



RECEIVED

9/13/2024

AIR QUALITY
DEP, Southwest Regional Office

Shell Chemical Appalachia LLC
300 Frankfort Rd
Monaca, PA 15061

September 13, 2024

Mark Gorog, P.E.
Air Quality Program Regional Manager
Pennsylvania Department of Environmental Protection
Bureau of Air Quality - Southwest Regional Office
400 Waterfront Drive
Pittsburgh, PA 15222-4745

**Re: Shell Chemical Appalachia LLC
Shell Polymers Monaca Site
Potter and Center Townships, Beaver County
Plan Approval Submittal for Shell Chemical Appalachia LLC**

Dear Mr. Gorog:

Shell Chemical Appalachia LLC ("Shell") is submitting this plan approval application in accordance with the Pennsylvania Air Pollution Control Act and 25 Pa. Code §127.12 for the Shell Polymers Monaca ("SPM") Site. Shell owns and operates SPM, which is an ethylene and polyethylene production facility in Monaca, Beaver County, Pennsylvania. The Pennsylvania Department of Environmental Protection (DEP) authorized the initial construction and temporary operation of SPM with issuance of Plan Approval No. 04-00740A (PA-04-00740A) 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 prior to the commissioning and startup of 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.

As part of this plan approval application submittal, Shell is proposing the following SPM projects and plan approval reconciliations:

- Shell is proposing to implement the Wastewater Treatment Plant (WWTP) Permanent Controls Project to install permanent equipment at SPM that will improve the oils, grease, and VOC removal efficiency of the primary treatment section of SPM's WWTP.
- Shell is proposing the Ethylene Maximum Achievable Control Technology (EMACT) Project at SPM to comply with the 40 Code of Federal Regulations (CFR) Part 63 Subpart YY pressure-assisted

multi-point flare minimum net heating value of flare combustion zone gas (NHV_{cz}) requirement that recently became applicable to the Totally Enclosed Ground Flare (TEGF) A and TEGF B.

- After successfully commissioning all of SPM's operations and 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 PA-04-00740A, PA-04-00740B, and PA-04-00740C, Shell is proposing to reconcile specific plan approval source descriptions, potential to emit calculations, and permit conditions.

Enclosed with this letter are the required plan approval application forms and supporting documents. It should be noted that the agency review fee of the amount of \$60,000 was paid in full via electronic payment. Shell looks forward to working with DEP to facilitate the processing of this permit application.

If you have any questions regarding the information presented in this plan approval, please contact Michael Carbon at (225) 412-8169 or mcarbon@landauinc.com. I can be contacted at (724) 709-2463 or james.howell@shell.com, or alternatively you can contact Kimberly Kaal, SPM's Environmental Manager, at kimberly.kaal@shell.com.

Sincerely,



James Howell
Production Manager

CC: Sheri Guerrieri, PADEP Environmental Group Manager (New Source Review)
Tom Joseph, PADEP Environmental Group Manager (Permits)
Alexander Sandy, PADEP Air Quality Engineering Specialist
Brad Spayd, PADEP Air Quality Engineering Specialist
Andrew Fleck, Air Quality Modeling and Risk Assessment Section Environmental Group Manager
Martin Padilla, SPM HSSE Manager
Laura Sabolyk, Shell Sr. Regulatory Advisor
Alan Binder, Shell Sr. Environmental Engineer - Air Quality
Kimberly Kaal, SPM Environmental Manager
Michael Carbon, Landau Associates Senior Principal
Rusty Bayham, Shell Sr. Environmental Engineer

Enclosure: Plan Approval Application including Appendices



PLAN APPROVAL APPLICATION FOR SHELL POLYMERS MONACA

Shell Chemical Appalachia LLC
Monaca, Pennsylvania

September 13, 2024

Prepared for

Shell Chemical Appalachia LLC
300 Frankfort Road
Monaca, Pennsylvania

This page intentionally left blank.

TABLE OF CONTENTS

	Page
1.0 Introduction	1-1
1.1 Facility Location	1-3
1.2 Process Overview	1-4
1.3 Permit History.....	1-5
1.4 WWTP Permanent Controls Project	1-6
1.5 EMACT Project.....	1-7
1.6 Plan Approval Source Description Reconciliations.....	1-8
1.7 Potential to Emit Calculation Reconciliations	1-11
1.8 Plan Approval Condition Reconciliations	1-20
2.0 Process and Emission Source Descriptions	2-1
2.1 Ethylene Manufacturing Process.....	2-1
2.1.1 Process Description	2-1
2.1.2 Emissions	2-3
2.1.2.1 Ethane Cracking Furnace Emissions	2-3
2.1.2.2 Equipment Leak Emissions.....	2-4
2.2 Polyethylene Manufacturing Process – Gas Phase Technology.....	2-5
2.2.1 Process Description	2-5
2.2.1.1 Purification	2-5
2.2.1.2 Slurry Catalyst System	2-5
2.2.1.3 Reaction.....	2-5
2.2.1.4 Purging and Vent Recovery	2-5
2.2.1.5 Additive Handling and Pelletizing.....	2-6
2.2.1.6 Granular Resin Seed Bed Storage	2-6
2.2.2 Emissions	2-6
2.3 Polyethylene Manufacturing Process – Liquid Phase Slurry Technology.....	2-6
2.3.1 Process Description	2-6
2.3.1.1 Catalyst Activation	2-6
2.3.1.2 Reaction.....	2-7
2.3.1.3 Solvent Recovery.....	2-7
2.3.1.4 Additive Handling and Pelletizing.....	2-8
2.3.2 Emissions	2-8
2.4 Cogen Units	2-8
2.5 Utilities and General Facilities	2-9
2.5.1 Engines.....	2-9
2.5.2 Storage Tanks	2-9
2.5.3 Product Loading.....	2-10
2.5.4 Cooling Water Towers.....	2-10
2.5.5 VOC Control Systems (Flares and Thermal Oxidizers)	2-11
2.5.6 WWTP	2-12

2.5.7	SF ₆ -Insulated High-Voltage Equipment	2-13
2.5.8	Plant Roadways	2-13
3.0	Regulatory Applicability	3-1
3.1	New Source Review (NSR)	3-1
3.1.1	Nonattainment New Source Review (NNSR).....	3-3
3.1.1.1	Plan Approval Reconciliations and WWTP Permanent Controls Project	3-3
3.1.1.2	EMACT Project	3-7
3.1.2	Prevention of Significant Deterioration (PSD)	3-9
3.1.2.1	Plan Approval Reconciliations and WWTP Permanent Controls Project	3-9
3.1.2.2	EMACT Project	3-11
3.2	Pennsylvania Air Pollution Control Regulations.....	3-12
3.2.1	25 Pa. Code Chapter 127. Construction, Modification, Reactivation and Operation of Sources	3-12
3.2.1.1	25 Pa. Code §127.1 and §127.12(a)(5) Best Available Technology (BAT).3-12	
3.2.1.2	25 Pa. Code §§127.81 to 127.83. Prevention of Significant Deterioration of Air Quality and 25 Pa. Code §§127.201 to 127.218. New Source Review 3-12	
3.2.2	25 Pa. Code Chapter 131. Ambient Air Quality Standards.....	3-13
3.3	Federal Air Quality Regulations.....	3-13
3.3.1	40 CFR Part 60: New Source Performance Standards	3-14
3.3.1.1	40 CFR Part 60, Subpart A – General Provisions.....	3-14
3.3.1.2	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	3-14
3.3.2	40 CFR Part 61: National Emission Standards for Hazardous Air Pollutants	3-15
3.3.2.1	40 CFR Part 61, Subpart A – General Provisions.....	3-16
3.3.2.2	40 CFR Part 61, Subpart FF – National Emission Standard for Benzene Waste Operations	3-16
3.3.3	40 CFR Part 63: National Emission Standards for Hazardous Air Pollutants for Source Categories	3-17
3.3.3.1	40 CFR Part 63, Subpart A – General Provisions.....	3-17
3.3.3.2	40 CFR Part 63, Subpart XX – National Emission Standards for Ethylene Manufacturing Process Units: Heat Exchange Systems and Waste Operations	3-17
3.3.3.3	40 CFR Part 63, Subpart YY – National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards	3-18
4.0	Lowest Achievable Emission Rate (LAER).....	4-1
4.1	LAER Applicability	4-1
4.1.1	Plan Approval Reconciliations and WWTP Permanent Controls Project	4-2
4.1.2	EMACT Project.....	4-2
4.2	LAER Analysis Process.....	4-2

4.3	Summary of LAER Determinations	4-3
4.4	New Wastewater Treatment Vessels LAER Determinations.....	4-3
4.4.1	VOC	4-3
4.4.1.1	Step 1: Identify NNSR Permit, PSD Permit, and SIP Limits for the Same Class or Category of Source.....	4-4
4.4.1.2	Step 2: Confirm the Limits Achieved in Practice.....	4-8
4.4.1.3	Step 3: Select LAER.....	4-8
4.5	TEGF A and TEGF B LAER Determinations	4-8
4.5.1	NOx	4-8
4.5.1.1	Step 1: Identify NNSR Permit, PSD Permit, and SIP Limits for the Same Class or Category of Source.....	4-9
4.5.1.2	Step 2: Confirm the Limits Achieved in Practice.....	4-11
4.5.1.3	Step 3: Select LAER.....	4-11
5.0	Best Available Control Technology (BACT)	5-1
5.1	BACT Applicability.....	5-1
5.1.1	Plan Approval Reconciliations and WWTP Permanent Controls Project	5-1
5.1.2	EMACT Project.....	5-2
5.2	BACT Analysis Process	5-2
5.2.1.1	Step 1: Identify All Control Technologies.....	5-3
5.2.1.2	Step 2: Eliminate Technically Infeasible Options.....	5-3
5.2.1.3	Step 3: Rank Remaining Control Technologies by Control Effectiveness ...	5-3
5.2.1.4	Step 4: Evaluate Most Effective Control Options and Document Results ..	5-4
5.2.1.5	Step 5: Select BACT	5-4
5.3	Summary of BACT Determinations.....	5-4
5.4	TEGF A and TEGF B BACT Determinations.....	5-6
5.4.1	CO	5-6
5.4.1.1	Step 1: Identify Control Technologies	5-6
5.4.1.2	Step 2: Eliminate Technically Infeasible Options.....	5-7
5.4.1.3	Step 3: Rank Remaining Control Technologies by Control Effectiveness ...	5-7
5.4.1.4	Step 4: Evaluate Most Effective Control Options and Document Results ..	5-8
5.4.1.5	Step 5: Select BACT	5-8
5.4.2	NOx	5-8
5.4.2.1	Step 1: Identify Control Technologies	5-8
5.4.2.2	Step 2: Eliminate Technically Infeasible Options.....	5-9
5.4.2.3	Step 3: Rank Remaining Control Technologies by Control Effectiveness ...	5-9
5.4.2.4	Step 4: Evaluate Most Effective Control Options and Document Results ..	5-9
5.4.2.5	Step 5: Select BACT	5-9
5.4.3	PM _{2.5}	5-9
5.4.3.1	Step 1: Identify Control Technologies	5-10
5.4.3.2	Step 2: Eliminate Technically Infeasible Options.....	5-10
5.4.3.3	Step 3: Rank Remaining Control Technologies by Control Effectiveness ..	5-10
5.4.3.4	Step 4: Evaluate Most Effective Control Options and Document Results ..	5-10

5.4.3.5	Step 5: Select BACT	5-11
5.4.4	GHGs	5-11
5.4.4.1	Step 1: Identify Control Technologies	5-11
5.4.4.2	Step 2: Eliminate Technically Infeasible Options.....	5-12
5.4.4.3	Step 3: Rank Remaining Control Technologies by Control Effectiveness ..	5-12
5.4.4.4	Step 4: Evaluate Most Effective Control Options and Document Results ..	5-12
5.4.4.5	Step 5: Select BACT	5-12
6.0	Best Available Technology (BAT).....	6-1
6.1	BAT Applicability.....	6-1
6.1.1	Plan Approval Reconciliations and WWTP Permanent Controls Project	6-1
6.1.2	EMACT Project.....	6-1
6.2	BAT Analysis Process	6-1
6.3	Summary of BAT Determinations.....	6-1
6.4	New Wastewater Treatment Vessels BAT Determinations.....	6-2
6.4.1	HAPs	6-2
6.4.1.1	Step 1: Identify Control Technologies	6-3
6.4.1.2	Step 2: Eliminate Technically Infeasible Options.....	6-5
6.4.1.3	Step 3: Rank Remaining Control Technologies by Control Effectiveness ...	6-5
6.4.1.4	Step 4: Evaluate Most Effective Control Options and Document Results ..	6-5
6.4.1.5	Step 5: Select BAT	6-6
7.0	Alternatives Analysis	7-1
7.1	Plan Approval Reconciliations and WWTP Permanent Controls Project	7-1
7.2	EMACT Project.....	7-2
7.2.1	Alternative Sites	7-2
7.2.2	Alternative Sizes	7-2
7.2.3	Alternative Production Processes	7-2
7.2.4	Alternative Environmental Control Techniques	7-2

FIGURES

Figure A. SPM Site Location Map	1-3

TABLES

Table A. Proposed Plan Approval Source Description Reconciliations	1-9
Table B. Proposed Potential to Emit Calculation Reconciliations	1-11
Table C. Proposed Plan Approval Condition Reconciliations	1-21
Table D. Plan Approval Reconciliations and WWTP Permanent Controls Project Retrospective NNSR Applicability Summary	3-4
Table E. Plan Approval Reconciliations and WWTP Permanent Controls Project Offset Requirements Summary	3-5
Table F. Plan Approval Reconciliations and WWTP Permanent Controls Project Surplus VOC Offsets	3-5
Table G. Updated Plan Approval Reconciliations and WWTP Permanent Controls Project ERC Requirements Summary	3-6
Table H. EMAX Project NNSR Applicability Summary for NO _x and VOC	3-7
Table I. EMAX Project NNSR Offset Requirements Summary	3-8
Table J. EMAX Project NNSR Applicability Summary for SO ₂ and Lead	3-8
Table K. Plan Approval Reconciliations and WWTP Permanent Controls Project Retrospective PSD Applicability Summary	3-10
Table L. EMAX Project PSD Applicability Summary	3-11
Table M. Summary of LAER Determinations	4-3
Table N. Potential VOC Limits and Emission Control Technologies Identified for the New Wastewater Treatment Vessels	4-5
Table O. Potential NO _x Limits and Emission Control Technologies Identified for the TEGF A & TEGF B ..	4-9
Table P. Summary of BACT Determinations	5-4
Table Q. Summary of BAT Determinations	6-2

APPENDICES

Appendix	Title
A	Plan Approval Application Forms
B	Potential to Emit Calculations
C	Process Flow Diagrams
D	Air Quality Analysis
E	EPA RBLC Database Information
F	General Information Form – Authorization Application
G	Air Pollution Control Act Compliance Review Supplemental Form
H	Local Municipality and County Notifications and Proof of Receipt
I	June 28, 2024 Letter from Shell to DEP Regarding NO _x and PM _{2.5} ERC Transfers
J	Summary of SPM Stack Test Results and Emission Source Actual Emissions Reporting Emission Factors

LIST OF ABBREVIATIONS AND ACRONYMS

AAQS	ambient air quality standard
BAT	best available technology
bhp	brake horsepower
CAA	Clean Air Act
CFR	Code of Federal Regulations
CO	carbon monoxide
CO ₂	carbon dioxide
CO ₂ e	carbon dioxide equivalent
Cogen	cogeneration
DEP	Pennsylvania Department of Environmental Protection
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
HEPA	high efficiency particulate air
HHV	higher heating value
HP	High Pressure
hr	hour
HRSG	heat recovery steam generator
HPSR	high pressure solvent recovery
H ₂ S	hydrogen sulfide
IFR	internal floating roof
INF	induced nitrogen flotation
kPa	kilopascals
LAER	lowest achievable emission rate
Landau	Landau Associates, Inc.
LDAR	leak detection and repair
LP	Low Pressure
LPSR	low pressure solvent recovery
m ³	cubic meter
MACT	maximum achievable control technology
Mg	megagrams
MIS	main incoming substation
MMBtu	million British thermal units
MPGF	multipoint ground flare

LIST OF ABBREVIATIONS AND ACRONYMS (CONTINUED)

MWe	megawatt electric
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emission Standards for Hazardous Air Pollutants
NNSR	Nonattainment New Source Review
NO _x	nitrogen oxides
NO ₂	nitrogen dioxide
NSPS	New Source Performance Standards
NSR	New Source Review
Pa. Code	Pennsylvania Code
PE	polyethylene
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
ppmw	parts per million by weight
ppmv	parts per million by volume
ppmvd	parts per million by volume on a dry basis
PSA	pressure swing adsorption
PSD	Prevention of Significant Deterioration
psia	pounds per square inch, absolute
RACT	reasonably available control technology
RICE	reciprocating internal combustion engine
SCR	selective catalytic reduction
SF ₆	sulfur hexafluoride
Shell	Shell Chemical Appalachia LLC
SHP	super high pressure
SO ₂	sulfur dioxide
SOCMI	synthetic organic chemical manufacturing industry
SPM	Shell Polymers Monaca
TAB	total annual benzene
TEAL	triethylaluminum
TEB	triethylborane
tpy	tons per year
UTM	Universal Transverse Mercator
VOC	volatile organic compounds
WWTP	wastewater treatment plant
wt%	percent weight
yr	year

This page intentionally left blank.

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 April 15, 2024, DEP granted its most recent 180-day extension to Shell for the temporary operation of SPM, including the continued commissioning and emission testing of equipment and emission sources, under all three of the referenced plan approvals from April 28, 2024, through October 28, 2024. As requested by DEP, Shell recently submitted a timely initial Title V operating permit application to DEP on June 19, 2024.¹

Shell is submitting this plan approval application in accordance with the Pennsylvania Air Pollution Control Act and 25 Pa. Code §127.12 to propose the following SPM projects and plan approval reconciliations.

- Shell is proposing to implement the Wastewater Treatment Plant (WWTP) Permanent Controls Project to install permanent equipment at SPM that will improve the oils, grease, and VOC removal efficiency of the primary treatment section of SPM’s WWTP. The WWTP Permanent Controls Project is discussed in more detail later in Section 1.4.
- Shell is proposing the Ethylene Maximum Achievable Control Technology (EMACT) Project at SPM to comply with the 40 Code of Federal Regulations (CFR) 63 Subpart YY² pressure-assisted multi-point flare minimum net heating value of flare combustion zone gas (NHV_{cz}) requirement that recently became applicable to the High Pressure (HP) Ground Flare #1 and HP Ground Flare #2, which hereinafter are referenced as the “Totally Enclosed Ground Flare (TEGF) A” or “TEGF A” and “TEGF B,” respectively, as documented in more detail later in Section 1.6. The EMACT Project is discussed in more detail later in Section 1.5.
- After commissioning and startup of SPM’s operations and 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 PA-04-00740A, PA-04-00740B, and PA-04-00740C, Shell is proposing to reconcile specific plan approval source descriptions, potential to emit calculations, and conditions, which are discussed in more detail later in Sections 1.6, 1.7, and

¹ 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 permit application for SPM prior to June 21, 2024.

² The 40 CFR 63 Subpart YY requirements applicable to ethylene production units are sometimes referenced as the “Ethylene MACT” or “EMACT” requirements or standards, hence the title of the EMACT Project.

1.8, respectively. Hereinafter, when addressed together, these proposed plan approval reconciliations are referenced as the “Plan Approval Reconciliations.”

The contents of this application are organized as follows:

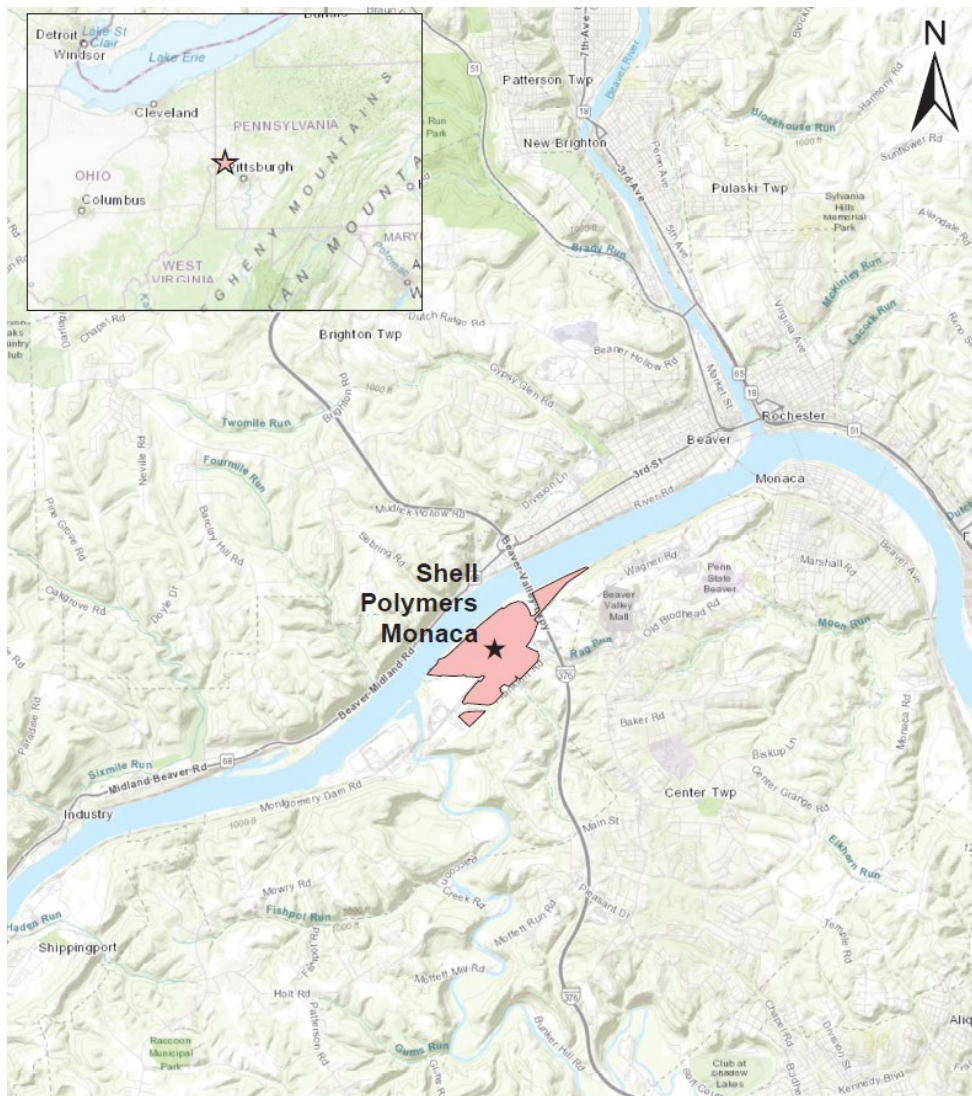
- Section 1.0 provides an overview of SPM, including facility location, process overview, and permit history, and the WWTP Permanent Controls Project, EMACT Project, and Plan Approval Reconciliations.
- Section 2.0 presents process and emission source descriptions for each of the manufacturing processes which make up SPM.
- Section 3.0 discusses the Pennsylvania and federal air quality regulations that Shell determined are potentially newly applicable to the WWTP Permanent Controls Project, EMACT Project, and Plan Approval Reconciliations.
- Section 4.0 documents the lowest achievable emissions rate (LAER) determinations completed for the WWTP Permanent Controls Project and EMACT Project.
- Section 5.0 documents the best available control technology (BACT) determinations completed for the WWTP Permanent Controls Project, EMACT Project, and Plan Approval Reconciliations.
- Section 6.0 documents the best available technology (BAT) determination completed for the WWTP Permanent Controls Project.
- Section 7.0 documents the alternatives analyses for the WWTP Permanent Controls Project, EMACT Project, and Plan Approval Reconciliations.
- Appendix A includes the Plan Approval 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 volatile organic compounds (VOC) control systems.
- Appendix D includes the air quality analysis completed for the WWTP Permanent Controls Project, EMACT Project, and Plan Approval Reconciliations.
- Appendix E is a compilation of the results of Shell’s search of the United States Environmental Protection Agency’s (EPA’s) reasonably available control technology (RACT)/BACT/LAER Clearinghouse (RBLC) database in support of the LAER, BACT, and BAT determinations made in this application.
- Appendix F includes a completed General Information Form – Authorization Application in support of this application.
- Appendix G includes a completed Air Pollution Control Act Compliance Review Supplemental Form in support of this application.
- Appendix H includes the local municipality and county notifications required for this application pursuant to 25 Pa. Code §127.413, as well as proof of receipt.
- Appendix I includes a copy of a June 28, 2024, letter from Shell to DEP addressing the transfer of nitrogen oxides (NOx) and particulate matter (PM) with an aerodynamic diameter less than or equal to 2.5 micrometers (PM_{2.5}) emission reduction credits (ERCs) from AES Beaver Valley, LLC (AES Beaver Valley) to Shell.

- Appendix J includes a summary of SPM's stack test results, and the emission factors Shell proposes to use to report actual emissions for SPM's emission sources.

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 A below shows the general location of SPM.

Figure A. 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 duct burners and a dedicated 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 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 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 (PSD) review for nitrogen dioxide (NO₂), carbon monoxide (CO), 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 (NNSR) for NO_x, VOC, and PM_{2.5} based on the ozone and PM_{2.5} nonattainment status of Beaver County contemporaneous with SPM's initial plan approval review and authorization efforts. 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} ERCs, as required by Section C, Conditions #037 and #038 of PA-04-00740A. Shell submitted supplemental requests on April 27, 2016 and May 20, 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.

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. Shell submitted a second round of extension requests for all three plan approvals on March 14, 2023, and DEP approved another 180-day extension on April 6, 2023. DEP granted a third 180-day extension for all three plan approvals on October 3, 2023, in response to requests that Shell submitted on September 13, 2023. Shell submitted a fourth round of extension requests on March 7, 2024, for the three plan approvals. On

April 15, 2024, DEP granted an additional 180-day extension for all three of the plan approvals from April 28, 2024, through October 28, 2024.

As requested by DEP, on June 19, 2024, Shell submitted an 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).³ In this Title V permit application, Shell noted that it would submit a plan approval application to DEP during the third quarter of 2024 to propose reconciliations to SPM's plan approval. Shell is submitting this plan approval application to propose, among other things, the reconciliations referenced in the June 19, 2024, initial Title V permit application for SPM.

1.4 WWTP Permanent Controls Project

SPM is currently using temporary equipment – a WEMCO mechanical induced nitrogen flotation (INF) device and an EC-15 hydraulic INF device, which were approved by DEP via Request for Determination (RFD) 10277 – to achieve improvements in oils, grease, and VOC removal capabilities in the primary treatment section of the facility's WWTP. After completing a thorough engineering evaluation of SPM's wastewater characteristics and WWTP design and operations, Shell is now proposing to implement the WWTP Permanent Controls Project to install permanent equipment in the primary treatment section of the WWTP to improve that section's oils, grease, and VOC removal capabilities, which will result in an improvement in the overall wastewater treatment performance of the WWTP. Specifically, Shell proposes to install the following permanent wastewater treatment vessels in the primary treatment section of SPM's WWTP with the WWTP Permanent Controls Project.

- **Settlement Drum(s):** One or more drums that will receive wastewater and 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 new Float/Sludge Drum and then to the existing Recovered Oil Storage Tank or recycled back to the Settlement Drum(s). The water phase will be routed to further treatment. The sludge material will be transferred to a truck to be transported offsite or routed to the existing Recovered Oil Storage Tank.
- **Two Dissolved Nitrogen Flotation (DNF) Units (DNF Unit #1 and DNF Unit #2):** DNF Unit #1 will primarily be used to remove oils, grease, and solids from wastewater. The effluent from DNF Unit #1 will be routed to the new Steam Stripper. The float and sludge from DNF Unit #1 will be routed to the new Float/Sludge Drum. DNF Unit #2 will typically receive effluent from the two existing Flow Equalization and Oil Removal (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 existing 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.
- **Float/Sludge Drum:** The drum will receive float and sludge from DNF Unit #1 and DNF Unit #2 and oils from the Settlement Drum(s) and new Steam Stripper. The material collected in the

³ 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 permit application for SPM prior to June 21, 2024.

drum will be transferred to the existing Recovered Oil Storage Tank or routed to the Settlement Drum(s).

- Steam Stripper, including a reflux drum: 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 existing FEOR Tanks.

Hereinafter, the Settlement Drum(s), DNF Unit #1, DNF Unit #2, Float/Sludge Drum, and Steam Stripper are referenced together as the “new Wastewater Treatment Vessels.” Shell also plans to install heat exchangers, small vessels (e.g., knockout vessel), chemical additive containers, and ancillary equipment such as piping, pumps, valves, and analyzers as part of the WWTP Permanent Controls Project to connect and support the operation of the new Wastewater Treatment Vessels. The temporary WWTP equipment referenced above will be removed after the successful commissioning of the WWTP Permanent Controls Project. Figure C-1 in Appendix C shows a simplified process flow diagram of SPM’s WWTP after the WWTP Permanent Controls Project.

The new Wastewater Treatment Vessels will treat VOC- and organic HAP-containing wastewater using a combination of gravity settlement/phase separation, dissolved nitrogen flotation, and steam stripping mechanisms. Therefore, the new Wastewater Treatment Vessels will have the potential to emit VOC and organic HAPs because some of the VOC and organic HAPs contained in the wastewater will either volatilize or be stripped from the wastewater during the referenced treatment processes. To minimize the new Wastewater Treatment Vessels’ VOC and organic HAP emissions, Shell will collect the vent streams from each of the vessels in a closed-vent system and route the vent streams to SPM’s Spent Caustic Vent Incinerator, which hereinafter is referenced as the “Spent Caustic Thermal Oxidizer (SCTO)” or “SCTO,” as documented in more detail later in Section 1.6, for combustion.

1.5 EMACT Project

SPM is a *major source*⁴ of HAPs and SPM’s ethylene manufacturing unit is an *ethylene production unit*,⁵ as that term is defined in 40 CFR 63 Subpart YY. Therefore, SPM’s ethylene manufacturing unit and relevant associated emission points represent an ethylene production affected source subject to 40 CFR 63 Subpart YY. The TEGF A and TEGF B receive vent streams from equipment that is part of the ethylene

⁴ *Major source* – means 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. (40 CFR Part 63, Subpart A).

⁵ *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).

production unit affected source at SPM. As a result, the TEGF A and TEGF B are *pressure-assisted multi-point flares*⁶ subject to applicable 40 CFR 63 Subpart YY control device requirements.⁷

Prior to July 6, 2023, the TEGF A and TEGF B were required to comply with both of the following flare vent gas minimum heating value limitations:

- 40 CFR 63 Subpart YY required the flare vent gas combusted at the flares to have a net heating value of 200 Btu/standard cubic feet (scf) or greater to comply with the flare control device requirements referenced by the subpart; and
- PA-04-00740A and PA-04-00740C BACT/LAER conditions required the flare vent gas combusted at the flares to have an NHV_{cz} of 500 Btu/scf or greater.

In consideration of the different values of these two overlapping flare vent gas minimum heating value limitations, for overall compliance assurance purposes, the effective flare vent gas minimum heating value limitation for the TEGF A and TEGF B was 500 Btu/scf or greater. However, as of July 6, 2023, 40 CFR 63 Subpart YY requires the flare vent gas combusted at the TEGF A and TEGF B to have an NHV_{cz} of 800 Btu/scf or greater due to the “pressure-assisted multi-point flare” design of the flares, while PA-04-00740A and PA-04-00740C BACT/LAER conditions continue to require the flare vent gas combusted at the flares to have an NHV_{cz} of 500 Btu/scf or greater. Hence, the effective flare vent gas minimum heating value limitation for the TEGF A and TEGF B is now 800 Btu/scf or greater.

The EMACT Project requires SPM to combust increased amounts of flare supplemental gas (natural gas and tail gas) at the TEGF A and TEGF B to achieve compliance with the minimum NHV_{cz} level of 800 Btu/scf that is currently required by 40 CFR 63 Subpart YY. Specifically, to comply with a minimum NHV_{cz} level of 800 Btu/scf rather than the previously effective minimum NHV_{cz} level of 500 Btu/scf, SPM must add more flare supplemental gas than before to the flare vent gas combusted at the TEGF A and TEGF B, which results in increased combustion pollutant emissions from the two flares. Thus, the EMACT Project represents a change in the method of operation of the TEGF A and TEGF B for New Source Review (NSR) purposes.

1.6 Plan Approval Source Description Reconciliations

Table A below summarizes the proposed plan approval source description reconciliations and the reasons for these proposed reconciliations. In general, the source description reconciliations will better align the plan approval source descriptions with SPM’s configurations, operations, and source descriptions.

⁶ *Pressure-assisted multi-point flare* – means a flare system consisting of multiple flare burners in staged arrays whereby the vent stream pressure is used to promote mixing and smokeless operation at the flare burner tips. Pressure-assisted multi-point flares are designed for smokeless operation at velocities up to Mach = 1 conditions (i.e., sonic conditions), can be elevated or at ground level, and typically use cross-lighting for flame propagation to combust any flare vent gases sent to a particular stage of flare burners. (40 CFR Part 63, Subpart YY).

⁷ 40 CFR 63 Subpart YY requires subject pressure-assisted multi-point flares that use cross lighting on a stage of burners to be equipped with two pilots per stage and one of the pilots to be lit and capable of igniting all regulated material that is routed to that stage of burners. As allowed in RFD 04-00740N, SPM has completed installation such that as of June of 2024 there are two pilots on each stage of burners for both TEGF A and TEGF B.

Table A. Proposed Plan Approval Source Description Reconciliations

Source ID	Current Source Description	Proposed Source Description	Reason for Reconciliation
107	Natural Gas-Fired Emergency Generator Engines (3)	Natural Gas-Fired Emergency Generator Engines (2)	Shell proposes to revise the source's description in the plan approval because only two natural gas-fired emergency generator engines are installed at SPM, not three.
204	Low Pressure (LP) Header System	Continuous Vent Thermal Oxidizer (CVTO) Header System	The plan approval currently indicates SPM is equipped with one integrated LP header system that connects to the CVTO and MPGF. However, that is not the case. There is one header system that connects to the CVTO, which Shell proposes to reference in the plan approval as the CVTO Header System. The CVTO Header System is also connected to an MPGF header, which receives vent streams from the CVTO Header System when the CVTO is unavailable. Shell proposes to reference this MPGF header as the MPGF CVTO Trip Header in the plan approval. Additionally, there is a header that is used to periodically route vent streams from Polyethylene (PE) Units 1 and 2 to the MPGF for combustion. Shell proposes to reference this MPGF header as the MPGF PE Units 1/2 Episodic Vent Header in the plan approval. Lastly, there is a header that is used to route intermittent vent streams from the Refrigerated Ethylene Storage Tank and ethylene gas recovery system to the MPGF for combustion. Shell proposes to reference this MPGF header as the MPGF Ethylene Tank Header in the plan approval.
-	-	Multi-Point Ground Flare (MPGF) CVTO Trip Header	
-	-	MPGF PE Units 1/2 Episodic Vent Header	
-	-	MPGF Ethylene Tank Header	
C204	LP System	-	As proposed above, the CVTO and MPGF will be associated with specific headers, which eliminates the need to include the LP System in the plan approval. Therefore, Shell proposes to remove the source from the plan approval.
C204A	LP Incinerator	CVTO	Shell proposes to revise the source's description in the plan approval so that it matches the description SPM uses for the equipment representing the source.

Source ID	Current Source Description	Proposed Source Description	Reason for Reconciliation
C204B	LP Multipoint Ground Flare (MPGF)	MPGF	Shell proposes to revise the source's description in the plan approval so that it matches the description SPM uses for the equipment representing the source. Also, Shell anticipates the Source ID for this source will be revised due to the proposed CVTO and MPGF header revisions discussed above.
C205	HP System	HP Flare System	Shell proposes to revise the source's description in the plan approval so that it matches the description SPM uses for the equipment representing the source.
C205A	HP Ground Flare #1	Totally Enclosed Ground Flare (TEGF) A	Shell proposes to revise the source's description in the plan approval so that it matches the description SPM uses for the equipment representing the source.
C205B	HP Ground Flare #2	TEGF B	Shell proposes to revise the source's description in the plan approval so that it matches the description SPM uses for the equipment representing the source.
C206	Spent Caustic Vent Incinerator	SCTO	Shell proposes to revise the source's description in the plan approval so that it matches the description SPM uses for the equipment representing the source.
303	Liquid Loadout (Pyrolysis Fuel Oil, Light Gasoline)	Liquid Loadout (Pyrolysis Fuel Oil, Light Gasoline, PE3 Heavies)	Shell originally planned to blend PE3 heavies into light gasoline. However, PE3 heavies is loaded separately from light gasoline into railcars at SPM, and the vapors generated during the loading of PE3 heavies into railcars are collected and routed through a closed system to the CVTO or MPGF, the same as originally planned when the PE3 heavies were to be blended into light gasoline. Thus, Shell proposes to separately identify PE3 heavies in the source's description.
304	Liquid Loadout (C3+, Butene, Isopentane, Isobutane, C3+ Ref)	Liquid Loadout (C3+, Butene, Isopentane, Isobutane, C3 Ref)	Shell proposes to revise the source's description in the plan approval so that the refrigerant material included in the description is correctly identified as C ₃ refrigerant rather than C ₃₊ refrigerant.

Source ID	Current Source Description	Proposed Source Description	Reason for Reconciliation
305	Liquid Loadout (Coke Residue/Tar)	Liquid Loadout (Blended Pitch)	SPM refers to the coke residue/tar material in the source's description as blended pitch. Therefore, Shell proposes to revise the source's description in the plan approval so that this material is referenced as blended pitch rather than coke residue/tar.

1.7 Potential to Emit Calculation Reconciliations

Table B below summarizes the proposed potential to emit calculation reconciliations for specific emission sources at SPM. These proposed reconciliations have been incorporated into the potential to emit calculations in Appendix B.

