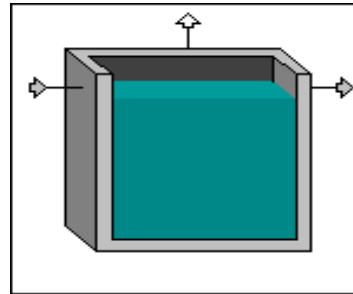
Contaminant : Pyrene

Total Air Emissions	0.00106984 %
Contribution from Surface Volatilization	0.00106984 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.000641916 g/d
Contribution from Surface Volatilization	0.000641916 g/d
Biodegradation	0 g/d

WWTP - Sump (T-59712)



Input Parameters

Data Entry

Liquid Depth	7.3 m
Surface Area	24.09 m ²
VSS to SS Ratio	- %
Removal Efficiency - Wastewater DOC	0 %
Covered	false
Ventilation Rate	-
Local pH value	-

Advanced

Water Surface Covered with Oil	0 %
Oil Layer Mass Transfer Coefficient	Hydromantis Method

Output Data

Contaminant : Benzene

Incoming Stream

	DW centrifuge_filtrate	BW_waste
Flow Rate (m3/d)	42.2448	6.00186
Total Suspended Solids (mg/L)	1081	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.0539964	0.00784532
Organic Chemical - Cl (ug/L)	1.12537	1.30551
Organic Chemical - Ct (ug/L)	1.27818	1.30715
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.880449	0.998745
Fraction of Sorbed Chemical - Organic Solid (-)	0.119551	0.00125452
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Waste Sum_air	Waste Sump_eff
Flow Rate (m3/d)	Infinite	48.2462
Total Suspended Solids (mg/L)	-	947.767
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.00614042	0.0557006
Organic Chemical - Cl (ug/L)	-	1.03169
Organic Chemical - Ct (ug/L)	-	1.15451
Metal - Cl (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.893616
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.106384
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.0102944 m/hr

Contaminant : Phenol**Incoming Stream**

	DW centrifuge_filtrate	BW_waste
Flow Rate (m3/d)	42.2448	6.00186
Total Suspended Solids (mg/L)	1081	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.00140769	0.00019318
Organic Chemical - Cl (ug/L)	0.0315679	0.0321701
Organic Chemical - Ct (ug/L)	0.0333223	0.0321866
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.947352	0.999486
Fraction of Sorbed Chemical - Organic Solid (-)	0.0526483	0.000513836
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Waste Sum_air	Waste Sump_eff
Flow Rate (m3/d)	Infinite	48.2462
Total Suspended Solids (mg/L)	-	947.767
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	1.36349E-05	0.00158722
Organic Chemical - Cl (ug/L)	-	0.0313699
Organic Chemical - Ct (ug/L)	-	0.0328984
Metal - Cl (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.953539
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.0464609
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.000752751 m/hr

Contaminant : Toluene**Incoming Stream**

	DW centrifuge_filtrate	BW_waste
Flow Rate (m3/d)	42.2448	6.00186
Total Suspended Solids (mg/L)	1081	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.176854	0.0209857
Organic Chemical - Cl (ug/L)	3.21269	3.48675
Organic Chemical - Ct (ug/L)	4.1864	3.49653
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.767413	0.997204
Fraction of Sorbed Chemical - Organic Solid (-)	0.232587	0.00279586
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Waste Sum_air	Waste Sump_eff
Flow Rate (m3/d)	Infinite	48.2462
Total Suspended Solids (mg/L)	-	947.767
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.0170434	0.180794
Organic Chemical - Cl (ug/L)	-	2.96061
Organic Chemical - Ct (ug/L)	-	3.74731
Metal - Cl (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.790061
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.209939
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00995697 m/hr

Contaminant : Ethylbenzene**Incoming Stream**

	DW centrifuge_filtrate	BW_waste
Flow Rate (m3/d)	42.2448	6.00186
Total Suspended Solids (mg/L)	1081	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.009769	0.000956007
Organic Chemical - Cl (ug/L)	0.151033	0.158506
Organic Chemical - Ct (ug/L)	0.231247	0.159285
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.653123	0.995111
Fraction of Sorbed Chemical - Organic Solid (-)	0.346877	0.00488908
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Waste Sum_air	Waste Sump_eff
Flow Rate (m3/d)	Infinite	48.2462
Total Suspended Solids (mg/L)	-	947.767
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.000788063	0.00993683
Organic Chemical - Cl (ug/L)	-	0.140525
Organic Chemical - Ct (ug/L)	-	0.205961
Metal - Cl (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.682292
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.317708
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00969969 m/hr

Contaminant : Xylene**Incoming Stream**

	DW centrifuge_filtrate	BW_waste
Flow Rate (m3/d)	42.2448	6.00186
Total Suspended Solids (mg/L)	1081	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.0383095	0.003753
Organic Chemical - Cl (ug/L)	0.592318	0.62225
Organic Chemical - Ct (ug/L)	0.906844	0.625307
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.653164	0.995112
Fraction of Sorbed Chemical - Organic Solid (-)	0.346836	0.00488819
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Waste Sum_air	Waste Sump_eff
Flow Rate (m3/d)	Infinite	48.2462
Total Suspended Solids (mg/L)	-	947.767
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.00317648	0.0388855
Organic Chemical - Cl (ug/L)	-	0.549946
Organic Chemical - Ct (ug/L)	-	0.80598
Metal - Cl (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.682332
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.317668
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00999027 m/hr

Contaminant : Styrene**Incoming Stream**

	DW centrifuge_filtrate	BW_waste
Flow Rate (m3/d)	42.2448	6.00186
Total Suspended Solids (mg/L)	1081	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.458326	0.0494626
Organic Chemical - Cl (ug/L)	7.71214	8.21031
Organic Chemical - Ct (ug/L)	10.8493	8.2412
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.710843	0.996251
Fraction of Sorbed Chemical - Organic Solid (-)	0.289157	0.00374889
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Waste Sum_air	Waste Sump_eff
Flow Rate (m3/d)	Infinite	48.2462
Total Suspended Solids (mg/L)	-	947.767
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.0403554	0.467424
Organic Chemical - Cl (ug/L)	-	7.14137
Organic Chemical - Ct (ug/L)	-	9.6883
Metal - Cl (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.737113
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.262887
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00977401 m/hr

Contaminant : Naphthalene**Incoming Stream**

	DW centrifuge_filtrate	BW_waste
Flow Rate (m3/d)	42.2448	6.00186
Total Suspended Solids (mg/L)	1081	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.0229903	0.00207627
Organic Chemical - Cl (ug/L)	0.330346	0.343878
Organic Chemical - Ct (ug/L)	0.544215	0.345937
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.607013	0.994047
Fraction of Sorbed Chemical - Organic Solid (-)	0.392987	0.00595335
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Waste Sum_air	Waste Sump_eff
Flow Rate (m3/d)	Infinite	48.2462
Total Suspended Solids (mg/L)	-	947.767
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.00170818	0.0233581
Organic Chemical - Cl (ug/L)	-	0.30884
Organic Chemical - Ct (ug/L)	-	0.484143
Metal - Cl (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.637911
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.362089
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00956646 m/hr

Contaminant : Dibutylphthalate**Incoming Stream**

	DW centrifuge_filtrate	BW_waste
Flow Rate (m3/d)	42.2451	6.00191
Total Suspended Solids (mg/L)	1081	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.103806	0.00172372
Organic Chemical - Cl (ug/L)	0.266932	0.266933
Organic Chemical - Ct (ug/L)	2.45723	0.287194
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.108631	0.929449
Fraction of Sorbed Chemical - Organic Solid (-)	0.891369	0.0705507
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Waste Sum_air	Waste Sump_eff
Flow Rate (m3/d)	Infinite	48.247
Total Suspended Solids (mg/L)	-	947.768
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	1.97163E-05	0.105507
Organic Chemical - Cl (ug/L)	-	0.266875
Organic Chemical - Ct (ug/L)	-	2.1868
Metal - Cl (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.122039
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.877961
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.000127782 m/hr

Contaminant : Chloroform (Trichloromethane)**Incoming Stream**

	DW centrifuge_filtrate	BW_waste
Flow Rate (m3/d)	42.2448	6.00186
Total Suspended Solids (mg/L)	1081	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.000263713	4.00407E-05
Organic Chemical - Cl (ug/L)	0.00562384	0.0066646
Organic Chemical - Ct (ug/L)	0.00624248	0.00667138
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.900899	0.998983
Fraction of Sorbed Chemical - Organic Solid (-)	0.0991012	0.00101657
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Waste Sum_air	Waste Sump_eff
Flow Rate (m3/d)	Infinite	48.2462
Total Suspended Solids (mg/L)	-	947.767
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	3.12643E-05	0.000272485
Organic Chemical - Cl (ug/L)	-	0.00515102
Organic Chemical - Ct (ug/L)	-	0.00564781
Metal - Cl (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.912039
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.0879614
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.010498 m/hr

Contaminant : Acenaphthene**Incoming Stream**

	DW centrifuge_filtrate	BW_waste
Flow Rate (m3/d)	42.2448	6.00186
Total Suspended Solids (mg/L)	1081	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.0104755	0.000616627
Organic Chemical - Cl (ug/L)	0.0998322	0.101348
Organic Chemical - Ct (ug/L)	0.247972	0.102739
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.402595	0.986459
Fraction of Sorbed Chemical - Organic Solid (-)	0.597405	0.0135411
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Waste Sum_air	Waste Sump_eff
Flow Rate (m3/d)	Infinite	48.2462
Total Suspended Solids (mg/L)	-	947.767
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.000494142	0.0105979
Organic Chemical - Cl (ug/L)	-	0.0954639
Organic Chemical - Ct (ug/L)	-	0.219662
Metal - Cl (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.434594
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.565406
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00895291 m/hr

Contaminant : Acenaphthylene**Incoming Stream**

	DW centrifuge_filtrate	BW_waste
Flow Rate (m3/d)	42.2448	6.00186
Total Suspended Solids (mg/L)	1081	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.0119384	0.000619172
Organic Chemical - Cl (ug/L)	0.100348	0.101459
Organic Chemical - Ct (ug/L)	0.2826	0.103163
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.35509	0.983477
Fraction of Sorbed Chemical - Organic Solid (-)	0.64491	0.0165234
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Waste Sum_air	Waste Sump_eff
Flow Rate (m3/d)	Infinite	48.2462
Total Suspended Solids (mg/L)	-	947.767
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.000442724	0.0121147
Organic Chemical - Cl (ug/L)	-	0.0968625
Organic Chemical - Ct (ug/L)	-	0.251101
Metal - Cl (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.385751
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.614249
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00790551 m/hr

Contaminant : Fluorene**Incoming Stream**

	DW centrifuge_filtrate	BW_waste
Flow Rate (m3/d)	42.2448	6.00186
Total Suspended Solids (mg/L)	1081	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.0101942	0.000480274
Organic Chemical - Cl (ug/L)	0.0777758	0.078494
Organic Chemical - Ct (ug/L)	0.241311	0.0800208
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.322305	0.98092
Fraction of Sorbed Chemical - Organic Solid (-)	0.677695	0.0190799
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Waste Sum_air	Waste Sump_eff
Flow Rate (m3/d)	Infinite	48.2462
Total Suspended Solids (mg/L)	-	947.767
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.000357683	0.0103166
Organic Chemical - Cl (ug/L)	-	0.0752004
Organic Chemical - Ct (ug/L)	-	0.213833
Metal - Cl (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.351679
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.648321
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00822677 m/hr

Contaminant : Anthracene**Incoming Stream**

	DW centrifuge_filtrate	BW_waste
Flow Rate (m3/d)	42.2448	6.00186
Total Suspended Solids (mg/L)	1081	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.0212247	0.000776202
Organic Chemical - Cl (ug/L)	0.125179	0.125819
Organic Chemical - Ct (ug/L)	0.502421	0.129327
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.249152	0.972878
Fraction of Sorbed Chemical - Organic Solid (-)	0.750848	0.0271219
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Waste Sum_air	Waste Sump_eff
Flow Rate (m3/d)	Infinite	48.2462
Total Suspended Solids (mg/L)	-	947.767
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.000550231	0.0214503
Organic Chemical - Cl (ug/L)	-	0.12207
Organic Chemical - Ct (ug/L)	-	0.4446
Metal - Cl (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.27456
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.72544
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00779633 m/hr

Contaminant : Phenanthrene**Incoming Stream**

	DW centrifuge_filtrate	BW_waste
Flow Rate (m3/d)	42.2448	6.00186
Total Suspended Solids (mg/L)	1081	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.0212193	0.000768142
Organic Chemical - Cl (ug/L)	0.12391	0.124468
Organic Chemical - Ct (ug/L)	0.502294	0.127984
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.246687	0.972527
Fraction of Sorbed Chemical - Organic Solid (-)	0.753313	0.0274729
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Waste Sum_air	Waste Sump_eff
Flow Rate (m3/d)	Infinite	48.2462
Total Suspended Solids (mg/L)	-	947.767
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.000448229	0.0215389
Organic Chemical - Cl (ug/L)	-	0.121402
Organic Chemical - Ct (ug/L)	-	0.446436
Metal - Cl (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.271935
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.728065
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00638597 m/hr

Contaminant : Fluoranthene**Incoming Stream**

	DW centrifuge_filtrate	BW_waste
Flow Rate (m3/d)	42.245	6.00191
Total Suspended Solids (mg/L)	1081	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.0816777	0.00117774
Organic Chemical - Cl (ug/L)	0.180024	0.180009
Organic Chemical - Ct (ug/L)	1.93343	0.196227
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.0931115	0.917347
Fraction of Sorbed Chemical - Organic Solid (-)	0.906888	0.082653
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Waste Sum_air	Waste Sump_eff
Flow Rate (m3/d)	Infinite	48.2469
Total Suspended Solids (mg/L)	-	947.768
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.000248604	0.0826036
Organic Chemical - Cl (ug/L)	-	0.179477
Organic Chemical - Ct (ug/L)	-	1.7121
Metal - Cl (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.104829
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.895171
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.0023958 m/hr

Contaminant : Pyrene**Incoming Stream**

	DW centrifuge_filtrate	BW_waste
Flow Rate (m3/d)	42.245	6.0019
Total Suspended Solids (mg/L)	1081	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	0.53
Wastewater DOC (mg/L)	0	0
Oil/Grease (mg/L)	0	0
Organic Chemical Mass (g/d)	0.0505843	0.000858645
Organic Chemical - Cl (ug/L)	0.133205	0.133217
Organic Chemical - Ct (ug/L)	1.1974	0.143062
Metal - Cl (ug/L)	0	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	0
Powdered Activated Carbon (mg/L)	0	0
Temperature (deg C)	25	25
MKp (L/g)	0	0
Solubility (mg/L)	0	0
pH (-)	7	7
Fraction of Soluble Chemical (-)	0.111245	0.931181
Fraction of Sorbed Chemical - Organic Solid (-)	0.888755	0.0688192
Fraction of Sorbed Chemical - Oil (-)	0	0
Fraction of Sorbed Chemical - DOC (-)	0	0
Fraction of Sorbed Chemical - PAC (-)	0	0