Table B. Proposed Potential to Emit Calculation Reconciliations

Source ID	Source Description	Reconciliation
031 through 037	Ethane Cracking Furnace #1 through Ethane Cracking Furnace #7	- The furnace's potential to emit calculation was reconciled so that the molecular hydrogen contained in the tail gas combusted in the furnace during the furnace's long-term normal operation mode is no longer estimated to result in CO and VOC emissions from the furnace. - The furnace's potential to emit calculation was reconciled to account for a higher percentage of natural gas in the tail gas/natural gas fuel blend combusted in the furnace. This reconciliation impacted the furnace's sulfur dioxide (SO₂), carbon dioxide (CO₂), methane, sulfuric acid, lead, ammonia, and hazardous air pollutant (HAP) emission rates. - The furnace's n-hexane emission factor was updated to equal a factor derived from stack testing performed on the seven ethane cracking furnaces at SPM rather than either the n-hexane emission factor documented in AP-42, Section 1.4, Table 1.4-3, which has a poor "E" rating and is not representative of the furnaces, or the n-hexane factor documented by the Ventura County Air Pollution Control District, which is lower than the stack test results for the furnaces. - The furnace's sulfuric acid emission factor was reconciled to use the molecular weight of sulfuric acid rather than sulfur trioxide. - The furnace's CO₂ and methane emission factors for certain operating modes were reconciled to properly account for the amount of molecular hydrogen contained in the tail gas combusted in the furnace.

Source ID	Source Description	Reconciliation
101 through 103	Combustion Turbine/Duct Burner Unit #1 through Combustion Turbine/Duct Burner Unit #3	- The Cogen Unit's PM (filterable only) emission factor was reconciled to equal the PM (filterable only) emission factor documented in AP-42, Section 3.1, Table 3.1-2a. - The Cogen Unit's benzene, formaldehyde, and toluene emission factors were updated to equal respective factors derived from stack testing performed on the three Cogen Units at SPM rather than the benzene, formaldehyde, and toluene emission factors documented in AP-42, Section 3.1, Table 3.1-3. - The Cogen Unit's potential to emit calculation was reconciled so that the oxidation catalyst destruction efficiency used for organic HAP emission rates calculated using AP-42, Section 3.1, Table 3.1-3 emission factors is 30% rather than 90%. This lower oxidation catalyst destruction efficiency is a result of the low concentration of organic compounds in the Cogen Unit's uncontrolled exhaust stream (i.e., the inlet stream to the oxidation catalyst). - The Cogen Unit's sulfuric acid emission factor was reconciled to use the molecular weight of sulfuric acid rather than sulfur trioxide.
104	Cogeneration Plant Cooling Tower	The cooling tower's potential to emit calculation was reconciled by increasing the cooling tower's cooling water recirculation rate in the calculation so that the recirculation rate more accurately represents the level required by SPM's Cogen Units.
105	Diesel-Fired Emergency Generator Engines (2); Generator 1 - Parking Garage	- The engine's CO emission factor was reconciled to equal the engine's CO BACT limit of 0.50 grams per brake horsepower per hour (g/bhp-hr), converted to a pounds per brake horsepower per hour (lb/bhp-hr) unit basis. - The engine's sulfuric acid emission factor was reconciled to use the molecular weight of sulfuric acid rather than sulfur trioxide.
105	Diesel-Fired Emergency Generator Engines (2); Generator 2 - Telecom Hut	- The engine's CO emission factor was reconciled to equal the engine's CO BACT limit of 0.67 g/bhp-hr. - The engine's sulfuric acid emission factor was reconciled to use the molecular weight of sulfuric acid rather than sulfur trioxide.
106	Fire Pump Engines (2); Firewater Pump 1	The engine's sulfuric acid emission factor was reconciled to use the molecular weight of sulfuric acid rather than sulfur trioxide.
106	Fire Pump Engines (2); Firewater Pump 2	The engine's sulfuric acid emission factor was reconciled to use the molecular weight of sulfuric acid rather than sulfur trioxide.

Source ID	Source Description	Reconciliation
107	Natural Gas-Fired Emergency Generator Engines (2); Generator 3 - Lift Station	- The engine's CO, NOx, VOC, and CO₂ emission factors were reconciled to be on a lb/bhp-hr unit basis rather than a lb/MMBtu unit basis that had been derived using a generic engine's thermal-to-mechanical energy efficiency conversion factor. The CO and CO₂ lb/bhp-hr emission factors are engine manufacturer specifications, and the NOx and VOC lb/bhp-hr emission factors equal the engine's NOx BACT limit of 2.0 g/bhp-hr and the engine's VOC LAER limit of 1.0 g/bhp-hr, respectively, converted to a lb/bhp-hr unit basis. - The engine's sulfuric acid emission factor was reconciled to use the molecular weight of sulfuric acid rather than sulfur trioxide.
107	Natural Gas-Fired Emergency Generator Engines (2); Generator 4 - Lift Station	- The engine's CO and CO₂ emission factors were reconciled to be on a lb/bhp-hr unit basis rather than a lb/MMBtu unit basis that had been derived using a generic engine's thermal-to-mechanical energy efficiency conversion factor. The CO and CO₂ lb/bhp-hr emission factors are engine manufacturer specifications. - The engine's NOx emission factor was reconciled to be on a lb/MMBtu unit basis that has been derived using a thermal-to-mechanical energy efficiency conversion factor that is specific to the engine. - The engine's PM₁₀ and PM_{2.5} emission factors were reconciled to equal the PM₁₀ (filterable + condensable) and PM_{2.5} (filterable + condensable) emission factors documented in AP-42, Section 3.2, Table 3.2-2 for 4-stroke lean burn engines. - The engine's sulfuric acid emission factor was reconciled to use the molecular weight of sulfuric acid rather than sulfur trioxide.
202	Polyethylene Manufacturing Lines	The emission source's potential to emit calculation was reconciled by updating the hours of operation (i.e., intermittent operation versus continuous operation) and exhaust flow rate of specific filter vents (i.e., SPM-specific flow rate versus licenser estimates) to better represent the operations and design of the filtration systems.
203	Process Cooling Tower	- The cooling tower's potential to emit calculation was reconciled by reducing the organic HAP fraction of any VOC leak into the cooling tower's recirculating water to better represent the number of heat exchangers with the potential to leak VOC into the cooling water and the organic HAP fraction of the heat exchangers with the potential to leak VOC into the cooling water. - The cooling tower's potential to emit calculation was reconciled by assigning a worst-case organic HAP-containing material for the calculation of speciated organic HAPs due to a leaking heat exchanger.

Source ID	Source Description	Reconciliation
C204A	CVTO	- The thermal oxidizer's potential to emit calculation was reconciled to include the additional amount of supplemental fuel gas that has been estimated to be required to maintain the thermal oxidizer's temperature at a level necessary to ensure the minimum destruction efficiency required by applicable regulations and SPM's plan approval is achieved. - The thermal oxidizer's potential to emit calculation was reconciled to include updates to vent stream flow rate and composition data based on a review of SPM's operating data. - The thermal oxidizer's sulfuric acid emission factor was reconciled to use the molecular weight of sulfuric acid rather than sulfur trioxide. - The thermal oxidizer's n-hexane emission factor was updated to equal the n-hexane emission factor indicated for a flare in the Natural Gas Fired External Combustion Equipment table in the May 17, 2001, Ventura County Air Pollution Control District AB 2588 Combustion Emission Factors document rather than the n-hexane emission factor documented in AP-42, Section 3.1, Table 3.1-3.
C204B	MPGF (MPGF CVTO Trip Header)	- The flare's potential to emit calculation was reconciled by using a 99% destruction efficiency for organic compounds containing 3 or fewer carbon atoms, which is consistent with EPA guidance. - The flare's potential to emit calculation was reconciled to include the additional amount of supplemental gas that has been estimated to be required to maintain the net heating value of the header's combustion zone gas at the minimum level required by SPM's plan approval. - The flare's potential to emit calculation was reconciled to include updates to vent stream flow rate and composition data based on a review of SPM's operating data, including expected annual downtime of the CVTO. - The flare's CO emission factor was updated to equal the CO emission factor documented in Table 13.5-2 of the latest version of AP-42, Section 13.5. - The flare's sulfuric acid emission factor was reconciled to use the molecular weight of sulfuric acid rather than sulfur trioxide. - The flare's n-hexane emission factor was updated to equal the n-hexane emission factor indicated for a flare in the Natural Gas Fired External Combustion Equipment table in the May 17, 2001, Ventura County Air Pollution Control District AB 2588 Combustion Emission Factors document rather than the n-hexane emission factor documented in AP-42, Section 3.1, Table 3.1-3.

Source ID	Source Description	Reconciliation
C204B	MPGF (MPGF PE Units 1/2 Episodic Vent Header)	- The flare's potential to emit calculation was reconciled by using a 99% destruction efficiency for organic compounds containing 3 or fewer carbon atoms, which is consistent with EPA guidance. - The flare's potential to emit calculation was reconciled to include the additional amount of supplemental gas that has been estimated to be required to maintain the net heating value of the header's combustion zone gas at the minimum level required by SPM's plan approval. - The flare's potential to emit calculation was reconciled to include updates to vent stream flow rate and composition data based on a review of SPM's operating data. - The flare's CO emission factor was updated to equal the CO emission factor documented in Table 13.5-2 of the latest version of AP-42, Section 13.5. - The flare's sulfuric acid emission factor was reconciled to use the molecular weight of sulfuric acid rather than sulfur trioxide. - The flare's n-hexane emission factor was updated to equal the n-hexane emission factor indicated for a flare in the Natural Gas Fired External Combustion Equipment table in the May 17, 2001, Ventura County Air Pollution Control District AB 2588 Combustion Emission Factors document rather than the n-hexane emission factor documented in AP-42, Section 3.1, Table 3.1-3.
C204B	MPGF (MPGF Ethylene Tank Header)	- The flare's potential to emit calculation was reconciled by using a 99% destruction efficiency for organic compounds containing 3 or fewer carbon atoms, which is consistent with EPA guidance. - The flare's potential to emit calculation was reconciled to include the additional amount of supplemental gas that has been estimated to be required to maintain the net heating value of the header's combustion zone gas at the minimum level required by SPM's plan approval. - The flare's potential to emit calculation was reconciled to include updates to vent stream flow rate and composition data based on a review of SPM's operating data. - The flare's CO emission factor was updated to equal the CO emission factor documented in Table 13.5-2 of the latest version of AP-42, Section 13.5. - The flare's sulfuric acid emission factor was reconciled to use the molecular weight of sulfuric acid rather than sulfur trioxide. - The flare's n-hexane emission factor was updated to equal the n-hexane emission factor indicated for a flare in the Natural Gas Fired External Combustion Equipment table in the May 17, 2001, Ventura County Air Pollution Control District AB 2588 Combustion Emission Factors document rather than the n-hexane emission factor documented in AP-42, Section 3.1, Table 3.1-3.

Source ID	Source Description	Reconciliation
C205A	TEGF A	- The flare's potential to emit calculation was reconciled by using a 99% destruction efficiency for organic compounds containing 3 or fewer carbon atoms, which is consistent with EPA guidance. - The flare's potential to emit calculation was reconciled to include the additional amount of supplemental gas that has been estimated to be required to maintain the net heating value of the flare's combustion zone gas at the minimum level required by 40 CFR 63 Subpart YY. - The flare's potential to emit calculation was reconciled to include updates to vent stream flow rate and composition data based on a review of SPM's operating data. - The flare's CO emission factor was updated to equal the CO emission factor documented in Table 13.5-2 of the latest version of AP-42, Section 13.5. - The flare's sulfuric acid emission factor was reconciled to use the molecular weight of sulfuric acid rather than sulfur trioxide. - The flare's n-hexane emission factor was updated to equal the n-hexane emission factor indicated for a flare in the Natural Gas Fired External Combustion Equipment table in the May 17, 2001, Ventura County Air Pollution Control District AB 2588 Combustion Emission Factors document rather than the n-hexane emission factor documented in AP-42, Section 3.1, Table 3.1-3.
C205B	TEGF B	- The flare's potential to emit calculation was reconciled by using a 99% destruction efficiency for organic compounds containing 3 or fewer carbon atoms, which is consistent with EPA guidance. - The flare's potential to emit calculation was reconciled to include the additional amount of supplemental gas that has been estimated to be required to maintain the net heating value of the flare's combustion zone gas at the minimum level required by 40 CFR 63 Subpart YY. - The flare's potential to emit calculation was reconciled to include updates to vent stream flow rate and composition data based on a review of SPM's operating data. - The flare's CO emission factor was updated to equal the CO emission factor documented in Table 13.5-2 of the latest version of AP-42, Section 13.5. - The flare's sulfuric acid emission factor was reconciled to use the molecular weight of sulfuric acid rather than sulfur trioxide. - The flare's n-hexane emission factor was updated to equal the n-hexane emission factor indicated for a flare in the Natural Gas Fired External Combustion Equipment table in the May 17, 2001, Ventura County Air Pollution Control District AB 2588 Combustion Emission Factors document rather than the n-hexane emission factor documented in AP-42, Section 3.1, Table 3.1-3.

Source ID	Source Description	Reconciliation
C205C	HP Elevated Flare	• The flare's potential to emit calculation was reconciled by using a 99% destruction efficiency for organic compounds containing 3 or fewer carbon atoms, which is consistent with EPA guidance. • The flare's potential to emit calculation was reconciled to reflect that it periodically combusts vent streams during non-emergency episodes at SPM and its annual potential to emit rates were grouped with the annual potential to emit rates of the TEGF A and TEGF B due to the integrated operation of the three flares (i.e., the HP Elevated Flare only receives vent streams when the combined capacity of the TEGF A and TEGF B is exceeded). It is worth noting that the TEGF A, TEGF B, and HP Elevated Flare potential to emit rates do not cover emergency flaring events. • The flare's CO emission factor was updated to equal the CO emission factor documented in Table 13.5-2 of the latest version of AP-42, Section 13.5. • The flare's sulfuric acid emission factor was reconciled to use the molecular weight of sulfuric acid rather than sulfur trioxide. • The flare's n-hexane emission factor was updated to equal the n-hexane emission factor indicated for a flare in the Natural Gas Fired External Combustion Equipment table in the May 17, 2001, Ventura County Air Pollution Control District AB 2588 Combustion Emission Factors document rather than the n-hexane emission factor documented in AP-42, Section 3.1, Table 3.1-3.

Source ID	Source Description	Reconciliation
C206	SCTO	- The thermal oxidizer's potential to emit calculation was reconciled to use a 99.9% destruction efficiency for the VOC and organic HAP contained in the vent streams combusted in the thermal oxidizer rather than a 99% destruction efficiency for those compounds to more accurately represent the designed VOC and organic HAP destruction efficiency of the thermal oxidizer. - The thermal oxidizer's potential to emit calculation was reconciled to include the additional amount of supplemental fuel gas that has been estimated to be required to maintain the thermal oxidizer's temperature at a level necessary to ensure the minimum destruction efficiency required by applicable regulations and SPM's plan approval is achieved. - The thermal oxidizer's potential to emit calculation was reconciled to include updates to vent stream flow rates and compositions based on a review of operating data. - The thermal oxidizer's potential to emit calculation was updated to include the vent streams from the new Wastewater Treatment Vessels that are proposed to be installed in the WWTP in association with the WWTP Permanent Controls Project. - The thermal oxidizer's PM₁₀ and PM_{2.5} emission factors were reconciled to include the thermal oxidizer's sulfuric acid emission factor in each of the emission factors because the thermal oxidizer's sulfuric acid emissions represent condensable PM emissions. - The thermal oxidizer's SO₂ emission factor was reconciled to include the small amount of SO₂ generated by the combustion of natural gas in the thermal oxidizer. - The thermal oxidizer's sulfuric acid emission factor was reconciled to use the molecular weight of sulfuric acid rather than sulfur trioxide. - The thermal oxidizer's n-hexane emission factor was updated to equal the n-hexane emission factor indicated for a flare in the Natural Gas Fired External Combustion Equipment table in the May 17, 2001, Ventura County Air Pollution Control District AB 2588 Combustion Emission Factors document rather than the n-hexane emission factor documented in AP-42, Section 3.1, Table 3.1-3.
301	Polyethylene Pellet Material Storage/Handling/Loadout	The emission source's VOC potential to emit calculation was reconciled by increasing the PE Units 1-3 total annual polyethylene production rate to reflect the units' as-built polyethylene production rate capability.
304	Liquid Loadout (C3+, Butene, Isopentane, Isobutane, C3 Ref)	The emission source's potential to emit calculation was reconciled to more accurately represent the number of railcar loading and unloading events that may occur for the specific materials covered by the emission source.

Source ID	Source Description	Reconciliation
501	Equipment Components	- The equipment leak potential to emit calculation was reconciled by updating the component inventory and composition of the materials contained in those components to more accurately represent the number of equipment leak components located at SPM and the material compositions at SPM. - The equipment leak potential to emit calculation was reconciled by revising the control efficiencies indicated for the compressor seals and certain relief valves at SPM to reflect the collection and routing of leaked materials from those components to an enclosed collection system and control device or closed system process equipment rather than the implementation of an LDAR program on the referenced components.
502	Wastewater Treatment Plant	- The WWTP's potential to emit calculation model was revised from WATER9 to Toxchem, which is a calculation tool mainly used for estimating VOC emissions from wastewater collection, preliminary/primary/secondary treatment, and disposal facilities.⁸ - The WWTP's potential to emit calculation was reconciled by increasing the wastewater flow rate through the WWTP to more accurately represent the rates that flow through the WWTP, increasing the aeration area of the WWTP's Biotreater Aeration Tanks to reflect the as-built dimensions of the tanks, and increasing the number of organic compounds indicated to be present in the wastewater treated in the WWTP based on actual operations data. - The WWTP's potential to emit calculation was updated to include the new Wastewater Treatment Vessels that are proposed to be installed in the WWTP in association with the WWTP Permanent Controls Project.

⁸ WATER9 is a wastewater collection, storage, separation, and treatment system emissions estimation model that is provided free by EPA, but it was developed by EPA using a freeware Windows software that is now outdated. As a result, WATER9 is not reliably functional on computers using newer Windows operating systems, and EPA is no longer providing updates to WATER9 or assistance to users experiencing model operating errors. For these reasons, SPM has revised the WWTP's potential to emit calculation so that it is now performed using Toxchem rather than WATER9. Like WATER9, Toxchem is a wastewater collection, storage, separation, and treatment system emissions estimation model that uses fundamental mass transfer equations and mass balances to perform wastewater emission calculations. Toxchem was developed in the early 1990s as an alternative to WATER8/WATER9 to overcome some of the limitations of those models, including improved mass transfer processes, sorption of contaminants to solids, and a compound database containing critically reviewed physical, chemical, and biological properties. Also, Toxchem is recognized as a more user-friendly alternative to WATER9. As documented in 40 CFR Part 63, Appendix C, EPA approved Toxchem as an alternative to WATER7/WATER8/WATER9 during the development of 40 CFR 63 Subpart G. Moreover, EPA and state agencies have recently been suggesting Toxchem as an available alternative to WATER9 due to the growing outdated status of WATER9 for its users.

Source ID	Source Description	Reconciliation
503	Plant Roadways	- The emission source's potential to emit calculation was reconciled by increasing the distance travelled by the average truck and average truck weight to more accurately reflect the paths taken by the trucks at SPM and the weight of the typical truck that travels the roadways at SPM. - The emission source's potential to emit calculation was reconciled by correcting the calculations used to calculate the PM, PM₁₀, and PM_{2.5} emission factors that are used in the annual potential to emit calculations so that the emission factor calculations equal the daily basis emission factor calculation (Equation 2) in AP-42, Section 13.2.1.
504	Gas Insulated Switchgear (SF ₆)	The equipment leak potential to emit calculation was reconciled by updating the component inventory and quantity of SF₆ in specific components to more accurately represent the number and physical characteristics of the equipment leak components in SF₆ service located at SPM.

1.8 Plan Approval Condition Reconciliations

Table C below summarizes the proposed plan approval condition reconciliations for specific emission sources at SPM. These proposed plan approval condition reconciliations represent corrections, as-built changes, or updates to monitoring, recordkeeping, or reporting requirements.

Table C. Proposed Plan Approval Condition Reconciliations

Section	ID/Name	Description	Condition	Reconciliation																								
C. Site Level Plan Approval Requirements	-	Site Level	# 005	Shell proposes to revise the condition as indicated below due to the proposed plan approval source description reconciliations (i.e., the proposed use of thermal oxidizer in relevant source descriptions rather than incinerator) and proposed potential to emit calculation reconciliations, WWTP Permanent Controls Project, and EMACT Project (i.e., proposed changes in the facility-wide potential to emit rates and VOC ERC requirements). The proposed facility-wide potential to emit rates can be found in Appendix B. The VOC ERC requirements are discussed in Section 3.1.1.1 herein. <i>Emissions from the Facility shall not equal or exceed the following in any consecutive 12-month period:</i> <table><tr><td><i>Air Contaminant</i></td><td><i>Emission Rate (tons)</i></td></tr><tr><td>NOx</td><td>~~328.5~~ <u>461.67</u></td></tr><tr><td>CO</td><td>~~983.7~~ <u>1,223.76</u></td></tr><tr><td>PM (filterable)</td><td>~~74.3~~ <u>79.26</u></td></tr><tr><td>PM10</td><td>~~168.9~~ <u>184.27</u></td></tr><tr><td>PM2.5</td><td>~~163.7~~ <u>178.40</u></td></tr><tr><td>SOx</td><td>~~22.4~~ <u>27.17</u></td></tr><tr><td>VOC</td><td>~~516.2~~ <u>439.61</u></td></tr><tr><td>VOC (ERC)*</td><td>~~612~~ <u>513</u></td></tr><tr><td>HAP</td><td>~~32.0~~ <u>25.29</u></td></tr><tr><td>Ammonia</td><td>~~154~~ <u>137.23</u></td></tr><tr><td>CO2e**</td><td>~~2,304,499~~ <u>2,571,991</u></td></tr></table> <i>* This limit is included to ensure that the proper amount of VOC ERCs are 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:</i> <i>VOC (ERC) = 1.15*sum(flue VOC emissions) + 1.3*sum(fugitive VOC emissions) (Eq. 1)</i> <i>Where:</i> <i>Flue VOC emissions are actual emissions from the ethane cracking furnaces, combustion turbines/duct burners, ~~incinerators~~ <u>thermal oxidizers</u>, flares, engines, miscellaneous storage tanks, and polyethylene pellet residual VOC.</i> <i>Fugitive VOC emissions are actual emissions from liquid loadout, component leaks, the process cooling tower, and wastewater treatment plant.</i> <i>** This limit includes 854 tpy CO2e from SF6-Insulated High Voltage Equipment included in PA-04-00740B.</i>	<i>Air Contaminant</i>	<i>Emission Rate (tons)</i>	NOx	~~328.5~~ <u>461.67</u>	CO	~~983.7~~ <u>1,223.76</u>	PM (filterable)	~~74.3~~ <u>79.26</u>	PM10	~~168.9~~ <u>184.27</u>	PM2.5	~~163.7~~ <u>178.40</u>	SOx	~~22.4~~ <u>27.17</u>	VOC	~~516.2~~ <u>439.61</u>	VOC (ERC)*	~~612~~ <u>513</u>	HAP	~~32.0~~ <u>25.29</u>	Ammonia	~~154~~ <u>137.23</u>	CO2e**	~~2,304,499~~ <u>2,571,991</u>
<i>Air Contaminant</i>	<i>Emission Rate (tons)</i>																											
NOx	~~328.5~~ <u>461.67</u>																											
CO	~~983.7~~ <u>1,223.76</u>																											
PM (filterable)	~~74.3~~ <u>79.26</u>																											
PM10	~~168.9~~ <u>184.27</u>																											
PM2.5	~~163.7~~ <u>178.40</u>																											
SOx	~~22.4~~ <u>27.17</u>																											
VOC	~~516.2~~ <u>439.61</u>																											
VOC (ERC)*	~~612~~ <u>513</u>																											
HAP	~~32.0~~ <u>25.29</u>																											
Ammonia	~~154~~ <u>137.23</u>																											
CO2e**	~~2,304,499~~ <u>2,571,991</u>																											

Section	ID/Name	Description	Condition	Reconciliation
C. Site Level Plan Approval Requirements	-	Site Level	# 008	Shell proposes to revise the condition as indicated below because SPM has a TAB quantity greater than 11 tons per year (tpy) and the facility uses the “6 BQ” compliance option outlined in 40 CFR 61.342(e) in 40 CFR 61 Subpart FF to comply with the regulation’s emission control requirements. <u>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]. 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). 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).</u>
C. Site Level Plan Approval Requirements	-	Site Level	# 009.a	Shell proposes to revise the condition as indicated below because DEP does not require hard copy submittals of the referenced test protocols. <i>a. The Owner/Operator shall submit ~~two hard copies and one an~~ electronic copy of a pre-test protocol to the Department for review at least 60 days prior to the performance of any EPA Reference Method stack test. The Owner/Operator shall submit ~~two hard copies and one an~~ 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.</i>
C. Site Level Plan Approval Requirements	-	Site Level	# 009.c	Shell proposes to revise the condition as indicated below to include State-Only test reporting requirements and add clarity to the condition. <i>c. <u>For testing</u> pursuant to <u>State-Only requirements</u>, 40 CFR Part 60.8(a), ~~or 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.</i>
C. Site Level Plan Approval Requirements	-	Site Level	# 009.d	Shell proposes to revise the condition as indicated below to add clarity to the condition. <i>d. <u>For testing</u> 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.</i>

Section	ID/Name	Description	Condition	Reconciliation
C. Site Level Plan Approval Requirements	-	Site Level	# 009.h	Shell proposes to revise the condition as indicated below because DEP does not require hard copy submittals of test protocols and test reports. <i>h. Pursuant to 25 Pa. Code Section 139.53(a)(1) and 139.53(a)(3) all hard copy submittals shall be sent to the Pennsylvania Department of Environmental Protection, Air Quality Program, 400 Waterfront Drive, Pittsburgh, PA 15222 with deadlines verified through document postmarks. Electronic submittals shall be sent to RA epstacktesting@pa.gov and Onbase or as otherwise directed in writing by the Department. Alternatively, electronic copies may be provided on a CD along with hard copy submittals.</i>
C. Site Level Plan Approval Requirements	-	Site Level	# 011	Shell proposes to revise the condition as indicated below because only the Operations group at SPM is responsible for the type of compliance observations indicated in the condition. <i>Employees involved in the operation and/or maintenance 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:</i> <i>a. Visible stack emissions;</i> <i>b. Fugitive emissions; and</i> <i>c. Potentially objectionable odors.</i> <i>If 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. Records of each reported 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.</i>

Section	ID/Name	Description	Condition	Reconciliation
C. Site Level Plan Approval Requirements	-	Site Level	# 029	Shell proposes to revise the condition as indicated below because only the Operations group at SPM is responsible for the type of compliance demonstration referenced in the condition. <i>Employees involved in the operation ~~and/or maintenance~~ 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 Section C Condition #012.</i> <i>a. New employees shall be trained upon hiring.</i> <i>b. Existing employees shall be trained prior to source startup.</i> <i>c. Employees shall be given refresher training annually.</i> <i>d. A copy of the written employee training program shall be maintained at the Facility. The training program shall include provisions for the following:</i> <i>1) Equipment and areas to be observed;</i> <i>2) That observation is to be made for the presence of visible stack emissions, fugitive emissions, and potentially objectionable odors;</i> <i>3) Information to be collected in the event of an affirmative observation; and</i> <i>4) Whom at the Facility to report affirmative observations to.</i> <i>e. Records of successful completion of initial and annual training shall be maintained for a minimum of five years for each employee trained.</i>
C. Site Level Plan Approval Requirements	-	Site Level	# 030, second bullet	Shell proposes to revise the condition as indicated below so that the ethylene production rate referenced in the condition more closely matches the as-built ethylene production rate capability of the ethylene manufacturing line. Additionally, Shell proposes to revise the condition to reflect the proposed HP System source description reconciliation, as previously discussed in more detail in Section 1.6. • One (1) ethylene manufacturing line, ~~1,500,000~~ <u>1,763,000</u> metric tons/yr; compressor seal vents and startup/shutdown/maintenance/upsets controlled by ~~the high pressure header system (HP Flare System).~~
C. Site Level Plan Approval Requirements	-	Site Level	# 030, third bullet	Shell proposes to revise the condition as indicated below so that the polyethylene production rate referenced in the condition more closely matches the as-built total polyethylene production rate capability of the two gas phase polyethylene manufacturing lines. Additionally, Shell proposes to revise the condition to more accurately represent SPM's header systems and reflect the proposed HP System source description reconciliation, as previously discussed in more detail in Section 1.6. • Two (2) gas phase polyethylene manufacturing lines, ~~550,000~~ <u>605,000</u> metric tons/yr each; VOC emission points controlled by the ~~low pressure header system (LP System)~~ CVTO, MPGF, or HP <u>Flare</u> System, PM emission points controlled by filters.

Section	ID/Name	Description	Condition	Reconciliation
C. Site Level Plan Approval Requirements	-	Site Level	# 030, fourth bullet	Shell proposes to revise the condition as indicated below so that the polyethylene production rate referenced in the condition more closely matches the as-built polyethylene production rate capability of the liquid phase slurry polyethylene manufacturing line. Additionally, Shell proposes to revise the condition to more accurately represent SPM's header systems and reflect the proposed HP System source description reconciliation, as previously discussed in more detail in Section 1.6. One (1) ~~slurry technology polyethylene manufacturing line, 500,000~~ 550,000 metric tons/yr; VOC emission points controlled by the ~~LP System~~ CVTO, MPGF, or HP Flare System, PM emission points controlled by filters.
C. Site Level Plan Approval Requirements	-	Site Level	# 030, fifth bullet	Shell proposes to revise the condition as indicated below to more accurately represent SPM's header systems, as previously discussed in more detail in Section 1.6. Additionally, Shell proposes to revise the condition to reference a Btu-basis capacity for the CVTO rather than a mass-basis capacity. Lastly, Shell expects DEP to add bullets to the condition to document the MPGF headers and MPGF. One (1) ~~LP System CVTO Header System; routed to the LP incinerator CVTO, 10 tons/hr 200 MMBtu/hr capacity, with backup multipoint ground flare (MPGF), 74 metric tons/hr capacity.~~
C. Site Level Plan Approval Requirements	-	Site Level	# 030, tenth bullet	Shell proposes to revise the condition as indicated below because the 113-bhp natural gas-fired emergency generator engine referenced in the condition is not at SPM. ~~Three (3)~~ Two (2) natural gas-fired emergency generator engines, 50 bhp, ~~113 bhp~~, and 158 bhp rating.
C. Site Level Plan Approval Requirements	-	Site Level	# 030, twelfth bullet	Shell proposes to revise the condition as indicated below so that the cooling water flow rate referenced in the condition more closely matches the as-built cooling water flow rate capability of the Cogeneration Plant Cooling Tower. One (1) ~~cogen cooling tower~~ Cogeneration Plant Cooling Tower, 6 cell counter-flow mechanical draft, ~~4.443~~ 7.2 MMgal/hr water flow capacity; controlled by drift eliminators.
C. Site Level Plan Approval Requirements	-	Site Level	# 030, fourteenth bullet	Shell proposes to revise the condition as indicated below because SPM refers to coke residue/tar as blended pitch, and the vapors generated during the "loading" of blended pitch into trucks are alternatively routed to the HP Header System rather than the SCTO. Additionally, the vapors generated during the loading of recovered oil into trucks are not captured due to the low vapor pressure of recovered oil. Therefore, Shell expects DEP to add a bullet to the condition to separately address the loading of recovered oil into trucks and the fact that the vapors generated during that loading activity are not captured. Liquid loading, ~~coke residue/tar blended pitch and recovered oil~~; controlled by vapor capture and routing back to the process or ~~Spent Caustic Vent incinerator~~ HP Header System, and low-leak couplings.

Section	ID/Name	Description	Condition	Reconciliation
C. Site Level Plan Approval Requirements	-	Site Level	# 030, fifteenth bullet	Shell proposes to revise the condition as indicated below to clarify that the pyrolysis fuel oil and light gasoline transfer activities represent the “loading” of those materials into railcars to be transported offsite. Additionally, Shell proposes to revise the condition to document that PE3 heavies is loaded into railcars at SPM. Shell originally planned to blend PE3 heavies into light gasoline. However, PE3 heavies is loaded separately from light gasoline into railcars, and the vapors generated during the loading of PE3 heavies into railcars are collected and routed through a closed system to the CVTO or MPGF, the same as originally planned when the PE3 heavies were to be blended into light gasoline. Thus, Shell proposes to separately identify PE3 heavies in the condition. Lastly, Shell proposes to revise the condition to more accurately represent SPM’s header systems, as previously discussed in more detail in Section 1.6. • Liquid loading, pyrolysis fuel oil, ~~and light gasoline, and PE3 heavies~~; controlled by vapor capture and routing to the ~~LP System~~ CVTO Header System or MPGF CVTO Trip Header, and low-leak couplings.
C. Site Level Plan Approval Requirements	-	Site Level	# 030, sixteenth bullet	Shell proposes to revise the condition as indicated below to clarify that the C₃₊ transfer activity represents the “loading” of C₃₊ into railcars to be transported offsite, while the butene, isopentane, isobutane, and C₃ refrigerant transfer activities represent the “unloading” of those materials from railcars into storage tanks at SPM. Additionally, Shell proposes to revise the condition to correctly identify the refrigerant referenced in the condition as C₃ refrigerant rather than C₃₊ refrigerant. • Liquid loading, C₃₊, ~~and liquid unloading~~, butene, isopentane, isobutane, and C₃₊ refrigerant; controlled by pressurized transfer with vapor balance and low-leak couplings.
C. Site Level Plan Approval Requirements	-	Site Level	# 030, seventeenth bullet	Shell proposes to revise the condition as indicated below because SPM references the Spent Caustic Vent Incinerator as the SCTO. Additionally, Shell proposes to revise the SCTO’s firing rate referenced in the condition so that it more closely matches the SCTO’s as-built firing rate capability. • One (1) recovered oil, one (1) spent caustic, and two (2) equalization wastewater storage tanks, 23,775 to 878,000 gallon capacities; controlled by internal floating roofs (IFR) and vapor capture routed to the ~~Spent Caustic Vent incinerator SCTO, 10.7 11.07~~ MMBtu/hr.
C. Site Level Plan Approval Requirements	-	Site Level	# 030, eighteenth bullet	Shell proposes to revise the condition as indicated below so that the storage tank capacities referenced in the condition more closely match the as-built capacities of the storage tanks. Additionally, Shell proposes to revise the condition to more accurately represent SPM’s header systems, as previously discussed in more detail in Section 1.6. • One (1) light gasoline, and two (2) hexene storage tanks; ~~85,856 152,000 and 607,596 802,000~~ gallon capacities; controlled by IFR and vapor capture routed to the ~~LP System~~ CVTO Header System or MPGF CVTO Trip Header.

Plan Approval Application
Shell Polymers Monaca

Section	ID/Name	Description	Condition	Reconciliation
C. Site Level Plan Approval Requirements	-	Site Level	# 030, nineteenth bullet	Shell proposes to revise the condition as indicated below so that the storage tank capacities referenced in the condition more closely match the as-built capacities of the storage tanks. Additionally, Shell proposes to revise the condition to more accurately represent SPM's header systems, as previously discussed in more detail in Section 1.6. Two (2) pyrolysis fuel oil storage tanks; ~~85,856~~ 127,000 gallon capacity; controlled by vapor capture routed to the ~~LP System~~ CVTO Header System or MPGF CVTO Trip Header.
C. Site Level Plan Approval Requirements	-	Site Level	# 030, twentieth bullet	Shell proposes to revise the condition as indicated below so that the storage tank capacities referenced in the condition more closely match the as-built capacities of the storage tanks. Additionally, the storage tanks do not vent to carbon canisters due to the low vapor pressure of diesel, as authorized by RFD 8799. Miscellaneous storage tanks, diesel fuel, ~~500 to 1,849 to 18,000~~ gallon capacities; ~~controlled by carbon canisters.~~
C. Site Level Plan Approval Requirements	-	Site Level	# 033	Shell proposes to remove the condition as indicated below because the condition will not be applicable to the plan approval that DEP issues to Shell in response to this application. The initial inspection of equipment contained within PA-04-00740B has been completed. ~~Upon completion of the Initial Operating Permit Inspection and determination by the Department that the source(s) covered by this Plan Approval and Plan Approval PA-04-00740B are in compliance with all conditions of the Plan Approvals the Owner/Operator shall submit a Title V Operating Permit application for this Facility.~~
C. Site Level Plan Approval Requirements	-	Site Level	# 035	Shell proposes to remove the condition as indicated below because the condition will not be applicable to the plan approval that DEP issues to Shell in response to this application. ~~The Owner/Operator shall conduct an inhalation risk assessment for the Facility based upon the final as-built design parameters of the air contamination sources. The inhalation risk assessment shall be conducted in accordance with the protocol previously submitted to the Department on January 7, 2015, which has already been approved. The inhalation risk assessment shall be submitted to the Department within 180 days of product in tank (commercial product production).~~
C. Site Level Plan Approval Requirements	-	Site Level	# 036	Shell proposes to remove the condition as indicated below because the condition will not be applicable to the plan approval that DEP issues to Shell in response to this application. ~~This Plan Approval is for "as-built" changes in design and construction and allows the continued construction and temporary operation of a petrochemicals complex by Shell Chemical Appalachia LLC to be located in Potter and Center Townships, Beaver County.~~

Plan Approval Application
Shell Polymers Monaca

Section	ID/Name	Description	Condition	Reconciliation
C. Site Level Plan Approval Requirements	-	Site Level	# 038	Shell proposes to revise the condition as indicated below because the proposed potential to emit calculation reconciliations and WWTP Permanent Controls Project result in changes in the ERC amounts required for the initial construction of SPM. These ERC requirement changes are discussed in Section 3.1.1.1 herein. <i>The Owner/Operator shall secure ~~379 446~~ tons of NOx, ~~612 513~~ tons of VOC, and ~~164 171~~ tons of PM2.5 ERCs. ERCs shall be properly generated, certified by the Department and processed through the registry in accordance with 25 Pa. Code §127.206(d)(1). Upon transfer, the Owner/Operator shall provide the Department with documentation clearly specifying the details of the ERC transaction. This facility may not commence operation until the required emissions reductions are certified and registered by the Department. All required ERCs have been secured by the Owner/Operator and incorporated into this Plan Approval in accordance with 25 Pa. Code §127.208(2).</i>
C. Site Level Plan Approval Requirements	-	Site Level	# 043	Shell proposes to revise the condition as indicated below to document that the referenced surplus PM_{2.5} and NOx ERCs have expired. <i>The Owner/Operator has secured 34.10 tons of PM2.5, 64 tons of VOC, and 211 tons of NOx ERCs from the shutdown of the Monaca Zinc Smelter in a transfer from Horsehead Corporation to Shell Chemical Appalachia LLC. Amounts of 8.78 tons of PM2.5 ERCs, 64 tons of VOC ERCs, and 13.4 tons of NOx ERCs have been applied to this Plan Approval and are no longer subject to expiration under 25 Pa. Code §127.206(f) except as specified in §127.206(g) as long as they remain in this Plan Approval. Amounts of 25.32 tons of PM2.5 ERCs and 197.6 tons of NOx ERCs ~~that remained secured by Shell but are were not applied to this Plan Approval because they would exceed the total emissions offsetting requirement of this Plan Approval. Expiration of these ERCs remains expired~~ April 26, 2024.</i>
D. Source Level Plan Approval Requirements	104	Cogeneration Plant Cooling Tower	# 002	Shell proposes to revise the condition as indicated below so that the cooling water flow rate referenced in the condition more closely matches the as-built cooling water flow rate capability of the Cogeneration Plant Cooling Tower. <i>Maximum designed water circulation rate through the ~~cogen cooling tower~~ Cogeneration Plant Cooling Tower shall not exceed ~~4,443,360~~ 7,200,000 gallons per hour.</i>

Section	ID/Name	Description	Condition	Reconciliation																
D. Source Level Plan Approval Requirements	104	Cogeneration Plant Cooling Tower	# 004	Shell proposes to revise the condition as indicated below so that the TDS and conductivity testing that are performed on the cooling water that circulates through the Cogeneration Plant Cooling Tower are more accurately described in the condition. <i>The Owner/Operator shall perform TDS ~~and electrical conductivity~~ testing upon the ~~cogen cooling tower~~ Cogeneration Plant Cooling Tower water according to ASTM Methods D5907-13 ~~and D5391-14 (or other methods deemed acceptable by the Department)~~ and correlate the results with an online conductivity analyzer. Samples and/or measurements ~~for both tests~~ are required to be performed under identical operating conditions, at a point which is representative of the water being evaporated to the atmosphere, ~~and over the same time frame as applicable to each test method~~. A factor shall be derived from test results correlating TDS and electrical conductivity such that TDS may be approximated by ~~future~~ electrical conductivity measurements. Initial testing is required within 180 days of startup of the cooling towers or on an alternative schedule as approved by the Department. Subsequent TDS and electrical conductivity 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.</i>																
D. Source Level Plan Approval Requirements	104	Cogeneration Plant Cooling Tower	# 005	Shell proposes to revise the condition as indicated below so that the TDS and conductivity monitoring that are performed on the cooling water that circulates through the Cogeneration Plant Cooling Tower are more accurately described in the condition. <i>The Owner/Operator shall, ~~at a minimum of once per month, calculate TDS for the cogen cooling tower water. TDS shall be calculated by measuring electrical conductivity according to ASTM Method D5391-14 (or other method deemed acceptable by the Department) and multiplying the result by the correlation factor derived during the most recent simultaneous TDS and electrical conductivity test~~ calculate TDS via continuous online conductivity analyzer readings correlated to TDS as approved by the Department.</i>																
D. Source Level Plan Approval Requirements	107	Natural Gas-Fired Emergency Generator Engines (2)	# 002	Shell proposes to revise the condition as indicated below because the 113-bhp natural gas-fired emergency generator engine referenced in the condition is not at SPM. <i>The natural gas-fired emergency generator engines 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)</i> <i>Emission standards (g/HP-hr)</i> <table><tr><td>Engine Size</td><td>NOx</td><td>VOC</td><td>CO</td></tr><tr><td>158 hp</td><td>2.0</td><td>1.0</td><td>4.0</td></tr><tr><td>~~113 hp~~</td><td>~~5.79*~~</td><td>~~387~~</td><td></td></tr><tr><td>50 hp</td><td>5.39*</td><td></td><td>387</td></tr></table> <i>* The emission standards are in terms of NOx + VOC.</i>	Engine Size	NOx	VOC	CO	158 hp	2.0	1.0	4.0	~~113 hp~~	~~5.79*~~	~~387~~		50 hp	5.39*		387
Engine Size	NOx	VOC	CO																	
158 hp	2.0	1.0	4.0																	
~~113 hp~~	~~5.79*~~	~~387~~																		
50 hp	5.39*		387																	

Section	ID/Name	Description	Condition	Reconciliation
D. Source Level Plan Approval Requirements	202	Polyethylene Manufacturing Lines	# 010	Shell proposes to revise the condition as indicated below to more accurately represent SPM's header systems, as previously discussed in more detail in Section 1.6, and the multiple headers that may receive the referenced vent streams. <i>Compressor seal gas vents; intermittent VOC process vents; and startup, shutdown, and maintenance gases associated with the gas phase polyethylene manufacturing lines shall be routed to the HP <u>Header System</u>, <u>CVTO Header System</u>, <u>MPGF CVTO Trip Header</u>, or <u>MPGF PE Units 1/2 Episodic Vent Header</u>. Emergency and malfunction event gases shall be captured and routed to the HP <u>Header System</u>, <u>CVTO Header System</u>, <u>MPGF CVTO Trip Header</u>, or <u>MPGF PE Units 1/2 Episodic Vent Header</u> as practicable. Hydrocarbon-containing equipment shall be drained, depressurized, and purged with nitrogen to the HP <u>Header System</u>, <u>CVTO Header System</u>, <u>MPGF CVTO Trip Header</u>, or <u>MPGF PE Units 1/2 Episodic Vent Header</u> prior to being opened to the atmosphere.</i>
D. Source Level Plan Approval Requirements	202	Polyethylene Manufacturing Lines	# 013	Shell proposes to revise the condition as indicated below to more accurately represent SPM's header systems, as previously discussed in more detail in Section 1.6, and the multiple headers that may receive the referenced vent streams. <i>Compressor seal gas vents; intermittent VOC process vents; and startup, shutdown, and maintenance gases associated with the gas phase polyethylene manufacturing lines shall be routed to the HP <u>Header System</u>, <u>CVTO Header System</u>, <u>MPGF CVTO Trip Header</u>, or <u>MPGF PE Units 1/2 Episodic Vent Header</u>. Emergency and malfunction event gases shall be captured and routed to the HP <u>Header System</u>, <u>CVTO Header System</u>, <u>MPGF CVTO Trip Header</u>, or <u>MPGF PE Units 1/2 Episodic Vent Header</u> as practicable. Hydrocarbon-containing equipment shall be drained, depressurized, and purged with nitrogen to the HP <u>Header System</u>, <u>CVTO Header System</u>, <u>MPGF CVTO Trip Header</u>, or <u>MPGF PE Units 1/2 Episodic Vent Header</u> prior to being opened to the atmosphere.</i>

Section	ID/Name	Description	Condition	Reconciliation
D. Source Level Plan Approval Requirements	203	Process Cooling Tower	# 005	Shell proposes to revise the condition as indicated below so that the TDS and conductivity testing that are performed on the cooling water that circulates through the Process Cooling Tower are more accurately described in the condition. <i>The Owner/Operator shall perform TDS ~~and electrical conductivity~~ testing upon the process cooling tower water according to ASTM Methods D5907-13 ~~and D5391-14 (or other methods deemed acceptable by the Department)~~ and correlate the results with an online conductivity analyzer. Samples and/or measurements for both tests are required to be performed under identical operating conditions, at a point which is representative of the water being evaporated to the atmosphere, ~~and over the same time frame as applicable to each test method.~~ A factor shall be derived from test results correlating TDS and electrical conductivity such that TDS may be approximated by future electrical conductivity measurements. Initial testing is required within 180 days of startup of the cooling towers or on an alternative schedule as approved by the Department. Subsequent TDS and electrical conductivity 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.</i>
D. Source Level Plan Approval Requirements	203	Process Cooling Tower	# 006	Shell proposes to revise the condition as indicated below so that the TDS and conductivity monitoring that are performed on the cooling water that circulates through the Process Cooling Tower are more accurately described in the condition. <i>The Owner/Operator shall, ~~at a minimum of once per month, calculate TDS for the process cooling tower water. TDS shall be calculated by measuring electrical conductivity according to ASTM Method D5391-14 (or other method deemed acceptable by the Department) and multiplying the result by the correlation factor derived during the most recent simultaneous TDS and electrical conductivity test calculate TDS via continuous online conductivity analyzer readings correlated to TDS as approved by the Department.~~</i>
D. Source Level Plan Approval Requirements	204	CVTO Header System	# 002	Shell proposes to revise the condition as indicated below because SPM references the LP Incinerator as the CVTO. Additionally, Shell proposes to reference the CVTO's combustion pollutant emission limitations on a lb/hr basis rather than a lb/MMBtu basis to avoid firing rate intensity biases that are associated with a lb/MMBtu limitation. Specifically, operations at low firing rates may result in lb/MMBtu ratios that are biased high because of the lower firing rate divisor value even though lb/hr emission rates are well below authorized amounts. <i>Emissions from the ~~LP incinerator~~ CVTO shall not exceed the following:</i> a. NOx - ~~0.068 lb/MMBtu~~ 13.43 lb/hr b. CO - ~~0.0824 lb/MMBtu~~ 16.27 lb/hr c. PM10 - ~~0.0075 lb/MMBtu~~ 1.47 lb/hr d. PM2.5 - ~~0.0075 lb/MMBtu~~ 1.47 lb/hr

Section	ID/Name	Description	Condition	Reconciliation
D. Source Level Plan Approval Requirements	204	CVTO Header System	# 008	Shell proposes to remove the condition as indicated below because the MPGF is connected to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header, not the CVTO Header System. Shell's proposed revisions to the plan approval's sources to more accurately represent SPM's header systems are discussed in more detail in Section 1.6 herein. However, Shell expects DEP to include applicable MPGF requirements in plan approval conditions assigned to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header. Shell has documented the monitoring, testing, reporting, recordkeeping, and work practice requirements applicable to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header in Appendix A. ~~Monitoring for compliance with the 98% destruction efficiency requirement for the MPGF shall be performed in accordance with 40 CFR §63.987(c). Operating parameter monitoring shall include flame detection at a minimum.~~
D. Source Level Plan Approval Requirements	204	CVTO Header System	# 009	Shell proposes to remove the condition as indicated below because the MPGF is connected to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header, not the CVTO Header System. Shell's proposed revisions to the plan approval's sources to more accurately represent SPM's header systems are discussed in more detail in Section 1.6 herein. However, Shell expects DEP to include applicable MPGF requirements in plan approval conditions assigned to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header. Shell has documented the monitoring, testing, reporting, recordkeeping, and work practice requirements applicable to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header in Appendix A. ~~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).~~
D. Source Level Plan Approval Requirements	204	CVTO Header System	# 010	Shell proposes to remove the condition as indicated below because the MPGF is connected to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header, not the CVTO Header System. Shell's proposed revisions to the plan approval's sources to more accurately represent SPM's header systems are discussed in more detail in Section 1.6 herein. However, Shell expects DEP to include applicable MPGF requirements in plan approval conditions assigned to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header. Shell has documented the monitoring, testing, reporting, recordkeeping, and work practice requirements applicable to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header in Appendix A. ~~Net heating value of the combustion zone gas at the MPGF 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.~~

Section	ID/Name	Description	Condition	Reconciliation
D. Source Level Plan Approval Requirements	204	CVTO Header System	# 011	Shell proposes to remove the condition as indicated below because the MPGF is connected to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header, not the CVTO Header System. Shell's proposed revisions to the plan approval's sources to more accurately represent SPM's header systems are discussed in more detail in Section 1.6 herein. However, Shell expects DEP to include applicable MPGF requirements in plan approval conditions assigned to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header. Shell has documented the monitoring, testing, reporting, recordkeeping, and work practice requirements applicable to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header in Appendix A. ~~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.~~
D. Source Level Plan Approval Requirements	204	CVTO Header System	# 012	Shell proposes to remove the condition as indicated below because the MPGF is connected to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header, not the CVTO Header System. Shell's proposed revisions to the plan approval's sources to more accurately represent SPM's header systems are discussed in more detail in Section 1.6 herein. However, Shell expects DEP to include applicable MPGF requirements in plan approval conditions assigned to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header. Shell has documented the monitoring, testing, reporting, recordkeeping, and work practice requirements applicable to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header in Appendix A. ~~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.~~
D. Source Level Plan Approval Requirements	204	CVTO Header System	# 016	Shell proposes to remove the condition as indicated below because the MPGF is connected to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header, not the CVTO Header System. Shell's proposed revisions to the plan approval's sources to more accurately represent SPM's header systems are discussed in more detail in Section 1.6 herein. However, Shell expects DEP to include applicable MPGF requirements in plan approval conditions assigned to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header. Shell has documented the monitoring, testing, reporting, recordkeeping, and work practice requirements applicable to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header in Appendix A. ~~The MPGF shall be equipped with automated controls for control of the supplemental gas flow rate to the flare.~~

Section	ID/Name	Description	Condition	Reconciliation
D. Source Level Plan Approval Requirements	204	CVTO Header System	# 017	Shell proposes to remove the condition as indicated below because the MPGF is connected to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header, not the CVTO Header System. Shell's proposed revisions to the plan approval's sources to more accurately represent SPM's header systems are discussed in more detail in Section 1.6 herein. However, Shell expects DEP to include applicable MPGF requirements in plan approval conditions assigned to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header. Shell has documented the monitoring, testing, reporting, recordkeeping, and work practice requirements applicable to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header in Appendix A. ~~The Owner/Operator shall minimize flaring resulting from startups, shutdowns, and unforeseeable events by operating 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 and LP Systems 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 and LP Systems 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 and LP Systems determined in accordance with the provisions of 40 CFR §60.103a(a)(4).~~

Section	ID/Name	Description	Condition	Reconciliation
D. Source Level Plan Approval Requirements	204	CVTO Header System	# 018	Shell proposes to remove the condition as indicated below because the MPGF is connected to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header, not the CVTO Header System. Shell's proposed revisions to the plan approval's sources to more accurately represent SPM's header systems are discussed in more detail in Section 1.6 herein. However, Shell expects DEP to include applicable MPGF requirements in plan approval conditions assigned to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header. Shell has documented the monitoring, testing, reporting, recordkeeping, and work practice requirements applicable to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header in Appendix A. ~~The Owner/Operator shall conduct a root cause analysis within 45 days after any startup flaring event, shutdown flaring event, or unforeseeable flaring event. 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 analyses 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, 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.~~

Section	ID/Name	Description	Condition	Reconciliation
D. Source Level Plan Approval Requirements	204	CVTO Header System	# 019	Shell proposes to remove the condition as indicated below because the MPGF is connected to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header, not the CVTO Header System. Shell's proposed revisions to the plan approval's sources to more accurately represent SPM's header systems are discussed in more detail in Section 1.6 herein. However, Shell expects DEP to include applicable MPGF requirements in plan approval conditions assigned to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header. Shell has documented the monitoring, testing, reporting, recordkeeping, and work practice requirements applicable to the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header in Appendix A. Moreover, when DEP assigns the below condition to the three MPGF headers, Shell proposes for the condition to be written to clarify that i) the NHV_{cz} limitation only applies when VOC-containing waste gas is routed through the header, ii) the NHV_{cz} calculation starts with the first 15-minute block that includes a full 15 minutes of VOC-containing waste gas being routed through the header, iii) compliance with the NHV_{cz} limitation starts with the first full three-hour rolling average, and iv) perimeter assist air is not included in the NHV_{cz} calculation. ~~Net heating value of the combustion zone gas at the MPGF header shall equal or exceed 500 Btu/scf on a three hour rolling average, calculated every 15 minutes.~~
D. Source Level Plan Approval Requirements	205	High Pressure (HP) Header System	# 005	Shell proposes to revise the condition as indicated below to streamline the flare monitoring and work practice requirements applicable to the TEGF A, TEGF B, and HP Elevated Flare that are connected to the HP Header System, while ensuring these three flares are monitored and operated in accordance with EPA's latest flare monitoring and performance demonstration requirements. The TEGF A, TEGF B, and HP Elevated Flare are not otherwise subject to 40 CFR 60.18(c) through (f) or 40 CFR 63.11(b) flare monitoring and work practice requirements, but they are subject to EPA's more recently promulgated and comprehensive flare monitoring and work practice requirements under 40 CFR 63 Subpart YY, 40 CFR 63 Subpart FFFF, 40 CFR 63.670, and 40 CFR 63.671. <i>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)~~ 40 CFR 63 Subpart YY, 40 CFR 63 Subpart FFFF, 40 CFR 63.670, and 40 CFR 63.671.</i>

Section	ID/Name	Description	Condition	Reconciliation
D. Source Level Plan Approval Requirements	206	Spent Caustic Vent Header System	# 001	Shell proposes to revise the condition as indicated below because SPM references the Spent Caustic Vent Incinerator as the SCTO. Additionally, Shell proposes to reference the SCTO's combustion pollutant emission limitations on a lb/hr basis rather than a lb/MMBtu basis to avoid firing rate intensity biases that are associated with a lb/MMBtu limitation. Specifically, operations at low firing rates may result in lb/MMBtu ratios that are biased high because of the lower firing rate divisor value even though lb/hr emission rates are well below authorized amounts. <i>Emissions from the ~~Spent Caustic Vent incinerator~~ SCTO shall not exceed the following:</i> <i>a. NOx - ~~0.068 lb/MMBtu~~ 0.75 lb/hr</i> <i>b. CO - ~~0.0824 lb/MMBtu~~ 0.91 lb/hr</i> <i>c. PM10 - ~~0.0075 lb/MMBtu~~ 0.13 lb/hr</i> <i>d. PM2.5 - ~~0.0075 lb/MMBtu~~ 0.13 lb/hr</i>
D. Source Level Plan Approval Requirements	206	Spent Caustic Vent Header System	# 003	Shell proposes to revise the condition as indicated below because SPM references the Spent Caustic Vent Incinerator as the SCTO. Additionally, Shell proposes to raise the VOC percentage destruction efficiency indicated for the SCTO in the condition to more accurately represent the VOC percentage destruction efficiency that has been demonstrated by the SCTO. <i>The ~~Spent Caustic Vent incinerator~~ SCTO shall be operated to reduce collected VOC emissions by a minimum of 99.9%.</i>
D. Source Level Plan Approval Requirements	206	Spent Caustic Vent Header System	# 006	Shell proposes to revise the condition as indicated below because SPM references the Spent Caustic Vent Incinerator as the SCTO. Additionally, Shell proposes to raise the VOC percentage destruction efficiency indicated for the SCTO in the condition to more accurately represent the VOC percentage destruction efficiency that has been demonstrated by the SCTO. <i>Monitoring for compliance with the 99.9% destruction efficiency requirement for the ~~Spent Caustic Vent incinerator~~ SCTO shall be performed in accordance with 40 CFR §63.985(c). Operating parameter monitoring shall include combustion temperature at a minimum.</i>
D. Source Level Plan Approval Requirements	206	Spent Caustic Vent Header System	# 007	Shell proposes to revise the condition as indicated below because SPM references the Spent Caustic Vent Incinerator as the SCTO. Additionally, Shell proposes to raise the VOC percentage destruction efficiency indicated for the SCTO in the condition to more accurately represent the VOC percentage destruction efficiency that has been demonstrated by the SCTO. <i>The ~~Spent Caustic Vent incinerator~~ 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.</i>

Section	ID/Name	Description	Condition	Reconciliation
D. Source Level Plan Approval Requirements	301	Polyethylene Pellet Material Storage/Handling/Loadout	# 004	Shell proposes to revise the condition as indicated below because reactor grade changes occur at SPM in response to product formulation changes. Therefore, to better sync the condition with SPM's operating changes, Shell prefers to use a reactor grade change at SPM as the basis for measuring the residual VOC content of the polyethylene product rather than a product formulation change. Additionally, Shell proposes to include a mechanism to potentially reduce recurring measurements after compliance is reliably demonstrated. <i>Polyethylene residual VOC content shall be measured no less than once per calendar month and once per ~~product formulation change~~ reactor grade change for each polyethylene manufacturing line. Measurement shall be conducted 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 sampling burden reduction upon written request and approval from the Department.</i>
D. Source Level Plan Approval Requirements	302	Liquid Loadout (Recovered Oil)	# 001	Shell proposes to remove the condition as indicated below because the vapors generated during the loading of recovered oil into trucks are not captured due to the low vapor pressure of recovered oil. This is consistent with the original LAER analysis for low vapor pressure liquids loading and potential to emit calculations ~~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.~~
D. Source Level Plan Approval Requirements	303	Liquid Loadout (Pyrolysis Fuel Oil, Light Gasoline, PE3 Heavies)	# 001	Shell proposes to revise the condition as indicated below to clarify that the pyrolysis fuel oil and light gasoline transfer activities represent the "loading" of those materials into railcars to be transported offsite. Additionally, Shell proposes to revise the condition to document that PE3 heavies is loaded into railcars at SPM. Shell originally planned to blend PE3 heavies into light gasoline. However, PE3 heavies is loaded separately from light gasoline into railcars, and the vapors generated during the loading of PE3 heavies into railcars are collected and routed through a closed system to the CVTO or MPGF, the same as originally planned when the PE3 heavies were to be blended into light gasoline. Thus, Shell proposes to separately identify PE3 heavies in the condition. Lastly, Shell proposes to revise the condition to more accurately represent SPM's header systems, as previously discussed in more detail in Section 1.6. <i>Vapors displaced or generated by the ~~loading~~ of pyrolysis fuel oil, or light gasoline, and PE3 heavies shall be captured and routed through a closed system to the ~~LP System~~ CVTO Header System or MPGF CVTO Trip Header.</i>

Section	ID/Name	Description	Condition	Reconciliation
D. Source Level Plan Approval Requirements	304	Liquid Loadout (C3+, Butene, Isopentane, Isobutane, C3 Ref)	# 001	Shell proposes to revise the condition as indicated below to clarify that the C₃₊ transfer activity represents the “loading” of C₃₊ into railcars to be transported offsite, while the butene, isopentane, isobutane, and C₃ refrigerant transfer activities represent the “unloading” of those materials from railcars into storage tanks at SPM. Additionally, Shell proposes to revise the condition as indicated below to correctly identify the refrigerant referenced in the condition as C₃ refrigerant rather than C₃₊ refrigerant. <i>C3+ liquids shall be loaded, and C3+ refrigerant, butene, isopentane, and isobutane shall be unloaded 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 and unloading operations.</i>
D. Source Level Plan Approval Requirements	305	Liquid Loadout (Blended Pitch)	# 001	Shell proposes to revise the condition as indicated below because SPM refers to coke residue/tar as blended pitch, and the vapors generated during the “loading” of blended pitch into trucks are alternatively routed to the HP Header System if they are not routed back to the process. <i>Vapors displaced or generated by the loading of coke residue/tar blended pitch shall be captured and routed through a closed system back to the process or to the HP Header System.</i>
D. Source Level Plan Approval Requirements	404	Storage Tanks (Hexene)	# 001	Shell proposes to remove the condition as indicated below because the Hexene Storage Tanks are assigned to a miscellaneous organic chemical manufacturing process unit (MCPU) and comply with 40 CFR 63 Subpart FFFF Group 1 storage tank requirements. Therefore, pursuant to the overlap provisions at 40 CFR 63.2535(c) in 40 CFR 63 Subpart FFFF, the Hexene Storage Tanks are not required to comply with 40 CFR 60 Subpart Kb. <i>The Owner/Operator shall comply with the applicable storage tank testing and procedures specified in 40 CFR §60.113b(a) and/or (c) or (d).</i>
D. Source Level Plan Approval Requirements	404	Storage Tanks (Hexene)	# 002	Shell proposes to remove the condition as indicated below because the Hexene Storage Tanks are assigned to an MCPU and comply with 40 CFR 63 Subpart FFFF Group 1 storage tank requirements. Therefore, pursuant to the overlap provisions at 40 CFR 63.2535(c) in 40 CFR 63 Subpart FFFF, the Hexene Storage Tanks are not required to comply with 40 CFR 60 Subpart Kb. <i>The Owner/Operator shall comply with the applicable storage tank monitoring requirements specified in 40 CFR §60.116b.</i>
D. Source Level Plan Approval Requirements	404	Storage Tanks (Hexene)	# 003	Shell proposes to remove the condition as indicated below because the Hexene Storage Tanks are assigned to an MCPU and comply with 40 CFR 63 Subpart FFFF Group 1 storage tank requirements. Therefore, pursuant to the overlap provisions at 40 CFR 63.2535(c) in 40 CFR 63 Subpart FFFF, the Hexene Storage Tanks are not required to comply with 40 CFR 60 Subpart Kb. <i>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).</i>

Section	ID/Name	Description	Condition	Reconciliation
D. Source Level Plan Approval Requirements	404	Storage Tanks (Hexene)	# 006	Shell proposes to remove the condition as indicated below because the Hexene Storage Tanks are assigned to an MCPU and comply with 40 CFR 63 Subpart FFFF Group 1 storage tank requirements. Therefore, pursuant to the overlap provisions at 40 CFR 63.2535(c) in 40 CFR 63 Subpart FFFF, the Hexene Storage Tanks are not required to comply with 40 CFR 60 Subpart Kb. ~~The Owner/Operator shall comply with the applicable storage tank VOC standards specified in 40 CFR §60.112b(a).~~
D. Source Level Plan Approval Requirements	404	Storage Tanks (Hexene)	# 007	Shell proposes to remove the condition as indicated below because the Hexene Storage Tanks are assigned to an MCPU and comply with 40 CFR 63 Subpart FFFF Group 1 storage tank requirements. Therefore, pursuant to the overlap provisions at 40 CFR 63.2535(c) in 40 CFR 63 Subpart FFFF, the Hexene Storage Tanks are not required to comply with 40 CFR 60 Subpart Kb. ~~The two hexene storage tanks are subject to the requirements of 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.~~
D. Source Level Plan Approval Requirements	404	Storage Tanks (Hexene)	# 008	Shell proposes to remove the condition as indicated below because the Hexene Storage Tanks are assigned to an MCPU and comply with 40 CFR 63 Subpart FFFF Group 1 storage tank requirements. Therefore, pursuant to the overlap provisions at 40 CFR 63.2535(c) in 40 CFR 63 Subpart FFFF, the Hexene Storage Tanks are not required to comply with 40 CFR 60 Subpart Kb. ~~All terms used in 40 CFR Part 60 Subpart Kb shall have the meaning given in 40 CFR §60.111b or else in the Clean Air Act and 40 CFR Part 60 Subpart A.~~
D. Source Level Plan Approval Requirements	405	Storage Tanks (Misc Pressurized/Refrigerated)	# 001	Shell proposes to revise the condition as indicated below to correctly identify the refrigerant referenced in the condition as C₃ refrigerant rather than C₃₊ refrigerant. Additionally, Shell proposes to include PE3 heavies in the list of materials that are stored in pressurized and/or refrigerated storage tanks with no uncontrolled vent directed to the atmosphere because PE3 heavies was mistakenly omitted from the list. ~~Ethylene, C₃+, C₃+ refrigerant, butene, isopentane, isobutane, aqueous ammonia, dimethyl disulfide, and methanol, and PE3 heavies shall be stored in pressurized and/or refrigerated storage tanks with no uncontrolled vent directed to the atmosphere.~~
D. Source Level Plan Approval Requirements	405	Storage Tanks (Misc Pressurized/Refrigerated)	# 002	Shell proposes to revise the condition as indicated below because SPM's pressurized storage tanks vent to the HP Header System, while the Refrigerated Ethylene Storage Tank at SPM vents to the MPGF Ethylene Tank Header. ~~Emergency Pressure control relief vents for pressurized or refrigerated storage tanks shall vent to the HP Header System and pressure control relief vents for the Refrigerated Ethylene Storage Tank shall vent to the MPGF Ethylene Tank Header.~~

Section	ID/Name	Description	Condition	Reconciliation
D. Source Level Plan Approval Requirements	405	Storage Tanks (Misc Pressurized/Refrigerated)	-	Shell proposes that DEP include applicable 40 CFR 60 Subpart Kb requirements for the Refrigerated Ethylene Storage Tank in the plan approval because the storage tank is a fixed roof storage vessel affected facility under the subpart that vents to a closed-vent system and control device (MPGF Ethylene Tank Header and MPGF) to comply with the subpart. Below is a summary of the 40 CFR 60 Subpart Kb requirements that are applicable to the Refrigerated Ethylene Storage Tank. - 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. [40 CFR 60.112b(b)(1) and 60.112b(a)(3)(i)]. - 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). [40 CFR 60.112b(b)(1) and 60.112b(a)(3)(ii)]. - 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)]. - 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)].
D. Source Level Plan Approval Requirements	406	Storage Tanks (Diesel Fuel > 150 Gallons)	# 001	Shell proposes to remove the condition as indicated below because the storage tanks do not vent to carbon canisters due to the low vapor pressure of diesel, as authorized by RFD 8799. ~~Diesel fuel storage tank vents shall be controlled by carbon canisters designed to reduce VOC emissions by a minimum of 95%.~~
D. Source Level Plan Approval Requirements	406	Storage Tanks (Diesel Fuel > 150 Gallons)	# 002	Shell proposes to remove the condition as indicated below because the storage tanks do not vent to carbon canisters due to the low vapor pressure of diesel, as authorized by RFD 8799. ~~The Owner/Operator shall monitor carbon canisters in accordance with the manufacturer's recommendations to ensure that the adsorption media is regenerated or replaced prior to breakthrough. Breakthrough shall be defined as a VOC reading above background for a single canister and greater than or equal to 50 ppmv for all canisters operated as part of a primary and secondary system.~~
E. Source Group Restrictions	G01	Ethane Cracking Furnaces	# 001	Shell proposes to revise the condition as indicated below due to the proposed potential to emit calculation reconciliations for the ethane cracking furnaces. GHG emissions from the ethane cracking furnaces shall not exceed ~~1,048,670~~ 1,112,989 tons of CO₂e from all furnaces combined in any consecutive 12-month period. Compliance with this limit may be determined through CO₂e calculations in accordance with 40 CFR §98.34(b)(3) or utilizing an in-line gas chromatograph.

Section	ID/Name	Description	Condition	Reconciliation
E. Source Group Restrictions	G01	Ethane Cracking Furnaces	# 006	Shell proposes to revise the condition as indicated below to document the averaging period basis that has been approved by DEP to demonstrate compliance with the ammonia slip emission limitation for the ethane cracking furnaces. <i>NH3 emissions from each of the ethane cracking furnaces shall not exceed 10 ppmvd at 3% O2 <u>on a daily average</u>.</i>

Section	ID/Name	Description	Condition	Reconciliation
E. Source Group Restrictions	G01	Ethane Cracking Furnaces	# 008	Shell proposes to revise the condition as indicated below to allow a lower ethane cracking furnace minimum turndown hydrocarbon feed rate of 29 metric tons per hour, which is within the original design capabilities of the furnaces and has been identified and demonstrated through engineering study, simulation, and trial run without requiring any new equipment or physical changes to existing equipment. The ethane cracking furnaces can sustain stable operation at a hydrocarbon feed rate of 29 metric tons per hour, and this lower normal operation threshold for the furnaces will provide a wider range of balanced operations between SPM's ethylene manufacturing unit and polyethylene manufacturing units, which in turn will support efforts to minimize the flaring that occurs when the ethylene manufacturing unit must be shut down due to material balance misalignments between the ethylene manufacturing unit and polyethylene manufacturing units. Shell is not proposing any increases in ethane cracking furnace allowable emission rates in association with this revision. Specifically, for NOx, the ethane cracking furnaces will be subject to the more stringent 0.015 lb NOx/MMBtu, 1-hour and 0.010 lb NOx/MMBtu, 12-month rolling average emission limitations during the proposed lower operating rate normal operations rather than the 6.2 lb/hr allowable NOx emission rate that would apply during feed in and feed out operations at this lower operating rate. <i>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:</i> • <i>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.</i> • <i>Hot Steam Standby – When the furnace COT is greater than or equal to 750°C, below 50% of the maximum allowable firing rate, no hydrocarbon feed is being charged to the furnace, and not operating in decoking, startup, or shutdown mode.</i> • <i>Feed In – Beginning when hydrocarbon feed is introduced to the furnace and ending when the hydrocarbon feed reaches ~~43~~ 29 metric tons per hour.</i> • <i>Normal – When the furnace is at or above a hydrocarbon feed rate of ~~43~~ 29 metric tons per hour.</i> • <i>Feed Out – Beginning when the furnace drops below a hydrocarbon feed rate of ~~43~~ 29 metric tons per hour and ending when hydrocarbon feed is isolated from the furnace.</i> • <i>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.</i> • <i>Decoking – Beginning when air is introduced to the furnace for the purpose of decoking and ending when decoking air is removed.</i>

Section	ID/Name	Description	Condition	Reconciliation
E. Source Group Restrictions	G01	Ethane Cracking Furnaces	# 010	Shell proposes to revise the condition as indicated below to provide firing rate flexibility during the startup of an ethane cracking furnace. For background, the plan approval defines “startup” for an ethane cracking furnace as follows: <i>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.</i> The proposed condition revision will allow an ethane cracking furnace to operate in compliance in a scenario where the furnace’s firing rate exceeds 25% of the maximum allowable firing rate of the furnace, or 155 MMBtu/hr, but the furnace’s COT has not yet reached 750°C, the end point defined for a startup, provided the furnace’s NOx emission rate does not exceed 6.2 lb/hr, which is the allowable NOx emission rate for a furnace during long-term normal operations. Shell is not proposing any increases in ethane cracking furnace allowable emission rates in association with this revision. In fact, the proposed 6.2 lb/hr allowable NOx emission rate for an ethane cracking furnace when it is operating above 25% of its maximum allowable firing rate during a startup is significantly lower than the 31.1 lb/hr allowable NOx emission rate that would otherwise apply during the startup. <i>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. <u>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.</u></i>
E. Source Group Restrictions	G01	Ethane Cracking Furnaces	# 014	Shell proposes to replace the condition’s existing language with the language indicated below to properly document the ammonia slip monitoring methodology that is being used on the ethane cracking furnaces, as approved by DEP. <u>Continuous ammonia slip measurement via in-situ tunable diode laser (TDL) as approved by the Department.</u>
E. Source Group Restrictions	G01	Ethane Cracking Furnaces	# 015	Shell proposes to revise the condition as indicated below because only the inlet temperature of the catalyst bed in the SCR system is used as a setpoint reference for the SCR system’s operations, not the outlet temperature of the catalyst bed. Therefore, it is not necessary to continuously monitor and record the outlet temperature of the catalyst bed in the SCR system. This general understanding is illustrated by DEP’s requirement to monitor only the inlet temperature of the catalyst beds used in the Cogeneration Unit SCR systems. <i>The Owner/Operator shall continuously monitor and record the catalyst bed inlet ~~and outlet~~ temperature for each SCR system.</i>

Section	ID/Name	Description	Condition	Reconciliation
E. Source Group Restrictions	G02	Cogeneration Units	# 003	Shell proposes to revise the condition as indicated below to acknowledge a scenario that can occur when the combustion turbines at SPM are being shut down, which is not properly captured in the shutdown definition currently included in the condition. First, for background, the combustion turbines at SPM must be transitioned out of low NOx firing mode while they are being shut down. During this shutdown process, the transition out of low NOx firing mode can occur prior to the SCR catalyst dropping below its design operating temperature. In this scenario, even though the SCR catalyst is at or above its design operating temperature, the Cogeneration Unit may not be able to comply with the 2 parts per million by volume on a dry basis (ppmvd) @ 15% oxygen emission limitation that would otherwise apply because the NOx concentrations at the inlet of the SCR catalyst would be higher than normal due to the combustion turbine having transitioned out of low NOx mode to complete the shutdown process. Shell is not proposing any increases in Cogeneration Unit allowable emission rates in association with this revision, just the threshold for the start of a shutdown event. The same duration and emission limitations will apply to each Cogeneration Unit shutdown event. <i>NOx emissions from the combustion turbines with duct burners shall not exceed the following:</i> • 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. <i>For purposes of determining compliance with these NOx 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.</i> <i>For purposes of determining compliance with these NOx limits, shutdown is defined as beginning when the ~~SCR catalyst bed drops below its design operating temperature~~ combustion turbine is transitioned out of low NOx firing mode and ending upon removing all fuel from the turbine. <u>Each shutdown event shall not exceed 30 minutes in duration.</u></i>

Section	ID/Name	Description	Condition	Reconciliation
E. Source Group Restrictions	G02	Cogeneration Units	# 005	Shell proposes to revise the condition as indicated below so that the same shutdown definition is used to evaluate applicable short-term CO and NOx emission limitations for the Cogeneration Units. Shell is not proposing any increases in Cogeneration Unit allowable emission rates in association with this revision, just the threshold for the start of a shutdown event. The same duration and emission limitations will apply to each Cogeneration Unit shutdown event. <i>CO emissions from the combustion turbines with duct burners shall not exceed the following:</i> • 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. <i>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.</i> <i>For purposes of determining compliance with these CO limits, shutdown is defined as beginning when the combustion turbine drops below 55% of its baseload operating level and ending when fuel is cut to this unit is transitioned out of low NOx firing mode and ending upon removing all fuel from the turbine. Each shutdown event shall not exceed 30 minutes in duration.</i>
E. Source Group Restrictions	G02	Cogeneration Units	# 008	Shell proposes to revise the condition as indicated below to document the averaging period basis that has been approved by DEP to demonstrate compliance with the ammonia slip emission limitation for the Cogeneration Units. <i>NH3 emissions from each of the combustion turbines with duct burners shall not exceed 5 ppmvd at 15% O2 on a daily average.</i>
E. Source Group Restrictions	G02	Cogeneration Units	# 016	Shell proposes to replace the condition's existing language with the language indicated below to properly document the ammonia slip monitoring methodology that is being used on the Cogeneration Units, as approved by DEP. <u>Continuous ammonia slip measurement via in-situ tunable diode laser (TDL) as approved by the Department.</u>