Outgoing Stream

	Waste Sum_air	Waste Sump_eff
Flow Rate (m3/d)	Infinite	48.2467
Total Suspended Solids (mg/L)	-	947.768
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.000152937	0.0512885
Organic Chemical - Cl (ug/L)	-	0.132806
Organic Chemical - Ct (ug/L)	-	1.06304
Metal - Cl (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.12493
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.87507
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00199181 m/hr

Fate Summary

Contaminant : Benzene

Total Air Emissions	0.000292396 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.00614042 g/d
Biodegradation	0 g/d

Contaminant : Phenol

Total Air Emissions	1.51497E-05 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	1.36349E-05 g/d
Biodegradation	0 g/d

Contaminant : Toluene

Total Air Emissions	0.000569242 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.0170434 g/d
Biodegradation	0 g/d

Contaminant : Ethylbenzene

Total Air Emissions	0.000298504 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.000788063 g/d
Biodegradation	0 g/d

Contaminant : Xylene

Total Air Emissions	0.00110293 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.00317648 g/d
Biodegradation	0 g/d

Contaminant : Styrene

Total Air Emissions	0.0077308 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.0403554 g/d
Biodegradation	0 g/d

Contaminant : Naphthalene

Total Air Emissions	0.000537154 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.00170818 g/d
Biodegradation	0 g/d

Contaminant : Dibutylphthalate

Total Air Emissions	0.00003286 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	1.97163E-05 g/d
Biodegradation	0 g/d

Contaminant : Chloroform (Trichloromethane)

Total Air Emissions	0.00434219 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	3.12643E-05 g/d
Biodegradation	0 g/d

Contaminant : Acenaphthene

Total Air Emissions	0.000823557 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.000494142 g/d
Biodegradation	0 g/d

Contaminant : Acenaphthylene

Total Air Emissions	0.000737862 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.000442724 g/d
Biodegradation	0 g/d

Contaminant : Fluorene

Total Air Emissions	0.000596128 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.000357683 g/d
Biodegradation	0 g/d

Contaminant : Anthracene

Total Air Emissions	0.000917038 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.000550231 g/d
Biodegradation	0 g/d

Contaminant : Phenanthrene

Total Air Emissions	0.000747036 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.000448229 g/d
Biodegradation	0 g/d

Contaminant : Fluoranthene

Total Air Emissions	0.000414333 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.000248604 g/d
Biodegradation	0 g/d

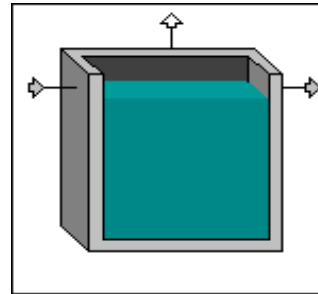
Contaminant : Pyrene

Total Air Emissions	0.000254891 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.000152937 g/d
Biodegradation	0 g/d

WWTP - Treated Effluent Sump (T-59717)



Input Parameters

Data Entry

Liquid Depth	4.3 m
Surface Area	57.4 m2
VSS to SS Ratio	- %
Removal Efficiency - Wastewater DOC	0 %
Covered	false
Ventilation Rate	-
Local pH value	-

Advanced

Water Surface Covered with Oil	0 %
Oil Layer Mass Transfer Coefficient	Hydromantis Method

Output Data

Contaminant : Benzene

Incoming Stream

	Sand Filter_eff
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	7.83747
Organic Chemical - Cl (ug/L)	1.30551
Organic Chemical - Ct (ug/L)	1.30715
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.998745
Fraction of Sorbed Chemical - Organic Solid (-)	0.00125452
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Treated Sump_air	eff_0
Flow Rate (m3/d)	Infinite	5995.86
Total Suspended Solids (mg/L)	-	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.0184706	7.819
Organic Chemical - Cl (ug/L)	-	1.30243
Organic Chemical - Ct (ug/L)	-	1.30407
Metal - Cl (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.998745
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.00125452
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.0102944 m/hr

Contaminant : Phenol**Incoming Stream**

	Sand Filter_eff
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.192986
Organic Chemical - CI (ug/L)	0.0321701
Organic Chemical - Ct (ug/L)	0.0321866
Metal - CI (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.999486
Fraction of Sorbed Chemical - Organic Solid (-)	0.000513836
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Treated Sump_air	eff_0
Flow Rate (m3/d)	Infinite	5995.86
Total Suspended Solids (mg/L)	-	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	3.33114E-05	0.192953
Organic Chemical - CI (ug/L)	-	0.0321645
Organic Chemical - Ct (ug/L)	-	0.0321811
Metal - CI (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.999486
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.000513836
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.000752751 m/hr

Contaminant : Toluene**Incoming Stream**

	Sand Filter_eff
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	20.9647
Organic Chemical - CI (ug/L)	3.48675
Organic Chemical - Ct (ug/L)	3.49653
Metal - CI (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.997204
Fraction of Sorbed Chemical - Organic Solid (-)	0.00279586
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Treated Sump_air	eff_0
Flow Rate (m3/d)	Infinite	5995.86
Total Suspended Solids (mg/L)	-	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.0477179	20.917
Organic Chemical - CI (ug/L)	-	3.47882
Organic Chemical - Ct (ug/L)	-	3.48857
Metal - CI (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.997204
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.00279586
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00995697 m/hr

Contaminant : Ethylbenzene**Incoming Stream**

	Sand Filter_eff
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.955051
Organic Chemical - CI (ug/L)	0.158506
Organic Chemical - Ct (ug/L)	0.159285
Metal - CI (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.995111
Fraction of Sorbed Chemical - Organic Solid (-)	0.00488908
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Treated Sump_air	eff_0
Flow Rate (m3/d)	Infinite	5995.86
Total Suspended Solids (mg/L)	-	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.00211332	0.952938
Organic Chemical - CI (ug/L)	-	0.158156
Organic Chemical - Ct (ug/L)	-	0.158933
Metal - CI (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.995111
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.00488908
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00969969 m/hr

Contaminant : Xylene**Incoming Stream**

	Sand Filter_eff
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	3.74925
Organic Chemical - CI (ug/L)	0.62225
Organic Chemical - Ct (ug/L)	0.625307
Metal - CI (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.995112
Fraction of Sorbed Chemical - Organic Solid (-)	0.00488819
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Treated Sump_air	eff_0
Flow Rate (m3/d)	Infinite	5995.86
Total Suspended Solids (mg/L)	-	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.00854426	3.74071
Organic Chemical - CI (ug/L)	-	0.620832
Organic Chemical - Ct (ug/L)	-	0.623882
Metal - CI (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.995112
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.00488819
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00999027 m/hr

Contaminant : Styrene**Incoming Stream**

	Sand Filter_eff
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	49.4131
Organic Chemical - CI (ug/L)	8.21031
Organic Chemical - Ct (ug/L)	8.2412
Metal - CI (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.996251
Fraction of Sorbed Chemical - Organic Solid (-)	0.00374889
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Treated Sump_air	eff_0
Flow Rate (m3/d)	Infinite	5995.86
Total Suspended Solids (mg/L)	-	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.110302	49.3028
Organic Chemical - CI (ug/L)	-	8.19198
Organic Chemical - Ct (ug/L)	-	8.22281
Metal - CI (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.996251
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.00374889
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00977401 m/hr

Contaminant : Naphthalene**Incoming Stream**

	Sand Filter_eff
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	2.07419
Organic Chemical - CI (ug/L)	0.343878
Organic Chemical - Ct (ug/L)	0.345937
Metal - CI (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.994047
Fraction of Sorbed Chemical - Organic Solid (-)	0.00595335
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Treated Sump_air	eff_0
Flow Rate (m3/d)	Infinite	5995.86
Total Suspended Solids (mg/L)	-	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.004522	2.06967
Organic Chemical - CI (ug/L)	-	0.343128
Organic Chemical - Ct (ug/L)	-	0.345183
Metal - CI (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.994047
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.00595335
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00956646 m/hr

Contaminant : Dibutylphthalate**Incoming Stream**

	Sand Filter_eff
Flow Rate (m3/d)	5995.91
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	1.72199
Organic Chemical - Cl (ug/L)	0.266933
Organic Chemical - Ct (ug/L)	0.287194
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.929449
Fraction of Sorbed Chemical - Organic Solid (-)	0.0705507
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Treated Sump_air	eff_0
Flow Rate (m3/d)	Infinite	5995.91
Total Suspended Solids (mg/L)	-	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	4.69876E-05	1.72194
Organic Chemical - Cl (ug/L)	-	0.266925
Organic Chemical - Ct (ug/L)	-	0.287187
Metal - Cl (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.929449
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.0705507
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.000127782 m/hr

Contaminant : Chloroform (Trichloromethane)**Incoming Stream**

	Sand Filter_eff
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.0400006
Organic Chemical - Cl (ug/L)	0.0066646
Organic Chemical - Ct (ug/L)	0.00667138
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.998983
Fraction of Sorbed Chemical - Organic Solid (-)	0.00101657
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Treated Sump_air	eff_0
Flow Rate (m3/d)	Infinite	5995.86
Total Suspended Solids (mg/L)	-	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	9.61522E-05	0.0399045
Organic Chemical - Cl (ug/L)	-	0.00664858
Organic Chemical - Ct (ug/L)	-	0.00665534
Metal - Cl (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.998983
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.00101657
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.010498 m/hr

Contaminant : Acenaphthene**Incoming Stream**

	Sand Filter_eff
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.61601
Organic Chemical - CI (ug/L)	0.101348
Organic Chemical - Ct (ug/L)	0.102739
Metal - CI (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.986459
Fraction of Sorbed Chemical - Organic Solid (-)	0.0135411
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Treated Sump_air	eff_0
Flow Rate (m3/d)	Infinite	5995.86
Total Suspended Solids (mg/L)	-	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.00124745	0.614763
Organic Chemical - CI (ug/L)	-	0.101143
Organic Chemical - Ct (ug/L)	-	0.102531
Metal - CI (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.986459
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.0135411
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00895291 m/hr

Contaminant : Acenaphthylene**Incoming Stream**

	Sand Filter_eff
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.618553
Organic Chemical - Cl (ug/L)	0.101459
Organic Chemical - Ct (ug/L)	0.103163
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.983477
Fraction of Sorbed Chemical - Organic Solid (-)	0.0165234
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Treated Sump_air	eff_0
Flow Rate (m3/d)	Infinite	5995.86
Total Suspended Solids (mg/L)	-	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.00110298	0.61745
Organic Chemical - Cl (ug/L)	-	0.101278
Organic Chemical - Ct (ug/L)	-	0.102979
Metal - Cl (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.983477
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.0165234
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00790551 m/hr

Contaminant : Fluorene**Incoming Stream**

	Sand Filter_eff
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.479793
Organic Chemical - CI (ug/L)	0.078494
Organic Chemical - Ct (ug/L)	0.0800208
Metal - CI (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.98092
Fraction of Sorbed Chemical - Organic Solid (-)	0.0190799
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Treated Sump_air	eff_0
Flow Rate (m3/d)	Infinite	5995.86
Total Suspended Solids (mg/L)	-	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.000887942	0.478905
Organic Chemical - CI (ug/L)	-	0.0783488
Organic Chemical - Ct (ug/L)	-	0.0798727
Metal - CI (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.98092
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.0190799
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00822677 m/hr

Contaminant : Anthracene**Incoming Stream**

	Sand Filter_eff
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.775426
Organic Chemical - CI (ug/L)	0.125819
Organic Chemical - Ct (ug/L)	0.129327
Metal - CI (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.972878
Fraction of Sorbed Chemical - Organic Solid (-)	0.0271219
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Treated Sump_air	eff_0
Flow Rate (m3/d)	Infinite	5995.86
Total Suspended Solids (mg/L)	-	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.00134898	0.774077
Organic Chemical - CI (ug/L)	-	0.125601
Organic Chemical - Ct (ug/L)	-	0.129102
Metal - CI (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.972878
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.0271219
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00779633 m/hr

Contaminant : Phenanthrene**Incoming Stream**

	Sand Filter_eff
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.767374
Organic Chemical - CI (ug/L)	0.124468
Organic Chemical - Ct (ug/L)	0.127984
Metal - CI (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.972527
Fraction of Sorbed Chemical - Organic Solid (-)	0.0274729
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Treated Sump_air	eff_0
Flow Rate (m3/d)	Infinite	5995.86
Total Suspended Solids (mg/L)	-	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.00109342	0.76628
Organic Chemical - CI (ug/L)	-	0.124291
Organic Chemical - Ct (ug/L)	-	0.127802
Metal - CI (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.972527
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.0274729
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00638597 m/hr

Contaminant : Fluoranthene**Incoming Stream**

	Sand Filter_eff
Flow Rate (m3/d)	5995.91
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	1.17656
Organic Chemical - CI (ug/L)	0.180009
Organic Chemical - Ct (ug/L)	0.196227
Metal - CI (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.917347
Fraction of Sorbed Chemical - Organic Solid (-)	0.082653
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Treated Sump_air	eff_0
Flow Rate (m3/d)	Infinite	5995.91
Total Suspended Solids (mg/L)	-	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.000593811	1.17597
Organic Chemical - CI (ug/L)	-	0.179918
Organic Chemical - Ct (ug/L)	-	0.196128
Metal - CI (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.917347
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.082653
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.0023958 m/hr

Contaminant : Pyrene**Incoming Stream**

	Sand Filter_eff
Flow Rate (m3/d)	5995.89
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.857787
Organic Chemical - CI (ug/L)	0.133217
Organic Chemical - Ct (ug/L)	0.143062
Metal - CI (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.931181
Fraction of Sorbed Chemical - Organic Solid (-)	0.0688192
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Treated Sump_air	eff_0
Flow Rate (m3/d)	Infinite	5995.89
Total Suspended Solids (mg/L)	-	10
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	-	0.53
Wastewater DOC (mg/L)	-	0
Oil/Grease (mg/L)	-	0
Organic Chemical Mass (g/d)	0.00036538	0.857421
Organic Chemical - CI (ug/L)	-	0.13316
Organic Chemical - Ct (ug/L)	-	0.143001
Metal - CI (ug/L)	-	0
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	-	0
Powdered Activated Carbon (mg/L)	-	0
Temperature (deg C)	-	25
MKp (L/g)	-	0
Solubility (mg/L)	-	0
pH (-)	-	7
Fraction of Soluble Chemical (-)	-	0.931181
Fraction of Sorbed Chemical - Organic Solid (-)	-	0.0688192
Fraction of Sorbed Chemical - Oil (-)	-	0
Fraction of Sorbed Chemical - DOC (-)	-	0
Fraction of Sorbed Chemical - PAC (-)	-	0

Process Values

Mass Transfer Coefficient for Surface Volatilization

0.00199181 m/hr

Fate Summary

Contaminant : Benzene

Total Air Emissions	0.000879537 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.0184706 g/d
Biodegradation	0 g/d

Contaminant : Phenol

Total Air Emissions	3.70121E-05 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	3.33114E-05 g/d
Biodegradation	0 g/d

Contaminant : Toluene

Total Air Emissions	0.00159376 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.0477179 g/d
Biodegradation	0 g/d