Section	ID/Name	Description	Condition	Reconciliation
E. Source Group Restrictions	G02	Cogeneration Units	# 027	Shell proposes to remove the condition as indicated below because the three lean premix gas-fired stationary combustion turbines are now subject to 40 CFR 63 Subpart YYYY emission limitation, operating limitation, monitoring, testing, reporting, recordkeeping, and work practice requirements since the removal of the stay of the subpart's standards for new lean premix gas-fired stationary combustion turbines on March 9, 2022. However, Shell expects DEP to add applicable 40 CFR 63 Subpart YYYY emission limitation, operating limitation, monitoring, testing, reporting, recordkeeping, and work practice requirements to the plan approval for the three lean premix gas-fired stationary combustion turbines. Shell has documented the 40 CFR 63 Subpart YYYY monitoring, testing, reporting, recordkeeping, and work practice requirements applicable to the combustion turbines in Appendix A. ~~The Owner/Operator of lean premix stationary combustion turbines is only required to comply with the initial notification requirements of 40 CFR Part 63 Subpart YYYY as specified in 40 CFR §63.6095.~~
E. Source Group Restrictions	G02	Cogeneration Units	# 035	Shell proposes to remove the condition as indicated below because the three lean premix gas-fired stationary combustion turbines are now subject to 40 CFR 63 Subpart YYYY emission limitation, operating limitation, monitoring, testing, reporting, recordkeeping, and work practice requirements since the removal of the stay of the subpart's standards for new lean premix gas-fired stationary combustion turbines on March 9, 2022. However, Shell expects DEP to add applicable 40 CFR 63 Subpart YYYY emission limitation, operating limitation, monitoring, testing, reporting, recordkeeping, and work practice requirements to the plan approval for the three lean premix gas-fired stationary combustion turbines. Shell has documented the 40 CFR 63 Subpart YYYY monitoring, testing, reporting, recordkeeping, and work practice requirements applicable to the combustion turbines in Appendix A. ~~The three combustion turbines are subject to limited requirements of 40 CFR Part 63 Subpart YYYY—National Emissions Standards for Hazardous Air Pollutants for Stationary Combustion Turbines.~~
E. Source Group Restrictions	G10	Liquid Loadout	# 002	Shell proposes to revise the condition as indicated below to clarify that the specific material transfer activities referenced in the condition represent the "loading" of materials into trucks and railcars to be transported offsite. <i>The Owner/Operator shall monitor for pressure relief valve releases during liquid loadout operations. Records of any pressure relief event shall be maintained onsite and include the following details at a minimum:</i> <i>a. Date and time of the pressure relief event;</i> <i>b. Name and title of the observer;</i> <i>c. Duration of the event;</i> <i>d. Estimated emission rate during the event; and,</i> <i>e. Corrective action taken as a result of the event.</i>

Section	ID/Name	Description	Condition	Reconciliation
H. Miscellaneous	-	-	-	Shell proposes to revise the condition as indicated below because the proposed potential to emit calculation reconciliations result in SPM no longer having the potential to emit 10 tpy or more of n-hexane. <i>This is a major Title V facility for NO_x, CO, PM₁₀, PM_{2.5}, VOC, ~~Hexane~~, Total HAP, and CO_{2e} and as such, actual emissions may equal or exceed the following in any consecutive 12-month period.</i> <i>100.0 tons of NO_x (NITROGEN OXIDES)</i> <i>100.0 tons of CO (CARBON MONOXIDE)</i> <i>100.0 tons of PM-10 (PARTICULATE MATTER < 10 MICRONS)</i> <i>100.0 tons of PM-2.5 (PARTICULATE MATTER < 2.5 MICRONS)</i> <i>50.0 tons of VOC (VOLATILE ORGANIC COMPOUNDS)</i> ~~<i>10.0 tons of HEXANE</i>~~ <i>25.0 tons of ALL HAP COMBINED (HAZARDOUS AIR POLLUTANT)</i> <i>This is a natural minor facility with respect to SO_x and as such, actual emissions cannot equal or exceed the following in any consecutive 12-month period:</i> <i>100.0 tons of SO_x (SULFUR OXIDES)</i>

2.0 PROCESS AND EMISSION SOURCE DESCRIPTIONS

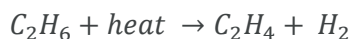
This section presents the process and emission source descriptions for SPM's equipment that is used to convert ethane into ethylene, which is then converted into low density polyethylene and high-density polyethylene (HDPE) pellets that are shipped offsite to plastic product manufacturing facilities. 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-2 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 into ethylene, propylene, methane, hydrogen, carbon, and other byproducts in SPM's seven ethane cracking furnaces, which operate in parallel as pyrolysis reactors. 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 [H₂S]). 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 eventually ends up in SPM's fuel gas system. 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 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 cracking furnaces.
- **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). Tail gas and natural gas are the fuels combusted by the ethane cracking furnaces. The seven ethane cracking furnaces are operated in parallel and have the following operating modes:⁹

- **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 is available to fuel the ethane cracking furnaces.
- **Decoking:** During the ethane cracking mode, coke forms within the radiant tubes of an ethane cracking furnace. Coke buildup eventually leads to high tube wall temperatures requiring decoking of the ethane cracking furnace. Every 30 to 60 days an ethane cracking furnace undergoes decoking, which lasts for approximately 36 hours. The coke buildup is removed from the tubes of an ethane cracking furnace during this mode of operation. Decoking is accomplished by injecting steam into an ethane cracking furnace's radiant tubes while

⁹ "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.

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 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

Methane and VOC emissions may result from equipment leaks in the ethylene manufacturing process area. Processes within the ethylene manufacturing unit with potential for fugitive methane and VOC 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-3 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 2.6.5. 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 the VOC control system. Resin from both purge bins flows to the additive handling and pelletizing section.

2.2.1.5 Additive Handling and Pelletizing

Resin from the reactors 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 particulates. All the vents with VOC containing gases located upstream of and including the product purge bin are directed to the VOC control system. VOC emissions from the vents located downstream of the product purge bin are minimized by maintaining the residual VOC content in the polyethylene resin exiting the product purge bin below 50 parts per million by weight (ppmw). 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 bin 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 bin.

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-4 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.¹⁰ 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.¹¹ 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 HEPA 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, there are two hydrocarbon (mostly diluent) recovery and recycle systems: High Pressure Solvent Recovery (HPSR) and Low Pressure Solvent Recovery (LPSR), as described below. Purified comonomer is introduced with recovered hydrocarbon that is recycled to the reaction section.

- **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

¹⁰ The Ziegler catalyst is purchased in 55-gallon drums.

¹¹ Pyrophoric means that the material can ignite spontaneously in air.

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

- **LPSR:** Polyethylene powder enters the LPSR degasser from the HPSR. The 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 other gas stream is a fresh pure nitrogen stream that is fed at a lower level in the vessel. Degassed polyethylene powder is pneumatically transferred to the additive handling and pelletizing section.

2.3.1.4 Additive Handling and Pelletizing

Virgin 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 particulates. All vent streams located upstream of the LPSR degasser that contain VOC are directed to the VOC control system. Control of VOC emissions resulting from vents located downstream of the degasser is accomplished by maintaining the residual VOC content in the polyethylene pellets below a level of 50 ppmw. In addition to VOC emissions associated with vents, fugitive VOC emissions may result from equipment leaks.

All the vent streams located upstream of the degasser that contain particulates are directed through particulate 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 duct burners and a dedicated 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). The exhaust of each

combustion turbine is equipped with duct burners capable of firing natural gas up to a rated capacity of 234 MMBtu/hr (HHV). Lastly, the HRSGs that are equipped on the exhaust of each combustion turbine-duct burner combination supply steam to two steam turbines rated at 75.6 MWe output each.

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 CO oxidation catalyst. 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 particulates are controlled through engine design. In addition, combustion of natural gas and low sulfur diesel results in low 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

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. Emissions occur from an internal floating roof (IFR) tank 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. Losses from SPM's non-fuel fixed roof storage tanks and IFR tanks are directed to the VOC control system. 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 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. 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 transferred into railcars for transport offsite. The vent gases that result from loading these products are directed to the CVTO or MPGF for control.
- **PE3 Heavies:** The PE3 heavies material is transferred into railcars for transport offsite. The vent gases that result from loading this material are directed to the CVTO or MPGF for control.
- **Recovered Oil:** Recovered oil is transferred into trucks for transport offsite. 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 emissions from loading polyethylene pellets, 2) fugitive emissions from equipment components (e.g., pumps, valves, and connectors) and trucks and railcars, 3) emissions from connecting and disconnecting loading hoses, and 4) combustion emissions from combustion control devices (see Section 2.6.5 for additional information related to the VOC control systems).

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. The cooling water removed from the recirculating cooling water circuit is referenced as "blowdown." SPM directs cooling water blowdown to the WWTP.

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 to the cooling water side of the exchanger and a portion of the VOC contained in the recirculated cooling water volatilizes to the atmosphere when the cooling water passes through the cooling water tower. The VOC emissions from the Process Cooling Tower are controlled by minimizing the VOC level in the cooling water that passes through the tower.

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-5 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
- 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 vent streams generated by the polyethylene manufacturing units, as well as vent streams from storage tanks and loading activities at SPM. As previously discussed, there is one

header system that connects these vent streams to the CVTO, which Shell proposes to reference in the plan approval as the CVTO Header System.

The MPGF is used as a backup control device to the CVTO when it is unavailable. Additionally, the MPGF is used to control specific vent streams from PE Units 1 and 2 and the Refrigerated Ethylene Storage Tank at SPM. As previously discussed, Shell proposes to identify three headers for the MPGF in the plan approval – the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header. The MPGF is a perimeter air-assisted flare.

The SCTO is currently 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, FEOR Tanks, Recovered Oil Storage Tank, and temporary primary treatment vessels in the WWTP. As previously discussed, Shell proposes to control the VOC and organic HAPs contained in the vent streams from the new Wastewater Treatment Vessels by routing their vents to the SCTO for combustion.

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 WWTP

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. Wastewater enters the WWTP and flows through the FEOR Tanks, which are IFR tanks that vent to the SCTO. Oil that rises to the top of the liquid in the FEOR Tanks is skimmed off and flows to the Recovered Oil Storage Tank, which is also an IFR tank that vents to the SCTO. Effluent from the FEOR Tanks currently flows to the following temporary equipment for the removal of additional oils, grease, and VOC: a WEMCO mechanical INF device and an EC-15 hydraulic INF device. The effluents from this temporary equipment and the FEOR Tanks are routed to the Biotreater Aeration Tanks, which also receive WWTP recycle, nutrient additive, and pH adjustment streams. However, after the WWTP Permanent Controls Project, the new Wastewater Treatment Vessels will be integrated with the FEOR Tanks, and specific effluents from these vessels and tanks will be routed to the Biotreater Aeration Tanks. The previously referenced temporary WWTP equipment will be removed after the successful commissioning of the WWTP Permanent Controls Project.

Effluent from the Biotreater Aeration Tanks flows to two Secondary Clarifier Tanks. The overflow stream from the clarifiers is pumped through a sand filter. Clarifier underflow is pumped to a biosludge holding tank that feeds a centrifuge used for concentrating clarifier solids into a cake. Cooling water tower blowdown is pumped directly to the Sand Filter. Effluent from this filter is discharged through an outfall

to the Ohio River. Sand filter backwash is pumped into the Sand Filter Backwash Receiver and then recycled back to the Biotreater Aeration Tanks.

The WWTP is a source of VOC and HAP emissions. However, these emissions are minimized by venting the FEOR Tanks, Recovered Oil Storage Tank, and temporary WWTP equipment referenced above to the SCTO. Additionally, the vents from the new Wastewater Treatment Vessels will be routed to the SCTO for combustion. 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 a leak detection and repair (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 PM_{10} (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

Shell reviewed Pennsylvania and federal (e.g., 40 CFR Parts 60, 61, and 63) environmental regulations to determine which air quality regulations may apply to the WWTP Permanent Controls Project, EMACT Project, and Plan Approval Reconciliations proposed in this application. This section addresses the Pennsylvania and federal air quality regulations that Shell determined are potentially applicable to the WWTP Permanent Controls Project, EMACT Project, and Plan Approval Reconciliations.

The Plan Approval Application forms in Appendix A, including the monitoring, testing, reporting, recordkeeping, and work practice standard requirements outlined in those forms, provide additional regulatory applicability necessary to support this application. A Combustion Unit or Processes Plan Approval Application form is included in Appendix A for the following combustion units and processes at SPM:

- Each combustion unit and process for which a potential to emit calculation reconciliation is proposed;
- Each combustion unit and process that would experience a physical change or change in the method of operation due to the WWTP Permanent Controls Project (i.e., WWTP) or EMACT Project (i.e., TEGF A and TEGF B);
- Each process that is proposed to be separately identified in the plan approval (i.e., MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header); and
- Each process that is proposed to have an additional material specifically identified in the plan approval (i.e., Liquid Loadout (Pyrolysis Fuel Oil, Light Gasoline, PE3 Heavies)).

3.1 New Source Review (NSR)

NSR is a preconstruction permitting program applicable to the construction of certain new stationary sources and specific physical and operational changes at certain existing stationary sources. The primary purpose of NSR is to support the attainment and maintenance of national ambient air quality standards (NAAQS) across the country for the following “criteria pollutants:”

- CO
- NO₂
- SO₂
- PM₁₀
- PM_{2.5}
- Ozone (NO_x and VOC)
- Lead.

There are two distinct permitting programs for physical and operational changes that do not qualify for a minor NSR permit. The two programs are NNSR and PSD, with the applicable program for a stationary source dependent on the ambient air quality in the geographic area in which the source is to be located.

NNSR permitting requirements apply to a stationary source for each criteria pollutant for which the geographic area in which the source is to be located has been designated pursuant to section 107 of the Clean Air Act (CAA) as a “nonattainment area” for not attaining relevant NAAQS. Alternatively, PSD permitting requirements apply to a stationary source for each criteria pollutant for which the geographic area in which the source is to be located has been designated as attainment or unclassifiable with respect to NAAQS. PSD permitting requirements also apply to a stationary source regardless of location for each regulated NSR pollutant that is not a criteria pollutant (e.g., fluorides, H₂S, and sulfuric acid mist). Because NNSR and PSD requirements are pollutant-specific, a stationary source may be subject to NNSR requirements for one or more regulated NSR pollutants and PSD requirements for all other regulated NSR pollutants as part of a single NSR permitting effort.

Shell has evaluated NSR applicability for the Plan Approval Reconciliations, WWTP Permanent Controls Project, and EMACT Project. Specifically, Shell has retrospectively evaluated the Plan Approval Reconciliations and WWTP Permanent Controls Project together as part of the initial construction of SPM for the following reasons:

- The relatively close timing between the Plan Approval Reconciliations and WWTP Permanent Controls Project and the recently completed initial construction of the facility;
- The Plan Approval Reconciliations represent as-built changes to the facility’s initial construction plan approvals; and
- The WWTP Permanent Controls Project represents needed improvements to the initial construction of the facility’s WWTP.

On the other hand, Shell has evaluated the EMACT Project separately from the Plan Approval Reconciliations, WWTP Permanent Controls Project, and initial construction of SPM because the EMACT Project is a regulatory driven project that is only being implemented at the facility to comply with newly effective federal regulatory requirements that are applicable to ethylene production units across the country.

SPM’s location in Beaver County is currently designated as marginal nonattainment for ozone (NO_x and VOC), nonattainment for SO₂ and lead, and attainment or unclassifiable/attainment for CO, NO₂, PM₁₀, and PM_{2.5}. Therefore, Shell evaluated the EMACT Project in regard to DEP’s NNSR regulations (25 Pa. Code §§127.201 to 127.218) for ozone (NO_x and VOC), SO₂, and lead, while Shell evaluated the project in regard to DEP’s PSD regulations (25 Pa. Code §§127.81 to 127.83) for CO, NO₂ (NO_x), PM₁₀, PM_{2.5}, and all other regulated NSR pollutants.

Alternatively, the attainment status designations for SPM’s location contemporaneous with DEP’s issuance of PA-04-00740A, which authorized the initial construction of SPM, are the relevant designations for the retrospective NSR applicability analysis performed for the Plan Approval Reconciliations and WWTP Permanent Controls Project. Although Beaver County is currently designated as attainment for PM_{2.5}, the county was designated as nonattainment for PM_{2.5} when DEP issued PA-04-00740A to Shell. The remaining currently effective attainment status designations for SPM’s location are unchanged from the attainment status designations that were in effect when DEP issued PA-04-00740A. Thus, Shell evaluated the Plan Approval Reconciliations and WWTP Permanent Controls Project in regard

to DEP's NNSR regulations (25 Pa. Code §§127.201 to 127.218) for ozone (NO_x and VOC), PM_{2.5}, SO₂, and lead, while Shell evaluated the same changes in regard to DEP's PSD regulations (25 Pa. Code §§127.81 to 127.83) for CO, NO₂ (NO_x), PM₁₀, and all other regulated PSD pollutants.

3.1.1 Nonattainment New Source Review (NNSR)

The purpose of the NNSR regulatory program is to promote progress toward compliance with NAAQS in geographic areas where air quality does not meet one or more NAAQS while also allowing some industrial growth in those areas. Two key requirements that must be addressed in an NNSR permitting program are LAER and emissions reductions (offsets). LAER is the emission control technology requirement of the NNSR permitting program and it represents the most stringent emission limitation contained in any state's implementation plan for a class or category of source, unless it is demonstrated that such limitation is not achievable, or the most stringent emission limitation achieved in practice by the same class or category of source, whichever is more stringent. For the emissions reduction requirement, reductions are typically obtained from sources that are or were in the same area as the new or modified source subject to NNSR permitting and they must offset the emissions increase from the new or modified source by at least a 1:1 ratio for the purpose of providing a net air quality benefit.

In accordance with Chapter 127, Subchapter E, NNSR permitting is required for the construction of a new "major facility," including a modification of an existing minor facility if the change would constitute a major facility by itself, or a "major modification" at an existing major facility.

3.1.1.1 Plan Approval Reconciliations and WWTP Permanent Controls Project

As previously discussed, Shell has retrospectively evaluated the Plan Approval Reconciliations and WWTP Permanent Controls Project together as part of the initial SPM construction for NSR applicability purposes. For background, Shell had concluded that the initial construction of SPM required NNSR permitting for ozone (NO_x and VOC) and PM_{2.5} because SPM was estimated to have the potential to emit NO_x, VOC, and PM_{2.5} above the applicable NNSR major facility thresholds of 100 tpy, 50 tpy, and 100 tpy, respectively. On the other hand, Shell had determined that the initial construction of SPM did not require NNSR permitting for SO₂ and lead because SPM was estimated to have the potential to emit SO₂ and lead, respectively, below the applicable NNSR major facility threshold of 100 tpy. These NNSR applicability determinations were documented in detail as part of the plan approval application and review process that resulted in the issuance in PA-04-00740A, which authorized the initial construction of SPM.

Table D below compares SPM's proposed facility-wide potential to emit rates of applicable NNSR pollutants after the incorporation of the Plan Approval Reconciliations and WWTP Permanent Controls Project to relevant NNSR review triggering thresholds (i.e., pollutant-specific NNSR major facility thresholds).

Table D. Plan Approval Reconciliations and WWTP Permanent Controls Project Retrospective NNSR Applicability Summary

Pollutant	Proposed Facility-Wide Potential to Emit Including Plan Approval Reconciliations and WWTP Permanent Controls Project¹² (tpy)	NNSR Major Facility Threshold (tpy)	Initial Construction Retrospectively Determined to be Subject to NNSR Review? (Yes/No)	Initial Construction Contemporaneously Determined to be Subject to NNSR Review? (Yes/No)
NO _x	386.40	100	Yes	Yes
PM _{2.5}	170.15	100	Yes	Yes
SO ₂	25.54	100	No	No
VOC	433.64	50	Yes	Yes
Lead	0.01	100	No	No

As indicated in the table, the Plan Approval Reconciliations and WWTP Permanent Controls Project will not retrospectively cause the initial construction of SPM to require NNSR permitting under Chapter 127, Subchapter E for any additional NNSR pollutants relative to the NNSR applicability determinations that were made contemporaneous with DEP's authorization of the initial construction of SPM. However, as discussed in more detail later in Section 4.0, LAER is applicable to the new Wastewater Treatment Vessels that will be installed as part of the WWTP Permanent Controls Project. As such, Shell completed a VOC LAER analysis for the new Wastewater Treatment Vessels, which is documented in Section 4.0. Additionally, the alternatives analysis for the Plan Approval Reconciliations and WWTP Permanent Controls Project pursuant to 25 Pa. Code §127.205(5) is addressed later in Section 7.0. Lastly, as presented immediately below, Shell has reevaluated the NNSR offsetting requirements for the initial construction of SPM due to the proposed changes to SPM's facility-wide NNSR pollutant potential to emit rates that are a result of the Plan Approval Reconciliations and WWTP Permanent Controls Project.

Plan Approval Reconciliations and WWTP Permanent Controls Project NNSR Offsetting Requirements

DEP's NNSR regulations at 25 Pa. Code §127.205(4) indicate DEP may issue a plan approval for the construction of a new major facility when the facility offsets its potential to emit with ERCs in accordance with 25 Pa. Code §§127.206 and 127.210. Contemporaneous with the initial construction of SPM, Shell offset the facility's NO_x, PM_{2.5}, and VOC potential to emit rates in accordance with applicable offsetting requirements under Chapter 127, Subchapter E. However, Shell has reevaluated the NO_x, PM_{2.5}, and VOC offsetting requirements for SPM's initial construction due to the proposed changes to SPM's facility-wide NNSR pollutant potential to emit rates that are a result of the Plan Approval Reconciliations and WWTP Permanent Controls Project.

¹² As denoted, the proposed facility-wide potential to emit rates in the table do not include the potential to emit rate increases that are proposed to occur at the TEGF A and TEGF B due to the EMAX Project.

Table E below documents what, if any, additional NO_x, PM_{2.5}, and VOC offsets are required for the initial construction of SPM due to the impacts of the Plan Approval Reconciliations and WWTP Permanent Controls Project on SPM's facility-wide NO_x, PM_{2.5}, and VOC potential to emit rates.

Table E. Plan Approval Reconciliations and WWTP Permanent Controls Project Offset Requirements Summary

Pollutant/Area¹³	Proposed Facility-Wide Potential to Emit Including Plan Approval Reconciliations and WWTP Permanent Controls Project¹⁴ (tpy)	PA-04-00740C Facility-Wide Potential to Emit (tpy)	Facility-Wide Potential to Emit Increase (tpy)	Applicable 25 Pa. Code §127.210(a) Offset Ratio	Additional Offset Requirement (tpy)
NO _x /Transport Region	386.40	328.5	57.90	1.15:1	66.59
PM _{2.5} /Nonattainment Area	170.15	163.7	6.45	1:1	6.45
VOC/Transport Region	433.64	516.2	-82.56	Flue Emiss.- 1.15:1 Fugitive Emiss. - 1.3:1	0

As indicated in the table above, Shell has estimated that additional NO_x and PM_{2.5} offsets are required for the initial construction of SPM due to the Plan Approval Reconciliations and WWTP Permanent Controls Project, while a lesser amount of VOC offsets is now required due to the same changes. In fact, Table F below documents the specific amount of surplus VOC offsets when using applicable 25 Pa. Code §127.210(a) offset ratios.

Table F. Plan Approval Reconciliations and WWTP Permanent Controls Project Surplus VOC Offsets

Pollutant/Area	Facility-Wide Potential to Emit Decrease Due to Plan Approval Reconciliations and WWTP Permanent Controls Project (tpy)	Applicable 25 Pa. Code §127.210(a) Offset Ratio	Surplus Offsets (tpy)
VOC/Transport Region (Flue Emissions)	49.24	1.15:1	56.63

¹³ Although SPM's location in Beaver County was contemporaneously designated as marginal nonattainment for ozone (NO_x and VOC), all the Commonwealth of Pennsylvania was/is located in the Northeast Ozone Transport Region and was/is treated like a moderate ozone nonattainment area. Therefore, "Transport Region" is referenced in the table instead of "Marginal Nonattainment Area" for 25 Pa. Code §127.210(a) NO_x and VOC emissions offset ratio applicability purposes.

¹⁴ As denoted, the proposed facility-wide potential to emit rates in the table do not include the potential to emit rate increases that are proposed to occur at the TEGF A and TEGF B due to the EMACT Project.

Pollutant/Area	Facility-Wide Potential to Emit Decrease Due to Plan Approval Reconciliations and WWTP Permanent Controls Project (tpy)	Applicable 25 Pa. Code §127.210(a) Offset Ratio	Surplus Offsets (tpy)
VOC/Transport Region (Fugitive Emissions)	33.32	1.3:1	43.32
Total			99.95

As such, Shell previously offset 99.95 tpy of VOC for the initial construction of SPM that is no longer required to be offset as a result of the Plan Approval Reconciliations and WWTP Permanent Controls Project.

As documented in Condition #037 in Section C of PA-04-00740C, DEP authorized Shell to use NO_x ERCs in place of VOC ERCs at a 1:1 ratio to offset VOC emissions in association with the initial construction of SPM. Thus, Shell proposes to use the 99.95 tpy of VOC offsets that were achieved in association with the initial construction of SPM, but no longer required due to the Plan Approval Reconciliations and WWTP Permanent Controls Project, to satisfy the 66.59 tpy of additional NO_x offsets that are now estimated to be required for the initial construction of SPM due to the Plan Approval Reconciliations and WWTP Permanent Controls Project.

In summary, Table G below documents the updated NO_x, PM_{2.5}, and VOC ERC requirements for the initial construction of SPM due to the Plan Approval Reconciliations and WWTP Permanent Controls Project.

Table G. Updated Plan Approval Reconciliations and WWTP Permanent Controls Project ERC Requirements Summary

ERC Summary	NO _x (tpy)	VOC (tpy)	Total NO _x /VOC (tpy)	PM _{2.5} (tpy)
ERC Amount Applied in PA-04-00740C	913	107.62	1,020.62	164
ERC Amount Required per PA-04-00740C Condition #038	379	612	991	164
Updated ERC Amount Requirement	445.57	512.06	957.63	170.42
Additional ERC Amount Required to be Applied	-	-	0	6.42

Regarding the additional PM_{2.5} offsets estimated to be required for the initial construction of SPM due to the Plan Approval Reconciliations and WWTP Permanent Controls Project, on June 28, 2024, Shell

submitted a letter to DEP requesting the agency to approve the transfer of 319 tpy of NO_x ERCs and 19 tpy of PM_{2.5} ERCs from AES Beaver Valley to Shell. A copy of this letter is included in Appendix I. Following DEP's approval of the transfer of the referenced NO_x and PM_{2.5} ERCs to Shell, Shell requests DEP to apply 6.42 tpy of the available 19 tpy of PM_{2.5} ERCs to the plan approval issued for the Plan Approval Reconciliations and WWTP Permanent Controls Project to satisfy the additional PM_{2.5} offsets required for SPM.

3.1.1.2 EMACT Project

SPM currently has the potential to emit greater than 50 tpy of VOC and 100 tpy of NO_x. Therefore, SPM is a major facility for VOC and NO_x (i.e., ozone) for NNSR purposes under Chapter 127, Subchapter E. Alternatively, as indicated above, SPM currently has the potential to emit less than 100 tpy of SO₂ and lead, respectively, which means the facility is not an existing NNSR major facility for those pollutants under Chapter 127, Subchapter E. As a result of these current NNSR pollutant-specific major facility statuses for SPM, NNSR permitting requirements would apply to the EMACT Project in either (or both) of the following scenarios.

- The EMACT Project is estimated to result in a significant net emissions increase of 40 tpy or greater of NO_x, VOC, or both.
- The EMACT Project is estimated to cause SPM's potential to emit of SO₂, lead, or both to increase by an amount equal to or greater than 100 tpy.

Table H below compares the NO_x and VOC emissions increases that Shell has estimated will occur at SPM due to the EMACT Project to the relevant NNSR significant threshold of 40 tpy.

Table H. EMACT Project NNSR Applicability Summary for NO_x and VOC

Pollutant	Project-Only Emissions Increase (tpy)	Project Net Emissions Increase (tpy)	NNSR Significant Threshold (tpy)	Project Subject to NNSR Review? (Yes/No)
NO _x	75.27	75.27	40	Yes
VOC	5.97	5.97	40	No

As indicated in the table, the EMACT Project will result in a significant net emissions increase of NO_x. Accordingly, the EMACT Project will be a major modification subject to NNSR permitting requirements under Chapter 127, Subchapter E for NO_x (ozone). The NO_x LAER analysis completed for the EMACT Project is documented in Section 4.0 herein, the alternatives analysis completed for the EMACT Project pursuant to 25 Pa. Code §127.205(5) is documented in Section 7.0 herein, and the NO_x ERC requirements for the EMACT Project are discussed immediately below.

EMACT Project NNSR Offsetting Requirements

DEP's NNSR regulations at 25 Pa. Code §127.205(3) indicate DEP may issue a plan approval for a major modification at an existing major facility when the facility offsets its entire applicable net emissions

increase in accordance with 25 Pa. Code §§127.206 and 127.210. Table I below documents the NOx offsets that are required for the EMACT.

Table I. EMACT Project NNSR Offset Requirements Summary

Pollutant/Area¹⁵	Project Net Emissions Increase (tpy)	Applicable 25 Pa. Code §127.210(a) Offset Ratio	Project Offset Requirement (tpy)
NOx/Transport Region	75.27	1.15:1	86.56

As indicated in the table above, 86.56 tpy of NOx offsets are required due to the EMACT Project.

As previously discussed, Shell submitted a letter to DEP on June 28, 2024, requesting the agency to approve the transfer of 319 tpy of NOx ERCs and 19 tpy of PM_{2.5} ERCs from AES Beaver Valley to Shell. Following DEP's approval of the transfer of the referenced NOx and PM_{2.5} ERCs to Shell, Shell requests DEP to apply 86.56 tpy of the available 319 tpy of NOx ERCs to the plan approval issued for the EMACT Project to satisfy the NOx offsets required for the EMACT Project.

As noted above, the EMACT Project would also be subject to additional NNSR permitting requirements if it were estimated to cause SPM's potential to emit of SO₂, lead, or both to increase by an amount equal to or greater than the relevant NNSR review triggering threshold of 100 tpy. Table J below compares the increases in SPM's potential to emit rates of SO₂ and lead due to the EMACT Project to this 100 tpy threshold.

Table J. EMACT Project NNSR Applicability Summary for SO₂ and Lead

Pollutant	Facility-Wide Potential to Emit Increase Due to Project (tpy)	NNSR Major Facility Threshold (tpy)	Project Subject to NNSR Review? (Yes/No)
SO ₂	1.63	100	No
Lead	<0.01	100	No

As indicated in the table, SPM's potential to emit rates of SO₂ and lead will not increase by respective amounts equal to or greater than 100 tpy due to the EMACT Project. Accordingly, the EMACT Project will not be subject to NNSR permitting requirements under Chapter 127, Subchapter E for SO₂ or lead.

¹⁵ Although SPM's location in Beaver County is designated as marginal nonattainment for ozone (NOx and VOC), all the Commonwealth of Pennsylvania is located in the Northeast Ozone Transport Region and is treated like a moderate ozone nonattainment area. Therefore, "Transport Region" is referenced in the table instead of "Marginal Nonattainment Area" for 25 Pa. Code §127.210(a) NOx and VOC emissions offset ratio applicability purposes.

3.1.2 Prevention of Significant Deterioration (PSD)

The purpose of the PSD regulatory program is to avoid significant deterioration of air quality in geographic areas where air quality meets applicable NAAQS. Two key requirements that must be addressed in a PSD permitting program are BACT and an air quality analysis. BACT is the emission control technology requirement of the PSD permitting program and it represents an emission limitation based on the maximum degree of reduction of a pollutant that is determined, on a case-by-case basis taking into consideration energy impacts, environmental impacts, and economic impacts and other costs, to be achievable for an emissions unit. For the air quality analysis requirement, ambient air monitoring data and ambient air dispersion modeling are used to demonstrate that the new or modified source subject to PSD permitting will not cause or contribute to ambient air concentrations that would violate any applicable NAAQS or PSD increment.

In accordance with 25 Pa. Code §127.83, PSD permitting is required for any one of the following three scenarios in Beaver County.

- 1) The construction of a new “major stationary source.” Excluding greenhouse gases (GHGs) as a regulated NSR pollutant because of the *Utility Air Regulatory Group v. Environmental Protection Agency et al.* (United States Supreme Court 2014) (hereinafter “*UARG v. EPA*”) decision, a new stationary source is a major stationary source if the source is one of the 28 source categories listed in EPA’s PSD regulations and it emits, or has the potential to emit, 100 tpy or more of any regulated NSR pollutant, or if the source is not one of the 28 listed source categories but it emits, or has the potential to emit, 250 tpy or more of any regulated NSR pollutant.
- 2) The modification of an existing minor stationary source if the change would constitute a major stationary source by itself, with the major stationary source criteria being the same as indicated above.
- 3) A “major modification” of an existing major stationary source. A *major modification* is “any physical change in or change in the method of operation of a major stationary source that would result in: a significant emissions increase (as defined in 40 CFR 52.21(b)(40)) of a regulated NSR pollutant (as defined in 40 CFR 52.21(b)(50)); and a significant net emissions increase of that pollutant from the major stationary source.”¹⁶

The primary activity at SPM is the production of ethylene and polyethylene using reaction and separation operations, which falls under the “chemical process plants” source category, one of the 28 source categories listed at 40 CFR 52.21(b)(1)(i)(a). As a result, the PSD “major stationary source” threshold applicable to SPM is 100 tpy of any regulated non-GHG NSR pollutant.

3.1.2.1 Plan Approval Reconciliations and WWTP Permanent Controls Project

Shell has retrospectively evaluated the Plan Approval Reconciliations and WWTP Permanent Controls Project together as part of the initial SPM construction for NSR applicability purposes. For background, Shell had concluded that the initial construction of SPM required PSD permitting for CO, NO_x (NO₂), PM (filterable only), PM₁₀, and GHGs because SPM was estimated to have the potential to emit one or more

¹⁶ Due to *UARG v. EPA*, if a modification of an existing major stationary source is “major” for GHGs only, then PSD permitting is not required for the modification.

regulated non-GHG PSD pollutants above the applicable PSD major source threshold of 100 tpy, and the potentials to emit of CO, NO_x, PM (filterable only), PM₁₀, and GHGs were estimated to be above the applicable PSD significant thresholds of 100 tpy, 40 tpy, 25 tpy, 15 tpy, and 75,000 tpy CO₂e, respectively. Alternatively, Shell had determined that the initial construction of SPM did not require PSD permitting for sulfuric acid mist because SPM was estimated to have a sulfuric acid mist potential to emit below the pollutant's PSD significant threshold of 7 tpy. These PSD applicability determinations were documented in detail as part of the plan approval application and review process that resulted in the issuance of PA-04-00740A, which authorized the initial construction of SPM.

Table K below compares SPM's proposed facility-wide potential to emit rates of applicable PSD pollutants after the incorporation of the Plan Approval Reconciliations and WWTP Permanent Controls Project to relevant PSD significant thresholds.

Table K. Plan Approval Reconciliations and WWTP Permanent Controls Project Retrospective PSD Applicability Summary

Pollutant	Proposed Facility-Wide Potential to Emit Including Plan Approval Reconciliations and WWTP Permanent Controls Project ¹⁷ (tpy)	PSD Significant Threshold (tpy)	Initial Construction Retrospectively Determined to be Subject to PSD Review? (Yes/No)	Initial Construction Contemporaneously Determined to be Subject to PSD Review? (Yes/No)
CO	880.64	100	Yes	Yes
NO _x	386.40	40	Yes	Yes
PM (filterable only)	77.20	25	Yes	Yes
PM ₁₀	176.02	15	Yes	Yes
Sulfuric Acid Mist	1.25	7	No	No
GHGs, as CO ₂ e ¹⁸	2,479,837	75,000	Yes	Yes

As indicated in the table, the Plan Approval Reconciliations and WWTP Permanent Controls Project will not retrospectively cause the initial construction of SPM to require PSD permitting under 25 Pa. Code §127.83 for any additional regulated PSD pollutants relative to the PSD applicability determinations that were made contemporaneous with DEP's authorization of the initial construction of SPM. However,

¹⁷ As denoted, the proposed facility-wide potential to emit rates in the table do not include the potential to emit rate increases that are proposed to occur at the TEGF A and TEGF B due to the EMAX Project.

¹⁸ *tpy CO₂ equivalent emissions (CO₂e)* – shall represent an amount of GHGs emitted, and shall be computed as follows:

- Multiplying the mass amount of emissions (tpy), for each of the six greenhouse gases in the pollutant GHGs, by the gas's associated global warming potential published at Table A-1 to subpart A of part 98 of this chapter—Global Warming Potentials.
- Sum the resultant value from paragraph (b)(49)(ii)(a) of this section for each gas to compute a tpy CO₂e. (40 CFR 52.21(b)(49)(ii)).

Shell has updated the most recent air quality analysis that was completed for the initial construction of SPM due to the emissions unit-specific and facility-wide CO, NO_x, and PM₁₀ potential to emit rate changes that are being proposed because of the Plan Approval Reconciliations and WWTP Permanent Controls Project. This updated air quality analysis is documented in Appendix D herein. As discussed in more detail later in Section 5.0, Shell has concluded that the Plan Approval Reconciliations and WWTP Permanent Controls Project do not require a BACT analysis.

3.1.2.2 EMACT Project

SPM currently has the potential to emit greater than 100 tpy of CO, NO_x, PM₁₀, PM_{2.5}, and VOC, respectively, which means the facility is an existing PSD major stationary source under 40 CFR 52.21. Because SPM is currently a PSD major stationary source, PSD permitting requirements would apply to the EMACT Project if the project were estimated to represent a “major modification” (i.e., if the EMACT Project were estimated to result in a significant net emissions increase of one or more regulated non-GHG NSR pollutants).

Table L below compares the emissions increases of PSD pollutants that Shell has estimated will occur at SPM due to the EMACT Project to relevant PSD significant thresholds.

Table L. EMACT Project PSD Applicability Summary

Pollutant	Project-Only Emissions Increase (tpy)	Project Net Emissions Increase (tpy)	PSD Significant Threshold (tpy)	Project Subject to PSD Review? (Yes/No)
CO	343.12	343.12	100	Yes
NO _x	75.27	75.27	40	Yes
PM (filterable only)	2.06	2.06	25	No
PM ₁₀	8.25	8.25	15	No
PM _{2.5}	8.25	8.25	10	Yes ¹⁹
Sulfuric Acid Mist	0.08	0.08	7	No
GHGs, as CO ₂ e	92,154	92,154	75,000	Yes

As indicated in the table, the EMACT Project will result in a significant net emissions increase of CO, NO_x, and GHGs. Additionally, although the EMACT Project will not result in a significant net emissions increase in direct PM_{2.5} emissions, Shell has concluded that the project is subject to PSD review for PM_{2.5} because it will result in a significant net emissions increase in NO_x, which is a precursor to PM_{2.5}. Accordingly, the EMACT Project will be a major modification subject to PSD permitting requirements under 40 CFR 52.21 for CO, NO_x (NO₂), PM_{2.5}, and GHGs. The BACT analysis completed for the EMACT

¹⁹ Although the EMACT Project was not estimated to cause a significant net emissions increase in direct PM_{2.5} emissions, the project is subject to PSD review for PM_{2.5} because it was estimated to cause a significant net emissions increase in NO_x, which is a precursor to PM_{2.5}.

Project is documented in Section 5.0 herein, and the air quality analysis completed for the EMACT Project is documented in Appendix D herein.

3.2 Pennsylvania Air Pollution Control Regulations

The Commonwealth of Pennsylvania has promulgated ambient air quality standards (AAQS) and pollution control regulations under Title 25 of the Pennsylvania Code (Pa. Code) to address, among other things, air quality permitting applicability and procedures for new and existing stationary sources of regulated air pollutants, emission standards and limitations for new and existing stationary sources of regulated air pollutants, control technology requirements for new and existing stationary sources of regulated air pollutants, and ambient air standards in Pennsylvania.²⁰ The Pennsylvania air quality regulations that Shell determined are potentially applicable to the Plan Approval Reconciliations, WWTP Permanent Controls Project, and EMACT Project are discussed below.

3.2.1 25 Pa. Code Chapter 127. Construction, Modification, Reactivation and Operation of Sources

Chapter 127 includes requirements applicable to construction, modification, reactivation, and operation of emission sources. Chapter 127 requires air quality to be maintained at existing levels in areas where the existing ambient air quality is better than the applicable AAQS, and air quality shall be improved to achieve the applicable AAQS in areas where the existing air quality is worse than the applicable AAQS.

3.2.1.1 25 Pa. Code §127.1 and §127.12(a)(5) - Best Available Technology (BAT)

Sections 127.1 and 127.12(a)(5) require the emissions from a new emission source to be controlled to the maximum extent, consistent with BAT as determined by DEP as of the date of issuance of the plan approval for the new source. SPM will comply with these BAT requirements for the new Wastewater Treatment Vessels that are proposed to be installed as part of the WWTP Permanent Controls Project, as documented in Section 6.0 herein.

3.2.1.2 25 Pa. Code §§127.81 to 127.83. Prevention of Significant Deterioration of Air Quality and 25 Pa. Code §§127.201 to 127.218. New Source Review

As previously documented in Section 3.1.2.1, Shell has concluded that the Plan Approval Reconciliations and WWTP Permanent Controls Project will not retrospectively cause the initial construction of SPM to require PSD permitting under 25 Pa. Code §127.83 for any additional regulated PSD pollutants relative to the PSD applicability determinations that were made contemporaneous with DEP's authorization of the initial construction of SPM. However, Shell has updated the air quality analysis that was completed for the initial construction of SPM due to the CO, NO_x, and PM₁₀ potential to emit rate changes that are being proposed with the Plan Approval Reconciliations and WWTP Permanent Controls Project. This updated air quality analysis is documented in Appendix D herein. As discussed in more detail later in

²⁰ 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.

Section 5.0, Shell has concluded that the Plan Approval Reconciliations and WWTP Permanent Controls Project do not require a BACT analysis.

Shell previously documented in Section 3.1.2.2 that the EMAX Project will be a major modification subject to PSD permitting requirements for CO, NO_x, PM_{2.5}, and GHGs. The BACT analysis completed for the EMAX Project is documented in Section 5.0 herein, and the air quality analysis completed for the EMAX Project is documented in Appendix D herein.

Regarding NNSR applicability, Shell previously documented in Section 3.1.1.1 that the Plan Approval Reconciliations and WWTP Permanent Controls Project will not retrospectively cause the initial construction of SPM to require NNSR permitting under Chapter 127, Subchapter E (25 Pa. Code §§127.201 to 127.218) for any additional NNSR pollutants relative to the NNSR applicability determinations that were made contemporaneous with DEP's authorization of the initial construction of SPM. However, as discussed in more detail in Section 4.0 herein, Shell has concluded that LAER is applicable to the new Wastewater Treatment Vessels that are proposed to be installed at SPM as part of the WWTP Permanent Controls Project. As such, Shell completed a VOC LAER analysis for the new Wastewater Treatment Vessels, which is documented in Section 4.0. Additionally, the alternatives analysis for the Plan Approval Reconciliations and WWTP Permanent Controls Project pursuant to 25 Pa. Code §127.205(5) is addressed in Section 7.0 herein. Lastly, as previously presented in Section 3.1.1.1, Shell has reevaluated the NNSR offsetting requirements for the initial construction of SPM due to the proposed changes to SPM's facility-wide NNSR pollutant potential to emit rates that are a result of the Plan Approval Reconciliations and WWTP Permanent Controls Project.

Shell previously documented in Section 3.1.1.2 that the EMAX Project will be a major modification subject to NNSR permitting requirements for NO_x (ozone). The NO_x LAER analysis completed for the EMAX Project is documented in Section 4.0 herein, the alternatives analysis completed for the EMAX Project pursuant to 25 Pa. Code §127.205(5) is documented in Section 7.0 herein, and the EMAX Project's NO_x offsetting requirements are discussed in Section 3.1.1.2.

3.2.2 25 Pa. Code Chapter 131. Ambient Air Quality Standards

This chapter establishes AAQS by incorporating by reference the federal NAAQS, and by setting state AAQS for settled particulate, beryllium, fluorides, and H₂S. The air quality analysis performed in support of this application to demonstrate compliance with relevant state AAQS and federal NAAQS is documented in Appendix D.

3.3 Federal Air Quality Regulations

Shell concluded that the Plan Approval Reconciliations and EMAX Project will not result in any changes to the federal air quality regulatory applicability determinations that have been most recently documented for SPM and the emission sources covered by the Plan Approval Reconciliations and EMAX Project. However, Shell discusses below the federal air quality regulations that were determined to be potentially applicable to the new emission sources proposed to be installed at SPM with the WWTP Permanent Controls Project.

3.3.1 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*²¹ and certain *existing facilities*²² within specific stationary source categories, which EPA has determined contribute to air pollution that may cause or contribute to the endangerment of public health or 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.”

3.3.1.1 40 CFR Part 60, Subpart A – General Provisions

The NSPS general provisions in 40 CFR 60 Subpart A are applicable to facilities subject to any standard promulgated under 40 CFR Part 60. In general, 40 CFR 60 Subpart A provisions specify performance test, performance evaluation (monitoring systems), notification, recordkeeping, reporting, and flare control device requirements for affected facilities. SPM will comply with these NSPS general provisions as they apply to the new emission sources that are indicated below to be subject to 40 CFR Part 60 standards.

3.3.1.2 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

Except for the types of *storage vessels*²³ listed under 40 CFR 60.110b(d), storage vessels with a design capacity²⁴ greater than or equal to 151 cubic meters (m³) (39,890 gallons) storing a VOL with a *maximum true vapor pressure*²⁵ (TVP) less than 3.5 kilopascals (kPa) (0.51 pounds per square inch, absolute [psia]),

²¹ *Affected facility* – means, with reference to a stationary source, any apparatus to which a standard is applicable. (40 CFR Part 60, Subpart A).

²² *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).

²³ *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).

²⁴ “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).

²⁵ Maximum true vapor pressure – means the equilibrium partial pressure exerted by the volatile organic compounds (as defined in 40 CFR §51.100) [emphasis added] 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:

and storage vessels with a design capacity greater than or equal to 75 m³ (19,813 gallons) but less than 39,890 gallons storing a VOL with a maximum TVP less than 15.0 kPa (2.2 psia), 40 CFR 60 Subpart Kb applies to each storage vessel with a design capacity greater than or equal to 19,813 gallons that is used to store a VOL for which construction, reconstruction, or modification commenced after July 23, 1984. 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*²⁶ is not a “storage vessel” under 40 CFR 60 Subpart Kb.

The new Wastewater Treatment Vessels that are proposed to be installed at SPM will not be subject to 40 CFR 60 Subpart Kb because they will be “process tanks” rather than “storage vessels” under the subpart since they will be used to perform wastewater treatment unit operations or serve as a surge control vessel in the WWTP.

3.3.2 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

(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).

²⁶ *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).

- Vinyl chloride.

3.3.2.1 40 CFR Part 61, Subpart A - General Provisions

The general provisions in 40 CFR 61 Subpart A are applicable to stationary sources with facilities subject to any standard promulgated under 40 CFR Part 61. In general, 40 CFR 61 Subpart A provisions specify performance testing, performance evaluation (monitoring systems), notification, recordkeeping, reporting, and control device requirements for affected facilities. SPM will comply with these NESHAP general provisions as they apply to the new emission sources that are indicated below to be subject to 40 CFR Part 61 standards.

3.3.2.2 40 CFR Part 61, Subpart FF - National Emission Standard for Benzene Waste Operations

The requirements of 40 CFR 61 Subpart FF, which is often referenced as “the BWON (Benzene Waste Operations NESHAP) rule,” apply to owners and operators of *chemical manufacturing plants*²⁷, 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.

A key concept of the BWON rule is a facility’s total annual benzene (TAB) quantity, which is calculated for specific waste streams at a facility to determine the BWON rule requirements that are applicable to the facility. A facility’s TAB quantity is calculated by summing together the annual benzene quantity for each 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%.

SPM is a “chemical manufacturing plant” that has a TAB quantity greater than 10 Megagrams per year (Mg/yr), and the new Wastewater Treatment Vessels will be subject to the BWON rule because they will manage or treat benzene-containing waste streams. However, SPM is using the overlap provisions in 40 CFR 63 Subpart YY at 40 CFR 63.1100(g)(6)(ii) that states compliance with 40 CFR 63.1103(e) of 40 CFR 63 Subpart YY constitutes compliance with the BWON rule for waste streams that are subject to both the requirements of the BWON rule and 40 CFR 63 Subpart YY. Refer to Section 3.3.3.2.

²⁷ *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).

3.3.3 40 CFR Part 63: National Emission Standards for Hazardous Air Pollutants for Source Categories

40 CFR Part 63 regulations are also 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 synthetic organic chemical manufacturing industry (SOCMI) 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 the potential to emit more than 25 tpy of a combination of HAPs. Therefore, SPM is a “major source” of HAPs subject to applicable 40 CFR Part 63 NESHAP regulations.

3.3.3.1 40 CFR Part 63, Subpart A – General Provisions

The general provisions in 40 CFR 63 Subpart A are applicable to stationary sources with facilities subject to any standard promulgated under 40 CFR Part 63. In general, 40 CFR 63 Subpart A includes requirements related to notification, recordkeeping, monitoring, and performance testing. This subpart also contains flare control device requirements comparable to the requirements in 40 CFR 60.18 in 40 CFR 60 Subpart A. SPM will comply with these NESHAP general provisions as they apply to the new and existing emission sources that are indicated below to be subject to 40 CFR Part 63 standards.

3.3.3.2 40 CFR Part 63, Subpart XX – National Emission Standards for Ethylene Manufacturing Process Units: Heat Exchange Systems and Waste Operations

This subpart applies to each heat exchange system and *waste stream*²⁸ that is part of an ethylene production affected source subject to 40 CFR 63 Subpart YY. SPM includes an ethylene production

²⁸ *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).

affected source subject to 40 CFR 63 Subpart YY. Therefore, all the heat exchange systems and waste streams that are associated with SPM's ethylene production unit are subject to 40 CFR 63 Subpart XX.

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 an 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 the BWON rule and 40 CFR 63 Subpart XX.

The new Wastewater Treatment Vessels will be subject to 40 CFR 63 Subpart XX because they will manage or treat benzene-containing waste streams generated by an ethylene production unit at SPM. As such, the new Wastewater Treatment Vessels will comply with 40 CFR 63 Subpart XX by complying with BWON rule emission control requirements to ensure SPM maintains compliance with the BWON rule's 6 BQ compliance option. Specifically, SPM will use a closed-vent system to collect and route the new Wastewater Treatment Vessels' vent streams to an enclosed combustion device (the SCTO) that will reduce the organic content of the vent streams by 95 wt% or greater in compliance with 40 CFR 61.349(a)(2)(i)(A).

3.3.3.3 40 CFR Part 63, Subpart YY - National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards

This subpart includes requirements that apply to certain "ethylene production unit" equipment located at a major source of HAPs. Specifically, the 40 CFR 63 Subpart YY ethylene production 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.

Heat exchange systems and waste streams that are associated with an ethylene production unit subject to 40 CFR 63 Subpart YY must comply with applicable 40 CFR 63 Subpart XX requirements.

SPM includes an ethylene production affected source subject to 40 CFR 63 Subpart YY. Therefore, SPM must comply with applicable 40 CFR 63 Subpart YY storage vessel, ethylene process vent, transfer rack, equipment leak, and ethylene cracking furnace and associated decoking operations requirements. Additionally, as previously discussed, SPM must comply with applicable 40 CFR 63 Subpart XX heat

exchange system and waste stream requirements because that subpart contains the standards for heat exchange systems and waste streams that are part of an ethylene production affected source subject to 40 CFR 63 Subpart YY.

As previously documented under the 40 CFR 63 Subpart XX regulatory applicability discussion, the new Wastewater Treatment Vessels will be subject to 40 CFR 63 Subpart XX, and they will comply with the subpart by complying with BWON rule emission control requirements to ensure SPM maintains compliance with the BWON rule's 6 BQ compliance option.

The EMACT Project is being performed at SPM to comply with newly effective 40 CFR 63 Subpart YY control device requirements that are applicable to the TEGF A and TEGF B. Specifically, the TEGF A and TEGF B are now required to achieve compliance with a minimum NHV_{cz} level of 800 Btu/scf pursuant to 40 CFR 63 Subpart YY. Therefore, the TEGF A and TEGF B will comply with applicable control device requirements under 40 CFR 63 Subpart YY, including the newly effective minimum 800 Btu/scf NHV_{cz} limitation.

4.0 LOWEST ACHIEVABLE EMISSION RATE (LAER)

DEP's NNSR regulations under Chapter 127, Subchapter E require the application of LAER when constructing a new major facility subject to NNSR permitting and carrying out a major modification at an existing major facility subject to NNSR permitting. "LAER" is defined at 25 Pa Code §121.1 as:

(i) The rate of emissions based on the following, whichever is more stringent:

(A) The most stringent emission limitation which is contained in the implementation plan of a state for the class or category of source unless the owner or operator of the proposed source demonstrates that the limitations are not achievable.

(B) The most stringent emission limitation which is achieved in practice by the class or category of source.

(ii) The application of the term may not allow a new or proposed modified source to emit a pollutant in excess of the amount allowable under an applicable new source standard of performance.

As indicated by this definition, unlike BACT, LAER does not consider energy, environmental, or economic factors when evaluating the applicability of an emission control technology for a particular source, except a control technology is not considered achievable if its cost would be so great that a source could not be built or operated using the control technology. LAER generally is specified as a numerical limitation. However, design, equipment, work practice, or operation requirements may be established rather than a numerical limitation if technical feasibility factors limit the application of a measurement methodology to demonstrate compliance with such a limitation.

4.1 LAER Applicability

For a new major facility, a LAER determination must be made for each emissions unit constructed as part of the new facility that would have the potential to emit a regulated NNSR pollutant for which the facility is determined to have the potential to emit at or above the applicable major facility threshold. Alternatively, for a major modification at an existing major facility, a LAER determination must be made for the two types of emissions units described below:

- Each new emissions unit constructed as part of the major modification that would have the potential to emit a regulated NNSR pollutant for which the facility is determined to have the potential to emit at or above the applicable major facility threshold and for which the modification is determined to result in a significant net emissions increase; and
- Each existing emissions unit undergoing a physical change or change in the method of operation as part of the major modification that would experience an emissions increase of a regulated NNSR pollutant for which the facility is determined to have the potential to emit at or above the applicable major facility threshold and for which the modification is determined to result in a significant net emissions increase.

4.1.1 Plan Approval Reconciliations and WWTP Permanent Controls Project

Shell has retrospectively evaluated the Plan Approval Reconciliations and WWTP Permanent Controls Project together as part of the initial SPM construction for NNSR applicability purposes. As previously discussed, Shell has determined that the Plan Approval Reconciliations and WWTP Permanent Controls Project will not retrospectively cause the initial construction of SPM to require NNSR permitting under Chapter 127, Subchapter E for any additional NNSR pollutants relative to the NNSR applicability determinations that were made contemporaneous with the authorization of the initial construction of SPM. In consideration of the retrospective nature of this NNSR applicability determination, the inventory of emissions units proposed to be newly constructed with the Plan Approval Reconciliations and WWTP Permanent Controls Project along with the NNSR pollutants that will be emitted by those emissions units, and the LAER applicability criteria outlined above for emissions units constructed as part of a new major stationary source, Shell has concluded that the only LAER analysis required for the Plan Approval Reconciliations and WWTP Permanent Controls Project is for the VOC emissions from the new Wastewater Treatment Vessels that are proposed to be constructed at SPM as part of the WWTP Permanent Controls Project.

4.1.2 EMACT Project

SPM is an existing major facility for NO_x for the EMACT Project for NNSR applicability purposes, and Shell determined that the EMACT Project is a major modification subject to NNSR review for NO_x. Therefore, a LAER analysis is required for each of the EMACT Project's new and modified emissions units that would newly emit or experience an emissions increase of NO_x due to the EMACT Project. Based on these criteria, Shell concluded that the EMACT Project requires a LAER analysis for the emissions units and associated pollutants listed below:

- TEGF A for NO_x
- TEGF B for NO_x.

4.2 LAER Analysis Process

To make the LAER determinations in this permit application, Shell first identified NNSR permit, PSD permit, and SIP limits for the same class or category of source as the particular source subject to LAER. Shell primarily relied upon a review of EPA's RBLC database, South Coast Air Quality Management District (SCAQMD) BACT Guidelines, Bay Area Air Quality Management District (BAAQMD) BACT/Best Available Control Technology for Toxics (TBACT) Workbook, and California and Texas RACT requirements to identify potential LAER limits for a specific class or category of source. Next, these limits were evaluated to confirm which of them have been achieved in practice. A limit was deemed to have been achieved in practice when testing or continuous monitoring has successfully demonstrated compliance with the limit over its associated averaging period. Last, LAER was proposed for the source based on the most stringent limit that has been achieved in practice by the same class or category of source.

4.3 Summary of LAER Determinations

Table M below summarizes the LAER determinations made for the WWTP Permanent Controls Project and EMAX Project.

Table M. Summary of LAER Determinations

Emissions Unit	Pollutant	Control Technology/ Work Practice	Emissions Level
New Wastewater Treatment Vessels	VOC	Thermal oxidizer (SCTO)	≥99.9% VOC destruction efficiency
TEGF A	NOx	- Flare minimization (i.e., flare operated in accordance with a flare minimization plan) - Good combustion practices (i.e., flare designed and operated in accordance with 40 CFR 63 Subparts CC/YY flare control device design, operating, and monitoring requirements)	-
TEGF B	NOx	- Flare minimization (i.e., flare operated in accordance with a flare minimization plan) - Good combustion practices (i.e., flare designed and operated in accordance with 40 CFR 63 Subparts CC/YY flare control device design, operating, and monitoring requirements)	-

Below, Shell documents the analysis that was completed to make these LAER determinations.

4.4 New Wastewater Treatment Vessels LAER Determinations

The LAER determinations made for the new Wastewater Treatment Vessels proposed to be installed at SPM with the WWTP Permanent Controls Project are presented below, by pollutant.

4.4.1 VOC

The new Wastewater Treatment Vessels will treat VOC-containing wastewater using a combination of gravity settlement/phase separation, dissolved nitrogen flotation, and steam stripping mechanisms. Therefore, the new Wastewater Treatment Vessels will have the potential to emit VOC because some of the VOC contained in the wastewater will either volatilize or be stripped from the wastewater during the referenced treatment processes. To minimize the new Wastewater Treatment Vessels' VOC emissions,

Shell will collect the vent streams from each of the vessels in a closed-vent system and route the vent streams to SPM's SCTO for combustion.

The new Wastewater Treatment Vessels will be subject to the BWON rule. SPM complies with the 6 BQ compliance option outlined in 40 CFR 61.342(e) in the BWON rule, which allows a facility to exempt certain aqueous waste streams from the emission control requirements of the BWON rule provided that the total benzene quantity of the qualifying waste streams chosen for exemption does not exceed 6.0 Mg/yr. SPM will apply the emission control requirements of the BWON rule to the new Wastewater Treatment Vessels as part of the facility's 6 BQ compliance strategy. As such, each of the new Wastewater Treatment Vessels' vent streams must be collected in a closed-vent system and routed to a control device or recovery device that complies with one of the following BWON rule emission limitations.

- The vent stream must be combusted in an enclosed combustion device that meets one of the following conditions:
 - Reduces organic emissions by 95 wt% or greater;
 - Achieves an exhaust total organic compound concentration of 20 ppmvd, corrected to 3% oxygen; or
 - Provides a minimum residence time of 0.5 seconds at a minimum temperature of 760°C (1,400°F). If a boiler or process heater is used as the control device, then the vent stream shall be introduced into the flame zone of the boiler or process heater.
- The vent stream must be processed in a vapor recovery system that recovers or controls organic emissions at an efficiency of 95 wt% or greater; or, alternatively, recovers or controls benzene emissions at an efficiency of 98 wt% or greater.
- The vent stream must be combusted in a flare that complies with the requirements of 40 CFR 60.18.
- The vent stream must be processed in a device other than those specified above that recovers or controls organic emissions at an efficiency of 95 wt% or greater; or, alternatively, recovers or controls benzene emissions at an efficiency of 98 wt% or greater.

SPM has chosen the option to collect and route the new Wastewater Treatment Vessels' vent streams to an enclosed combustion device (the SCTO) that reduces organic emissions by 95 wt% or greater.

4.4.1.1 Step 1: Identify NNSR Permit, PSD Permit, and SIP Limits for the Same Class or Category of Source

Table N below summarizes potential VOC limits and emission control technologies identified for the new Wastewater Treatment Vessels based on a review of information sources that included EPA's RBLC database, SCAQMD BACT Guidelines, BAAQMD BACT/TBACT Workbook, and California RACT requirements.

Table N. Potential VOC Limits and Emission Control Technologies Identified for the New Wastewater Treatment Vessels

Reference ID	Facility Name	Permit Issuance Date	Process Description	Control Technology Description	Emissions Limit
BAAQMD Regulation 8: Organic Compounds, Rule 8: Wastewater Collection and Separation Systems	-	Rule Date: 12/20/23	Wastewater Separators	Equip the wastewater separator with a fixed cover that does not vent during normal operations, a floating cover equipped with primary and secondary rim seals, a fixed cover equipped with a closed-vent system vented to an air pollution control device that has a combined collection and destruction efficiency of at least 95% for total organic compounds, or a fixed cover with a pressure/vacuum valve that does not emit total organic compounds in excess of 1,000 parts per million by volume (ppmv) (expressed as methane) above background.	Air pollution control device option: 95% destruction efficiency for total organic compounds
BAAQMD Regulation 8: Organic Compounds, Rule 8: Wastewater Collection and Separation Systems	-	Rule Date: 12/20/23	Air Flotation Units	Equip the air flotation unit with a fixed cover with a pressure/vacuum valve or a fixed cover equipped with a closed-vent system vented to an air pollution control device that has a combined collection and destruction efficiency of at least 70% for total organic compounds.	Air pollution control device option: 70% destruction efficiency for total organic compounds
TX-0876	Port Arthur Ethane Cracker Jefferson, TX	2/6/20	Wastewater Treatment Plant	Covered conveyances, benzene stripper, activated sludge biological treatment, and thermal oxidizer.	99.9% destruction efficiency
LA-0364	FG LA LLC St. James Parish, LA	1/6/20	Wastewater Treatment System	Good design and venting the emissions to a control device in the primary treatment system.	None

Reference ID	Facility Name	Permit Issuance Date	Process Description	Control Technology Description	Emissions Limit
TX-0865	Equistar Chemicals, LP Channelview, TX	9/9/19	Wastewater Treatment	The wastewater tank emissions are routed to a multi-point ground flare for control at an efficiency of 98%.	98% destruction efficiency
TX-0858	GCGV Asset Holding LLC Gregory, TX	6/12/19	Wastewater Treatment Plant	All vapors from the equalization tanks and the dissolved air flotation basin must also be captured and controlled. The required controls are a catalytic oxidizer and the shared vent system, respectively. The catalytic oxidizer must achieve a minimum destruction efficiency of 99%, to be demonstrated through stack sampling.	99% destruction efficiency
LA-0382	Big Lake Fuels LLC Calcasieu Parish, LA	4/25/19	Wastewater Treatment Plant	Comply with 40 CFR 63 Subpart G.	None
OH-0378	PTGCA Belmont, OH	12/21/18	Wastewater Collection and Treatment	Route emissions from wastewater generated in the ethylene manufacturing process to a thermal oxidizer designed to achieve >99.5% destruction efficiency for VOC. Cover and route emissions from the process wastewater equalization tank, waste oil drum, oily wastewater storage tank, and wet air oxidation unit to a thermal oxidizer designed to achieve >99.5% destruction efficiency for VOC.	99.5% destruction efficiency
LA-0301	Sasol Chemicals Lake Charles, LA	5/23/14	Benzene Stripper	Route emissions to the fuel gas system.	None
LA-0301	Sasol Chemicals Lake Charles, LA	5/23/14	Wastewater Drums and Sumps	Route the drums and sumps through a closed-vent system to a ground flare.	None
LA-0301	Sasol Chemicals Lake Charles, LA	5/23/14	Sour Water Stripper	Route emissions to the fuel gas system.	None
LA-0301	Sasol Chemicals Lake Charles, LA	5/23/14	Process Wastewater Treatment Plant	Compliance with 40 CFR 63 Subpart G and 40 CFR 61 Subpart FF.	40.01 tpy

Reference ID	Facility Name	Permit Issuance Date	Process Description	Control Technology Description	Emissions Limit
LA-0301	Sasol Chemicals Lake Charles, LA	5/23/14	Process Water Tanks	Internal floating roof.	17.82 tpy
LA-0302	Sasol Chemicals Lake Charles, LA	5/23/14	Wastewater VOC Stripper (Vent)	Combustion in a process heat boiler.	None
SCAQMD	EMWD-PVRWRF Perris, CA	6/27/12	WWTP Digester	Digester gas combusted in 12 MMBtu/hr enclosed flare equipped with natural gas pilots.	0.038 lb/MMBtu
IA-0088	ADM Cedar Rapids, IA	6/29/07	WWTP Anaerobic Digester	Combustion in enclosed flare.	98% reduction avg. of 3 test runs and 0.36 lb/hr avg. of 3 test runs
TX-0354	ATOFINA Chemicals Jefferson County, TX	12/19/02	WWTP	Emissions from any VOC water separation equipment shall be vented to a permitted control device or recycled to the process.	0.12 lb/hr and 0.5 tpy
SCAQMD	Sunoco Chemicals Philadelphia, PA	7/27/99	WWT system at chemical plant. VOC-contaminated water air stripped of VOC.	Wastewater is required to be air-stripped with stripper vented to thermal oxidizer with minimum 95% destruction efficiency.	95% destruction efficiency
SCAQMD Rule 1176. VOC Emissions from Wastewater Systems	-	Rule Date: 9/13/96	Wastewater Separators	Equip the wastewater separator with a floating cover equipped with a primary rim seal, a fixed cover equipped with a closed-vent system vented to an air pollution control device, or an approved equivalent alternative control technology.	Air pollution control device option: 95% control efficiency
BAAQMD BACT/TBACT Workbook BACT Guideline	-	BACT Guideline Date: 6/12/95	Sewage Treatment Plant - Headworks and Primary Treatment	Process modifications (e.g., turbulence reduction), and covers with vapor phase controls (process air recycle, odor control equipment, activated carbon or alumina systems, biofilters). Industrial source control, packed scrubber for odor control at headworks, and fixed covers for primary clarifiers.	None

Reference ID	Facility Name	Permit Issuance Date	Process Description	Control Technology Description	Emissions Limit
BAAQMD BACT/TBACT Workbook BACT Guideline	-	BACT Guideline Date: 10/14/91	Water Treating - Oil/Water Separator	Vapor-tight fixed cover and vented to vapor recovery system w/ combined collection and destruction/recovery efficiency of >95%.	95% destruction/recovery efficiency
TN-0039	OSCO Treatment Systems, Inc.	6/12/90	Wastewater Treatment Plant	Thermal incinerator - 99% efficient.	99% destruction efficiency and 4.3 lb/hr
OH-0153	Hilton Davis Co.	7/22/87	Wastewater Treatment System	Thermal incinerator, covers.	95% destruction efficiency and 17.8 tpy

The above limits and control technologies that were obtained from EPA's RBLC database are further documented in Appendix E.

4.4.1.2 Step 2: Confirm the Limits Achieved in Practice

Shell proposes a LAER limit for the new Wastewater Treatment Vessels that is equal to or more stringent than the limits indicated above. Therefore, no additional analysis is necessary under this step.

4.4.1.3 Step 3: Select LAER

Shell determined that a 99.9% VOC destruction efficiency represents LAER for the VOC emissions from the new Wastewater Treatment Vessels. Therefore, Shell proposes to collect and route the new Wastewater Treatment Vessels' VOC emissions to SPM's SCTO, which achieves a 99.9% VOC destruction efficiency as demonstrated during performance testing.

4.5 TEGF A and TEGF B LAER Determinations

The LAER determinations made for the TEGF A and TEGF B are presented below, by pollutant.

4.5.1 NO_x

NO_x can be emitted by the TEGF A and TEGF B due to three fundamentally different mechanisms that generate NO_x when a material is combusted. The three NO_x generation mechanisms are the thermal NO_x, prompt NO_x, and fuel-bound NO_x mechanisms.

Thermal NO_x results from the high temperature thermal dissociation and subsequent reaction of combustion air molecular nitrogen and oxygen. The rate of thermal NO_x generation is affected by the following three factors: oxygen concentration, peak flame temperature, and duration at peak flame temperature. As these three factors increase in value, the rate of thermal NO_x generation increases.

Prompt NO_x occurs when nitrogen molecules in combustion air react with hydrocarbon radicals from the material undergoing combustion. Prompt NO_x reactions occur only within the combustion flame and are typically negligible compared to NO_x emissions formed via the thermal NO_x mechanism.

Fuel-bound NO_x results from the reaction of fuel-bound nitrogen compounds with oxygen during the combustion reactions. Therefore, a fuel without any nitrogen compounds will not result in fuel-bound NO_x emissions, while a fuel with a considerable amount of nitrogen compounds will result in elevated fuel-bound NO_x emissions.

For the open flame combustion process occurring at the TEGF A and TEGF B, NO_x emissions are relatively low and estimated to mostly result from the thermal NO_x mechanism. The TEGF A and TEGF B may emit a minor amount of NO_x formed by the prompt NO_x mechanism. However, the TEGF A and TEGF B are not expected to emit fuel-bound NO_x because these flares do not combust vent streams that contain fuel-bound nitrogen compounds since SPM does generate vent streams containing fuel-bound nitrogen compounds, and the supplemental gas and pilot fuel combusted at the flares do not contain fuel-bound nitrogen compounds.

The TEGF A and TEGF B are currently subject to the following NO_x LAER and BACT requirements:

- Each flare must be operated in accordance with a flare minimization plan; and
- Each flare must be operated in accordance with good combustion practices.

4.5.1.1 Step 1: Identify NNSR Permit, PSD Permit, and SIP Limits for the Same Class or Category of Source

Table O below summarizes potential NO_x limits and emission control technologies identified for the TEGF A and TEGF B based on a review of information sources that included EPA's RBLC database, SCAQMD BACT Guidelines, BAAQMD BACT/TBACT Workbook, and California RACT requirements.

Table O. Potential NO_x Limits and Emission Control Technologies Identified for the TEGF A and TEGF B

Reference ID	Facility Name	Permit Issuance Date	Process Description	Control Technology Description	Emissions Limit
EPA RBLC Database: Multiple Entries	See Appendix E	See Appendix E	Chemical Plant Flares	• Flare minimization • Good combustion practices (i.e., flare designed and operated in accordance with 40 CFR 60.18, 40 CFR 63.11, 40 CFR 63 Subpart SS, and/or 40 CFR 63 Subpart PPP flare control device design, operating, and monitoring requirements)	0.068-0.138 lb/MMBtu; various wide-ranging lb/hr and tpy emission rates

Reference ID	Facility Name	Permit Issuance Date	Process Description	Control Technology Description	Emissions Limit
EPA RBLC Database: Multiple Entries	See Appendix E	See Appendix E	Refinery Flares	- Flare minimization - Good combustion practices (i.e., flare designed and operated in accordance with 40 CFR 60.18 or 40 CFR 63 Subpart CC flare control device design, operating, and monitoring requirements)	0.068 lb/MMBtu; various lb/hr emission rates
SCAQMD Rule 1118. Control of Emissions from Refinery Flares	-	Rule Date: 4/5/24	Refinery Flares	- Flare minimization, including not routing vent gas to the flare except during emergencies, shutdowns, startups, turnarounds, or essential operational needs; and, potentially operating in accordance with a flare minimization plan - Good combustion practices (i.e., flare designed and operated in accordance with specific design, operating, and monitoring requirements)	-
BAAQMD Regulation 12: Miscellaneous Standards of Performance, Rule 12: Flares at Refineries	-	Rule Date: 11/3/21	Refinery Flares	Flare minimization (i.e., flare operated in accordance with a flare minimization plan)	-

The above limits and control technologies that were obtained from EPA's RBLC database are further documented in Appendix E.

4.5.1.2 Step 2: Confirm the Limits Achieved in Practice

Shell proposes LAER design, work practice, and operation requirements for the TEGF A and TEGF B that are equal to or more stringent than the requirements indicated above. Therefore, no additional analysis is necessary under this step.

4.5.1.3 Step 3: Select LAER

Shell determined that operating in accordance with a flare minimization plan and good combustion practices represents LAER for the NO_x emissions from the TEGF A and TEGF B. Therefore, Shell will operate these flares in accordance with a flare minimization plan that will include the following:

- Procedures for operating and maintaining the flares during periods of process unit startup, shutdown, and unforeseeable events;
- A program of corrective action for malfunctioning process equipment;
- Procedures to minimize discharges to the flares during the planned and unplanned startup or shutdown of process equipment;
- Procedures for conducting root cause analyses; and
- Procedures for taking identified corrective actions.

Also, Shell will operate the TEGF A and TEGF B in accordance with the good combustion practice requirements in 40 CFR 63 Subpart YY, which include design requirements, minimum flare combustion zone gas heating value requirements, and extensive monitoring requirements for the flares.

5.0 BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

DEP's PSD regulations at 25 Pa. Code §127.83 adopt EPA's PSD regulations in 40 CFR 52 in their entirety. EPA's PSD regulations at 40 CFR 52.21 require the application of BACT when constructing a new major stationary source subject to PSD permitting and carrying out a major modification at an existing major stationary source subject to PSD permitting. *BACT* is defined at 40 CFR 52.21(b)(12) as "an emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under the Act which would be emitted from any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant...." As indicated by this definition, BACT is evaluated on a case-by-case basis, and a BACT determination is made based on an evaluation of the amount of emissions reduction that each available emissions-reducing technology or technique can achieve, as well as the energy, environmental, and economic impacts associated with each technology or technique. For a specific pollutant emitted by a particular emissions unit, a BACT analysis can result in the establishment of a numerical emissions limitation that reflects the maximum degree of reduction achievable for the pollutant through the application of the selected technology or technique on that emissions unit. However, design, equipment, work practice, or operation requirements may be established for a pollutant rather than a numerical emissions limitation if technical or economic factors limit the application of a measurement methodology to demonstrate compliance with such a limitation.

5.1 BACT Applicability

For a new major stationary source, a BACT determination must be made for each emissions unit constructed as part of the new stationary source that would have the potential to emit a regulated PSD pollutant for which the stationary source is determined to have the potential to emit in a significant amount. Alternatively, for a major modification at an existing major stationary source, a BACT determination must be made for the two types of emissions units described below:

- Each new emissions unit constructed as part of the major modification that would have the potential to emit a regulated PSD pollutant for which the modification is determined to result in a significant net emissions increase; and
- Each existing emissions unit undergoing a physical change or change in the method of operation as part of the major modification that would experience an emissions increase of a regulated PSD pollutant for which the modification is determined to result in a significant net emissions increase.