Contaminant : Ethylbenzene

Total Air Emissions	0.000800488 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.00211332 g/d
Biodegradation	0 g/d

Contaminant : Xylene

Total Air Emissions	0.00296671 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.00854426 g/d
Biodegradation	0 g/d

Contaminant : Styrene

Total Air Emissions	0.0211304 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.110302 g/d
Biodegradation	0 g/d

Contaminant : Naphthalene

Total Air Emissions	0.00142199 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.004522 g/d
Biodegradation	0 g/d

Contaminant : Dibutylphthalate

Total Air Emissions	7.83114E-05 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	4.69876E-05 g/d
Biodegradation	0 g/d

Contaminant : Chloroform (Trichloromethane)

Total Air Emissions	0.0133543 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	9.61522E-05 g/d
Biodegradation	0 g/d

Contaminant : Acenaphthene

Total Air Emissions	0.00207905 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.00124745 g/d
Biodegradation	0 g/d

Contaminant : Acenaphthylene

Total Air Emissions	0.00183827 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.00110298 g/d
Biodegradation	0 g/d

Contaminant : Fluorene

Total Air Emissions	0.00147988 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.000887942 g/d
Biodegradation	0 g/d

Contaminant : Anthracene

Total Air Emissions	0.00224826 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.00134898 g/d
Biodegradation	0 g/d

Contaminant : Phenanthrene

Total Air Emissions	0.00182234 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.00109342 g/d
Biodegradation	0 g/d

Contaminant : Fluoranthene

Total Air Emissions	0.000989669 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.000593811 g/d
Biodegradation	0 g/d

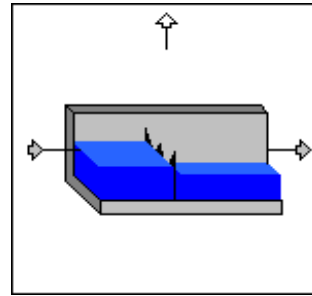
Contaminant : Pyrene

Total Air Emissions	0.000608957 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00036538 g/d
Biodegradation	0 g/d

WWTP - Outfall



Input Parameters

Data Entry

Weir Length

10 m

Waterfall Height

0.2 m

Local pH value

-

Advanced

Kg/Kl Ratio for Weirs

100

Use Pincince Relationship from

Primary Clarifier

Output Data

Contaminant : Benzene

Incoming Stream

	eff_0
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	7.819
Organic Chemical - CI (ug/L)	1.30243
Organic Chemical - Ct (ug/L)	1.30407
Metal - CI (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.998745
Fraction of Sorbed Chemical - Organic Solid (-)	0.00125452
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Outfall_Ohio River	Outfall_air
Flow Rate (m3/d)	5995.86	Infinite
Total Suspended Solids (mg/L)	10	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	7.63988	0.17912
Organic Chemical - CI (ug/L)	1.27259	-
Organic Chemical - Ct (ug/L)	1.27419	-
Metal - CI (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.998745	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.00125452	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Contaminant : Phenol**Incoming Stream**

	eff_0
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.192953
Organic Chemical - Cl (ug/L)	0.0321645
Organic Chemical - Ct (ug/L)	0.0321811
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.999486
Fraction of Sorbed Chemical - Organic Solid (-)	0.000513836
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Outfall_Ohio River	Outfall_air
Flow Rate (m3/d)	5995.86	Infinite
Total Suspended Solids (mg/L)	10	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.192928	2.47731E-05
Organic Chemical - Cl (ug/L)	0.0321604	-
Organic Chemical - Ct (ug/L)	0.0321769	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.999486	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.000513836	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Contaminant : Toluene**Incoming Stream**

	eff_0
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	20.917
Organic Chemical - Cl (ug/L)	3.47882
Organic Chemical - Ct (ug/L)	3.48857
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.997204
Fraction of Sorbed Chemical - Organic Solid (-)	0.00279586
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Outfall_Ohio River	Outfall_air
Flow Rate (m3/d)	5995.86	Infinite
Total Suspended Solids (mg/L)	10	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	20.4827	0.434258
Organic Chemical - Cl (ug/L)	3.40659	-
Organic Chemical - Ct (ug/L)	3.41614	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.997204	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.00279586	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Contaminant : Ethylbenzene**Incoming Stream**

	eff_0
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.952938
Organic Chemical - CI (ug/L)	0.158156
Organic Chemical - Ct (ug/L)	0.158933
Metal - CI (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.995111
Fraction of Sorbed Chemical - Organic Solid (-)	0.00488908
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Outfall_Ohio River	Outfall_air
Flow Rate (m3/d)	5995.86	Infinite
Total Suspended Solids (mg/L)	10	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.934659	0.0182789
Organic Chemical - CI (ug/L)	0.155122	-
Organic Chemical - Ct (ug/L)	0.155884	-
Metal - CI (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.995111	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.00488908	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Contaminant : Xylene**Incoming Stream**

	eff_0
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	3.74071
Organic Chemical - Cl (ug/L)	0.620832
Organic Chemical - Ct (ug/L)	0.623882
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.995112
Fraction of Sorbed Chemical - Organic Solid (-)	0.00488819
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Outfall_Ohio River	Outfall_air
Flow Rate (m3/d)	5995.86	Infinite
Total Suspended Solids (mg/L)	10	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	3.66297	0.077742
Organic Chemical - Cl (ug/L)	0.60793	-
Organic Chemical - Ct (ug/L)	0.610916	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.995112	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.00488819	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Contaminant : Styrene**Incoming Stream**

	eff_0
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	49.3028
Organic Chemical - Cl (ug/L)	8.19198
Organic Chemical - Ct (ug/L)	8.22281
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.996251
Fraction of Sorbed Chemical - Organic Solid (-)	0.00374889
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Outfall_Ohio River	Outfall_air
Flow Rate (m3/d)	5995.86	Infinite
Total Suspended Solids (mg/L)	10	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	48.3758	0.92697
Organic Chemical - Cl (ug/L)	8.03796	-
Organic Chemical - Ct (ug/L)	8.06821	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.996251	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.00374889	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Contaminant : Naphthalene**Incoming Stream**

	eff_0
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	2.06967
Organic Chemical - CI (ug/L)	0.343128
Organic Chemical - Ct (ug/L)	0.345183
Metal - CI (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.994047
Fraction of Sorbed Chemical - Organic Solid (-)	0.00595335
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Outfall_Ohio River	Outfall_air
Flow Rate (m3/d)	5995.86	Infinite
Total Suspended Solids (mg/L)	10	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	2.04076	0.0289067
Organic Chemical - CI (ug/L)	0.338336	-
Organic Chemical - Ct (ug/L)	0.340362	-
Metal - CI (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.994047	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.00595335	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Contaminant : Dibutylphthalate**Incoming Stream**

	eff_0
Flow Rate (m3/d)	5995.91
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	1.72194
Organic Chemical - Cl (ug/L)	0.266925
Organic Chemical - Ct (ug/L)	0.287187
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.929449
Fraction of Sorbed Chemical - Organic Solid (-)	0.0705507
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Outfall_Ohio River	Outfall_air
Flow Rate (m3/d)	5995.91	Infinite
Total Suspended Solids (mg/L)	10	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	1.72192	2.46167E-05
Organic Chemical - Cl (ug/L)	0.266922	-
Organic Chemical - Ct (ug/L)	0.287183	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.929449	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.0705507	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Contaminant : Chloroform (Trichloromethane)**Incoming Stream**

	eff_0
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.0399045
Organic Chemical - Cl (ug/L)	0.00664858
Organic Chemical - Ct (ug/L)	0.00665534
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.998983
Fraction of Sorbed Chemical - Organic Solid (-)	0.00101657
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Outfall_Ohio River	Outfall_air
Flow Rate (m3/d)	5995.86	Infinite
Total Suspended Solids (mg/L)	10	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.0389439	0.000960581
Organic Chemical - Cl (ug/L)	0.00648853	-
Organic Chemical - Ct (ug/L)	0.00649514	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.998983	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.00101657	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Contaminant : Acenaphthene**Incoming Stream**

	eff_0
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.614763
Organic Chemical - Cl (ug/L)	0.101143
Organic Chemical - Ct (ug/L)	0.102531
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.986459
Fraction of Sorbed Chemical - Organic Solid (-)	0.0135411
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Outfall_Ohio River	Outfall_air
Flow Rate (m3/d)	5995.86	Infinite
Total Suspended Solids (mg/L)	10	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.608957	0.0058062
Organic Chemical - Cl (ug/L)	0.100188	-
Organic Chemical - Ct (ug/L)	0.101563	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.986459	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.0135411	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Contaminant : Acenaphthylene**Incoming Stream**

	eff_0	
Flow Rate (m3/d)	5995.86	
Total Suspended Solids (mg/L)	10	
Suspended Solids Mass (g/d)	-	
Volatile SS Fraction (-)	0.53	
Wastewater DOC (mg/L)	0	
Oil/Grease (mg/L)	0	
Organic Chemical Mass (g/d)	0.61745	
Organic Chemical - Cl (ug/L)	0.101278	
Organic Chemical - Ct (ug/L)	0.102979	
Metal - Cl (ug/L)	0	
Metal - Ct (ug/L)	-	
Metal Mass (g/d)	-	
Precipitated Metal (mg/L)	0	
Powdered Activated Carbon (mg/L)	0	
Temperature (deg C)	25	
MKp (L/g)	0	
Solubility (mg/L)	0	
pH (-)	7	
Fraction of Soluble Chemical (-)	0.983477	
Fraction of Sorbed Chemical - Organic Solid (-)	0.0165234	
Fraction of Sorbed Chemical - Oil (-)	0	
Fraction of Sorbed Chemical - DOC (-)	0	
Fraction of Sorbed Chemical - PAC (-)	0	

Outgoing Stream

	Outfall_Ohio River	Outfall_air
Flow Rate (m3/d)	5995.86	Infinite
Total Suspended Solids (mg/L)	10 -	
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53 -	
Wastewater DOC (mg/L)	0 -	
Oil/Grease (mg/L)	0 -	
Organic Chemical Mass (g/d)	0.614271	0.00317929
Organic Chemical - Cl (ug/L)	0.100756 -	
Organic Chemical - Ct (ug/L)	0.102449 -	
Metal - Cl (ug/L)	0 -	
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0 -	
Powdered Activated Carbon (mg/L)	0 -	
Temperature (deg C)	25 -	
MKp (L/g)	0 -	
Solubility (mg/L)	0 -	
pH (-)	7 -	
Fraction of Soluble Chemical (-)	0.983477 -	
Fraction of Sorbed Chemical - Organic Solid (-)	0.0165234 -	
Fraction of Sorbed Chemical - Oil (-)	0 -	
Fraction of Sorbed Chemical - DOC (-)	0 -	
Fraction of Sorbed Chemical - PAC (-)	0 -	

Contaminant : Fluorene**Incoming Stream**

	eff_0
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.478905
Organic Chemical - CI (ug/L)	0.0783488
Organic Chemical - Ct (ug/L)	0.0798727
Metal - CI (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.98092
Fraction of Sorbed Chemical - Organic Solid (-)	0.0190799
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Outfall_Ohio River	Outfall_air
Flow Rate (m3/d)	5995.86	Infinite
Total Suspended Solids (mg/L)	10	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.476084	0.00282146
Organic Chemical - CI (ug/L)	0.0778872	-
Organic Chemical - Ct (ug/L)	0.0794021	-
Metal - CI (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.98092	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.0190799	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Contaminant : Anthracene**Incoming Stream**

	eff_0
Flow Rate (m3/d)	5995.86
Total Suspended Solids (mg/L)	10
Suspended Solids Mass (g/d)	-
Volatile SS Fraction (-)	0.53
Wastewater DOC (mg/L)	0
Oil/Grease (mg/L)	0
Organic Chemical Mass (g/d)	0.774077
Organic Chemical - Cl (ug/L)	0.125601
Organic Chemical - Ct (ug/L)	0.129102
Metal - Cl (ug/L)	0
Metal - Ct (ug/L)	-
Metal Mass (g/d)	-
Precipitated Metal (mg/L)	0
Powdered Activated Carbon (mg/L)	0
Temperature (deg C)	25
MKp (L/g)	0
Solubility (mg/L)	0
pH (-)	7
Fraction of Soluble Chemical (-)	0.972878
Fraction of Sorbed Chemical - Organic Solid (-)	0.0271219
Fraction of Sorbed Chemical - Oil (-)	0
Fraction of Sorbed Chemical - DOC (-)	0
Fraction of Sorbed Chemical - PAC (-)	0

Outgoing Stream

	Outfall_Ohio River	Outfall_air
Flow Rate (m3/d)	5995.86	Infinite
Total Suspended Solids (mg/L)	10	-
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53	-
Wastewater DOC (mg/L)	0	-
Oil/Grease (mg/L)	0	-
Organic Chemical Mass (g/d)	0.770497	0.00358071
Organic Chemical - Cl (ug/L)	0.12502	-
Organic Chemical - Ct (ug/L)	0.128505	-
Metal - Cl (ug/L)	0	-
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0	-
Powdered Activated Carbon (mg/L)	0	-
Temperature (deg C)	25	-
MKp (L/g)	0	-
Solubility (mg/L)	0	-
pH (-)	7	-
Fraction of Soluble Chemical (-)	0.972878	-
Fraction of Sorbed Chemical - Organic Solid (-)	0.0271219	-
Fraction of Sorbed Chemical - Oil (-)	0	-
Fraction of Sorbed Chemical - DOC (-)	0	-
Fraction of Sorbed Chemical - PAC (-)	0	-

Contaminant : Phenanthrene**Incoming Stream**

	eff_0	
Flow Rate (m3/d)	5995.86	
Total Suspended Solids (mg/L)	10	
Suspended Solids Mass (g/d)	-	
Volatile SS Fraction (-)	0.53	
Wastewater DOC (mg/L)	0	
Oil/Grease (mg/L)	0	
Organic Chemical Mass (g/d)	0.76628	
Organic Chemical - CI (ug/L)	0.124291	
Organic Chemical - Ct (ug/L)	0.127802	
Metal - CI (ug/L)	0	
Metal - Ct (ug/L)	-	
Metal Mass (g/d)	-	
Precipitated Metal (mg/L)	0	
Powdered Activated Carbon (mg/L)	0	
Temperature (deg C)	25	
MKp (L/g)	0	
Solubility (mg/L)	0	
pH (-)	7	
Fraction of Soluble Chemical (-)	0.972527	
Fraction of Sorbed Chemical - Organic Solid (-)	0.0274729	
Fraction of Sorbed Chemical - Oil (-)	0	
Fraction of Sorbed Chemical - DOC (-)	0	
Fraction of Sorbed Chemical - PAC (-)	0	

Outgoing Stream

	Outfall_Ohio River	Outfall_air
Flow Rate (m3/d)	5995.86	Infinite
Total Suspended Solids (mg/L)	10 -	
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53 -	
Wastewater DOC (mg/L)	0 -	
Oil/Grease (mg/L)	0 -	
Organic Chemical Mass (g/d)	0.764455	0.00182528
Organic Chemical - CI (ug/L)	0.123994 -	
Organic Chemical - Ct (ug/L)	0.127497 -	
Metal - CI (ug/L)	0 -	
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0 -	
Powdered Activated Carbon (mg/L)	0 -	
Temperature (deg C)	25 -	
MKp (L/g)	0 -	
Solubility (mg/L)	0 -	
pH (-)	7 -	
Fraction of Soluble Chemical (-)	0.972527 -	
Fraction of Sorbed Chemical - Organic Solid (-)	0.0274729 -	
Fraction of Sorbed Chemical - Oil (-)	0 -	
Fraction of Sorbed Chemical - DOC (-)	0 -	
Fraction of Sorbed Chemical - PAC (-)	0 -	

Contaminant : Fluoranthene**Incoming Stream**

	eff_0	
Flow Rate (m3/d)	5995.91	
Total Suspended Solids (mg/L)	10	
Suspended Solids Mass (g/d)	-	
Volatile SS Fraction (-)	0.53	
Wastewater DOC (mg/L)	0	
Oil/Grease (mg/L)	0	
Organic Chemical Mass (g/d)	1.17597	
Organic Chemical - CI (ug/L)	0.179918	
Organic Chemical - Ct (ug/L)	0.196128	
Metal - CI (ug/L)	0	
Metal - Ct (ug/L)	-	
Metal Mass (g/d)	-	
Precipitated Metal (mg/L)	0	
Powdered Activated Carbon (mg/L)	0	
Temperature (deg C)	25	
MKp (L/g)	0	
Solubility (mg/L)	0	
pH (-)	7	
Fraction of Soluble Chemical (-)	0.917347	
Fraction of Sorbed Chemical - Organic Solid (-)	0.082653	
Fraction of Sorbed Chemical - Oil (-)	0	
Fraction of Sorbed Chemical - DOC (-)	0	
Fraction of Sorbed Chemical - PAC (-)	0	

Outgoing Stream

	Outfall_Ohio River	Outfall_air
Flow Rate (m3/d)	5995.91	Infinite
Total Suspended Solids (mg/L)	10 -	
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53 -	
Wastewater DOC (mg/L)	0 -	
Oil/Grease (mg/L)	0 -	
Organic Chemical Mass (g/d)	1.17549	0.00047419
Organic Chemical - CI (ug/L)	0.179845 -	
Organic Chemical - Ct (ug/L)	0.196049 -	
Metal - CI (ug/L)	0 -	
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0 -	
Powdered Activated Carbon (mg/L)	0 -	
Temperature (deg C)	25 -	
MKp (L/g)	0 -	
Solubility (mg/L)	0 -	
pH (-)	7 -	
Fraction of Soluble Chemical (-)	0.917347 -	
Fraction of Sorbed Chemical - Organic Solid (-)	0.082653 -	
Fraction of Sorbed Chemical - Oil (-)	0 -	
Fraction of Sorbed Chemical - DOC (-)	0 -	
Fraction of Sorbed Chemical - PAC (-)	0 -	

Contaminant : Pyrene**Incoming Stream**

	eff_0	
Flow Rate (m3/d)	5995.89	
Total Suspended Solids (mg/L)	10	
Suspended Solids Mass (g/d)	-	
Volatile SS Fraction (-)	0.53	
Wastewater DOC (mg/L)	0	
Oil/Grease (mg/L)	0	
Organic Chemical Mass (g/d)	0.857421	
Organic Chemical - CI (ug/L)	0.13316	
Organic Chemical - Ct (ug/L)	0.143001	
Metal - CI (ug/L)	0	
Metal - Ct (ug/L)	-	
Metal Mass (g/d)	-	
Precipitated Metal (mg/L)	0	
Powdered Activated Carbon (mg/L)	0	
Temperature (deg C)	25	
MKp (L/g)	0	
Solubility (mg/L)	0	
pH (-)	7	
Fraction of Soluble Chemical (-)	0.931181	
Fraction of Sorbed Chemical - Organic Solid (-)	0.0688192	
Fraction of Sorbed Chemical - Oil (-)	0	
Fraction of Sorbed Chemical - DOC (-)	0	
Fraction of Sorbed Chemical - PAC (-)	0	

Outgoing Stream

	Outfall_Ohio River	Outfall_air
Flow Rate (m3/d)	5995.89	Infinite
Total Suspended Solids (mg/L)	10 -	
Suspended Solids Mass (g/d)	-	-
Volatile SS Fraction (-)	0.53 -	
Wastewater DOC (mg/L)	0 -	
Oil/Grease (mg/L)	0 -	
Organic Chemical Mass (g/d)	0.857143	0.000278527
Organic Chemical - CI (ug/L)	0.133117 -	
Organic Chemical - Ct (ug/L)	0.142955 -	
Metal - CI (ug/L)	0 -	
Metal - Ct (ug/L)	-	-
Metal Mass (g/d)	-	-
Precipitated Metal (mg/L)	0 -	
Powdered Activated Carbon (mg/L)	0 -	
Temperature (deg C)	25 -	
MKp (L/g)	0 -	
Solubility (mg/L)	0 -	
pH (-)	7 -	
Fraction of Soluble Chemical (-)	0.931181 -	
Fraction of Sorbed Chemical - Organic Solid (-)	0.0688192 -	
Fraction of Sorbed Chemical - Oil (-)	0 -	
Fraction of Sorbed Chemical - DOC (-)	0 -	
Fraction of Sorbed Chemical - PAC (-)	0 -	

Fate Summary

Contaminant : Benzene

Total Air Emissions	0.00852939 %
Contribution from Weir Volatilization	0.00852939 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.17912 g/d
Contribution from Weir Volatilization	0.17912 g/d
Biodegradation	0 g/d

Contaminant : Phenol

Total Air Emissions	2.75252E-05 %
Contribution from Weir Volatilization	2.75252E-05 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	2.47731E-05 g/d
Contribution from Weir Volatilization	2.47731E-05 g/d
Biodegradation	0 g/d

Contaminant : Toluene

Total Air Emissions	0.0145041 %
Contribution from Weir Volatilization	0.0145041 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.434258 g/d
Contribution from Weir Volatilization	0.434258 g/d
Biodegradation	0 g/d

Contaminant : Ethylbenzene

Total Air Emissions	0.00692371 %
Contribution from Weir Volatilization	0.00692371 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0182789 g/d
Contribution from Weir Volatilization	0.0182789 g/d
Biodegradation	0 g/d

Contaminant : Xylene

Total Air Emissions	0.0269933 %
Contribution from Weir Volatilization	0.0269933 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.077742 g/d
Contribution from Weir Volatilization	0.077742 g/d
Biodegradation	0 g/d

Contaminant : Styrene

Total Air Emissions	0.177578 %
Contribution from Weir Volatilization	0.177578 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.92697 g/d
Contribution from Weir Volatilization	0.92697 g/d
Biodegradation	0 g/d

Contaminant : Naphthalene

Total Air Emissions	0.00909001 %
Contribution from Weir Volatilization	0.00909001 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.0289067 g/d
Contribution from Weir Volatilization	0.0289067 g/d
Biodegradation	0 g/d

Contaminant : Dibutylphthalate

Total Air Emissions	4.10272E-05 %
Contribution from Weir Volatilization	4.10272E-05 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	2.46167E-05 g/d
Contribution from Weir Volatilization	2.46167E-05 g/d
Biodegradation	0 g/d

Contaminant : Chloroform (Trichloromethane)

Total Air Emissions	0.133412 %
Contribution from Weir Volatilization	0.133412 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.000960581 g/d
Contribution from Weir Volatilization	0.000960581 g/d
Biodegradation	0 g/d

Contaminant : Acenaphthene

Total Air Emissions	0.00967684 %
Contribution from Weir Volatilization	0.00967684 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.0058062 g/d
Contribution from Weir Volatilization	0.0058062 g/d
Biodegradation	0 g/d

Contaminant : Acenaphthylene

Total Air Emissions	0.00529872 %
Contribution from Weir Volatilization	0.00529872 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00317929 g/d
Contribution from Weir Volatilization	0.00317929 g/d
Biodegradation	0 g/d

Contaminant : Fluorene

Total Air Emissions	0.00470237 %
Contribution from Weir Volatilization	0.00470237 %
Biodegradation	0 %

* as a percentage of the total contaminant in the system

Total Air Emissions	0.00282146 g/d
Contribution from Weir Volatilization	0.00282146 g/d
Biodegradation	0 g/d

Contaminant : Anthracene

Total Air Emissions	0.00596776 %
Contribution from Weir Volatilization	0.00596776 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.00358071 g/d
Contribution from Weir Volatilization	0.00358071 g/d
Biodegradation	0 g/d

Contaminant : Phenanthrene

Total Air Emissions	0.00304208 %
Contribution from Weir Volatilization	0.00304208 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.00182528 g/d
Contribution from Weir Volatilization	0.00182528 g/d
Biodegradation	0 g/d

Contaminant : Fluoranthene

Total Air Emissions	0.000790304 %
Contribution from Weir Volatilization	0.000790304 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.00047419 g/d
Contribution from Weir Volatilization	0.00047419 g/d
Biodegradation	0 g/d

Contaminant : Pyrene

Total Air Emissions	0.000464205 %
Contribution from Weir Volatilization	0.000464205 %
Biodegradation	0 %
* as a percentage of the total contaminant in the system	

Total Air Emissions	0.000278527 g/d
Contribution from Weir Volatilization	0.000278527 g/d
Biodegradation	0 g/d

<i>Source ID = 503 Plant Roadways (Transport Truck Annual Particulate Emissions)</i>		
Parameter	Value	Reference & Calculation Basis
<i>Calculation based on paved road equation from AP-42, Section 13.2.1 for daily emissions</i>		
k for PM	0.011 lb/VMT	AP-42, Table 13.2.1-1
k for PM10	0.0022 lb/VMT	AP-42, Table 13.2.1-1
k for PM2.5	0.00054 lb/VMT	AP-42, Table 13.2.1-1
sL	0.20 g/m2	Estimated value based on application of LAER controls
W	26.75 tons	Average weight of vehicles traveling the road
P	150 days	Number of days with precipitation greater than 0.01 inch
N	365 days	Number of days in the averaging period
EF for PM	0.065 lb/VMT	$EF = k \times (sL)^{0.91} \times (W)^{1.02} \times (1 - P/(4 \times N))$
EF for PM10	0.013 lb/VMT	$EF = k \times (sL)^{0.91} \times (W)^{1.02} \times (1 - P/(4 \times N))$
EF for PM2.5	0.0032 lb/VMT	$EF = k \times (sL)^{0.91} \times (W)^{1.02} \times (1 - P/(4 \times N))$
Vehicles per day	44 vehicles/day	Design estimate ⁽¹⁾
Hours per day of vehicle traffic	24 hr/day	Annual average value
Road length	1.02 miles	Round trip distance from current plot plan
VMT hourly	1.9 VMT/hr	$= (\text{Vehicles per day}) / (\text{Hours per day of vehicle traffic}) \times (\text{Road length})$
PM Emissions [hourly]	0.12 lb/hr	$= (\text{VMT hourly}) \times (\text{EF for PM})$
PM10 Emissions [hourly]	0.02 lb/hr	$= (\text{VMT hourly}) \times (\text{EF for PM10})$
PM2.5 Emissions [hourly]	0.01 lb/hr	$= (\text{VMT hourly}) \times (\text{EF for PM2.5})$
PM Emissions [annual]	0.53 tpy	$= (\text{PM Emissions [hourly]}) \times (8,760 \text{ hr/yr}) / (2,000 \text{ lb/T})$
PM10 Emissions [annual]	0.11 tpy	$= (\text{PM10 Emissions [hourly]}) \times (8,760 \text{ hr/yr}) / (2,000 \text{ lb/T})$
PM2.5 Emissions [annual]	0.03 tpy	$= (\text{PM2.5 Emissions [hourly]}) \times (8,760 \text{ hr/yr}) / (2,000 \text{ lb/T})$

<u>Source ID = 503 Plant Roadways (Transport Truck Hourly Particulate Emissions)</u>		
Parameter	Value	Reference & Calculation Basis
<i>Calculation based on paved road equation from AP-42, Section 13.2.1 for hourly emissions</i>		
k for PM	0.011 lb/VMT	AP-42, Table 13.2.1-1
k for PM10	0.0022 lb/VMT	AP-42, Table 13.2.1-1
k for PM2.5	0.00054 lb/VMT	AP-42, Table 13.2.1-1
sL	0.20 g/m2	Estimated value based on application of LAER controls
W	26.75 tons	Average weight of vehicles traveling the road
P	0 hours	Number of hours with precipitation greater than 0.01 inch
N	24 hours	Number of hours in the averaging period
EF for PM	0.073 lb/VMT	$EF = k \times (sL)^{0.91} \times (W)^{1.02} \times (1 - 1.2 \times P/N)$
EF for PM10	0.015 lb/VMT	$EF = k \times (sL)^{0.91} \times (W)^{1.02} \times (1 - 1.2 \times P/N)$
EF for PM2.5	0.0036 lb/VMT	$EF = k \times (sL)^{0.91} \times (W)^{1.02} \times (1 - 1.2 \times P/N)$
Vehicles per day	44 vehicles/day	Design estimate ⁽¹⁾
Hours per day of vehicle traffic	8 hr/day	Assumes 8 hours per day of traffic as worst-case for short-term rate
Road length	1.02 miles	Round trip distance from current plot plan
VMT hourly	5.6 VMT/hr	$= (\text{Vehicles per day}) / (\text{Hours per day of vehicle traffic}) \times (\text{Road length})$
PM Emissions [hourly]	0.41 lb/hr	$= (\text{VMT hourly}) \times (\text{EF for PM})$
PM10 Emissions [hourly]	0.08 lb/hr	$= (\text{VMT hourly}) \times (\text{EF for PM10})$
PM2.5 Emissions [hourly]	0.02 lb/hr	$= (\text{VMT hourly}) \times (\text{EF for PM2.5})$

Note: (1) Original logistics of 10% truck shipments updated to 20% per Volume X Version D.