5.1.1 Plan Approval Reconciliations and WWTP Permanent Controls Project

Shell has retrospectively evaluated the Plan Approval Reconciliations and WWTP Permanent Controls Project together as part of the initial SPM construction for NSR applicability purposes. As previously

discussed, Shell has determined that the Plan Approval Reconciliations and WWTP Permanent Controls Project will not retrospectively cause the initial construction of SPM to require PSD permitting under 25 Pa. Code §127.83 for any additional regulated PSD pollutants relative to the PSD applicability determinations that were made contemporaneous with DEP's authorization of the initial construction of SPM. In consideration of this retrospective PSD applicability determination, the inventory of emissions units proposed to be constructed with the Plan Approval Reconciliations and WWTP Permanent Controls Project along with the regulated PSD pollutants that will be emitted by those emissions units, and the BACT applicability criteria outlined above for emissions units constructed as part of a new major stationary source, Shell has concluded that the Plan Approval Reconciliations and WWTP Permanent Controls Project do not require a BACT analysis because the only emissions units proposed to be constructed as part of these changes are the new Wastewater Treatment Vessels, but VOC is the only regulated NSR pollutant these vessels are estimated to emit and the VOC emissions from the vessels are subject to LAER requirements rather than BACT requirements due to the ozone nonattainment status of Beaver County.

5.1.2 EMACT Project

SPM is an existing major stationary source for the EMACT Project for PSD applicability purposes, and Shell determined the EMACT Project is a major modification subject to PSD review for CO, NOx, PM_{2.5}, and GHGs, respectively. Therefore, a BACT analysis is required for each of the EMACT Project's new and modified emissions units that would newly emit or experience an emissions increase of CO, NOx, PM_{2.5}, and/or GHGs due to the EMACT Project. Based on these criteria, Shell has concluded that the EMACT Project requires a BACT analysis for the emissions units and associated pollutants listed below:

- TEGF A for CO, NOx, PM_{2.5}, and GHGs
- TEGF B for CO, NOx, PM_{2.5}, and GHGs.

5.2 BACT Analysis Process

The process typically used to perform a BACT analysis is the five-step "top-down" BACT process. Although this specific process is not required by EPA's PSD regulations, Shell has used it to make the BACT determinations in this application.²⁹ In general, the top-down BACT process starts with consideration of the control technology that would achieve the maximum degree of emissions limitation (lowest emission rate) for an emissions unit and that can be or has been applied to the same type of emissions unit or to a similar type of emissions unit. The top-ranked control technology that is considered technically available may be eliminated based on economic, environmental, and/or energy impacts. If the top-ranked control technology is not chosen, then the analysis proceeds to the next most stringent control technology. This process continues until a BACT decision is reached. The following is a detailed outline of the steps used to perform the top-down BACT process.

²⁹ On July 23, 1996, EPA proposed to revise the federal PSD regulations to incorporate the top-down process. 61 Federal Register 38250. However, that proposed revision has never been promulgated.

5.2.1.1 Step 1: Identify All Control Technologies

The first step in the top-down BACT process is to define the spectrum of process and/or add-on emission control alternatives potentially available for application to an emissions unit. Under the federal statutory definition of BACT, “in no event shall application of ‘best available control technology’ result in emissions of any pollutants which will exceed the emissions allowed by any applicable standard established pursuant to section 111 [NSPS] or 112 [NESHAP] of this Act [CAA].” Consequently, an applicable NSPS or NESHAP emission limitation represents a “floor” or “baseline” when making a BACT determination. Consistent with this concept, Shell did not identify as available for a specific emissions unit any control technology that, at a minimum, would not comply with NSPS and/or NESHAP emission limitations applicable to the emissions unit. Shell primarily relied upon a review of EPA’s RBLC database to identify BACT alternatives.

5.2.1.2 Step 2: Eliminate Technically Infeasible Options

The second step is to evaluate the technical feasibility of the alternatives identified in Step 1 and to reject those which are technically infeasible based on an engineering evaluation or due to chemical or physical principles. The following criteria are considered in determining technical feasibility: previous commercial scale demonstrations, precedents based on previous permits, and technology transfer from similar emissions units. EPA stated the following in its 1990 Draft New Source Review Workshop Manual³⁰ regarding technical feasibility for newly developing technologies.

Technologies which have not yet been applied to (or permitted for) full scale operations need not be considered available; an applicant should be able to purchase or construct a process or control device that has already been demonstrated in practice. B.11.

When evaluating the technical feasibility of a control technology that has been operated successfully on a type of emissions unit that is different than the unit type under review, EPA has indicated that the “availability” and “applicability” of the control technology to the unit type under review should be considered to eliminate the control technology as technically infeasible. For this situation, EPA stated in its March 2011 “PSD and Title V Permitting Guidance for Greenhouse Gases”³¹ that it “considers a technology to be ‘available’ where it can be obtained through commercial channels or is otherwise available within the common meaning of the term.” In the same document, EPA stated that it “considers an available technology to be ‘applicable’ if it can reasonably be installed and operated on the source type under consideration.”

5.2.1.3 Step 3: Rank Remaining Control Technologies by Control Effectiveness

The third step involves an assessment of the emissions level achievable by each technically feasible control technology when taking into consideration the specific operating constraints of the emissions

³⁰ EPA. *New Source Review Workshop Manual*. Draft. October 1990.

³¹ EPA. Office of Air Quality Planning and Standards. Air Quality Policy Division. *PSD and Title V Permitting Guidance for Greenhouse Gases*. EPA-457/B-11-001. March 2011.

unit undergoing review. After determining the control efficiency achievable by each of the technically feasible control technologies, they are ranked from most to least stringent control technology.

5.2.1.4 Step 4: Evaluate Most Effective Control Options and Document Results

The fourth step is to evaluate the economic, environmental, and energy impacts of the top or most stringent control technology. To reject the top control technology, it must be demonstrated to be infeasible based on the results of this impacts analysis. If a control technology is determined to be infeasible due to costs or adverse energy or environmental impacts (including toxic pollutant impacts), then it is rejected as BACT, and the impacts analysis is performed on the next most stringent control technology alternative. Regarding the cost evaluation performed in this step, both average cost effectiveness and incremental cost effectiveness may be derived for the control technology alternatives. Cost effectiveness is the cost of a control technology divided by the mass of emissions (in tons) reduced by that control technology. For a specific control technology, average cost effectiveness is the cost per ton that would be incurred compared with a baseline control level (i.e., either uncontrolled or the control level that would be required in the absence of BACT requirements, such as NSPS, NESHAP, or DEP standards). Incremental cost effectiveness is the difference in cost per ton of emissions reduced at the next most stringent level of control, when comparing two control technology options.

5.2.1.5 Step 5: Select BACT

BACT is identified as the control technology option with the highest control effectiveness that was not eliminated in Step 4.

5.3 Summary of BACT Determinations

Table P below summarizes the BACT determinations made for the EMAX Project.

Table P. Summary of BACT Determinations

Emissions Unit	Pollutant	Control Technology/ Work Practice	Emissions Level
TEGF A	CO	- Flare minimization (i.e., flare operated in accordance with a flare minimization plan) - Good combustion practices (i.e., flare designed and operated in accordance with 40 CFR 63 Subparts CC/YY flare control device design, operating, and monitoring requirements)	-

Emissions Unit	Pollutant	Control Technology/ Work Practice	Emissions Level
TEGF A (cont'd)	NOx	- Flare minimization (i.e., flare operated in accordance with a flare minimization plan) - Good combustion practices (i.e., flare designed and operated in accordance with 40 CFR 63 Subparts CC/YY flare control device design, operating, and monitoring requirements)	-
	GHGs	- Flare minimization (i.e., flare operated in accordance with a flare minimization plan) - Good combustion practices (i.e., flare designed and operated in accordance with 40 CFR 63 Subparts CC/YY flare control device design, operating, and monitoring requirements) - Low-carbon fuels	-
TEGF B	CO	- Flare minimization (i.e., flare operated in accordance with a flare minimization plan) - Good combustion practices (i.e., flare designed and operated in accordance with 40 CFR 63 Subparts CC/YY flare control device design, operating, and monitoring requirements)	-
	NOx	- Flare minimization (i.e., flare operated in accordance with a flare minimization plan) - Good combustion practices (i.e., flare designed and operated in accordance with 40 CFR 63 Subparts CC/YY flare control device design, operating, and monitoring requirements)	-

Emissions Unit	Pollutant	Control Technology/ Work Practice	Emissions Level
TEGF B (cont'd)	GHGs	- Flare minimization (i.e., flare operated in accordance with a flare minimization plan) - Good combustion practices (i.e., flare designed and operated in accordance with 40 CFR 63 Subparts CC/YY flare control device design, operating, and monitoring requirements) - Low-carbon fuels	-

Below, Shell documents the analysis that was completed to make these BACT determinations.

5.4 TEGF A and TEGF B BACT Determinations

The BACT determinations made for the TEGF A and TEGF B are presented below, by pollutant. The EPA RBLC database control technology and emission limitation information that Shell used to support the below BACT determinations for the TEGF A and TEGF B is documented in Appendix E.

5.4.1 CO

CO is emitted by the TEGF A and TEGF B due to the incomplete oxidation of hydrocarbons present in the flare vent gas combusted at the flares. The combustion efficiency of a flare is a measure of the amount of hydrocarbon present in the flare vent gas that oxidizes completely to CO₂ and water at the flare tip. The combustion efficiency of a flare is affected by flare vent gas characteristics (e.g., Btu content, composition), flare tip velocity, and oxygen levels at the flare's combustion zone.

The TEGF A and TEGF B are currently subject to the following CO BACT requirements:

- Each flare must be operated in accordance with a flare minimization plan; and
- Each flare must be operated in accordance with good combustion practices.

5.4.1.1 Step 1: Identify Control Technologies

The following are available CO emission control technologies for the flares.

- Flare minimization
- Good combustion practices

As noted above, the flares are currently required to operate in accordance with a flare minimization plan and good combustion practices. Flare minimization and good combustion practices are generally described below.

Flare Minimization

A facility typically develops a flare minimization plan to document and guide its flare minimization design features, procedures, and practices. In general, a flare minimization plan is used to minimize flaring at a facility without compromising its safe operations and practices, especially during planned startup, shutdown, and maintenance events. A flare minimization plan results in reduced emissions of combustion pollutants such as CO, NO_x, PM_{2.5}, and CO₂ from a flare because it promotes a reduction in the occurrence of certain flaring events, the amount of waste gas generated during flaring events, and the duration of flaring events. Key components of an effective flare minimization plan are careful planning to minimize flaring events, measuring and monitoring flaring events when they occur, and investigative evaluation of the causes of flaring events, especially large or unplanned flaring events. Regarding unplanned flaring events, a flare minimization plan usually includes procedures to evaluate the events and their causes to develop strategies and measures to minimize the likelihood for the reoccurrence of the same or similar events.

Good Combustion Practices

Good combustion practices for a flare promote appropriate flame zone residence time, temperature, and turbulence to achieve low CO, PM_{2.5}, and methane emission levels. The following are design and operating parameters that are typically used to measure or indicate good combustion practices for a flare: flare vent gas heating value, flare vent gas flow rate, assist gas flow rate, and visible emissions. A flare is generally recognized as achieving and demonstrating good combustion practice operations when it follows the design, operating, and monitoring requirements specified in 40 CFR 63 Subpart CC, which are specifically referenced and required to be met by 40 CFR 63 Subpart YY with minor revisions.

5.4.1.2 Step 2: Eliminate Technically Infeasible Options

The technical feasibility of the CO emission control technologies determined to be available for the flares is evaluated below.

Flare Minimization

This option is technically feasible for the flares.

Good Combustion Practices

This option is technically feasible for the flares.

5.4.1.3 Step 3: Rank Remaining Control Technologies by Control Effectiveness

The technically feasible CO emission control technologies for the flares are listed below from the highest to lowest potential emission control.

- Flare minimization
- Good combustion practices

5.4.1.4 Step 4: Evaluate Most Effective Control Options and Document Results

Shell proposes to use the two emission control technologies determined to be available for the flares to control their CO emissions. Therefore, no additional analysis is necessary under this step.

5.4.1.5 Step 5: Select BACT

Shell determined that operating in accordance with a flare minimization plan and good combustion practices represents BACT for the CO emissions from the TEGF A and TEGF B. Therefore, Shell will operate these flares in accordance with a flare minimization plan and good combustion practices., as previously described in Section 4.5.1.3.

5.4.2 NO_x

As previously discussed, NO_x can be emitted by the TEGF A and TEGF B due to three fundamentally different mechanisms that generate NO_x when a material is combusted. The three NO_x generation mechanisms are the thermal NO_x, prompt NO_x, and fuel-bound NO_x mechanisms.

For the open flame combustion process occurring at the TEGF A and TEGF B, NO_x emissions are relatively low and estimated to mostly result from the thermal NO_x mechanism. The TEGF A and TEGF B may emit a minor amount of NO_x formed by the prompt NO_x mechanism. However, the TEGF A and TEGF B are not expected to emit fuel-bound NO_x because these flares do not combust vent streams that contain fuel-bound nitrogen compounds since SPM does generate vent streams containing fuel-bound nitrogen compounds, and the supplemental gas and pilot fuel combusted at the flares do not contain fuel-bound nitrogen compounds.

The TEGF A and TEGF B are currently subject to the following NO_x LAER and BACT requirements:

- Each flare must be operated in accordance with a flare minimization plan; and
- Each flare must be operated in accordance with good combustion practices.

5.4.2.1 Step 1: Identify Control Technologies

The following are available NO_x emission control technologies for the flares.³²

- Flare minimization
- Good combustion practices

As noted above, the flares are currently required to operate in accordance with a flare minimization plan and good combustion practices. Flare minimization and good combustion practices are generally described below.

³² Shell did not identify low fuel-bound nitrogen compound waste gas, supplemental gas, and/or fuel gas as an available NO_x emission control technology for the TEGF A and TEGF B because the waste gas, supplemental gas, and fuel gas streams combusted at the flares do not contain fuel-bound nitrogen compounds.

Flare Minimization

Please see Section 5.4.1.1 herein for a discussion of this technology.

Good Combustion Practices

Please see Section 5.4.1.1 herein for a discussion of this technology.

5.4.2.2 Step 2: Eliminate Technically Infeasible Options

The technical feasibility of the NO_x emission control technologies determined to be available for the flares is evaluated below.

Flare Minimization

This option is technically feasible for the flares.

Good Combustion Practices

This option is technically feasible for the flares.

5.4.2.3 Step 3: Rank Remaining Control Technologies by Control Effectiveness

The technically feasible NO_x emission control technologies for the flares are listed below from the highest to lowest potential emission control.

- Flare minimization
- Good combustion practices

5.4.2.4 Step 4: Evaluate Most Effective Control Options and Document Results

Shell proposes to use the two emission control technologies determined to be available for the flares to control their NO_x emissions. Therefore, no additional analysis is necessary under this step.

5.4.2.5 Step 5: Select BACT

Shell determined that operating in accordance with a flare minimization plan and good combustion practices represents BACT for the NO_x emissions from the TEGF A and TEGF B. Therefore, Shell will operate these flares in accordance with a flare minimization plan and good combustion practices., as previously described in Section 4.5.1.3.

5.4.3 PM_{2.5}

PM_{2.5} is emitted by the TEGF A and TEGF B due to the incomplete combustion of hydrocarbons present in the flare vent gas combusted at the flares. However, these flares are used to combust mostly low molecular weight hydrocarbons (e.g., methane, ethane, and ethylene) that combust relatively easily, minimizing the generation of carbon particles. Additionally, the flares are designed to use high pressure upstream of their flare tips to draw air into the flame zone at the tips to promote proper air and flare vent gas mixing in the flame zone, which results in smokeless flare operation (i.e., negligible carbon particles escaping oxidation to CO and CO₂).

The TEGF A and TEGF B are currently subject to the following PM_{2.5} LAER requirements:

- Each flare must be operated in accordance with a flare minimization plan; and
- Each flare must be operated in accordance with good combustion practices.

5.4.3.1 Step 1: Identify Control Technologies

The following are available PM_{2.5} emission control technologies for the flares.

- Flare minimization
- Good combustion practices

As noted above, the flares are currently required to operate in accordance with a flare minimization plan and good combustion practices. Flare minimization and good combustion practices are generally described below.

Flare Minimization

Please see Section 5.4.1.1 herein for a discussion of this technology.

Good Combustion Practices

Please see Section 5.4.1.1 herein for a discussion of this technology.

5.4.3.2 Step 2: Eliminate Technically Infeasible Options

The technical feasibility of the PM_{2.5} emission control technologies determined to be available for the flares is evaluated below.

Flare Minimization

This option is technically feasible for the flares.

Good Combustion Practices

This option is technically feasible for the flares.

5.4.3.3 Step 3: Rank Remaining Control Technologies by Control Effectiveness

The technically feasible PM_{2.5} emission control technologies for the flares are listed below from the highest to lowest potential emission control.

- Flare minimization
- Good combustion practices

5.4.3.4 Step 4: Evaluate Most Effective Control Options and Document Results

Shell proposes to use the two emission control technologies determined to be available for the flares to control their PM_{2.5} emissions. Therefore, no additional analysis is necessary under this step.

5.4.3.5 Step 5: Select BACT

Shell determined that operating in accordance with a flare minimization plan and good combustion practices represents BACT for the PM_{2.5} emissions from the TEGF A and TEGF B. Therefore, Shell will operate the flares in accordance with a flare minimization plan and good combustion practices, as previously described in Section 4.5.1.3.

5.4.4 GHGs

The primary GHG emitted by the TEGF A and TEGF B is CO₂, which is emitted due to the complete oxidation of hydrocarbons present in the flare vent gas to CO₂. However, that is the purpose of the TEGF A and TEGF B – to safely combust (oxidize) vent streams that contain hydrocarbons, including VOC and HAPs, to minimize the uncontrolled release of those compounds to the atmosphere. Additionally, the TEGF A and TEGF B emit small amounts of methane and nitrous oxide, which are also GHGs. The flares emit methane because some of the methane in the flare vent gas does not react as part of the combustion reactions that occur at the flares and is therefore emitted to the atmosphere as methane, while some of the non-methane hydrocarbons in the flare vent gas may react to form methane as part of the combustion reactions at the flares. The flares emit nitrous oxide due to certain reactions that occur during the combustion process at the flares.

The TEGF A and TEGF B are currently subject to the following GHG BACT requirements:

- Each flare must be operated in accordance with a flare minimization plan; and
- Each flare must be operated in accordance with good combustion practices.

5.4.4.1 Step 1: Identify Control Technologies

The following are available GHG emission control technologies for the flares.

- Flare minimization
- Low-carbon fuels
- Good combustion practices

As noted above, the flares are currently required to operate in accordance with a flare minimization plan and good combustion practices. Flare minimization, low-carbon fuels, and good combustion practices are generally described below.

Flare Minimization

Please see Section 5.4.1.1 herein for a discussion of this technology.

Low-Carbon Fuels

Low-carbon fuels emit a small amount of GHGs per unit of thermal energy production relative to other fuels. SPM uses natural gas and/or tail gas as the supplemental gas that is combusted at the TEGF A and TEGF B, while natural gas is used as the pilot fuel at the TEGF A and TEGF B. Natural gas and tail gas are low-carbon fuels based on their composition. Natural gas is primarily comprised of methane, which is a

single carbon atom compound that results in lower CO₂ emissions per unit of thermal energy production compared to gaseous fuels that include hydrocarbon compounds containing two or more carbon atoms. Tail gas is mostly comprised of hydrogen and methane. Hydrogen combustion does not result in GHGs.

Good Combustion Practices

Please see Section 5.4.1.1 herein for a discussion of this technology.

5.4.4.2 Step 2: Eliminate Technically Infeasible Options

The technical feasibility of the GHG emission control technologies determined to be available for the flares is evaluated below.

Flare Minimization

This option is technically feasible for the flares.

Low-Carbon Fuels

This option is technically feasible for the flares.

Good Combustion Practices

This option is technically feasible for the flares.

5.4.4.3 Step 3: Rank Remaining Control Technologies by Control Effectiveness

The technically feasible PM_{2.5} emission control technologies for the flares are listed below from the highest to lowest potential emission control.

- Flare minimization
- Low-carbon fuels
- Good combustion practices

5.4.4.4 Step 4: Evaluate Most Effective Control Options and Document Results

Shell proposes to use the three emission control technologies determined to be available for the flares to control their GHG emissions. Therefore, no additional analysis is necessary under this step.

5.4.4.5 Step 5: Select BACT

Shell determined that operating in accordance with a flare minimization plan and good combustion practices and combusting low-carbon fuels represent BACT for the GHG emissions from the TEGF A and TEGF B. Therefore, Shell will operate the TEGF A and TEGF B in accordance with a flare minimization plan and good combustion practices, as previously described in Section 4.5.1.3, use natural gas and/or tail gas as the supplemental gas combusted at the flares, and use natural gas as the pilot fuel combusted at the flares.

6.0 BEST AVAILABLE TECHNOLOGY (BAT)

Pursuant to 25 Pa. Code 127.12(a)(5), a plan approval applicant must show that emissions from each new emission source will be the minimum attainable through the use of BAT. *BAT* is defined at 25 Pa Code §121.1 as “equipment, devices, methods or techniques as determined by the Department which will prevent, reduce or control emissions of air contaminants to the maximum degree possible and which are available or may be made available.” For a plan approval applicant subject to PSD or NNSR permitting requirements, 25 Pa. Code 127.205(7) provides that DEP may determine BAT requirements are equivalent to BACT or LAER requirements.

6.1 BAT Applicability

A BAT determination must be made for the emissions from each new emission source that is proposed in a plan approval application.

6.1.1 Plan Approval Reconciliations and WWTP Permanent Controls Project

Shell is not proposing to construct any new emission sources at SPM as part of the Plan Approval Reconciliations. Therefore, Shell has concluded that the Plan Approval Reconciliations do not require any BAT determinations.

Alternatively, Shell is proposing to install the new Wastewater Treatment Vessels at SPM as part of the WWTP Permanent Controls Project. As such, the new Wastewater Treatment Vessels are subject to BAT requirements for VOC and HAPs. However, Shell proposes that the VOC LAER requirements previously documented for the new Wastewater Treatment Vessels represent BAT for VOC. Thus, Shell has concluded that a HAP BAT analysis is the only detailed BAT-specific analysis required for the new Wastewater Treatment Vessels.

6.1.2 EMACT Project

Shell has concluded that the EMACT Project does not require any BAT determinations because no new emission sources are proposed to be constructed at SPM as part of the project.

6.2 BAT Analysis Process

Although not required, Shell used the same “top-down” process typically used to perform a PSD BACT analysis to make the BAT determinations in this application. The top-down BACT process was previously discussed in detail in Section 5.2.

6.3 Summary of BAT Determinations

Table Q below summarizes the BAT determination made for the WWTP Permanent Controls Project.

Table Q. Summary of BAT Determinations

Emissions Unit	Pollutant	Control Technology/ Work Practice	Emissions Level
New Wastewater Treatment Vessels	HAPs	Thermal oxidation (SCTO)	≥99.9% VOC destruction efficiency

Below, Shell documents the analysis that was completed to make this BAT determination.

6.4 New Wastewater Treatment Vessels BAT Determinations

The HAP BAT determination made for the new Wastewater Treatment Vessels that are proposed to be installed at SPM with the WWTP Permanent Controls Project is presented below. The EPA RBLC database VOC control technology and emission limitation information that Shell used to support the below HAP BAT determination for the new Wastewater Treatment Vessels is documented in Appendix E.

6.4.1 HAPs

The new Wastewater Treatment Vessels will treat organic HAP-containing wastewater using a combination of gravity settlement/phase separation, dissolved nitrogen flotation, and steam stripping mechanisms. Therefore, the new Wastewater Treatment Vessels will have the potential to emit organic HAPs because some of the organic HAPs contained in the wastewater will either volatilize or be stripped from the wastewater during the referenced treatment processes. To minimize the new Wastewater Treatment Vessels' organic HAP emissions, Shell will collect the vent streams from each of the vessels in a closed-vent system and route the vent streams to SPM's SCTO for combustion.

The new Wastewater Treatment Vessels will be subject to the BWON rule. SPM complies with the 6 BQ compliance option outlined in 40 CFR 61.342(e) in the BWON rule, which allows a facility to exempt certain aqueous waste streams from the emission control requirements of the BWON rule provided that the total benzene quantity of the qualifying waste streams chosen for exemption does not exceed 6.0 Mg/yr. SPM will apply the emission control requirements of the BWON rule to the new Wastewater Treatment Vessels as part of the facility's 6 BQ compliance strategy. As such, each of the new Wastewater Treatment Vessels' vent streams must be collected in a closed-vent system and routed to a control device or recovery device that complies with one of the following BWON rule emission limitations.

- The vent stream must be combusted in an enclosed combustion device that meets one of the following conditions:
 - Reduces organic emissions by 95 wt% or greater;
 - Achieves an exhaust total organic compound concentration of 20 ppmvd, corrected to 3% oxygen; or

- Provides a minimum residence time of 0.5 seconds at a minimum temperature of 760°C (1,400°F). If a boiler or process heater is used as the control device, then the vent stream shall be introduced into the flame zone of the boiler or process heater.
- The vent stream must be processed in a vapor recovery system that recovers or controls organic emissions at an efficiency of 95 wt% or greater; or, alternatively, recovers or controls benzene emissions at an efficiency of 98 wt% or greater.
- The vent stream must be combusted in a flare that complies with the requirements of 40 CFR 60.18.
- The vent stream must be processed in a device other than those specified above that recovers or controls organic emissions at an efficiency of 95 wt% or greater; or, alternatively, recovers or controls benzene emissions at an efficiency of 98 wt% or greater.

SPM has chosen the option to collect and route the new Wastewater Treatment Vessels' vent streams to an enclosed combustion device (the SCTO) that reduces organic emissions by 95 wt% or greater.

6.4.1.1 Step 1: Identify Control Technologies

The following are available organic HAP emission control technologies for the new Wastewater Treatment Vessels.

- Thermal Oxidation
- Catalytic Oxidation
- Absorption
- Carbon Adsorption
- Condensation

These technologies are generally described below.

Thermal Oxidation

Thermal oxidation can be used to reduce organic HAPs contained in a source's vent stream by maintaining the stream at a high enough temperature in the presence of oxygen, resulting in the oxidation of organic HAPs to CO₂. Thermal oxidation of an organic HAP-containing vent stream can be achieved by routing the stream to a flare, afterburner, thermal oxidizer, incinerator, or combustion device used primarily for process heating or steam generation purposes, such as a heater, furnace, or boiler. The effectiveness of all thermal oxidation devices is influenced by the residence time of the vent stream in the device's combustion zone, the degree of mixing in the device's combustion zone, and the temperature of the device's combustion zone. Auxiliary fuel is typically required to achieve the combustion zone temperature needed to ensure proper organic HAP oxidation by a flare, afterburner, or thermal oxidizer. The necessary amount of auxiliary fuel is dependent on the composition of the vent stream (i.e., less auxiliary fuel is required for a high Btu value vent stream, while more auxiliary fuel is required for a low Btu value vent stream) and minimum temperature required to oxidize the target compounds contained in the stream.

Catalytic Oxidation

Catalytic oxidation uses catalysts, such as the precious metals platinum, palladium, or rhodium, to reduce the temperature at which organic HAPs oxidize to CO₂. The organic HAP removal effectiveness of catalytic oxidation is dependent on a vent stream's temperature, the concentration of organic HAPs in the stream, and the presence of potentially poisoning contaminants in the stream. The amount of catalyst required for a particular application is dependent upon a stream's flow rate, composition, and temperature, as well as the desired organic HAP removal efficiency. The catalyst in a catalytic oxidation system will experience activity loss over time due to physical deterioration and/or chemical deactivation. Therefore, periodic testing of the catalyst is necessary to monitor its activity (i.e., oxidation promoting effectiveness) and predict its remaining useful life. As needed, the catalyst will require periodic replacement. Catalyst life varies from manufacturer-to-manufacturer, but a three to six-year window is not uncommon.

Absorption

Absorption is primarily a physical process – though it can also include a chemical mechanism – in which a pollutant in a gas phase contacts a liquid media and is removed from the gas phase by the liquid media. A common absorption device used to remove organic HAPs from a gaseous stream is a wet scrubber, which provides an intimate contacting environment for soluble organic HAPs to be dissolved in a scrubbing liquid. Water is often used as the scrubbing liquid for the control of organic HAP emissions, but it may be necessary to use a very low vapor pressure organic material as the scrubbing liquid when the organic HAPs requiring control are less soluble in water. In general, organic HAPs containing only one to three carbon atoms are soluble in water. As the number of carbon atoms increases, the organic HAP is typically less soluble in water to a point where it is insoluble in water. There are several types of wet scrubber designs, including packed-bed counterflow scrubbers, packed-bed cross-flow scrubbers, bubble plate scrubbers, and tray scrubbers.

Carbon Adsorption

Carbon adsorption is used to capture a specific compound, or a range of compounds, present in a gas phase on the surface of granular activated carbon. Carbon adsorption performance depends on the type of activated carbon used, the characteristics of the target compound(s), the concentration of the target compound(s) in the gaseous stream, and the temperature, pressure, and moisture content of the gaseous stream. Carbon adsorbers can be of the fixed-bed or fluidized bed design. A fixed-bed carbon adsorber must be periodically regenerated to desorb the collected compounds from the carbon, while a fluidized-bed carbon adsorber is continuously regenerated. Additionally, portable, easily replaceable carbon adsorption units (e.g., 55-gallon drums) are used in some applications. This type of unit is not regenerated at the facility where it is used. Instead, a portable unit is typically returned to the supplier of the unit, and the supplier regenerates or disposes of the spent carbon.

Condensation

A condenser achieves condensation by lowering the temperature of the gas stream containing a condensable compound to a temperature at which the desired condensate's vapor pressure is lower

than its entering partial pressure. A condenser can be either a surface noncontact condenser or a direct-contact condenser. A surface condenser is usually a shell-and-tube heat exchanger in which the cooling fluid flows inside the tubes of the exchanger and the gas undergoing condensation treatment flows on the outside of the tubes. A direct-contact condenser is a device in which intimate contact occurs between the cooling fluid and the gas undergoing condensation treatment, usually in a spray or packed tower. Although a direct-contact condenser may also be part of a chemical recovery system, an extra separation step is usually required to separate the cooling liquid from the newly formed condensate. Examples of cooling fluids used in condensers are water, brine, and refrigerants.

6.4.1.2 Step 2: Eliminate Technically Infeasible Options

The technical feasibility of the organic HAP emission control technologies determined to be available for the new Wastewater Treatment Vessels is evaluated below.

Thermal Oxidation

This option is technically feasible for the new Wastewater Treatment Vessels.

Catalytic Oxidation

This option is technically feasible for the new Wastewater Treatment Vessels.

Absorption

This option is technically feasible for the new Wastewater Treatment Vessels.

Carbon Adsorption

This option is technically feasible for the new Wastewater Treatment Vessels.

Condensation

This option is technically feasible for the new Wastewater Treatment Vessels.

6.4.1.3 Step 3: Rank Remaining Control Technologies by Control Effectiveness

The technically feasible organic HAP emission control technologies for the new Wastewater Treatment Vessels are listed below from the highest to lowest potential emission control.

- Thermal Oxidation
- Catalytic Oxidation
- Absorption/Carbon Adsorption/Condensation

6.4.1.4 Step 4: Evaluate Most Effective Control Options and Document Results

Shell proposes to use the most effective emission control technology, thermal oxidation, to control the new Wastewater Treatment Vessels' organic HAP emissions. Therefore, no additional analysis is necessary under this step.

6.4.1.5 Step 5: Select BAT

Shell determined that thermal oxidation represents BAT for the organic HAP emissions from the new Wastewater Treatment Vessels. Therefore, Shell proposes to collect and route the new Wastewater Treatment Vessels' organic HAP emissions to SPM's SCTO. The SCTO achieves a 99.9% VOC destruction efficiency, and the new Wastewater Treatment Vessels' organic HAP emissions are VOC emissions. As a result, the SCTO is expected to reduce the new Wastewater Treatment Vessels' organic HAP emissions by at least 99.9%.

7.0 ALTERNATIVES ANALYSIS

DEP's NNSR regulations at 25 Pa. Code §127.205(5) require a major new or modified facility to provide an "analysis...of alternative sites, sizes, production processes and environmental control techniques, which demonstrates that the benefits of the proposed facility significantly outweigh the environmental and social costs imposed within this Commonwealth as a result of its location, construction or modification." Generally, an alternatives analysis completed pursuant to 25 Pa. Code §127.205(5) documents the efforts an applicant will take to avoid or minimize environmental impacts that may result from a major new or modified facility subject to NNSR permitting under Chapter 127, Subchapter E. Below, Shell documents the alternatives analyses completed for the Plan Approval Reconciliations, WWTP Permanent Controls Project, and EMACT Project.

7.1 Plan Approval Reconciliations and WWTP Permanent Controls Project

As previously discussed, Shell has retrospectively evaluated the Plan Approval Reconciliations and WWTP Permanent Controls Project together as part of the initial construction of SPM because of the relatively close timing between these changes and the recently completed initial construction of the facility, as well as the relationships between these changes and the initial construction of the facility. Shell originally concluded that the initial construction of SPM required NNSR permitting for ozone (NO_x and VOC) and PM_{2.5}, and Shell has determined that the Plan Approval Reconciliations and WWTP Permanent Controls Project will not retrospectively cause the initial construction of SPM to require NNSR permitting under Chapter 127, Subchapter E for any additional NNSR pollutants.

In line with the aggregation of the Plan Approval Reconciliations and WWTP Permanent Controls Project with the initial construction of SPM for NSR applicability purposes and the conclusion that the Plan Approval Reconciliations and WWTP Permanent Controls Project will not retrospectively cause the initial construction of SPM to require NNSR permitting for any additional NNSR pollutants, Shell has determined that the alternatives analysis that was previously completed and submitted to DEP for the initial construction of SPM is applicable to the Plan Approval Reconciliations and WWTP Permanent Controls Project for the following reasons.

- The Plan Approval Reconciliations will not materially impact or change the information that served as the basis for the alternative site, size, production process, and environmental control technique analyses that were documented in the referenced alternatives analysis.
- The WWTP Permanent Controls Project will improve the performance of SPM's WWTP as initially designed and constructed, which will align the WWTP's air emissions and water discharge characteristics with the analyses and determinations that were included in the referenced alternatives analysis.

Therefore, for the Plan Approval Reconciliations and WWTP Permanent Controls Project, please refer to the alternatives analysis that Shell previously completed and submitted to DEP for the initial construction of SPM.

7.2 EMACT Project

SPM is an existing major facility for NO_x for the EMACT Project for NNSR applicability purposes, and Shell determined that the EMACT Project is a major modification subject to NNSR permitting for NO_x under Chapter 127, Subchapter E. Therefore, Shell completed the below alternatives analysis for the EMACT Project pursuant to 25 Pa. Code §127.205(5).

7.2.1 Alternative Sites

The EMACT Project is being implemented at SPM because the TEGF A and TEGF B must comply with newly applicable federal requirements, which EPA promulgated to ensure improved combustion efficiency of VOC and organic HAPs routed to flares with the same design features as the TEGF A and TEGF B. Therefore, Shell must implement the EMACT Project at SPM, eliminating the option to perform the project at a site other than SPM while also ensuring compliance with a federally mandated requirement applicable to the TEGF A and TEGF B at SPM.

7.2.2 Alternative Sizes

The EMACT Project is a change in the method of operation of the existing TEGF A and TEGF B, which were appropriately sized in association with the initial design and construction of SPM for the safe and effective combustion of specific VOC- and organic HAP-containing vent streams, to meet federal regulatory requirements that were promulgated to reduce VOC and organic HAP emissions across the country from similarly designed flares. The EMACT Project does not propose the installation of any new operations at SPM, and the project does not propose changes to the sizes of the TEGF A, TEGF B, or other existing operations at SPM. As such, there are no alternative sizes to consider for the EMACT Project.

7.2.3 Alternative Production Processes

The EMACT Project addresses the more effective operation of the TEGF A and TEGF B, which are emission control devices, not production processes. The EMACT Project does not propose the installation of any new production processes at SPM, and the project does not propose changes to existing production processes at SPM. Therefore, there are no alternative production processes to evaluate for the EMACT Project.

7.2.4 Alternative Environmental Control Techniques

The TEGF A and TEGF B are existing emission control devices at SPM. The EMACT Project will ensure that the TEGF A and TEGF B effectively combust VOC and organic HAPs to minimize VOC and organic HAP emissions to the atmosphere. Additionally, as previously documented for the EMACT Project, the TEGF A and TEGF B will be designed and operated in accordance with BACT and LAER requirements that will minimize emissions from the two flares. In summary, the EMACT Project itself represents the implementation of federally mandated environmental control techniques on the TEGF A and TEGF B, and the EMACT Project's PSD and NNSR permitting requirements result in the application of BACT and LAER, respectively, on the TEGF A and TEGF B for specific pollutants. As a result, Shell has concluded that

there are no better environmental control techniques to use on the TEGF A and TEGF B in association with the EMACT Project.

Plan Approval Application Forms



Submit in Triplicate

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

COMBUSTION UNIT

**Application for Plan Approval to Construct, Modify or Reactivate an
Air Contamination Source and/or Install an Air Cleaning Device**

This application and the General Information Form (GIF) must be included in the submittal

Before completing this form, read the instructions provided with this form.

Section A - Facility Name, Checklist And Certification

Organization Name or Registered Fictitious Name/Facility Name: Shell Polymers Monaca

DEP Client ID# (If Known): 311950

Type of Review required and Fees:

- ☐ Source which is not subject to NSPS, NESHAPs, MACT, NSR and PSD: \$ _____
- ☒ Source requiring approval under NSPS or NESHAPS or both: \$ 7,500
- ☒ Source requiring approval under NSR regulations: \$ 7,500
- ☐ Source requiring the establishment of a MACT limitation: \$ _____
- ☒ Source requiring approval under PSD: \$ 32,500

Applicant's Checklist

Check the following list to make sure that all the required documents are included.