<i>Source ID = 503 Plant Roadways (Talc Transport Truck Annual Particulate Emissions)</i>		
Parameter	Value	Reference & Calculation Basis
<i>Calculation based on paved road equation from AP-42, Section 13.2.1 for daily emissions</i>		
k for PM	0.011 lb/VMT	AP-42, Table 13.2.1-1
k for PM10	0.0022 lb/VMT	AP-42, Table 13.2.1-1
k for PM2.5	0.00054 lb/VMT	AP-42, Table 13.2.1-1
sL	0.20 g/m2	Estimated value based on application of LAER controls
W	26.75 tons	Average weight of vehicles traveling the road
P	150 days	Number of days with precipitation greater than 0.01 inch
N	365 days	Number of days in the averaging period
EF for PM	0.065 lb/VMT	$EF = k \times (sL)^{0.91} \times (W)^{1.02} \times (1 - P/(4 \times N))$
EF for PM10	0.013 lb/VMT	$EF = k \times (sL)^{0.91} \times (W)^{1.02} \times (1 - P/(4 \times N))$
EF for PM2.5	0.0032 lb/VMT	$EF = k \times (sL)^{0.91} \times (W)^{1.02} \times (1 - P/(4 \times N))$
Vehicles per day	1 vehicle/day	Design estimate
Hours per day of vehicle traffic	24 hr/day	Annual average value
Road length	9.17 miles	Round trip distance from current plot plan
VMT hourly	0.4 VMT/hr	$= (\text{Vehicles per day}) / (\text{Hours per day of vehicle traffic}) \times (\text{Road length})$
PM Emissions [hourly]	0.02 lb/hr	$= (\text{VMT hourly}) \times (\text{EF for PM})$
PM10 Emissions [hourly]	0.005 lb/hr	$= (\text{VMT hourly}) \times (\text{EF for PM10})$
PM2.5 Emissions [hourly]	0.001 lb/hr	$= (\text{VMT hourly}) \times (\text{EF for PM2.5})$
PM Emissions [annual]	0.11 tpy	$= (\text{PM Emissions [hourly]}) \times (8,760 \text{ hr/yr}) / (2,000 \text{ lb/T})$
PM10 Emissions [annual]	0.02 tpy	$= (\text{PM10 Emissions [hourly]}) \times (8,760 \text{ hr/yr}) / (2,000 \text{ lb/T})$
PM2.5 Emissions [annual]	0.01 tpy	$= (\text{PM2.5 Emissions [hourly]}) \times (8,760 \text{ hr/yr}) / (2,000 \text{ lb/T})$

<i>Source ID = 503 Plant Roadways (Talc Transport Truck Hourly Particulate Emissions)</i>		
Parameter	Value	Reference & Calculation Basis
<i>Calculation based on paved road equation from AP-42, Section 13.2.1 for hourly emissions</i>		
k for PM	0.011 lb/VMT	AP-42, Table 13.2.1-1
k for PM10	0.0022 lb/VMT	AP-42, Table 13.2.1-1
k for PM2.5	0.00054 lb/VMT	AP-42, Table 13.2.1-1
sL	0.20 g/m2	Estimated value based on application of LAER controls
W	26.75 tons	Average weight of vehicles traveling the road
P	0 hours	Number of hours with precipitation greater than 0.01 inch
N	24 hours	Number of hours in the averaging period
EF for PM	0.073 lb/VMT	$EF = k \times (sL)^{0.91} \times (W)^{1.02} \times (1 - 1.2 \times P/N)$
EF for PM10	0.015 lb/VMT	$EF = k \times (sL)^{0.91} \times (W)^{1.02} \times (1 - 1.2 \times P/N)$
EF for PM2.5	0.0036 lb/VMT	$EF = k \times (sL)^{0.91} \times (W)^{1.02} \times (1 - 1.2 \times P/N)$
Vehicles per day	4 vehicles/day	Design estimate
Hours per day of vehicle traffic	1 hr/day	Assumes 1 hour per day of traffic as worst-case for short-term rate
Road length	9.17 miles	Round trip distance from current plot plan
VMT hourly	36.7 VMT/hr	$= (\text{Vehicles per day}) / (\text{Hours per day of vehicle traffic}) \times (\text{Road length})$
PM Emissions [hourly]	2.66 lb/hr	$= (\text{VMT hourly}) \times (\text{EF for PM})$
PM10 Emissions [hourly]	0.53 lb/hr	$= (\text{VMT hourly}) \times (\text{EF for PM10})$
PM2.5 Emissions [hourly]	0.13 lb/hr	$= (\text{VMT hourly}) \times (\text{EF for PM2.5})$

Source ID		=		504 Gas Insulated Switchgear (SF6)				
Equipment	Tag	Location	SF6 Quantity (lb)	Pressure (psi)	Leak Rate (%/yr)	SF6 Losses (lb/yr)	SF6 GWP	CO2e (tpy)
138 kV GIS SWGR	555-ES-101	MIS Substation	-	-	-	-	-	-
GIS Breaker Bay 1	555-ES-101-E01	MIS Substation	7,872	65 - 81	0.1	7.87	23,500	92.50
GIS Breaker Bay 2	555-ES-101-E02	MIS Substation	7,746	65 - 81	0.1	7.75	23,500	91.02
GIS Breaker Bay 3	555-ES-101-E03	MIS Substation	6,022	65 - 81	0.1	6.02	23,500	70.76
GIS Breaker Bay 4	555-ES-101-E04	MIS Substation	5,266	65 - 81	0.1	5.27	23,500	61.88
GIS Breaker Bay 5	555-ES-101-E05	MIS Substation	5,346	65 - 81	0.1	5.35	23,500	62.82
GIS Breaker Bay 6	555-ES-101-E06	MIS Substation	5,266	65 - 81	0.1	5.27	23,500	61.88
GIS Breaker Bay 7	555-ES-101-E07	MIS Substation	8,485	65 - 81	0.1	8.49	23,500	99.70
GIS Breaker Bay 8	555-ES-101-E08	MIS Substation	5,346	65 - 81	0.1	5.35	23,500	62.82
GIS Breaker Bay 9	555-ES-101-E09	MIS Substation	5,266	65 - 81	0.1	5.27	23,500	61.88
GIS Breaker Bay 10	555-ES-101-E10	MIS Substation	6,022	65 - 81	0.1	6.02	23,500	70.76
GIS Breaker Bay 11	555-ES-101-E11	MIS Substation	5,266	65 - 81	0.1	5.27	23,500	61.88
GIS Breaker Bay 12	555-ES-101-E12	MIS Substation	5,312	65 - 81	0.1	5.31	23,500	62.42
35 kV GIS SWGR	556-ES-201	PDS Substation	-	-	-	-	-	-
35 kV GIS SWGR	556-ECB-201A	PDS Substation	-	-	-	-	-	-
35 kV GIS SWGR	Phase Bussing B11	PDS Substation	9.1	21 - 23	0.1	0.0091	23,500	0.107
35 kV GIS SWGR	Phase Bussing B12	PDS Substation	9.1	21 - 23	0.1	0.0091	23,500	0.107
35 kV GIS SWGR	Phase Bussing B13	PDS Substation	9.1	21 - 23	0.1	0.0091	23,500	0.107
35 kV GIS SWGR	556-ECB-201A H-1	PDS Substation	4.4	21 - 23	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-201A H-2	PDS Substation	4.4	21 - 23	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-201A H-3	PDS Substation	4.4	21 - 23	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-201A H-4	PDS Substation	4.4	21 - 23	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-201A H-5	PDS Substation	4.4	21 - 23	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-201A H-6	PDS Substation	4.4	21 - 23	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-201A H-7	PDS Substation	4.4	21 - 23	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-201A H-8	PDS Substation	4.4	21 - 23	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-201A H-10	PDS Substation	7.2	21 - 23	0.1	0.0072	23,500	0.085
35 kV GIS SWGR	556-ECB-201A H-11	PDS Substation	9.1	21 - 23	0.1	0.0091	23,500	0.107
35 kV GIS SWGR	556-ECB-201B	PDS Substation	-	-	-	-	-	-
35 kV GIS SWGR	Phase Bussing B11	PDS Substation	9.9	21 - 23	0.1	0.0099	23,500	0.116
35 kV GIS SWGR	Phase Bussing B12	PDS Substation	9.9	21 - 23	0.1	0.0099	23,500	0.116
35 kV GIS SWGR	Phase Bussing B13	PDS Substation	9.9	21 - 23	0.1	0.0099	23,500	0.116
35 kV GIS SWGR	556-ECB-201A H-13	PDS Substation	7.2	21 - 23	0.1	0.0072	23,500	0.085
35 kV GIS SWGR	556-ECB-201A H-15	PDS Substation	4.4	21 - 23	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-201A H-16	PDS Substation	4.4	21 - 23	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-201A H-17	PDS Substation	4.4	21 - 23	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-201A H-18	PDS Substation	4.4	21 - 23	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-201A H-19	PDS Substation	4.4	21 - 23	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-201A H-20	PDS Substation	4.4	21 - 23	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-201A H-21	PDS Substation	4.4	21 - 23	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-201A H-22	PDS Substation	4.4	21 - 23	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-201A H-23	PDS Substation	4.4	21 - 23	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ES-202	PDS Substation	-	-	-	-	-	-
35 kV GIS SWGR	556ECB-202A	PDS Substation	-	-	-	-	-	-
35 kV GIS SWGR	Phase Bussing B11	PDS Substation	8.3	21	0.1	0.0083	23,500	0.097
35 kV GIS SWGR	Phase Bussing B12	PDS Substation	8.3	21	0.1	0.0083	23,500	0.097
35 kV GIS SWGR	Phase Bussing B13	PDS Substation	8.3	21	0.1	0.0083	23,500	0.097
35 kV GIS SWGR	556-ECB-202A H-1	PDS Substation	4.4	21	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-202A H-2	PDS Substation	5.7	21	0.1	0.0057	23,500	0.067
35 kV GIS SWGR	556-ECB-202A H-3	PDS Substation	4.4	21	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-202A H-4	PDS Substation	4.4	21	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-202A H-5	PDS Substation	4.4	21	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-202A H-6	PDS Substation	4.4	21	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-202A H-7	PDS Substation	4.4	21	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-202A H-9	PDS Substation	10.4	21	0.1	0.0104	23,500	0.123
35 kV GIS SWGR	556-ECB-202A H-10	PDS Substation	13.6	21	0.1	0.0136	23,500	0.160
35 kV GIS SWGR	556-ECB-202B	PDS Substation	-	-	-	-	-	-

<i>Source ID = 504 Gas Insulated Switchgear (SF6)</i>								
Equipment	Tag	Location	SF6 Quantity (lb)	Pressure (psi)	Leak Rate (%/yr)	SF6 Losses (lb/yr)	SF6 GWP	CO2e (tpy)
35 kV GIS SWGR	Phase Bussing B11	PDS Substation	8.3	21	0.1	0.0083	23,500	0.097
35 kV GIS SWGR	Phase Bussing B12	PDS Substation	8.3	21	0.1	0.0083	23,500	0.097
35 kV GIS SWGR	Phase Bussing B13	PDS Substation	8.3	21	0.1	0.0083	23,500	0.097
35 kV GIS SWGR	556-ECB-202B H-12	PDS Substation	10.4	21	0.1	0.0104	23,500	0.123
35 kV GIS SWGR	556-ECB-202B H-14	PDS Substation	4.4	21	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-202B H-15	PDS Substation	4.4	21	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-202B H-16	PDS Substation	5.7	21	0.1	0.0057	23,500	0.067
35 kV GIS SWGR	556-ECB-202B H-17	PDS Substation	4.4	21	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-202B H-18	PDS Substation	4.4	21	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-202B H-19	PDS Substation	4.4	21	0.1	0.0044	23,500	0.052
35 kV GIS SWGR	556-ECB-202B H-20	PDS Substation	4.4	21	0.1	0.0044	23,500	0.052
MIS Transformer	556-ET-201A	Outside MIS	30	56.6	0.5	0.15	23,500	1.7625
MIS Transformer	556-ET-201B	Outside MIS	30	56.6	0.5	0.15	23,500	1.7625
MIS Transformer	556-ET-202A	Outside MIS	30	56.6	0.5	0.15	23,500	1.7625
MIS Transformer	556-ET-202B	Outside MIS	30	56.6	0.5	0.15	23,500	1.7625
GTG Step Up Transformer	555-ET-102	Cogen	30	56.6	0.5	0.15	23,500	1.7625
GTG Step Up Transformer	555-ET-103	Cogen	30	56.6	0.5	0.15	23,500	1.7625
GTG Step Up Transformer	555-ET-104	Cogen	30	56.6	0.5	0.15	23,500	1.7625
STG Step Up Transformer	555-ET-101	Cogen	30	56.6	0.5	0.15	23,500	1.7625
STG Step Up Transformer	555-ET-105	Cogen	30	56.6	0.5	0.15	23,500	1.7625
Total						74.87		880

Process Flow Diagrams

Figure C-1. Ethylene Manufacturing Process Flow Diagram

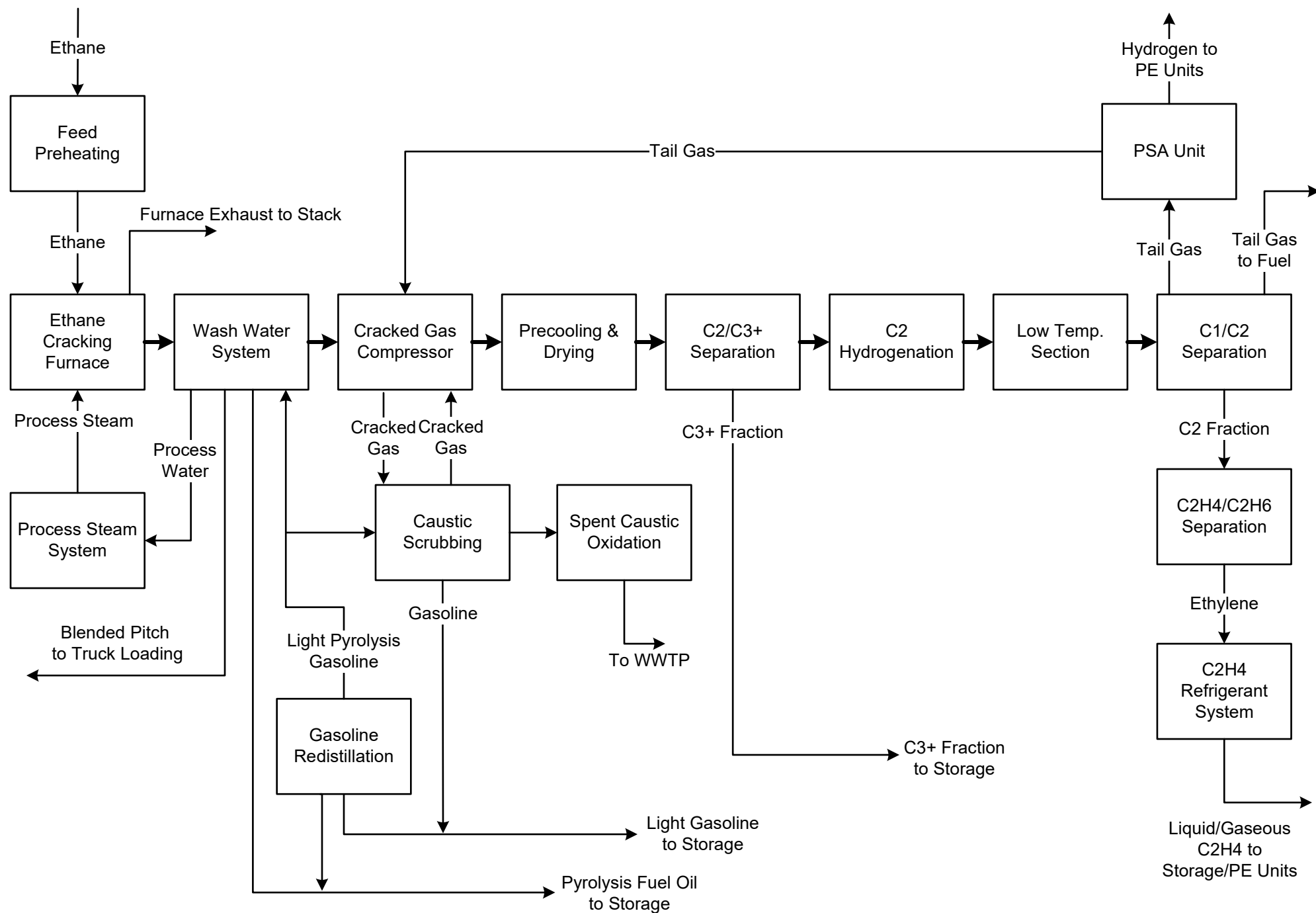


Figure C-2. Gas Phase Polyethylene Manufacturing Process Flow Diagram

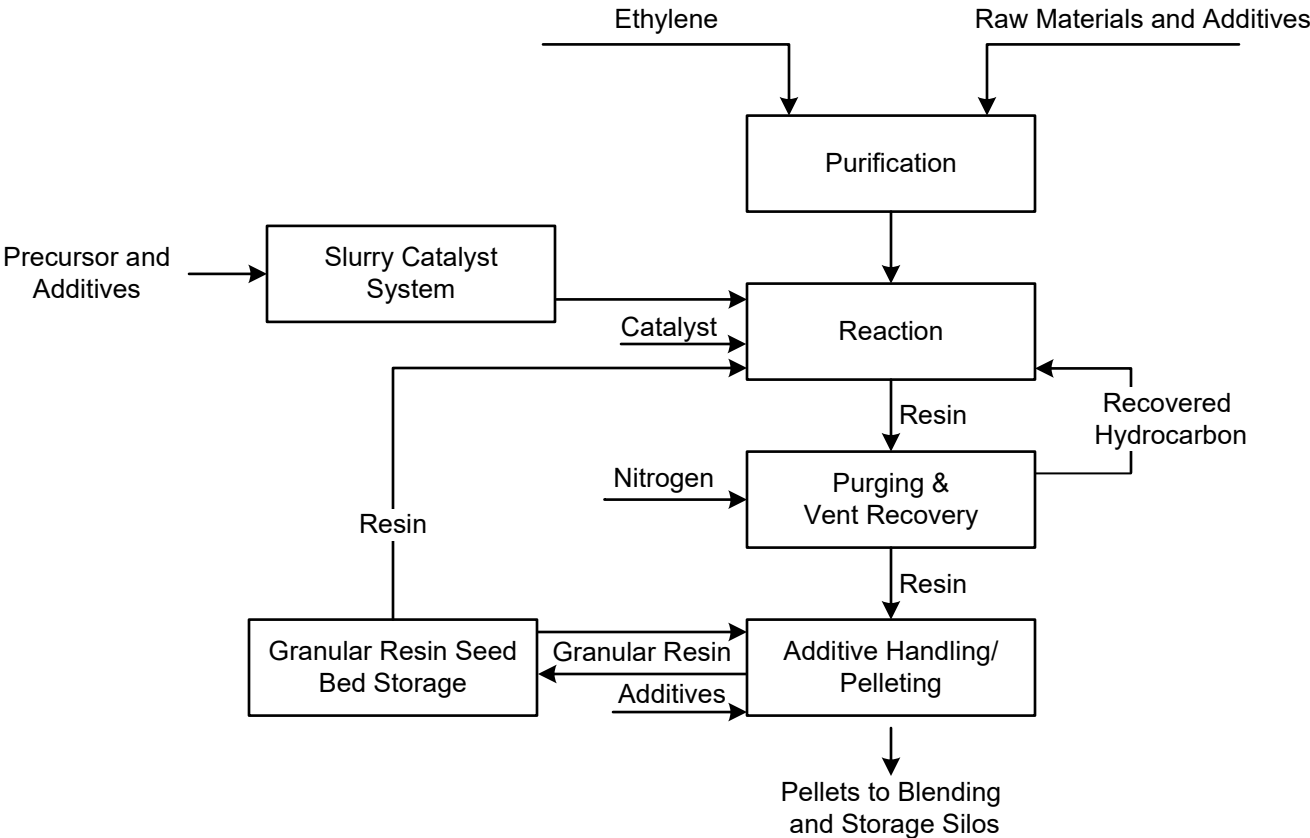


Figure C-3. Liquid Phase Slurry Polyethylene Manufacturing Process Flow Diagram

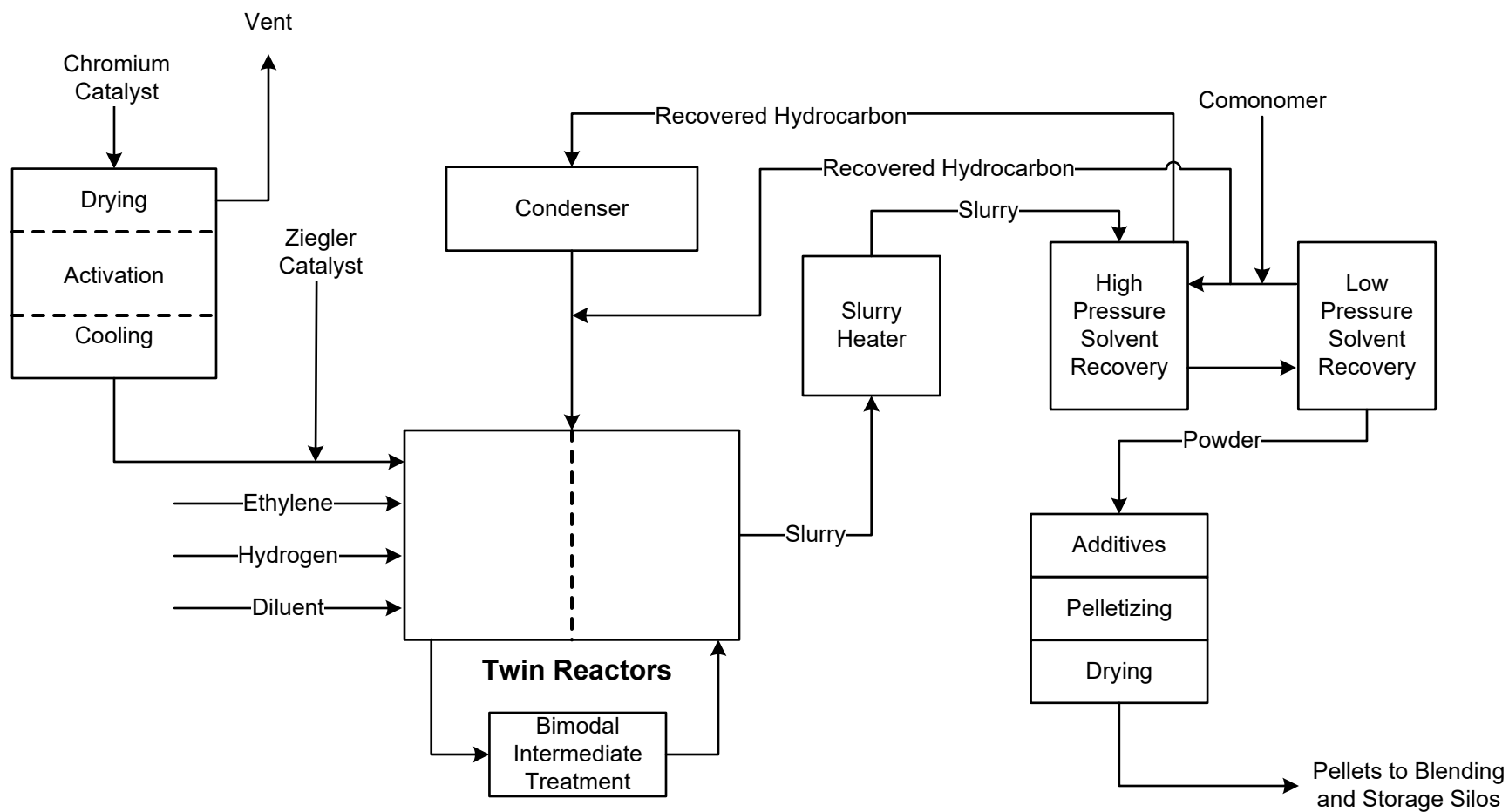
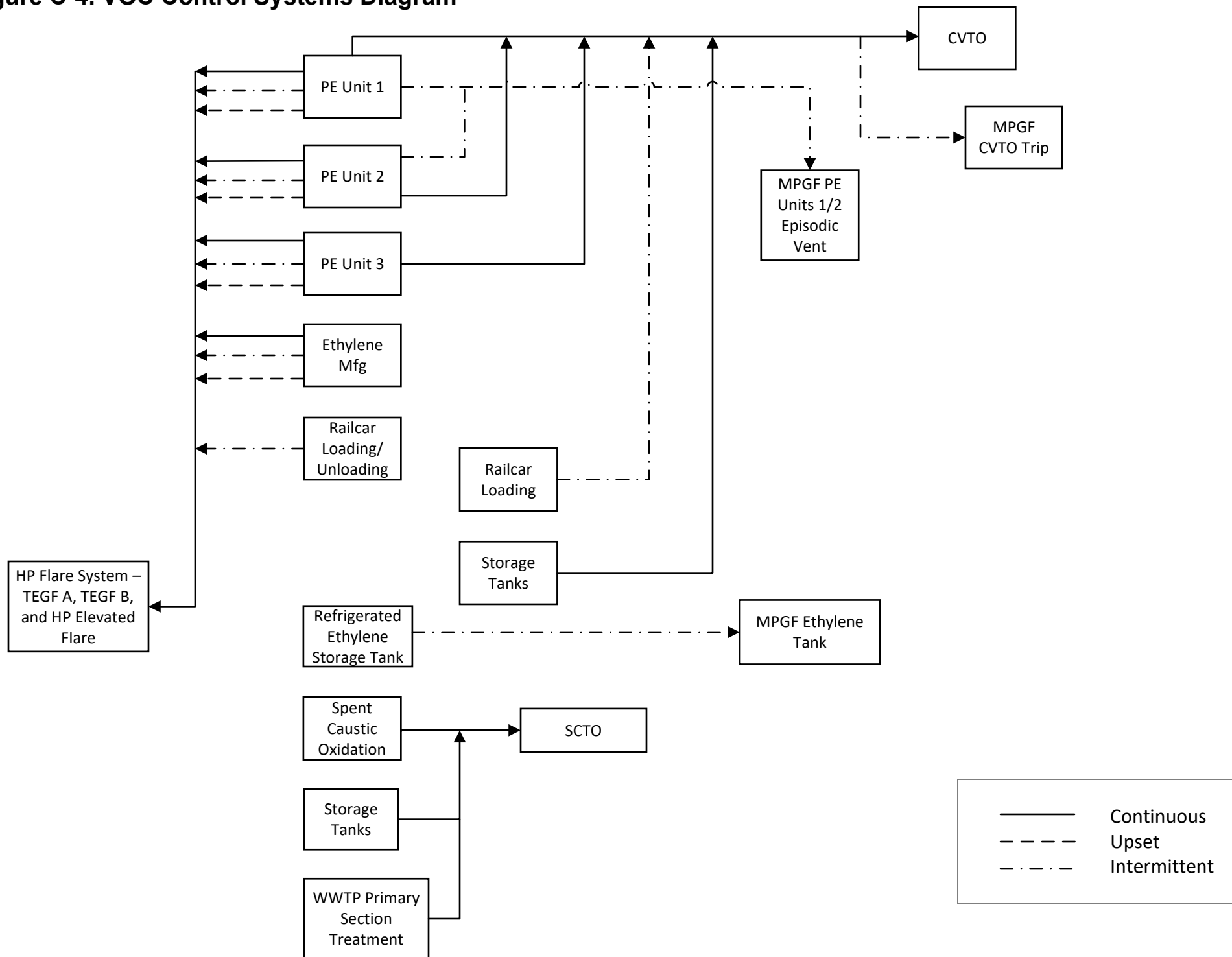


Figure C-4. VOC Control Systems Diagram



Compliance Plan

Unit ID	PA-C Condition	Citation	Requirement	Plan for Achieving Compliance	Timeline
Site Level	C #004	25 Pa. Code §127.12b	The Owner/Operator may not permit the emission into the outdoor atmosphere of any malodorous air contaminants from any source in such a manner that the malodors are detectable outside of the Owner/Operator's property.	Shell has installed temporary controls on the wastewater treatment plant (WWTP) to mitigate VOC emissions and malodors, and Shell is currently in the design phase of the permanent controls project for the WWTP to ensure VOC and malodor concerns are mitigated.	Project pending issuance of Plan Approval "D" (application submitted September 13, 2024) for WWTP permanent controls project.
Site Level	C #005	25 Pa. Code §127.12b	Plan approval terms and conditions. Emissions from the Facility shall not equal or exceed the following in any consecutive 12-month period: Air Contaminant Emission Rate (tons) NOx 328.5 CO 983.7 PM (filterable) 74.3 PM10 168.9 PM2.5 163.7 SOx 22.4 VOC 516.2 VOC (ERC)* 612 HAP 32.0 Ammonia 154 CO2e** 2,304,499 ** This limit includes 854 tpy CO2e from SF6-Insulated High Voltage Equipment included in PA-04-00740B.	NOX 12-month rolling violations: Updated emissions estimates associated with achieving compliance with the NHVcz Limit found in EMACT (NHVcz > 800 Btu/scf) are being proposed as part of a Plan Approval Application. Nitrogen reduction projects are being implemented to reduce the amount of nitrogen (and thus supplemental fuel gas) to the flare system which will result in a decrease in NOX emissions. Additionally, calorimeters have been added to the flare systems for faster and more optimized control response.	Pending issuance of Plan Approval "D" (application submitted September 13, 2024) for EMACT compliance and as-built reconciliations).
Site Level	C #008	25 Pa. Code §127.12b	Total benzene quantity from facility waste shall not equal or exceed 11 tons per year as determined through 40 CFR §61.355. [This limit is for the purpose of compliance with limited requirements of 40 CFR Part 61 Subpart FF for a facility with benzene waste less than 10 Mg (11 tons) per year].	Shell has provided an updated notification that the site generates >10 Mg/yr of benzene wastes and complies with 40 CFR 61.342(e). This application includes the updated regulatory applicability.	Proposed to be resolved in this application.
Site Level	C #032	25 Pa. Code §127.12b	Plan approval terms and conditions. Upon determination by the Owner/Operator that the source(s) covered by this Plan Approval and Plan Approval PA-04- 00740B are in compliance with all operative conditions of the Plan Approvals the Owner/Operator shall contact the Department and schedule the Initial Operating Permit Inspection.	The initial operating permit inspections have not been completed for the entire site. Shell and PADEP are in the process of scheduling the remaining areas for inspection.	Expected 2026 after issuance of Plan Approval "D" (dependent on PADEP resources)
Site Level	C #048	40 CFR Part 61 NESHAPs §40 CFR 61.342	Subpart FF--National Emission Standard for Benzene Waste Operations Standards: General. The Owner/Operator shall comply with the applicable general standards for a facility with benzene waste less than 10 Mg per year (11 tons per year) as specified in 40 CFR §61.342(a), (g), and (h).	Shell has provided an updated notification that the site generates >10 Mg/yr of benzene wastes and complies with 40 CFR 61.342(e). This application includes the updated regulatory applicability.	Proposed to be resolved in this application.
104	C#002	25 Pa. Code §127.12b	Maximum designed water circulation rate through the cogen cooling tower shall not exceed 4,443,360 gallons per hour.	Shell is correcting the designed water circulation rate for as-built in the upcoming Plan Approval Modification.	Pending issuance of Plan Approval "D" (application submitted September 13, 2024) for as-built reconciliations).
201	C# 005	40 CFR Part 60 NSPS §40 CFR 60.665	The Owner/Operator shall comply with the applicable reporting and recordkeeping requirements specified in 40 CFR §60.665.	Shell is preparing an updated initial notice and semi-annual reports to identify and report on 40 CFR Part 60 Subpart NNN compliance for distillation unit process vents.	Expected Q1 2026 submittal
201	C# 006	40 CFR Part 60 NSPS §40 CFR 60.705	The Owner/Operator shall comply with the applicable reporting and recordkeeping requirements specified in 40 CFR §60.705(r).	Shell is preparing an initial notice to identify each reactor process vent complying with 40 CFR Part 60 Subpart RRR by routing to a distillation unit subject to 40 CFR Part 60 Subpart NNN.	Expected Q1 2026 submittal
202	C# 005	25 Pa. Code §127.12b	The Owner/Operator shall perform chromium and hexavalent chromium emission testing upon each polyethylene manufacturing line chromium catalyst activation vent according to the requirements of 25 Pa. Code Chapter 139 and a Department-approved pre-test protocol. Initial performance testing is required within 180 days of startup of each polyethylene manufacturing line or on an alternative schedule as approved by the Department. Subsequent performance testing is required at minimum of once every 5 years thereafter. Extension to the initial and subsequent performance testing deadlines may be granted by the Department in writing in response to a written request from the Owner/Operator and upon a satisfactory showing that an extension is justified.	PE3 Catalyst Activators – Identified stack deficiency and initiated work plan to modify stack for tests.	Complete - PE3 Catalyst Activator stacks modified to enable chromium and hexavalent chromium testing per approved methods. Stack testing completed and final reports (re)submitted October 18, 2024 for Catalyst Activator "A" and November 5, 2024 for Catalyst Activator "B".
202	C# 006	25 Pa. Code §127.12b	The Owner/Operator shall perform PM (filterable) emission testing upon each polyethylene manufacturing line pellet dryer vent according to the requirements of 25 Pa. Code Chapter 139 and a Department-approved pre-test protocol. Initial performance testing is required within 180 days of startup of each polyethylene manufacturing line or on an alternative schedule as approved by the Department. Subsequent performance testing is required at a minimum of once every 5 years thereafter. Extension to the initial and subsequent performance testing deadlines may be granted by the Department in writing in response to a written request from the Owner/Operator and upon a satisfactory showing that an extension is justified.	PE1/2 Pellet Dryers – Complete PE3 Pellet Dryer – Complete	Complete - PE3 Pellet Dryer stack testing completed and final report submitted October 18, 2024.