- ☒ **General Information Form (GIF)**
- ☒ **Combustion Unit Plan Approval Application**
- ☒ **Compliance Review Form** or provide reference of most recently submitted compliance review form for facilities submitting on a periodic basis: See Appendix G – Air Pollution Control Act Compliance Review Supplemental Form in this submittal.
- ☒ **Copy and Proof of County and Municipal Notifications**
- ☒ **Permit Fees**
- ☐ **Addendum A:** Source Applicable Requirements (only applicable to existing Title V facility)

Certification of Truth, Accuracy and Completeness by a Responsible Official

I, James Howell, certify under penalty of law in 18 Pa. C. S. A. §4904, and 35 P.S. §4009(b) (2) that based on information and belief formed after reasonable inquiry, the statements and information in this application are true, accurate and complete.

(Signature): 

Date: 9/12/24

Name (Print): James Howell

Title: Production Manager

OFFICIAL USE ONLY

Application No. _____ Unit ID _____ Site ID _____
DEP Client ID #: _____ APS. ID _____ AUTH. ID _____
Date Received _____ Date Assigned _____ Reviewed By _____
Date of 1st Technical Deficiency _____ Date of 2nd Technical Deficiency _____
Comments: _____

Section B - Combustion Unit Information

1. Combustion Units: ☐ Coal ☐ Oil ☐ Natural Gas Other: Tail gas/natural gas

Description: 7 identical tail gas/natural gas-fired ethane cracking furnaces that are referenced as Ethane Cracking Furnace #1 (Source ID 031), Ethane Cracking Furnace #2 (Source ID 032), Ethane Cracking Furnace #3 (Source ID 033), Ethane Cracking Furnace #4 (Source ID 034), Ethane Cracking Furnace #5 (Source ID 035), Ethane Cracking Furnace #6 (Source ID 036), and Ethane Cracking Furnace #7 (Source ID 037), respectively, in PA-04-00740A and PA-04-00740C. As a group, the ethane cracking furnaces are referenced as the Ethane Cracking Furnaces (Group ID G01) in PA-04-00740A and PA-04-00740C.

Manufacturer Linde	Model No. NA	Number of units 7	
Maximum heat input (Btu/hr) 620 MMBtu/hr (HHV)	Rated heat input (Btu/hr) 620 MMBtu/hr (HHV)	Typical heat input (Btu/hr) 620 MMBtu/hr (HHV)	Furnace Volume
Grate Area (if applicable)	Method of firing		

Indicate how combustion air is supplied to boiler

Indicate the Steam Usage:

Mark and describe soot Cleaning Method: NA

i. Air Blown	iv. Other _____
ii. Steam Blown	v. Frequency of Cleaning _____
iii. Brushed and Vacuumed	

Maximum Operating schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Operational restrictions taken or requested, if any (e.g., bottlenecks or voluntary restrictions to limit potential to emit)

Capacity (specify units)

Per hour 620 MMBtu/hr (HHV)	Per day	Per week	Per year

Typical Operating schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Seasonal variations (Months): If variations exist, describe them.

Operating using primary fuel: _____	From _____ to _____
Operating using secondary fuel: _____	From _____ to _____
Non-operating: _____	From _____ to _____

2. Specify the primary, secondary and startup fuel. Furnish the details in item 3.

Primary fuel: Tail gas/natural gas

Secondary fuel: NA

Startup fuel: Natural gas

Section B - Combustion Unit Information (Continued)

3. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	620 MMBtu/hr (HHV) tail gas and natural gas	X 10 ⁶ Gal	0.5 gr/100 SCF	0%	~1,020 Btu/SCF
Gas (other) Tail gas	620 MMBtu/hr (HHV) tail gas and natural gas	X 10 ⁶ Gal	0 gr/100 SCF	0%	~461 Btu/SCF
Coal					
Other*					

* Note: Describe and furnish information separately for other fuels in Addendum B.

4. Burner

Manufacturer Callidus	Model Number CUBLF-8W	Type of Atomization (Steam, air, press, mech., rotary cup) NA
Number of Burners 64	Maximum fuel firing rate (all burners) 620 MMBtu/hr (HHV)	Normal fuel firing rate 620 MMBtu/hr (HHV)
If oil, temperature and viscosity.		
Maximum theoretical air requirement NA		
Percent excess air 100% rating 10%		
Turndown ratio 10:1		
Combustion modulation control (on/off, low-high fire, full automatic, manual). Describe. Automatic		
Main burner flame ignition method (electric spark, auto gas pilot, hand-held torch, other). Describe. Natural Gas Pilot		

5. Nitrogen Oxides (NO_x) control Options

Mark and describe the NO_x control options adopted

Low excess air (LEA)

Flue gas recirculation

Other. _____

Over fire air (OFA)

Burner out of service

X Low-NO_x burner

Reburning

Low NO_x burners with over fire
air

X Flue gas treatment (SCR /
SNCR)

Section B - Combustion Unit Information (Continued)

6. Miscellaneous Information

Describe fly ash reinjection operation

NA

Describe, in detail, the equipment provided to monitor and to record the source(s) operating conditions, which may affect emissions of air contaminants. Show that they are reasonable and adequate.

See the emission sources' monitoring and recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.

Describe each proposed modification to an existing source.

NA

Describe how emissions will be minimized especially during start up, shut down, combustion upsets and/or disruptions. Provide emission estimates for start up, shut down and upset conditions. Provide duration of start up and shut down.

See the emission sources' limitations in PA-04-00740A and PA-04-00740C and the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

Describe in detail with a schematic diagram of the control options adopted for SO₂ (if applicable).

NA

Anticipated milestones:

Expected commencement date of construction/reconstruction: NA

Expected completion date of construction/reconstruction: NA

Anticipated date(s) of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions*

Emission Rate					
Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM					
PM ₁₀					
SO _x					
CO					
NO _x		Varies with operating mode			**
VOC					
Others: (e.g., HAPs)	-----	-----	-----		-----

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Gas Conditioning NA

Water quenching ☐ YES ☐ NO Water injection rate _____ GPM	
Radiation and convection cooling ☐ YES ☐ NO	Air dilution ☐ YES ☐ NO If YES, _____ CFM
Forced draft ☐ YES ☐ NO	Water cooled duct work ☐ YES ☐ NO
Other _____	
Inlet volume _____ ACFM@_____ °F	Outlet volume _____ ACFM@_____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Inertial and Cyclone Collectors NA

Manufacturer		Type		Model No.	
Pressure Drop (in. of water)	Inlet Volume _____ ACFM @ _____ °F		Outlet Volume _____ ACFM @ _____ °F _____ % Moisture		
Number of Individual Cyclone(s)			Outlet Straightening Vanes Used? ☐ Yes ☐ No		
Length of Cyclone(s) Cylinder (ft)		Diameter of Cyclone(s) Cylinder		Length of cyclone(s) cone (ft)	
Inlet Diameter (ft) or Duct Area (ft ²) of Cyclone(s)			Outlet Diameter (ft) or Duct area (ft ²) of cyclone(s)		
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?					
Describe any exhaust gas recirculation loop to be employed.					
Attach particle size efficiency curve					
Emission data					
Inlet		Outlet		Removal Efficiency (%)	

Section C - Air Cleaning Device (Continued)

4. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No.	☐ Pressurized Design ☐ Suction Design
Number of Compartments	Number of Filters Per Compartment		Is Baghouse Insulated? ☐ Yes ☐ No
Can each compartment be isolated for repairs and/or filter replacement?			☐ Yes ☐ No
Are temperature controls provided? (Describe in detail)			☐ Yes ☐ No
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM	
Type of Fabric Material _____ Weight _____ oz/sq.yd Thickness _____ in ☐ Felted ☐ Woven ☐ Felted-Woven ☐ Membrane ☐ Others: List: _____			
Fabric permeability (clean) @ 1/2" water-Δ P _____ CFM/sq.ft.			
Filter dimensions _____ Diameter/Width _____			
Effective area per filter _____		Maximum operating temperature (°F) _____	
Effective air to cloth ratio		Minimum _____ Maximum _____	
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.			
Operation and Cleaning			
Volume of gases handled _____ ACFM _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.	
Type of filter cleaning ☐ Manual Cleaning ☐ Mechanical Shakers ☐ Pneumatic Shakers ☐ Bag Collapse ☐ Sonic Cleaning ☐ Reverse Air Flow ☐ Reverse Air Jets ☐ Other: _____			
If compressed air is required for collector operation, describe the equipment with the compressor to provide dry air free from oil.			
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Wet Collection Equipment: NA

Equipment Specifications

Manufacturer	Type	Model No.
Design Inlet Volume (SCFM)	Relative Particulate/Gas Velocity (ejector scrubbers only)	

Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).

Describe pH monitoring and pH adjustment systems, if applicable.

Describe mist eliminator or separator (type, configuration, backflush capability, frequency).

Attach particulate size efficiency curve.

Operating Parameters

Inlet volume of gases handled_____ (ACFM) @ _____ °F	Outlet volume of gases handled_____ (ACFM) @ _____ °F _____ % Moisture

Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)

Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc).

State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

6. Electrostatic Precipitator NA

Equipment specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ YES ☐ NO		Design inlet volume (SCFM) _____ Maximum operating temperature (°F) _____	

Total collecting surface area _____ sq. ft. Collector plates size length _____ ft. x width _____ ft.
 Number of fields _____ Number of collector plates/field _____ Spacing between collector plates _____ inches.
 Maximum gas velocity _____ ft/sec. Minimum gas treatment time: _____ sec.

Total discharge electrode length _____ ft.
 Number of discharge electrodes _____ Number collecting electrode rappers _____

Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____
 Describe in detail _____

Operating parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (water gauge) across collector only. Describe the equipment.
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field

Field No.	No. of Sets	Each Transformer KVA	Each Rectifier	
			KV Ave./Peak	MaDC

Current density _____ Micro amperes/ft ²	Corona power _____ Watts/1000 ACFM	Corona power density _____ Watts/ft ²

Will a flue gas conditioning system be employed? If yes, describe it.

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Absorption Equipment: NA
Equipment specifications

Manufacturer	Type	Model No	
Design inlet volume (SCFM)	Tower height (ft) and inside diameter (ft)		
Packing type and size (if applicable)	Height of packing (ft) (if applicable)		
Number of trays (if applicable)	Number of bubble caps (if applicable)		
Configuration: ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls			
Absorbent information			
Absorbent type and concentration	Sorbent injection rate	Retention time (sec)	
Attach equilibrium data for absorption (If applicable).			
Attach any additional information regarding auxiliary equipment, reagent (slurry mix) supply system (once through or recirculating, system capacity, etc) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in of water) and liquid flow rate. Describe the equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. ☒ **SELECTIVE CATALYTIC REDUCTION (SCR)**
☐ **SELECTIVE NON-CATALYTIC REDUCTION (SNCR)**
☐ **NON-SELECTIVE CATALYTIC REDUCTION (NSCR)**

Equipment specifications

Manufacturer HALDOR TOPSOE	Type PLATE-CORRUGATED TiO ₂ / V ₂ O ₅ / WO ₃	Model No DNX LD-2

Design inlet volume (SCFM) Variable	Design operating temperature (°F) Variable 648 F – 709 F entering reactor

Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.

Yes. Process controls adjust ammonia injection based upon the outlet NO_x rate of the CEMS analyzer. Process controls are also in place to manage proper ammonia air heating, ammonia vaporization, and dilution blowers prior to injection into the flue gas

Attach efficiency and other pertinent information (e.g., Ammonia, urea slip).
 ≥90% NO_x control efficiency during steady-state normal operation.

Operating parameters

Volume of gases handled (ACFM) Varies @ (°F)

Operating temperature range for the SCR/SNCR/NSCR system (°F) From 450 F To 900 F
 SCR

Reducing agent used, if any. 19% Aqueous Ammonia	Oxidation catalyst used, if any. NA

State expected range of usage rate and concentration.
 Variable

Service life of catalyst 5 years	Ammonia slip (ppm) 10 ppmvd @ 3% O ₂

Describe fully with a sketch giving locations of equipment, controls system, important parameters and method of operation.

See the plan approval application for PA-04-00740A and the conditions in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for important parameters and method of operation for the emission sources.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

See the conditions in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)
NO _x	See the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	See the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	≥90% during steady-state normal operation

Section C - Air Cleaning Device (Continued)

9. Other Control Equipment: NA

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Capacity

Describe pH monitoring and pH adjustment, if any.

Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.

Attach efficiency curve and/ or other efficiency information.

Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.

Operating parameters

Volume of gas handled

_____ @ _____ °F _____ % Moisture

Describe, in detail, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Operating Cost

11 MISCELLANEOUS

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

See the previously referenced manufacturer's performance guarantees.

Attach the maintenance schedule for the control equipment and any part of the process equipment that, if in disrepair, would increase air contaminant emissions.

NA

Section D - Additional Information

Will the construction, modification, etc. of the sources covered by this application increase emissions from other sources at the facility? If so, describe and quantify.

See Section 3.1.1 – Nonattainment New Source Review (NNSR) and Section 3.1.2 – Prevention of Significant Deterioration (PSD) in the plan approval application narrative of this submittal for a discussion and summary of the emissions increases estimated to result from the Plan Approval Reconciliations, WWTP Permanent Controls Project, and EMACT Project.

If this project is subject to any one of the following, attach a demonstration to show compliance with applicable standards

a. Prevention of Significant Deterioration permit (PSD), 40 CFR Part 52?	☒ YES	☐ NO
b. New Source Review, 25 Pa. Code Chapter 127, Subchapter E?	☒ YES	☐ NO
c. New Source Performance Standards, 40 CFR Part 60? (If Yes, which subpart) _____	☐ YES	☒ NO
d. National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 CFR Part 61? If Yes, which subpart) <u>FF (WWTP Permanent Controls Project)</u>	☒ YES	☐ NO
e. Maximum Achievable Control Technology (MACT), 40 CFR Part 63? (If Yes, which subpart) <u>XX (WWTP Permanent Controls Project) and YY (WWTP Permanent Controls Project and EMACT Project)</u>	☒ YES	☐ NO

Attach a demonstration showing that the emissions from any new source will be the minimum attainable through the use of best available technology (BAT).

See Section 4.0 – Lowest Achievable Emission Rate (LAER) and Section 6.0 – Best Available Technology (BAT) in the plan approval application narrative of this submittal.

Provide emission increases and decreases in allowable (or potential) and actual emissions within the last 5 years for applicable PSD pollutant(s) if the facility is an existing major facility (for PSD purposes).

Below is a summary of the decreases and increases in potential emissions of PSD pollutants that resulted from the issuance of PA-04-00740B and PA-04-00740C, respectively. PA-04-00740B authorized the installation of sulfur hexafluoride (SF₆)-insulated high-voltage equipment associated with the initial construction of SPM, and the potential to emit increases resulting from the issuance of this plan approval were reviewed as part of the project to initially construct SPM. PA-04-00740C authorized as-built changes for the initial construction of SPM, and the potential to emit decreases and increases resulting from the issuance of this plan approval were reviewed as part of the project to initially construct SPM.

- PA-04-00740B (potential to emissions change): +854 tpy CO_{2e}
- PA-04-00740C (potential to emissions changes): -19.5 tpy NO_x; -28.3 tpy CO; +3.3 tpy PM (filterable only); +4.9 tpy PM₁₀; +4.7 tpy PM_{2.5}; +1.4 tpy SO₂; -5.8 tpy VOC; and +56,206 tpy CO_{2e}.

Section D - Additional Information (Continued)

Indicate emission increases and decreases in tons per year (tpy), for volatile organic compounds (VOCs) and nitrogen oxides (NOx) for NSR applicability since January 1, 1991, or other applicable dates (See other applicable date in instructions). The emissions increases include all emissions including stack, fugitive, material transfer, other emission generating activities, quantifiable emissions from the exempted source(s), etc.

Permit number (if applicable)	Date issued	Indicate Yes or No if emission increases and decreases were used previously for netting	Source I.D. or Name	VOCs		NOx	
				Emission increases in potential to emit (tpy)	Creditable emission decreases in actual emissions (tpy)	Emission increases in potential to emit (tpy)	Creditable emission decreases in actual emissions (tpy)
NA	-	-	-	-	-	-	-

If the source is subject to 25 Pa. Code Chapter 127, Subchapter E, New Source Review requirements,

- a. Identify Emission Reduction Credits (ERCs) for emission offsets or demonstrate ability to obtain suitable ERCs for emission offsets. See Section 3.1.1.1 in the plan approval application narrative of this submittal for a discussion of the ERC requirements for the Plan Approval Reconciliations and WWTP Permanent Controls Project. See Section 3.1.1.2 in the plan approval application narrative of this submittal for a discussion of the ERC requirements for the EMACT Project.
- b. Provide a demonstration that the lowest achievable emission rate (LAER) control techniques will be implemented (if applicable). See Section 4.0 – Lowest Achievable Emission Rate (LAER) in the plan approval application narrative of this submittal.
- c. Provide an analysis of alternate sites, sizes, production processes and environmental control techniques demonstrating that the benefits of the proposed source outweigh the environmental and social costs (if applicable). See Section 7.0 – Alternatives Analysis in the plan approval application narrative of this submittal.

Attach calculations and any additional information necessary to thoroughly evaluate compliance with all the applicable requirements of 25 Pa. Code Article III and applicable requirements of the Clean Air Act and regulations adopted there under. The Department may request additional information to evaluate the application such as a stand by plan, a plan for air pollution emergencies, air quality modeling, etc.

See the potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

Section E - Compliance Demonstration

Note: Complete this section if the facility is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below.

☒ Monitoring	☒ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (stack test, CEM etc.): See the emission sources' monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.
- b. Monitoring device location: See the emission sources' monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter: See the emission sources' monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.

Testing:

- a. Reference Test Method Citation: See the emission sources' testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.
- b. Reference Test Method Description: See the emission sources' testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.

Recordkeeping:

Describe the parameters that will be recorded and the recording frequency: See the emission sources' recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.

Reporting:

- a. Describe the type of information to be reported and the reporting frequency: See the emission sources' reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.
- b. Reporting start date: See the emission sources' reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.

Work Practice Standard: Describe each

See the emission sources' work practice requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.

Section F - Flue and Air Contaminant Emission

1. Estimated Maximum Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		**	**	**
PM ₁₀		**	**	**
SO _x		**	**	**
CO		**	**	**
NO _x		**	**	**
VOC		**	**	**
Others: (e.g., HAPs)	-----	-----	-----	-----
PM _{2.5}		**	**	**
HAPs		**	**	**
Ammonia		**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number S031, S032, S033, S034, S035, S036, and S037

List Source(s) or source ID exhausted to this stack:
031, 032, 033, 034, 035, 036, and 037

% of flow exhausted to stack: 100%

Stack height above grade (ft.) 275
Grade elevation (ft.) 795

Stack diameter (ft) or Outlet duct area (sq. ft.)
8.5 ft

Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.

S031: ~220 ft; S032: ~270 ft; S033: ~385 ft; S034: ~440 ft; S035: ~515 ft; S036: ~570 ft; and S037: 655 ft

Does stack height meet Good Engineering Practice (GEP)?

Yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of Stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
S031	40	40	7.68	80	20	35.88
S032	40	40	7.32	80	20	35.52
S033	40	40	6.24	80	20	35.88
S034	40	40	5.88	80	20	34.08
S035	40	40	5.52	80	20	33.36
S036	40	40	5.16	80	20	33
S037	40	40	4.44	80	20	32.28
Stack Exhaust						
Volume <u>136,869</u> ACFM Temperature <u>253.6</u> °F Moisture <u>NA</u> %						
Exhauster (attach fan curves) _____ in. of water _____ HP @ _____ RPM.						
** If the datum and collection method information and codes differ from those provided on the General Information Form - Authorization Application, provide the additional required by that form on a separate sheet.						



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 04-00740C [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. Continuous ammonia slip measurement via in-situ tunable diode laser (TDL) 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 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	☐ 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. 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? Periodic reports

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).

Section B - Combustion Unit Information

1. Combustion Units: ☐ Coal ☐ Oil ☒ Natural Gas Other: _____

Description: 3 identical natural gas-fired combustion turbines equipped with natural gas-fired duct burners that are part of 3 cogeneration units that generate electricity and steam. The combustion turbine-duct burner combinations are referenced as Combustion Turbine/Duct Burner Unit #1 (Source ID 101), Combustion Turbine/Duct Burner Unit #2 (Source ID 102), and Combustion Turbine/Duct Burner Unit #3 (Source ID 103), respectively, in PA-04-00740A and PA-04-00740C. As a group, the combustion turbine-duct burner combinations are referenced as the Cogeneration Units (Group ID G02) in PA-04-00740A and PA-04-00740C.

Manufacturer GE	Model No. GE Frame 6B	Number of units 3	
Maximum heat input 715.4 MMBtu/hr (HHV) (total for combustion turbine and duct burners)	Rated heat input 715.4 MMBtu/hr (HHV) (total for combustion turbine and duct burners)	Typical heat input 715.4 MMBtu/hr (HHV) (total for combustion turbine and duct burners)	Furnace Volume
Grate Area (if applicable) NA	Method of firing		

Indicate how combustion air is supplied to boiler
NA

Indicate the Steam Usage:
NA

Mark and describe soot Cleaning Method: NA

i. Air Blown	iv. Other _____
ii. Steam Blown	v. Frequency of Cleaning _____
iii. Brushed and Vacuumed	

Maximum Operating schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Operational restrictions taken or requested, if any (e.g., bottlenecks or voluntary restrictions to limit potential to emit)

Capacity (specify units)

Per hour 715.4 MMBtu/hr (HHV) (total for combustion turbine and duct burners)	Per day	Per week	Per year

Typical Operating schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Seasonal variations (Months): If variations exist, describe them.

Operating using primary fuel: _____	From _____ to _____
Operating using secondary fuel: _____	From _____ to _____
Non-operating: _____	From _____ to _____

2. Specify the primary, secondary and startup fuel. Furnish the details in item 3.
Natural gas

Section B - Combustion Unit Information (Continued)

3. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	715.4 MMBtu/hr (HHV) (total for combustion turbine and duct burners)	X 10 ⁶ Gal	0.5 gr/100 SCF	0%	~1,020 Btu/SCF
Gas (other)		X 10 ⁶ Gal			
Coal					
Other*					

* Note: Describe and furnish information separately for other fuels in Addendum B.

4. Burner

Manufacturer Zeeco	Model Number NA	Type of Atomization (Steam, air, press, mech., rotary cup) NA
Number of Burners 9	Maximum fuel firing rate (all burners) 236 MMBTU/hr (HHV)	Normal fuel firing rate 236 MMBTU/hr (HHV)
If oil, temperature and viscosity. NA		
Maximum theoretical air requirement NA		
Percent excess air 100% rating 14%		
Turndown ratio 9:1		
Combustion modulation control (on/off, low-high fire, full automatic, manual). Describe. Automatic		
Main burner flame ignition method (electric spark, auto gas pilot, hand-held torch, other). Describe. Natural Gas Pilot		

5. Nitrogen Oxides (NO_x) control Options

Mark and describe the NO_x control options adopted

Low excess air (LEA)	Flue gas recirculation	X Other: <u>Lean Premix Dry Low NO_x Combustor</u>
Over fire air (OFA)	Burner out of service	
X Low-NO _x burner	Reburning	
Low NO _x burners with over fire air	X Flue gas treatment (SCR / SNCR)	

Section B - Combustion Unit Information (Continued)

6. Miscellaneous Information

Describe fly ash reinjection operation

NA

Describe, in detail, the equipment provided to monitor and to record the source(s) operating conditions, which may affect emissions of air contaminants. Show that they are reasonable and adequate.

See the emission sources' monitoring and recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.

Describe each proposed modification to an existing source.

NA

Describe how emissions will be minimized especially during start up, shut down, combustion upsets and/or disruptions. Provide emission estimates for start up, shut down and upset conditions. Provide duration of start up and shut down.

See the emission sources' limitations in PA-04-00740A and PA-04-00740C and the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

Describe in detail with a schematic diagram of the control options adopted for SO₂ (if applicable).

NA

Anticipated milestones:

Expected commencement date of construction/reconstruction: NA

Expected completion date of construction/reconstruction: NA

Anticipated date(s) of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions* 1 combustion turbine/duct burner unit

Emission Rate

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM					
PM ₁₀					
SO _x					
CO		4.60			**
NO _x		26.45			**
VOC		3.58			**
Others: (e.g., HAPs)	-----	-----	-----		-----
HAPs		0.61			**

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Gas Conditioning NA

 Water quenching ☐ YES ☐ NO Water injection rate _____ GPM

 Radiation and convection cooling ☐ YES ☐ NO Air dilution ☐ YES ☐ NO
 If YES, _____ CFM

 Forced draft ☐ YES ☐ NO Water cooled duct work ☐ YES ☐ NO

Other _____

Inlet volume _____ ACFM@_____ °F	Outlet volume _____ ACFM@_____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Inertial and Cyclone Collectors NA

Manufacturer		Type		Model No.	
Pressure Drop (in. of water)	Inlet Volume _____ ACFM @ _____ °F		Outlet Volume _____ ACFM @ _____ °F _____ % Moisture		
Number of Individual Cyclone(s)			Outlet Straightening Vanes Used? ☐ Yes ☐ No		
Length of Cyclone(s) Cylinder (ft)		Diameter of Cyclone(s) Cylinder		Length of cyclone(s) cone (ft)	
Inlet Diameter (ft) or Duct Area (ft ²) of Cyclone(s)			Outlet Diameter (ft) or Duct area (ft ²) of cyclone(s)		
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?					
Describe any exhaust gas recirculation loop to be employed.					
Attach particle size efficiency curve					
Emission data					
Inlet		Outlet		Removal Efficiency (%)	

Section C - Air Cleaning Device (Continued)

4. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No.	☐ Pressurized Design ☐ Suction Design
Number of Compartments	Number of Filters Per Compartment		Is Baghouse Insulated? ☐ Yes ☐ No
Can each compartment be isolated for repairs and/or filter replacement?			☐ Yes ☐ No
Are temperature controls provided? (Describe in detail)			☐ Yes ☐ No
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM	
Type of Fabric Material _____ ☐ Felted ☐ Membrane Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____ Thickness _____ in ☐ Felted-Woven			
Fabric permeability (clean) @ 1/2" water-Δ P _____ CFM/sq.ft.			
Filter dimensions _____ Diameter/Width _____			
Effective area per filter _____		Maximum operating temperature (°F) _____	
Effective air to cloth ratio		Minimum _____ Maximum _____	
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.			
Operation and Cleaning			
Volume of gases handled _____ ACFM _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.	
Type of filter cleaning ☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets ☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____ ☐ Pneumatic Shakers ☐ Reverse Air Flow			
If compressed air is required for collector operation, describe the equipment with the compressor to provide dry air free from oil.			
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.			

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Wet Collection Equipment: NA

Equipment Specifications

Manufacturer	Type	Model No.
Design Inlet Volume (SCFM)		Relative Particulate/Gas Velocity (ejector scrubbers only)
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).		
Describe pH monitoring and pH adjustment systems, if applicable.		
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).		
Attach particulate size efficiency curve.		

Operating Parameters

Inlet volume of gases handled _____ (ACFM) @ _____ °F	Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)	
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.).	
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.	

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

6. Electrostatic Precipitator NA

Equipment specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ YES ☐ NO		Design inlet volume (SCFM) _____ Maximum operating temperature (°F) _____	

Total collecting surface area _____ sq. ft. Collector plates size length _____ ft. x width _____ ft.
 Number of fields _____ Number of collector plates/field _____. Spacing between collector plates _____ inches.
 Maximum gas velocity _____ ft/sec. Minimum gas treatment time: _____ sec.

Total discharge electrode length _____ ft.
 Number of discharge electrodes _____ Number collecting electrode rappers _____

Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____
 Describe in detail _____

Operating parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (water gauge) across collector only. Describe the equipment.
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field

Field No.	No. of Sets	Each Transformer KVA	Each Rectifier	
			KV Ave./Peak	MaDC

Current density _____ Micro amperes/ft ²	Corona power _____ Watts/1000 ACFM	Corona power density _____ Watts/ft ²

Will a flue gas conditioning system be employed? If yes, describe it.

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Absorption Equipment: NA

Equipment specifications

Manufacturer	Type	Model No	
Design inlet volume (SCFM)	Tower height (ft) and inside diameter (ft)		
Packing type and size (if applicable)	Height of packing (ft) (if applicable)		
Number of trays (if applicable)	Number of bubble caps (if applicable)		
Configuration: ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls			
Absorbent information			
Absorbent type and concentration	Sorbent injection rate	Retention time (sec)	
Attach equilibrium data for absorption (If applicable).			
Attach any additional information regarding auxiliary equipment, reagent (slurry mix) supply system (once through or recirculating, system capacity, etc) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in of water) and liquid flow rate. Describe the equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. ☒ **SELECTIVE CATALYTIC REDUCTION (SCR)**
☐ **SELECTIVE NON-CATALYTIC REDUCTION (SNCR)**
☐ **NON-SELECTIVE CATALYTIC REDUCTION (NSCR)**

Equipment specifications

Manufacturer	Type	Model No
Cormetech	Modules- TiO2/V2O5/WO3	CMHDST
Umicore	Modules- TiO2/V2O5/WO3	GT-201
Design inlet volume (SCFM) varies	Design operating temperature (°F) 604 F to achieve 92% NOx reduction	

Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.

Yes. Process controls adjust ammonia injection based upon the outlet NOx rate of the CEMS analyzer. Process controls are also in place to manage proper ammonia air heating and ammonia vaporization.

Attach efficiency and other pertinent information (e.g., Ammonia, urea slip).
 92% NOx control efficiency during steady-state normal operation.

Operating parameters

Volume of gases handled (ACFM) <u>Varies</u> @ <u> </u> (°F)
Operating temperature range for the SCR/ ~~SNCR~~ / ~~NSCR~~ system (°F) From 604 To 685

Reducing agent used, if any. Ammonia	Oxidation catalyst used, if any. NA

State expected range of usage rate and concentration.
 121-132 lb/hr of ammonia

Service life of catalyst 3-5 years	Ammonia slip (ppm) 5 ppmvd @ 15% O2

Describe fully with a sketch giving locations of equipment, controls system, important parameters and method of operation.

See the plan approval application for PA-04-00740A and the conditions in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources for important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

See the conditions in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)
NOx	See the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	See the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	92% steady-state normal operation

Section C - Air Cleaning Device (Continued)

9. Other Control Equipment: Oxidation Catalyst
Equipment specifications

Manufacturer Johnson Matthey	Type Oxidation Catalyst	Model No SC03/SC09/SC14/SC42
Design inlet volume (SCFM) Varies	Capacity N/A	

Describe pH monitoring and pH adjustment, if any.
NA

Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.
Liquid flow rate is N/A; differential pressure instrument installed that sends a continuous reading of the catalyst bed pressure drop to the DCS

Attach efficiency curve and/ or other efficiency information.
92% CO removal efficiency

Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.
2 temperature indicators are installed upstream of the oxidation catalyst bed to ensure the catalyst is operating within the range specific by the catalyst manufacturer

Operating parameters

Volume of gas handled
varies _____ @ _____ °F _____ % Moisture

Describe, in detail, important parameters and method of operation.

See the plan approval application for PA-04-00740A and the conditions in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources for important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

See the conditions in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources

Emissions data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)
CO	See the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	See the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	≥30% steady-state normal operation
VOC	See the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	See the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	≥30% steady-state normal operation
HAPs	See the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	See the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	≥30% steady-state normal operation

Section C - Air Cleaning Device (Continued)

10. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Operating Cost

11 MISCELLANEOUS

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

See the previously referenced manufacturer's performance guarantees.

Attach the maintenance schedule for the control equipment and any part of the process equipment that, if in disrepair, would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if the facility is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below.

☒ Monitoring	☒ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (stack test, CEM etc.): See the emission sources' monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.
- b. Monitoring device location: See the emission sources' monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter: See the emission sources' monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.

Testing:

- a. Reference Test Method Citation: See the emission sources' testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.
- b. Reference Test Method Description: See the emission sources' testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.

Recordkeeping:

Describe the parameters that will be recorded and the recording frequency: See the emission sources' recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.

Reporting:

- a. Describe the type of information to be reported and the reporting frequency: See the emission sources' reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.
- b. Reporting start date: See the emission sources' reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.

Work Practice Standard: Describe each

See the emission sources' work practice requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.

Section F - Flue and Air Contaminant Emission

1. Estimated Maximum Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		**	**	**
PM ₁₀		**	**	**
SO _x		**	**	**
CO		**	**	**
NO _x		**	**	**
VOC		**	**	**
Others: (e.g., HAPs)	-----	-----	-----	-----
PM _{2.5}		**	**	**
HAPs		**	**	**
Ammonia		**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number: S101, S102, and S103

List Source(s) or source ID exhausted to this stack:
101, 102, and 103

% of flow exhausted to stack: 100%

Stack height above grade (ft.) 213
Grade elevation (ft.) 795

Stack diameter (ft) or Outlet duct area (sq. ft.)
10

Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.

S101: ~730 ft; S102: ~728 ft; and S103: ~728 ft

Does stack height meet Good Engineering Practice (GEP)?

Yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of Stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
S101	40	40	3	80	20	17.16
S102	40	40	4.44	80	20	15.36
S103	40	40	5.52	80	20	13.2

Stack Exhaust

Volume 372,279 ACFM Temperature 311 °F Moisture NA%

Exhauster (attach fan curves) _____ in. of water _____ HP @ _____ RPM.

** If the datum and collection method information and codes differ from those provided on the General Information Form - Authorization Application, provide the additional required by that form on a separate sheet.



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).			



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.	Plan Approval 04-00740C [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. Continuous ammonia slip measurement via in-situ tunable diode laser (TDL) 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)].



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 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)].



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	G13 (NSPS Subpart TTTT - Cogeneration Units)
☒	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).

Section B - Combustion Unit Information

1. Combustion Units: ☐ Coal ☐ Oil ☐ Natural Gas Other: Diesel

Description: A diesel-fired emergency generator engine (Generator 1 - Parking Garage) that is included under the source referenced as Diesel-Fired Emergency Generator Engines (2) (Source ID 105) in PA-04-00740C. As a group, this diesel-fired engine along with 1 other diesel-fired emergency generator engine and 2 diesel-fired emergency firewater pump engines at SPM are referenced as the Diesel-Fired Emergency Generator/Fire Pump Engines (Group ID G03) in PA-04-00740C.

Manufacturer Cummins	Model No. QSB5-G3	Number of units 1	
Maximum heat input (Btu/hr) 0.72 MMBtu/hr (HHV)	Rated heat input (Btu/hr) 0.72 MMBtu/hr (HHV)	Typical heat input (Btu/hr) 0.72 MMBtu/hr (HHV)	Furnace Volume
Grate Area (if applicable)	Method of firing		

Indicate how combustion air is supplied to boiler

Indicate the Steam Usage:

Mark and describe soot Cleaning Method: NA

i. Air Blown	iv. Other _____
ii. Steam Blown	v. Frequency of Cleaning _____
iii. Brushed and Vacuumed	

Maximum Operating schedule

Hours/Day	Days/Week	Days/Year	Hours/Year Unlimited emergency use

Operational restrictions taken or requested, if any (e.g., bottlenecks or voluntary restrictions to limit potential to emit)

Capacity (specify units)

Per hour 0.72 MMBtu/hr (HHV)	Per day	Per week	Per year

Typical Operating schedule

Hours/Day	Days/Week	Days/Year	Hours/Year 100 non-emergency use

Seasonal variations (Months): If variations exist, describe them.

Operating using primary fuel: _____	From _____ to _____
Operating using secondary fuel: _____	From _____ to _____
Non-operating: _____	From _____ to _____

2. Specify the primary, secondary and startup fuel. Furnish the details in item 3.
Diesel

Section B - Combustion Unit Information (Continued)

3. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number 2 (Diesel)	0.72 MMBtu/hr (HHV)	X 10 ³ Gal	0.0015% by wt	0.01%	137,030 Btu/Gal. & 7.1 Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas		X 10 ⁶ Gal			
Gas (other)		X 10 ⁶ Gal			
Coal					
Other*					

* Note: Describe and furnish information separately for other fuels in Addendum B.

4. Burner

Manufacturer	Model Number	Type of Atomization (Steam, air, press, mech., rotary cup)	
Number of Burners	Maximum fuel firing rate (all burners)		Normal fuel firing rate
If oil, temperature and viscosity.			
Maximum theoretical air requirement			
Percent excess air 100% rating			
Turndown ratio			
Combustion modulation control (on/off, low-high fire, full automatic, manual). Describe.			
Main burner flame ignition method (electric spark, auto gas pilot, hand-held torch, other). Describe.			

5. Nitrogen Oxides (NO_x) control Options

Mark and describe the NO_x control options adopted

Low excess air (LEA)	Flue gas recirculation	Other. _____
Over fire air (OFA)	Burner out of service	
Low-NO _x burner	Reburning	
Low NO _x burners with over fire air	Flue gas treatment (SCR / SNCR)	

Section B - Combustion Unit Information (Continued)

6. Miscellaneous Information

Describe fly ash reinjection operation

NA

Describe, in detail, the equipment provided to monitor and to record the source(s) operating conditions, which may affect emissions of air contaminants. Show that they are reasonable and adequate.

See the emission source's monitoring and recordkeeping requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Describe each proposed modification to an existing source.

NA

Describe how emissions will be minimized especially during start up, shut down, combustion upsets and/or disruptions. Provide emission estimates for start up, shut down and upset conditions. Provide duration of start up and shut down.

See the emission source's limitations in PA-04-00740C and the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

Describe in detail with a schematic diagram of the control options adopted for SO₂ (if applicable).

NA

Anticipated milestones:

Expected commencement date of construction/reconstruction: NA

Expected completion date of construction/reconstruction: NA

Anticipated date(s) of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions*

Emission Rate

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM					
PM ₁₀					
SO _x					
CO					
NO _x					
VOC					
Others: (e.g., HAPs)	-----	-----	-----		-----

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations.