Unit ID	PA-C Condition	Citation	Requirement	Plan for Achieving Compliance	Timeline
204	C #005	25 Pa. Code §127.12b	The Owner/Operator shall perform NOx, CO, PM10, PM2.5, and n-Hexane emission testing upon the LP incinerator according to the requirements of 25 Pa. Code Chapter 139. Initial performance testing is required within 180 days of startup of the LP incinerator or on an alternative schedule as approved by the Department. Subsequent performance testing is required at minimum of once every 5 years thereafter. Extension to the initial and subsequent performance testing deadlines may be granted by the Department in writing in response to a written request from the Owner/Operator and upon a satisfactory showing that an extension is justified. EPA Reference Method performance testing shall be conducted for the initial and subsequent performance tests.	Performance test extension notifications submitted. Complete performance testing.	Complete - CVTO stack testing was completed and final reports were submitted July 22, 2024 (for NOx, CO, PM10, PM2.5, and n-hexane), and November 15, 2024 (for PM10 and PM2.5 retest)
204	C #006	25 Pa. Code §127.12b	The Owner/Operator shall perform VOC destruction efficiency testing upon the LP incinerator in accordance with 40 CFR §63.985(b)(1)(ii). Initial performance testing is required within 180 days of startup of the LP incinerator or on an alternative schedule as approved by the Department. Subsequent performance testing is required at a minimum of once every 5 years thereafter. Extension of the initial and subsequent performance testing deadlines may be granted by the Department in writing in response to a written request from the Owner/Operator and upon a satisfactory showing that an extension is justified.	Performance test extension notifications submitted. Complete performance testing.	Complete - CVTO stack testing was completed and final report was submitted July 22, 2024 (for VOC DRE).
206	C #001	25 Pa. Code §127.12b	Emissions from the Spent Caustic Vent incinerator shall not exceed the following: a. NOx - 0.068 lb/MMBtu b. CO - 0.0824 lb/MMBtu c. PM10 - 0.0075 lb/MMBtu d. PM2.5 - 0.0075 lb/MMBtu	Replace SCTO burner tips - Complete Install knockout drum upstream of SCTO - Complete Reduce operating temperature of SCTO (while still maintaining above VOC DRE minimum) - Complete Adjust SCTO air/fuel ratio - Complete Relocate natural gas valve to improve burner tuning - Complete Lower NOx LAER limit of 0.06 lb/MMBtu proposed in Plan Approval "D" application. Entirely modify or replace SCTO burners - Proposed	Modification or replacement of the burners is expected to be completed by June 1, 2026, or within 180 days after issuance of Plan Approval "D". Testing for compliance demonstration is expected to occur within 180 days after installation of the modified or replacement burners.
206	C #004	25 Pa. Code §127.12b	The Owner/Operator shall perform NOx, CO, PM10, PM2.5, and Benzene emission testing upon the Spent Caustic Vent incinerator according to the requirements of 25 Pa. Code Chapter 139. Initial performance testing is required within 180 days of startup of the Spent Caustic Vent incinerator or on an alternative schedule as approved by the Department. Subsequent performance testing is required at minimum of once every 5 years thereafter. Extension to the initial and subsequent performance testing deadlines may be granted by the Department in writing in response to a written request from the Owner/Operator and upon a satisfactory showing that an extension is justified. EPA Reference Method performance testing shall be conducted for the initial and subsequent performance tests.	Performance test extension notifications submitted. Complete performance testing.	Partially Complete - SCTO stack testing was completed and final reports were submitted July 22, 2024 (for NOx, CO PM10, PM2.5 and benzene), and November 20, 2024 (for PM10 and PM2.5 retest) NOx retest pending installation of modified or replacement burners and then within 180 days after or in accordance with Plan Approval "D" requirements.
206	C #005	25 Pa. Code §127.12b	The Owner/Operator shall perform VOC destruction efficiency testing upon the Spent Caustic Vent incinerator in accordance with 40 CFR §63.985(b)(1)(ii). Initial performance testing is required within 180 days of startup of the Spent Caustic Vent incinerator or on an alternative schedule as approved by the Department. Subsequent performance testing is required at a minimum of once every 5 years thereafter. Extension of the initial and subsequent performance testing deadlines may be granted by the Department in writing in response to a written request from the Owner/Operator and upon a satisfactory showing that an extension is justified.	Performance test extension notifications submitted. Complete performance testing.	Complete - SCTO stack testing was completed and final report was submitted July 22, 2024 (for VOC DRE).
204	C #009	25 Pa. Code §127.12b	The Owner/Operator shall comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR §60.18(c) through (f) and 40 CFR §63.11(b).	Ethylene Refrigerated Tank was previously identified as not being subject to NSPS Kb; however, the as-built tank does not meet the definition of a pressure vessel and is therefore subject to the requirements of the regulation. The Net Heating Value of the MPGF Ethylene Header was not continuously meeting NHV of ≥ 200 Btu/scf in §60.18/§63.11 as an hourly average, as referenced in the Subpart Kb.	This application includes the updated regulatory applicability. Supplemental natural gas connection was added to meet the required NHV March 20, 2024. BOG compressor seal nitrogen rerouted to HP Flare September 17, 2024. Supplemental natural gas connection no longer needed to meet NHV and removed October 2, 2024.

Unit ID	PA-C Condition	Citation	Requirement	Plan for Achieving Compliance	Timeline
205	C #005	25 Pa. Code §127.12b	The Owner/Operator shall comply with the applicable flare monitoring and work practice requirements, including limits on maximum exit velocity and minimum net heating value requirements, specified in 40 CFR §60.18(c) through (f) and 40 CFR §63.11(b).	The HP ground flares are multi-point pressure-assisted ground flares that are not designed to comply with the exit velocity requirements found in the general subparts. This Title V application includes the updated correct regulatory applicability for the HP Flare System with the flare requirements found in 40 CFR 63 Subpart YY and supersede 40 CFR 60.18(c)-(f) and 40 CFR 63.11 (b).	Corrected regulatory requirements are provided in this application that document the exemption from the exit velocity requirements found in the general subparts.
205	C #006	25 Pa. Code §127.12b	The owner or operator shall install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate in the flare headers that feed the flare as well as any flare supplemental gas used.	The HP Flare System is undergoing project work for compliance with the flare monitoring requirements. The system currently has a flow meter in place, and pressure and temperature monitors are being installed to ensure accurate compensation.	Complete - TEGF pressure and temperature transmitters added and in service for flow calculation July 25, 2024.
205	C #007	25 Pa. Code §127.12b	The owner or operator shall install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist air and/or assist steam used with the flare.	The HP Elevated Flare is steam-assisted. The HP Flare System is undergoing project work for compliance with the flare monitoring requirements. Monitoring equipment will be added to measure and calculate the assist steam flow to the flare.	Complete - HPEF steam flow pressure and temperature monitors added and enabled updated assist steam flow calculation July 28, 2025.
205	C #015	25 Pa. Code §127.12b	The emergency elevated flare shall be equipped with automated controls for control of the total steam mass flow rate to the flare.	The HP Elevated Flare is steam-assisted. The HP Flare System is undergoing project work for compliance with the automated control requirements. A control valve is being installed in the small steam assist line to ensure proper controls are in place. The large steam line has an existing control valve and automated controls.	Complete - HPEF center steam control valve added April 28, 2025. Both the upper and center steam lines now have control valves.
302	C #001	25 Pa. Code §127.12b	Vapors displaced or generated by the loadout of recovered oil shall be captured and routed through a closed system to the Spent Caustic Vent incinerator.	Correct LAER analysis for recovered oil loadout to be consistent with applicable precedents for low vapor pressure hydrocarbon loadout. Loadout with carbon canister control per updated proposed Plan Approval "D" application requirements.	Pending issuance of Plan Approval "D" (application submitted September 13, 2024, and corrected LAER analysis supplemented October 27, 2025) for as-built reconciliations). Includes carbon canister control of recovered oil loadout.
304	C #001	25 Pa. Code §127.12b	Plan approval terms and conditions. C3+ liquids, C3+ refrigerant, butene, isopentane, and isobutane shall be loaded out with vapor balance to pressurized storage tanks capable of maintaining working pressures sufficient at all times to prevent vapor or gas loss to the atmosphere and with no venting during loading operations.	Loadout of C3+ liquids is performed via pressurized loading; however, loading can/does result in venting to HP Flares before and after loading process to meet required railcar pressure for loading and/or transport from the site.	Pending issuance of Plan Approval "D" (application submitted September 13, 2024) for as-built reconciliations). Includes adjusted PTE rates to account for venting to HP Flares before or after loading process.
404	C #002	40 CFR Part 60 NSPS §40 CFR 60.116b	The Owner/Operator shall comply with the applicable storage tank monitoring requirements specified in 40 CFR §60.116b.	The Owner/Operator shall comply with the applicable storage tank monitoring requirements specified in 40 CFR §60.116b.	This application includes the updated regulatory applicability.
404	C #003	40 CFR Part 60 NSPS §40 CFR 60.115b	The Owner/Operator shall comply with the applicable storage tank reporting and recordkeeping requirements specified in 40 CFR §60.115b(a) and/or (c) or (d).	Shell is preparing an updated initial notice and semi-annual reports to identify and report on 40 CFR Part 60 Subpart Kb compliance for hexene storage tanks.	Expected Q1 2026 submittal
405	NA	40 CFR Part 60 NSPS §40 CFR 60.116b	The Owner/Operator shall comply with the applicable storage tank requirements specified in 40 CFR §60.112b through 60.116b.	Ethylene Refrigerated Tank was previously not being subject to NSPS Kb; however, the as-built tank does not meet the definition of a pressure vessel and is therefore subject to the requirements of the regulation. The Net Heating Value of the MPGF Ethylene Header was not continuously meeting NHV of ≥ 200 Btu/scf in §60.18/§63.11 as an hourly average, as referenced in the Subpart Kb.	This application includes the updated regulatory applicability. Supplemental natural gas connection was added to meet the required NHV in March 2024. BOG compressor seal nitrogen rerouted to HP Flare September 17, 2024. Supplemental natural gas connection no longer needed to meet NHV and removed October 2, 2024.
G01	C #011	25 Pa. Code §127.12b	The Owner/Operator shall perform VOC, PM10, PM2.5, NH3, and n-Hexane emission testing upon each of the seven ethane cracking furnaces while operating in normal operating mode and according to the requirements of 25 Pa. Code Chapter 139. Initial performance testing is required within 180 days of startup of the furnaces or on an alternative schedule as approved by the Department. Subsequent performance testing is required at minimum of once every 5 years thereafter. Extension to the initial and subsequent performance testing deadlines may be granted by the Department in writing in response to a written request from the Owner/Operator and upon a satisfactory showing that an extension is justified. EPA Reference Method performance testing shall be conducted for the initial and subsequent performance tests.	Furnace 1, 5, and 7 are being retested for THC. PADEP found test report to be invalid due to missing raw analyzer readings and inaccurate FID temperature recordings Furnace 2 and 4 are being retested for PM. Results exceeded the lb/hr limit and PADEP found the report to be valid. Low sample volumes relative to all passing tests may have influenced test outcome. Shell submitted updated test protocol to simplify and run Method 5/202 with extended sample time, vs. 201A/202 with shorter sample times of original test.	Complete - Furnace 1, 5, and 7 retested and compliant for THC as VOC). Testing completed as of June 6, 2024. Final reports were submitted July 27, 2024. Furnace 2 and 4 retested and compliant for PM10 and PM2.5. Testing completed as of June 25, 2024. Final reports were submitted July 27, 2024, an August 22, 2024, respectively.

Unit ID	PA-C Condition	Citation	Requirement	Plan for Achieving Compliance	Timeline
G05	C #012	40 CFR Part 63 NESHAPS for Source Categories §40 CFR 63.1100	Subpart YY - National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards Applicability. The Owner/Operator shall comply with the applicable requirements for flares as specified in 40 CFR §63.1100(g)(7).	Project work is underway to bring the HP Ground Flares into compliance with the updated EMACT flare monitoring requirements including the addition of pilots such that each stage has two pilots available as well as GCs and calorimeters.	Complete - TEGF additional stage pilots added and in service June 19, and 28, 2024 for TEGF A and B respectively. HP Flare System calorimeter installed and in service March 19, 2025.

Air Pollution Control Act Compliance Review Supplemental Form



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

AIR POLLUTION CONTROL ACT COMPLIANCE REVIEW SUPPLEMENTAL FORM

Fully and accurately provide the following information, as specified. Attach additional sheets as necessary.

Date of Submission of Original Compliance Review Form 05/01/2014

Type of Supplemental Compliance Review Form Submittal (check all that apply)

☐ Original Filing ☒ Amended Filing
☐ No Changes ☐ Date of Last Compliance Review Form Filing 9/16/2025

Type of Submittal

☐ New Plan Approval ☒ New Operating Permit ☐ Renewal of Operating Permit
☐ Extension of Plan Approval ☐ Change of Ownership ☐ Periodic Submission
☐ Other _____ (every six months)

SECTION A. GENERAL APPLICANT INFORMATION

1. Name of Applicant/Permittee/("Applicant") (non-corporations attach documentation of legal name)

Shell Chemical Appalachia LLC

Address 300 Frankfort Road
Monaca, PA 15061

Telephone 724-709-2467

Taxpayer ID# 46-1624986

Permit, Plan Approval or Application ID# PA-04-00740 A, B, C

2. Identify the form of management under which the applicant conducts its business.

☐ Individual ☐ Fictitious Name ☐ Association
☐ Municipality ☐ Partnership ☐ Syndicate
☐ Proprietorship ☐ Limited Partnership
☐ Public corporation ☐ Government Agency
☐ Private Corporation ☐ Joint Venture
☐ Municipal Authority ☒ Other Type of Business (specify) Limited Liability Company

3. Describe the type(s) of business activities performed.

*** Supplemental ***

List only those changes since the date of the last original submission.

No Changes

SECTION B. GENERAL INFORMATION REGARDING "APPLICANT"

If applicant is a corporation or a division or other unit of a corporation, provide the names, principal places of business, state of incorporation, and taxpayer ID numbers of all domestic and foreign parent corporations (including the ultimate parent corporation), and all domestic and foreign subsidiary corporations of the ultimate parent corporation with operations in Pennsylvania. Please include all corporate divisions or units, (whether incorporated or unincorporated) and privately held corporations. (A diagram of corporate relationships may be provided to illustrate corporate relationships.) Attach additional sheets as necessary.

*** Supplemental ***

List only those changes since the date of the last original submission.

Unit Name	Principal Places of Business	State of Incorporation	Taxpayer ID	Relationship to Applicant
No Changes				

SECTION C. INFORMATION REGARDING APPLICANT & ITS "RELATED PARTIES"

1. Pennsylvania Facilities. List the name and location (mailing address, municipality, county), telephone number, and relationship to applicant (parent, subsidiary or general partner) of all Related Parties' places of business, and facilities in Pennsylvania. Attach additional sheets as necessary.

*** Supplemental ***

List only those changes since the date of the last original submission.

Unit Name	Street Business	County and Municipality	Telephone No.	Relationship to Applicant
No Changes				

2. General Partners. Provide the names and business addresses of all general partners of the applicant and parent corporation, if any.

*** Supplemental ***

List only those changes since the date of the last original submission.

Name	Business Address
No Changes	

3. Management Responsibility. Provide the names and business of persons with overall management responsibility for the process being permitted (i.e., plant manager).

*** Supplemental ***

List only those changes since the date of the last original submission.

Name	Business Address
Nathan Levin Operations Manager Shell Chemical Appalachia LLC	Shell Chemical Appalachia LLC 300 Frankfort Road Monaca, PA 15061

- 4. Plan Approvals or Operating Permits.** List all plan approvals or operating permits issued by the Department or an approved local air pollution control agency under the APCA to the applicant or related parties that are currently in effect or have been in effect at any time five years prior to the date on which this form is notarized. This list shall include the plan approval and operating permit numbers, locations, issuance and expiration dates. Attach additional sheets as necessary.

*** Supplemental ***

List only those changes since the date of the last original submission.

Source	Plan Approval Operating Permit Number	Location	Issuance Date	Expiration Date
No Changes				

SECTION D. COMPLIANCE BACKGROUND

Note: Copies of specific documents, if applicable, must be made available to the Department upon its request.)

- 1. Documented Conduct.** List all documented conduct of violations or enforcement actions identified by the Department pursuant to the APCA, regulations, terms and conditions of an operating permit or plan approval or order by applicant or any related party, using the following format grouped by source and location in reverse chronological order. Attach additional sheets as necessary. See the definition of "documented conduct" for further clarification. Unless specifically directed by the Department, deviations which have been previously reported to the Department in writing, relating to monitoring and reporting, need not be reported.

* * * Supplemental * * *

List only those changes since the date of the last original submission.

Date	Location	Plan Approval/ Operating Permit#	Nature of Documented Conduct	Type of Department Action	Status Litigation; Existing / Continuing; or corrected/Date	Dollar Amount Penalty
3/25/2025	Shell Polymers Monaca	PA-04-00740A/B/C	Exceedances of 12-Month Emission Limitations for NOx [February 2025]	Notice of Violation	Pending Settlement	TBD
9/19/2025	Shell Polymers Monaca	PA-04-00740A/B/C	Exceedances of 12-Month Emission Limitations for NOx [August 2025]	Notice of Violation	Pending Settlement	TBD
9/24/2025	Shell Polymers Monaca	PA-04-00740A/B/C	Visible Emissions >5 min in consecutive 2 hrs from TEGF A C205A and TEGF B C205B on 8/3/2025	Notice of Violation	Pending Settlement	TBD
10/9/2025	Shell Polymers Monaca	PA-04-00740A/B/C	Visible Emissions >5 min in consecutive 2 hrs from TEGF A C205A and TEGF B C205B on 8/29/2025	Notice of Violation	Pending Settlement	TBD
10/16/2025	Shell Polymers Monaca	PA-04-00740A/B/C	Exceedances of 12-Month Emission Limitations for NOx [September 2025]	Notice of Violation	Pending Settlement	TBD
11/7/2025	Shell Polymers Monaca	PA-04-00740A/B/C	LP Incinerators C206 (SCTO) malfunction causing excess emissions on 9/29 and 9/30/2025	Notice of Violation	Pending Settlement	TBD
11/17/2025	Shell Polymers Monaca	PA-04-00740A/B/C	Exceedances of 12-Month Emission Limitations for NOx [October 2025]	Notice of Violation	Pending Settlement	TBD

CONTINUING OBLIGATION: Applicant is under a continuing obligation to update this form using the Compliance Review Supplemental Form if any additional documented conduct occurs or related parties develop between the date of submission and Department action on its application

2. Incidents of Deviation. List all incidents of deviations of the APCA, regulations, terms and conditions of an operating permit or plan approval or order by applicant or any related party, using the following format grouped by source and location in reverse chronological order. This list must include items both currently known and unknown to the Department. Attach additional sheets as necessary. See the definition of "deviations" for further clarification.

*** Supplemental ***

List only those changes since the date of the last original submission.

Date	Location	Plan Approval/ Operating Permit#	Nature of Deviation	Incident Status: Existing/Continuing; or Corrected Date
2/1/2024 to present	Shell Polymers Monaca	PA-04-00740A/C	Site-wide NOx 12-month rolling limitation: The COA expired end of January 2024. Site remains non-compliant with emission limitation.	Continuing deviation. Engineering improvements and permitting corrections to match facility design. Proposed to be resolved in plan approval modification application.
12/22/2025	Shell Polymers Monaca	PA-04-00740A/C	Site-wide Leak Detection and Repair (LDAR). There were 4 valves in the PE3 Unit that were found to be in VOC service but not identified, tagged, or monitored.	Corrected. The valves were immediately monitored and leaking components were repaired as required by the rules.
10/9/2025	Shell Polymers Monaca	PA-04-00740A/C	Cracking Furnaces: Exceeded NOx 0.015 lb/MMBtu on a 1-hour average: 10/9/2026 Furnace 6: 1 hr	Corrected after each incident. Each deviation has been or will be addressed in quarterly excess emission reports.
7/2/2025	Shell Polymers Monaca	PA-04-00740A/C	Cracking Furnaces: Two or more furnaces operated with NOx emissions greater than 6.20 lb/hr at any time: 7/2/2025 Hour 9: Furnaces 1, 3, 4	Correction to the last Compliance Review Form. Incorrectly report the deviation as occurring on 7/15/2025 Hour 7 for Furnaces 1, 3, 4. The deviation actually occurred on 7/2/2025 Hour 9 for Furnaces 1, 3, 4.
Q4 2022 (Furnace 5) Q1-Q4 2023 (Furnaces 1-7) Q1-Q4 2024 (Furnaces 1-7)	Shell Polymers Monaca	PA-04-00740A/C	Cracking Furnaces CEMS Report: Reports required to be resubmitted due to inaccurate data from Density Analyzer B, resulting in inaccurate mass fuel gas consumption and resulting NOx and CO emissions.	Update to the last Compliance Review Form. Density analyzer settings were corrected on November 19, 2024. As of 8/18/2025, PADEP approved use of Density Analyzer A for historical data, and quarterly CEMS reports must be re-submitted with "A" data when it is available and valid. Quarterly CEMS reports must be submitted for the Q4 2022 for Furnace 5 only, Q1-Q4 2023 for all furnaces, and Q1-Q4 2024 for all furnaces. These revised reports are being prepared and resubmitted per PADEP approval of correction methodology.
12/52/2025 12/6/2025	Shell Polymers Monaca	PA-04-00740A/C	Cogeneration Units: Exceeded NOx 2 ppmvd at 15% O2 as detailed below: Unit 1: 1 hr on 12/5/2025 Unit 2: 1 hr on 12/5/2025 Unit 3: 1 hr on 12/26/2025	Corrected after each incident. For the 12/26/2025 deviation, a Malfunction Report is forthcoming. Each deviation has been or will be addressed in quarterly excess emission reports.
10/7/2025	Shell Polymers Monaca	PA-04-00740A/C	Cogeneration Units: Exceeded CO 2 ppmvd at 15% O2 as detailed below: 10/7/2025 Unit 1: 4 hrs	Corrected after each incident. Each deviation has been or will be addressed in quarterly excess emission reports.
12/16/2025	Shell Polymers Monaca	PA-04-00740A/C	Cogeneration Units: NH3 Excess Emissions on Cogen 2	Corrected after incident.

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*** Supplemental ***

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Date	Location	Plan Approval/ Operating Permit#	Nature of Deviation	Incident Status: Existing/Continuing; or Corrected Date
2022 to present	Shell Polymers Monaca	PA-04-00740A/C	Maximum designed water circulation rate through the cogeneration cooling tower is greater than limit in permit.	Continuing deviation. Correcting the designed water circulation rate for as-built in the plan approval modification application.
8/29/2025	Shell Polymers Monaca	PA-04-00740A/C	Visible Emissions TEGF A and TEGF B. Visible emissions > 5 minutes in consecutive 2 hours for each flare.	Corrected. See Malfunction Report dated 9/25/2025.
SCTO Downtime: 9/2025: ~7.2 hrs 12/2025: ~28.2 hrs FEORs/ROT Blower Downtime: 9/2025: ~5 hours 12/2025: ~ 21.6 hrs Spent Caustic Blower Downtime: 8/2025: ~0.2 hrs 9/2025: ~7.3 hrs 11/2025: ~1.2 hrs 12/2025: ~ 34.8 hrs	Shell Polymers Monaca	PA-04-00740A/C RFD 10277; Approval Date 8/9/2023 for WEMCO/EC-15	SCTO and SCTO Blower Downtime. Small amounts of excess emissions from FEOR A/B, recovered oil, spent caustic storage tanks, and temporary WEMCO and EC-15 Units due to either SCTO or blower issues where emissions did not go to the SCTO. The tanks are internal floating roof tanks with minimal uncontrolled emissions.	Corrected after each incident. See Malfunction Report dated 10/30/2025 for the SCTO Downtime occurring in 9/2025.
5/23/2024 Test Data	Shell Polymers Monaca	PA-04-00740A/C	SCTO stack test results not compliant with emission limitations for NOx.	Continuing Deviation. NOx: Burner tip modifications occurred in December 2024 but did not yield a passing NOx emission factor. Interim mitigations in place include: limiting the combustion temperature setpoint to ensure NOx lb/hr stays below the PTE basis, optimizing the air-to-fuel ratio for the modified burner tips, and relocating the natural gas valve to improve burner tuning. Final corrective action is pending burner replacement for reduced NOx emissions.
8/30/2025 11/6/2025	Shell Polymers Monaca	PA-04-00740A/C	Residual VOC Content Sampling for PE Unit. Missed the required sampling: PE2 Unit on 8/30/2025 PE1 Unit on 11/6/2025	Corrected. Shell is continuing to improve sampling procedures and pellet grade tracking.
12/30/2025	Shell Polymers Monaca	PA-04-00740A/C	Updated applicability of ECU reactor processes as subject to 40 CFR Part 60 Subpart RRR but exempt due to venting to a 40 CFR Part 60 Subpart NNN distillation operation. Previously interpreted exemption through 40 CFR Part 63 Subpart YY (EMACT) overlap. An initial notice is required to be submitted. No deviations from any applicable controls requirements.	Existing. Notice expected to be submitted in Q1 2026.

2. Incidents of Deviation. List all incidents of deviations of the APCA, regulations, terms and conditions of an operating permit or plan approval or order by applicant or any related party, using the following format grouped by source and location in reverse chronological order. This list must include items both currently known and unknown to the Department. Attach additional sheets as necessary. See the definition of "deviations" for further clarification.

*** Supplemental ***

List only those changes since the date of the last original submission.

Date	Location	Plan Approval/ Operating Permit#	Nature of Deviation	Incident Status: Existing/Continuing; or Corrected Date
12/30/2025	Shell Polymers Monaca	PA-04-00740A/C	Updated applicability of ECU distillation operations as subject to 40 CFR Part 60 Subpart NNN. Previously interpreted exemption through 40 CFR Part 63 Subpart YY (EMACT) overlap. An initial notice and semi-annual reports are required to be submitted. No deviations from any applicable controls requirements.	Existing. Notice and reports expected to be submitted in Q1 2026.
12/30/2025	Shell Polymers Monaca	PA-04-00740A/C	Updated applicability of Hexene storage tanks as subject to 40 CFR Part 60 Subpart Kb. Previously interpreted exemption through 40 CFR Part 63 Subpart FFFF (MON) overlap. A CVTO control plan and semi-annual reports are required to be submitted. No new deviations from any applicable controls requirements.	Existing. Notice and reports expected to be submitted in Q1 2026.

CONTINUING OBLIGATION: Applicant is under a continuing obligation to update this form using the Compliance Review Supplemental Form if any additional documented conduct occur or related parties develop between the date of submission and Department action on its application

VERIFICATION STATEMENT

Subject to the penalties of Title 18 Pa.C.S. Section 4904 and 35 P.S. Section 4009(b)(2), I verify under penalty of law that I am authorized to make this verification on behalf of the Applicant/Permittee. I further verify that the information contained in this Compliance Review Supplemental Form is true and complete to the best of my belief formed after reasonable inquiry. I further verify that reasonable procedures are in place to ensure that "documented conduct" and "deviations" as defined in 25 Pa Code Section 121.1 are identified and included in the information set forth in this Compliance Review Supplemental Form.



Signature

1-15-26

Date

Nathan Levin

Name (Print or Type)

Operations Manager

Title