2. Gas Conditioning NA

 Water quenching ☐ YES ☐ NO Water injection rate _____ GPM

 Radiation and convection cooling ☐ YES ☐ NO Air dilution ☐ YES ☐ NO
 If YES, _____ CFM

 Forced draft ☐ YES ☐ NO Water cooled duct work ☐ YES ☐ NO

Other _____

Inlet volume _____ ACFM@_____ °F	Outlet volume _____ ACFM@_____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Inertial and Cyclone Collectors NA

Manufacturer		Type		Model No.	
Pressure Drop (in. of water)	Inlet Volume _____ ACFM @ _____ °F		Outlet Volume _____ ACFM @ _____ °F _____ % Moisture		
Number of Individual Cyclone(s)			Outlet Straightening Vanes Used? ☐ Yes ☐ No		
Length of Cyclone(s) Cylinder (ft)		Diameter of Cyclone(s) Cylinder		Length of cyclone(s) cone (ft)	
Inlet Diameter (ft) or Duct Area (ft ²) of Cyclone(s)			Outlet Diameter (ft) or Duct area (ft ²) of cyclone(s)		
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?					
Describe any exhaust gas recirculation loop to be employed.					
Attach particle size efficiency curve					
Emission data					
Inlet		Outlet		Removal Efficiency (%)	

Section C - Air Cleaning Device (Continued)

4. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No.	☐ Pressurized Design ☐ Suction Design
Number of Compartments	Number of Filters Per Compartment		Is Baghouse Insulated? ☐ Yes ☐ No
Can each compartment be isolated for repairs and/or filter replacement?			☐ Yes ☐ No
Are temperature controls provided? (Describe in detail)			☐ Yes ☐ No
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM	
Type of Fabric Material _____ Weight _____ oz/sq.yd Thickness _____ in ☐ Felted ☐ Woven ☐ Felted-Woven ☐ Membrane ☐ Others: List: _____			
Fabric permeability (clean) @ 1/2" water-Δ P _____ CFM/sq.ft.			
Filter dimensions _____ Diameter/Width _____			
Effective area per filter _____		Maximum operating temperature (°F) _____	
Effective air to cloth ratio		Minimum _____ Maximum _____	
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.			
Operation and Cleaning			
Volume of gases handled _____ ACFM _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.	
Type of filter cleaning ☐ Manual Cleaning ☐ Mechanical Shakers ☐ Pneumatic Shakers ☐ Bag Collapse ☐ Sonic Cleaning ☐ Reverse Air Flow ☐ Reverse Air Jets ☐ Other: _____			
If compressed air is required for collector operation, describe the equipment with the compressor to provide dry air free from oil.			
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Wet Collection Equipment: NA

Equipment Specifications

Manufacturer	Type	Model No.
Design Inlet Volume (SCFM)		Relative Particulate/Gas Velocity (ejector scrubbers only)
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).		
Describe pH monitoring and pH adjustment systems, if applicable.		
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).		
Attach particulate size efficiency curve.		

Operating Parameters

Inlet volume of gases handled _____ (ACFM) @ _____ °F	Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)	
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.).	
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.	

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

6. Electrostatic Precipitator NA

Equipment specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ YES ☐ NO		Design inlet volume (SCFM) _____ Maximum operating temperature (°F) _____	

Total collecting surface area _____ sq. ft. Collector plates size length _____ ft. x width _____ ft.
 Number of fields _____ Number of collector plates/field _____. Spacing between collector plates _____ inches.
 Maximum gas velocity _____ ft/sec. Minimum gas treatment time: _____ sec.

Total discharge electrode length _____ ft.
 Number of discharge electrodes _____ Number collecting electrode rappers _____

Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____
 Describe in detail _____

Operating parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (water gauge) across collector only. Describe the equipment.
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field

Field No.	No. of Sets	Each Transformer KVA	Each Rectifier	
			KV Ave./Peak	MaDC

Current density _____ Micro amperes/ft ²	Corona power _____ Watts/1000 ACFM	Corona power density _____ Watts/ft ²

Will a flue gas conditioning system be employed? If yes, describe it.

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Absorption Equipment: NA

Equipment specifications

Manufacturer	Type	Model No	
Design inlet volume (SCFM)	Tower height (ft) and inside diameter (ft)		
Packing type and size (if applicable)	Height of packing (ft) (if applicable)		
Number of trays (if applicable)	Number of bubble caps (if applicable)		
Configuration: ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls			
Absorbent information			
Absorbent type and concentration	Sorbent injection rate	Retention time (sec)	
Attach equilibrium data for absorption (If applicable).			
Attach any additional information regarding auxiliary equipment, reagent (slurry mix) supply system (once through or recirculating, system capacity, etc) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in of water) and liquid flow rate. Describe the equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. ☐ **SELECTIVE CATALYTIC REDUCTION (SCR)**
☐ **SELECTIVE NON-CATALYTIC REDUCTION (SNCR)**
☐ **NON-SELECTIVE CATALYTIC REDUCTION (NSCR)**

Equipment specifications

Manufacturer	Type	Model No
Design inlet volume (SCFM)		Design operating temperature (°F)
Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.		
Attach efficiency and other pertinent information (e.g., Ammonia, urea slip).		

Operating parameters

Volume of gases handled (ACFM) _____ @ _____ (°F)			
Operating temperature range for the SCR/SNCR/NSCR system (°F)		From	To
Reducing agent used, if any.		Oxidation catalyst used, if any.	
State expected range of usage rate and concentration.			
Service life of catalyst		Ammonia slip (ppm)	
Describe fully with a sketch giving locations of equipment, controls system, important parameters and method of operation.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

9. Other Control Equipment: NA

Equipment specifications

Manufacturer	Type	Model No
Design inlet volume (SCFM)		Capacity

Describe pH monitoring and pH adjustment, if any.

Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.

Attach efficiency curve and/ or other efficiency information.

Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.

Operating parameters

Volume of gas handled

_____ @ _____ °F _____ % Moisture

Describe, in detail, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Operating Cost

11 MISCELLANEOUS

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

NA

Attach the maintenance schedule for the control equipment and any part of the process equipment that, if in disrepair, would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if the facility is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below.

☒ Monitoring	☐ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (stack test, CEM etc.): See the emission source's monitoring requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Monitoring device location: See the emission source's monitoring requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter: See the emission source's monitoring requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Testing:

- a. Reference Test Method Citation: NA
- b. Reference Test Method Description: NA

Recordkeeping:

Describe the parameters that will be recorded and the recording frequency: See the emission source's recordkeeping requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Reporting:

- a. Describe the type of information to be reported and the reporting frequency: See the emission source's reporting requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reporting start date: See the emission source's reporting requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Work Practice Standard: Describe each

See the emission source's work practice requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Section F - Flue and Air Contaminant Emission

1. Estimated Maximum Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		**	**	**
PM ₁₀		**	**	**
SO _x		**	**	**
CO		**	**	**
NO _x		**	**	**
VOC		**	**	**
Others: (e.g., HAPs)	-----	-----	-----	-----
PM _{2.5}		**	**	**
HAPs		**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number: S105 (Generator 1 - Parking Garage Stack)

List Source(s) or source ID exhausted to this stack:
105

% of flow exhausted to stack: 100%

Stack height above grade (ft.) 5
Grade elevation (ft.) 850

Stack diameter (ft) or Outlet duct area (sq. ft.)
0.25 ft

Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.
~236 ft

Does stack height meet Good Engineering Practice (GEP)?
Yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of Stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
S105 (Generator 1 - Parking Garage Stack)	40	39	53.64	80	20	5.28

Stack Exhaust

Volume 665 ACFM Temperature 778 °F Moisture NA %

Exhauster (attach fan curves) _____ in. of water _____ HP @ _____ RPM.

** If the datum and collection method information and codes differ from those provided on the General Information Form - Authorization Application, provide the additional required by that form on a separate sheet.



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)].

Section B - Combustion Unit Information

1. Combustion Units: ☐ Coal ☐ Oil ☐ Natural Gas Other: Diesel

Description: A diesel-fired emergency generator engine (Generator 2 - Telecom Hut) that is included under the source referenced as Diesel-Fired Emergency Generator Engines (2) (Source ID 105) in PA-04-00740C. As a group, this diesel-fired engine along with 1 other diesel-fired emergency generator engine and 2 diesel-fired emergency firewater pump engines at SPM are referenced as the Diesel-Fired Emergency Generator/Fire Pump Engines (Group ID G03) in PA-04-00740C.

Manufacturer Kohler	Model No. KDI 3404TM		Number of units 1	
Maximum heat input (Btu/hr) 0.47 MMBtu/hr (HHV)	Rated heat input (Btu/hr) 0.47 MMBtu/hr (HHV)	Typical heat input (Btu/hr) 0.47 MMBtu/hr (HHV)	Furnace Volume	
Grate Area (if applicable)		Method of firing		

Indicate how combustion air is supplied to boiler

Indicate the Steam Usage:

Mark and describe soot Cleaning Method: NA

i. Air Blown	iv. Other _____
ii. Steam Blown	v. Frequency of Cleaning _____
iii. Brushed and Vacuumed	

Maximum Operating schedule

Hours/Day	Days/Week	Days/Year	Hours/Year Unlimited emergency use

Operational restrictions taken or requested, if any (e.g., bottlenecks or voluntary restrictions to limit potential to emit)

Capacity (specify units)

Per hour 0.47 MMBtu/hr (HHV)	Per day	Per week	Per year

Typical Operating schedule

Hours/Day	Days/Week	Days/Year	Hours/Year 100 non-emergency use

Seasonal variations (Months): If variations exist, describe them.

Operating using primary fuel: _____	From _____ to _____
Operating using secondary fuel: _____	From _____ to _____
Non-operating: _____	From _____ to _____

2. Specify the primary, secondary and startup fuel. Furnish the details in item 3.
Diesel

Section B - Combustion Unit Information (Continued)

3. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number 2 (Diesel)	0.47 MMBtu/hr (HHV)	X 10 ³ Gal	0.0015% by wt	0.01%	137,030 Btu/Gal. & 7.1 Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas		X 10 ⁶ Gal			
Gas (other)		X 10 ⁶ Gal			
Coal					
Other*					

* Note: Describe and furnish information separately for other fuels in Addendum B.

4. Burner

Manufacturer	Model Number	Type of Atomization (Steam, air, press, mech., rotary cup)	
Number of Burners	Maximum fuel firing rate (all burners)		Normal fuel firing rate
If oil, temperature and viscosity.			
Maximum theoretical air requirement			
Percent excess air 100% rating			
Turndown ratio			
Combustion modulation control (on/off, low-high fire, full automatic, manual). Describe.			
Main burner flame ignition method (electric spark, auto gas pilot, hand-held torch, other). Describe.			

5. Nitrogen Oxides (NO_x) control Options

Mark and describe the NO_x control options adopted

Low excess air (LEA)	Flue gas recirculation	Other. _____
Over fire air (OFA)	Burner out of service	
Low-NO _x burner	Reburning	
Low NO _x burners with over fire air	Flue gas treatment (SCR / SNCR)	

Section B - Combustion Unit Information (Continued)

6. Miscellaneous Information

Describe fly ash reinjection operation

NA

Describe, in detail, the equipment provided to monitor and to record the source(s) operating conditions, which may affect emissions of air contaminants. Show that they are reasonable and adequate.

See the emission source's monitoring and recordkeeping requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Describe each proposed modification to an existing source.

NA

Describe how emissions will be minimized especially during start up, shut down, combustion upsets and/or disruptions. Provide emission estimates for start up, shut down and upset conditions. Provide duration of start up and shut down.

See the emission source's limitations in PA-04-00740C and the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

Describe in detail with a schematic diagram of the control options adopted for SO₂ (if applicable).

NA

Anticipated milestones:

Expected commencement date of construction/reconstruction: NA

Expected completion date of construction/reconstruction: NA

Anticipated date(s) of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions*

Emission Rate

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM					
PM ₁₀					
SO _x					
CO					
NO _x					
VOC					
Others: (e.g., HAPs)	-----	-----	-----		-----

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations.

2. Gas Conditioning NA

 Water quenching ☐ YES ☐ NO Water injection rate _____ GPM

 Radiation and convection cooling ☐ YES ☐ NO Air dilution ☐ YES ☐ NO
 If YES, _____ CFM

 Forced draft ☐ YES ☐ NO Water cooled duct work ☐ YES ☐ NO

Other _____

Inlet volume _____ ACFM@_____ °F	Outlet volume _____ ACFM@_____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Inertial and Cyclone Collectors NA

Manufacturer		Type		Model No.	
Pressure Drop (in. of water)	Inlet Volume _____ ACFM @ _____ °F		Outlet Volume _____ ACFM @ _____ °F _____ % Moisture		
Number of Individual Cyclone(s)			Outlet Straightening Vanes Used? ☐ Yes ☐ No		
Length of Cyclone(s) Cylinder (ft)		Diameter of Cyclone(s) Cylinder		Length of cyclone(s) cone (ft)	
Inlet Diameter (ft) or Duct Area (ft ²) of Cyclone(s)			Outlet Diameter (ft) or Duct area (ft ²) of cyclone(s)		
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?					
Describe any exhaust gas recirculation loop to be employed.					
Attach particle size efficiency curve					
Emission data					
Inlet		Outlet		Removal Efficiency (%)	

Section C - Air Cleaning Device (Continued)

4. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No.	☐ Pressurized Design ☐ Suction Design
Number of Compartments	Number of Filters Per Compartment		Is Baghouse Insulated? ☐ Yes ☐ No
Can each compartment be isolated for repairs and/or filter replacement?			☐ Yes ☐ No
Are temperature controls provided? (Describe in detail)			☐ Yes ☐ No
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM	
Type of Fabric Material _____ ☐ Felted ☐ Membrane Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____ Thickness _____ in ☐ Felted-Woven			
Fabric permeability (clean) @ 1/2" water-Δ P _____ CFM/sq.ft.			
Filter dimensions _____ Diameter/Width _____			
Effective area per filter _____		Maximum operating temperature (°F) _____	
Effective air to cloth ratio		Minimum _____ Maximum _____	
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.			
Operation and Cleaning			
Volume of gases handled _____ ACFM _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.	
Type of filter cleaning ☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets ☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____ ☐ Pneumatic Shakers ☐ Reverse Air Flow			
If compressed air is required for collector operation, describe the equipment with the compressor to provide dry air free from oil.			
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Wet Collection Equipment: NA

Equipment Specifications

Manufacturer	Type	Model No.
Design Inlet Volume (SCFM)		Relative Particulate/Gas Velocity (ejector scrubbers only)
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).		
Describe pH monitoring and pH adjustment systems, if applicable.		
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).		
Attach particulate size efficiency curve.		

Operating Parameters

Inlet volume of gases handled _____ (ACFM) @ _____ °F	Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)	
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.).	
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.	

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

6. Electrostatic Precipitator NA

Equipment specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ YES ☐ NO		Design inlet volume (SCFM) _____ Maximum operating temperature (°F) _____	

Total collecting surface area _____ sq. ft. Collector plates size length _____ ft. x width _____ ft.
 Number of fields _____ Number of collector plates/field _____ Spacing between collector plates _____ inches.
 Maximum gas velocity _____ ft/sec. Minimum gas treatment time: _____ sec.

Total discharge electrode length _____ ft.
 Number of discharge electrodes _____ Number collecting electrode rappers _____

Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____
 Describe in detail _____

Operating parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (water gauge) across collector only. Describe the equipment.
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field

Field No.	No. of Sets	Each Transformer KVA	Each Rectifier	
			KV Ave./Peak	MaDC

Current density _____ Micro amperes/ft ²	Corona power _____ Watts/1000 ACFM	Corona power density _____ Watts/ft ²

Will a flue gas conditioning system be employed? If yes, describe it.

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Absorption Equipment: NA

Equipment specifications

Manufacturer	Type	Model No	
Design inlet volume (SCFM)	Tower height (ft) and inside diameter (ft)		
Packing type and size (if applicable)	Height of packing (ft) (if applicable)		
Number of trays (if applicable)	Number of bubble caps (if applicable)		
Configuration: ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls			
Absorbent information			
Absorbent type and concentration	Sorbent injection rate	Retention time (sec)	
Attach equilibrium data for absorption (If applicable).			
Attach any additional information regarding auxiliary equipment, reagent (slurry mix) supply system (once through or recirculating, system capacity, etc) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in of water) and liquid flow rate. Describe the equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. ☐ **SELECTIVE CATALYTIC REDUCTION (SCR)**
☐ **SELECTIVE NON-CATALYTIC REDUCTION (SNCR)**
☐ **NON-SELECTIVE CATALYTIC REDUCTION (NSCR)**

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Design operating temperature (°F)

Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.

Attach efficiency and other pertinent information (e.g., Ammonia, urea slip).

Operating parameters

Volume of gases handled (ACFM) _____ @ _____ (°F)

Operating temperature range for the SCR/SNCR/NSCR system (°F) From To

Reducing agent used, if any.	Oxidation catalyst used, if any.

State expected range of usage rate and concentration.

Service life of catalyst	Ammonia slip (ppm)

Describe fully with a sketch giving locations of equipment, controls system, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

9. Other Control Equipment: NA

Equipment specifications

Manufacturer	Type	Model No
Design inlet volume (SCFM)		Capacity

Describe pH monitoring and pH adjustment, if any.

Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.

Attach efficiency curve and/ or other efficiency information.

Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.

Operating parameters

Volume of gas handled

_____ @ _____ °F _____ % Moisture

Describe, in detail, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Operating Cost

11 MISCELLANEOUS

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

NA

Attach the maintenance schedule for the control equipment and any part of the process equipment that, if in disrepair, would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if the facility is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below.

☒ Monitoring	☐ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (stack test, CEM etc.): See the emission source's monitoring requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Monitoring device location: See the emission source's monitoring requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter: See the emission source's monitoring requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Testing:

- a. Reference Test Method Citation: NA
- b. Reference Test Method Description: NA

Recordkeeping:

Describe the parameters that will be recorded and the recording frequency: See the emission source's recordkeeping requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Reporting:

- a. Describe the type of information to be reported and the reporting frequency: See the emission source's reporting requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reporting start date: See the emission source's reporting requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Work Practice Standard: Describe each

See the emission source's work practice requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Section F - Flue and Air Contaminant Emission

1. Estimated Maximum Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		**	**	**
PM ₁₀		**	**	**
SO _x		**	**	**
CO		**	**	**
NO _x		**	**	**
VOC		**	**	**
Others: (e.g., HAPs)	-----	-----	-----	-----
PM _{2.5}		**	**	**
HAPs		**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number S105 (Generator 2 - Telecom Hut Stack)

List Source(s) or source ID exhausted to this stack:
105

% of flow exhausted to stack: 100%

Stack height above grade (ft.) 5
Grade elevation (ft.) 850

Stack diameter (ft) or Outlet duct area (sq. ft.)
0.21 ft

Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.
~76 ft

Does stack height meet Good Engineering Practice (GEP)?
Yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of Stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
S105 (Generator 2 - Telecom Hut Stack)	40	39	53.64	80	20	5.28

Stack Exhaust

Volume 286 ACFM Temperature 914 °F Moisture NA %

Exhauster (attach fan curves) _____ in. of water _____ HP @ _____ RPM.

** If the datum and collection method information and codes differ from those provided on the General Information Form - Authorization Application, provide the additional required by that form on a separate sheet.



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)].

Section B - Combustion Unit Information

1. Combustion Units: ☐ Coal ☐ Oil ☐ Natural Gas Other: Diesel

Description: 2 identical diesel-fired emergency firewater pump engines that are referenced as Fire Pump Engines (2) (Source ID 106) in PA-04-00740C. As a group, these 2 diesel-fired engines along with 2 diesel-fired emergency generator engines at SPM are referenced as the Diesel-Fired Emergency Generator/Fire Pump Engines (Group ID G03) in PA-04-00740C.

Manufacturer Cummins	Model No. CFP15E-F10	Number of units 2	
Maximum heat input (Btu/hr) 3.42 MMBtu/hr (HHV)	Rated heat input (Btu/hr) 3.42 MMBtu/hr (HHV)	Typical heat input (Btu/hr) 3.42 MMBtu/hr (HHV)	Furnace Volume
Grate Area (if applicable)	Method of firing		

Indicate how combustion air is supplied to boiler

Indicate the Steam Usage:

Mark and describe soot Cleaning Method: NA

i. Air Blown	iv. Other _____
ii. Steam Blown	v. Frequency of Cleaning _____
iii. Brushed and Vacuumed	

Maximum Operating schedule

Hours/Day	Days/Week	Days/Year	Hours/Year Unlimited emergency use
Operational restrictions taken or requested, if any (e.g., bottlenecks or voluntary restrictions to limit potential to emit)			
Capacity (specify units)			
Per hour 3.42 MMBtu/hr (HHV)	Per day	Per week	Per year

Typical Operating schedule

Hours/Day	Days/Week	Days/Year	Hours/Year 100 non-emergency use

Seasonal variations (Months): If variations exist, describe them.

Operating using primary fuel: _____ From _____ to _____
 Operating using secondary fuel: _____ From _____ to _____
 Non-operating: From _____ to _____

2. Specify the primary, secondary and startup fuel. Furnish the details in item 3.
 Diesel

Section B - Combustion Unit Information (Continued)

3. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number 2 (Diesel)	3.42 MMBtu/hr (HHV)	X 10 ³ Gal	0.0015 % by wt	0.01%	137,030 Btu/Gal. & 7.1 Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas		X 10 ⁶ Gal			
Gas (other)		X 10 ⁶ Gal			
Coal					
Other*					

* Note: Describe and furnish information separately for other fuels in Addendum B.

4. Burner

Manufacturer	Model Number	Type of Atomization (Steam, air, press, mech., rotary cup)	
Number of Burners		Maximum fuel firing rate (all burners)	Normal fuel firing rate
If oil, temperature and viscosity.			
Maximum theoretical air requirement			
Percent excess air 100% rating			
Turndown ratio			
Combustion modulation control (on/off, low-high fire, full automatic, manual). Describe.			
Main burner flame ignition method (electric spark, auto gas pilot, hand-held torch, other). Describe.			

5. Nitrogen Oxides (NO_x) control Options

Mark and describe the NO_x control options adopted

Low excess air (LEA)	Flue gas recirculation	Other. _____
Over fire air (OFA)	Burner out of service	
Low-NO _x burner	Reburning	
Low NO _x burners with over fire air	Flue gas treatment (SCR / SNCR)	

Section B - Combustion Unit Information (Continued)

6. Miscellaneous Information

Describe fly ash reinjection operation

NA

Describe, in detail, the equipment provided to monitor and to record the source(s) operating conditions, which may affect emissions of air contaminants. Show that they are reasonable and adequate.

See the emission sources' monitoring and recordkeeping requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.

Describe each proposed modification to an existing source.

NA

Describe how emissions will be minimized especially during start up, shut down, combustion upsets and/or disruptions. Provide emission estimates for start up, shut down and upset conditions. Provide duration of start up and shut down.

See the emission sources' limitations in PA-04-00740C and the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

Describe in detail with a schematic diagram of the control options adopted for SO₂ (if applicable).

NA

Anticipated milestones:

Expected commencement date of construction/reconstruction: NA

Expected completion date of construction/reconstruction: NA

Anticipated date(s) of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions*

Emission Rate

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM					
PM ₁₀					
SO _x					
CO					
NO _x					
VOC					
Others: (e.g., HAPs)	-----	-----	-----		-----

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations.

2. Gas Conditioning NA

 Water quenching ☐ YES ☐ NO Water injection rate _____ GPM

 Radiation and convection cooling ☐ YES ☐ NO Air dilution ☐ YES ☐ NO
 If YES, _____ CFM

 Forced draft ☐ YES ☐ NO Water cooled duct work ☐ YES ☐ NO

Other _____

Inlet volume _____ ACFM@_____ °F	Outlet volume _____ ACFM@_____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Inertial and Cyclone Collectors NA

Manufacturer		Type		Model No.	
Pressure Drop (in. of water)	Inlet Volume _____ ACFM @ _____ °F		Outlet Volume _____ ACFM @ _____ °F _____ % Moisture		
Number of Individual Cyclone(s)			Outlet Straightening Vanes Used? ☐ Yes ☐ No		
Length of Cyclone(s) Cylinder (ft)		Diameter of Cyclone(s) Cylinder		Length of cyclone(s) cone (ft)	
Inlet Diameter (ft) or Duct Area (ft ²) of Cyclone(s)			Outlet Diameter (ft) or Duct area (ft ²) of cyclone(s)		
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?					
Describe any exhaust gas recirculation loop to be employed.					
Attach particle size efficiency curve					
Emission data					
Inlet		Outlet		Removal Efficiency (%)	

Section C - Air Cleaning Device (Continued)

4. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No.	☐ Pressurized Design ☐ Suction Design
Number of Compartments	Number of Filters Per Compartment		Is Baghouse Insulated? ☐ Yes ☐ No
Can each compartment be isolated for repairs and/or filter replacement? ☐ Yes ☐ No			
Are temperature controls provided? (Describe in detail) ☐ Yes ☐ No			
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM	
Type of Fabric Material _____ ☐ Felted ☐ Membrane Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____ Thickness _____ in ☐ Felted-Woven			
Fabric permeability (clean) @ 1/2" water-Δ P _____ CFM/sq.ft.			
Filter dimensions _____ Diameter/Width _____			
Effective area per filter _____		Maximum operating temperature (°F) _____	
Effective air to cloth ratio Minimum _____ Maximum _____			
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.			
Operation and Cleaning			
Volume of gases handled _____ ACFM _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.	
Type of filter cleaning ☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets ☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____ ☐ Pneumatic Shakers ☐ Reverse Air Flow			
If compressed air is required for collector operation, describe the equipment with the compressor to provide dry air free from oil.			
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Wet Collection Equipment: NA

Equipment Specifications

Manufacturer	Type	Model No.
Design Inlet Volume (SCFM)		Relative Particulate/Gas Velocity (ejector scrubbers only)
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).		
Describe pH monitoring and pH adjustment systems, if applicable.		
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).		
Attach particulate size efficiency curve.		

Operating Parameters

Inlet volume of gases handled _____ (ACFM) @ _____ °F	Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)	
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.).	
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.	

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

6. Electrostatic Precipitator NA

Equipment specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ YES ☐ NO		Design inlet volume (SCFM) _____ Maximum operating temperature (°F) _____	

Total collecting surface area _____ sq. ft. Collector plates size length _____ ft. x width _____ ft.
 Number of fields _____ Number of collector plates/field _____. Spacing between collector plates _____ inches.
 Maximum gas velocity _____ ft/sec. Minimum gas treatment time: _____ sec.

Total discharge electrode length _____ ft.
 Number of discharge electrodes _____ Number collecting electrode rappers _____

Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____
 Describe in detail _____

Operating parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (water gauge) across collector only. Describe the equipment.
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field

Field No.	No. of Sets	Each Transformer KVA	Each Rectifier	
			KV Ave./Peak	MaDC

Current density _____ Micro amperes/ft ²	Corona power _____ Watts/1000 ACFM	Corona power density _____ Watts/ft ²

Will a flue gas conditioning system be employed? If yes, describe it.

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Absorption Equipment: NA
Equipment specifications

Manufacturer	Type	Model No	
Design inlet volume (SCFM)	Tower height (ft) and inside diameter (ft)		
Packing type and size (if applicable)	Height of packing (ft) (if applicable)		
Number of trays (if applicable)	Number of bubble caps (if applicable)		
Configuration: ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls			
Absorbent information			
Absorbent type and concentration	Sorbent injection rate	Retention time (sec)	
Attach equilibrium data for absorption (If applicable).			
Attach any additional information regarding auxiliary equipment, reagent (slurry mix) supply system (once through or recirculating, system capacity, etc) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in of water) and liquid flow rate. Describe the equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. ☐ **SELECTIVE CATALYTIC REDUCTION (SCR)**
☐ **SELECTIVE NON-CATALYTIC REDUCTION (SNCR)**
☐ **NON-SELECTIVE CATALYTIC REDUCTION (NSCR)**

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Design operating temperature (°F)

Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.

Attach efficiency and other pertinent information (e.g., Ammonia, urea slip).

Operating parameters

Volume of gases handled (ACFM) Varies @ (°F)

Operating temperature range for the SCR/SNCR/NSCR system (°F) From To

Reducing agent used, if any.	Oxidation catalyst used, if any.

State expected range of usage rate and concentration.

Service life of catalyst	Ammonia slip (ppm)

Describe fully with a sketch giving locations of equipment, controls system, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

9. Other Control Equipment: NA

Equipment specifications

Manufacturer	Type	Model No
Design inlet volume (SCFM)		Capacity

Describe pH monitoring and pH adjustment, if any.

Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.

Attach efficiency curve and/ or other efficiency information.

Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.

Operating parameters

Volume of gas handled

_____ @ _____ °F _____ % Moisture

Describe, in detail, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Operating Cost

11 MISCELLANEOUS

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

NA

Attach the maintenance schedule for the control equipment and any part of the process equipment that, if in disrepair, would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if the facility is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below.

☒ Monitoring	☐ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (stack test, CEM etc.): See the emission sources' monitoring requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Monitoring device location: See the emission sources' monitoring requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter: See the emission sources' monitoring requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Testing:

- a. Reference Test Method Citation: NA
- b. Reference Test Method Description: NA

Recordkeeping:

Describe the parameters that will be recorded and the recording frequency: See the emission sources' recordkeeping requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Reporting:

- a. Describe the type of information to be reported and the reporting frequency: See the emission sources' reporting requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reporting start date: See the emission sources' reporting requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Work Practice Standard: Describe each

See the emission sources' work practice requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Section F - Flue and Air Contaminant Emission

1. Estimated Maximum Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		**	**	**
PM ₁₀		**	**	**
SO _x		**	**	**
CO		**	**	**
NO _x		**	**	**
VOC		**	**	**
Others: (e.g., HAPs)	-----	-----	-----	-----
PM _{2.5}		**	**	**
HAPs		**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number S106 (Firewater Pump 1 Stack) and S106 (Firewater Pump 2 Stack)

List Source(s) or source ID exhausted to this stack:
106

% of flow exhausted to stack: 100%

Stack height above grade (ft.) 32.7
Grade elevation (ft.) 850

Stack diameter (ft) or Outlet duct area (sq. ft.)
1 ft

Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.

S106 (Firewater Pump 1 Stack): ~125 ft; and S106 (Firewater Pump 1 Stack): ~126 ft

Does stack height meet Good Engineering Practice (GEP)?

Yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of Stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
S106 (Firewater Pump 1 Stack)	40	39	51.84	80	20	9.6
S106 (Firewater Pump 2 Stack)	40	39	51.48	80	20	9.96

Stack Exhaust

Volume 5,702 ACFM Temperature 787 °F Moisture NA%

Exhauster (attach fan curves) _____ in. of water _____ HP @ _____ RPM.

** If the datum and collection method information and codes differ from those provided on the General Information Form - Authorization Application, provide the additional required by that form on a separate sheet.



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)].

Section B - Combustion Unit Information

1. Combustion Units: ☐ Coal ☐ Oil ☒ Natural Gas Other: _____

Description: A natural gas-fired emergency generator engine (Generator 3 - Lift Station) that is included under the source referenced as Natural Gas-Fired Emergency Generator Engines (3) (Source ID 107) in PA-04-00740C. Note that Shell is proposing to revise the referenced Natural Gas-Fired Emergency Generator Engines (3) source description to Natural Gas-Fired Emergency Generator Engines (2) because only 2 natural gas-fired emergency generator engines are installed at SPM, not 3.

Manufacturer GM	Model No. Vortec 5.7L		Number of units 1	
Maximum heat input (Btu/hr) 1.42 MMBtu/hr (HHV)	Rated heat input (Btu/hr) 1.42 MMBtu/hr (HHV)	Typical heat input (Btu/hr) 1.42 MMBtu/hr (HHV)	Furnace Volume	
Grate Area (if applicable)		Method of firing		

Indicate how combustion air is supplied to boiler

Indicate the Steam Usage:

Mark and describe soot Cleaning Method: NA

i. Air Blown	iv. Other _____
ii. Steam Blown	v. Frequency of Cleaning _____
iii. Brushed and Vacuumed	

Maximum Operating schedule

Hours/Day	Days/Week	Days/Year	Hours/Year Unlimited emergency use

Operational restrictions taken or requested, if any (e.g., bottlenecks or voluntary restrictions to limit potential to emit)

Capacity (specify units)

Per hour 1.42 MMBtu/hr (HHV)	Per day	Per week	Per year

Typical Operating schedule

Hours/Day	Days/Week	Days/Year	Hours/Year 100 non-emergency use

Seasonal variations (Months): If variations exist, describe them.

Operating using primary fuel: _____	From _____ to _____
Operating using secondary fuel: _____	From _____ to _____
Non-operating: _____	From _____ to _____

2. Specify the primary, secondary and startup fuel. Furnish the details in item 3.
Natural gas

Section B - Combustion Unit Information (Continued)

3. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	1.42 MMBtu/hr (HHV)	X 10 ⁶ Gal	0.5 gr/100 SCF	0%	~1,020 Btu/SCF
Gas (other)		X 10 ⁶ Gal			
Coal					
Other*					

* Note: Describe and furnish information separately for other fuels in Addendum B.

4. Burner

Manufacturer	Model Number	Type of Atomization (Steam, air, press, mech., rotary cup)	
Number of Burners		Maximum fuel firing rate (all burners)	Normal fuel firing rate
If oil, temperature and viscosity.			
Maximum theoretical air requirement			
Percent excess air 100% rating			
Turndown ratio			
Combustion modulation control (on/off, low-high fire, full automatic, manual). Describe.			
Main burner flame ignition method (electric spark, auto gas pilot, hand-held torch, other). Describe.			

5. Nitrogen Oxides (NO_x) control Options

Mark and describe the NO_x control options adopted

Low excess air (LEA)

Flue gas recirculation

Other. _____

Over fire air (OFA)

Burner out of service

Low-NO_x burner

Reburning

Low NO_x burners with over fire
air

Flue gas treatment (SCR /
SNCR)

Section B - Combustion Unit Information (Continued)

6. Miscellaneous Information

Describe fly ash reinjection operation

NA

Describe, in detail, the equipment provided to monitor and to record the source(s) operating conditions, which may affect emissions of air contaminants. Show that they are reasonable and adequate.

See the emission source's monitoring and recordkeeping requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Describe each proposed modification to an existing source.

NA

Describe how emissions will be minimized especially during start up, shut down, combustion upsets and/or disruptions. Provide emission estimates for start up, shut down and upset conditions. Provide duration of start up and shut down.

See the emission source's limitations in PA-04-00740C and the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

Describe in detail with a schematic diagram of the control options adopted for SO₂ (if applicable).

NA

Anticipated milestones:

Expected commencement date of construction/reconstruction: NA

Expected completion date of construction/reconstruction: NA

Anticipated date(s) of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions*

Emission Rate

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM					
PM ₁₀					
SO _x					
CO					
NO _x					
VOC					
Others: (e.g., HAPs)	-----	-----	-----		-----

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations.

2. Gas Conditioning NA

 Water quenching ☐ YES ☐ NO Water injection rate _____ GPM

 Radiation and convection cooling ☐ YES ☐ NO Air dilution ☐ YES ☐ NO
 If YES, _____ CFM

 Forced draft ☐ YES ☐ NO Water cooled duct work ☐ YES ☐ NO

Other _____

Inlet volume _____ ACFM@_____ °F	Outlet volume _____ ACFM@_____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Inertial and Cyclone Collectors NA

Manufacturer		Type		Model No.	
Pressure Drop (in. of water)	Inlet Volume _____ ACFM @ _____ °F		Outlet Volume _____ ACFM @ _____ °F _____ % Moisture		
Number of Individual Cyclone(s)			Outlet Straightening Vanes Used? ☐ Yes ☐ No		
Length of Cyclone(s) Cylinder (ft)		Diameter of Cyclone(s) Cylinder		Length of cyclone(s) cone (ft)	
Inlet Diameter (ft) or Duct Area (ft ²) of Cyclone(s)			Outlet Diameter (ft) or Duct area (ft ²) of cyclone(s)		
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?					
Describe any exhaust gas recirculation loop to be employed.					
Attach particle size efficiency curve					
Emission data					
Inlet		Outlet		Removal Efficiency (%)	

Section C - Air Cleaning Device (Continued)

4. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No.	☐ Pressurized Design ☐ Suction Design
Number of Compartments	Number of Filters Per Compartment		Is Baghouse Insulated? ☐ Yes ☐ No
Can each compartment be isolated for repairs and/or filter replacement?			☐ Yes ☐ No
Are temperature controls provided? (Describe in detail)			☐ Yes ☐ No
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM	
Type of Fabric Material _____ ☐ Felted ☐ Membrane Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____ Thickness _____ in ☐ Felted-Woven			
Fabric permeability (clean) @ 1/2" water-Δ P _____ CFM/sq.ft.			
Filter dimensions _____ Diameter/Width _____			
Effective area per filter _____		Maximum operating temperature (°F) _____	
Effective air to cloth ratio		Minimum _____ Maximum _____	
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.			
Operation and Cleaning			
Volume of gases handled _____ ACFM _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.	
Type of filter cleaning ☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets ☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____ ☐ Pneumatic Shakers ☐ Reverse Air Flow			
If compressed air is required for collector operation, describe the equipment with the compressor to provide dry air free from oil.			
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.			

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Wet Collection Equipment: NA

Equipment Specifications

Manufacturer	Type	Model No.
Design Inlet Volume (SCFM)		Relative Particulate/Gas Velocity (ejector scrubbers only)
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).		
Describe pH monitoring and pH adjustment systems, if applicable.		
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).		
Attach particulate size efficiency curve.		

Operating Parameters

Inlet volume of gases handled _____ (ACFM) @ _____ °F	Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)	
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.).	
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.	

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

6. Electrostatic Precipitator NA

Equipment specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ YES ☐ NO		Design inlet volume (SCFM) _____ Maximum operating temperature (°F) _____	

Total collecting surface area _____ sq. ft. Collector plates size length _____ ft. x width _____ ft.
 Number of fields _____ Number of collector plates/field _____ Spacing between collector plates _____ inches.
 Maximum gas velocity _____ ft/sec. Minimum gas treatment time: _____ sec.

Total discharge electrode length _____ ft.
 Number of discharge electrodes _____ Number collecting electrode rappers _____

Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____
 Describe in detail _____

Operating parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (water gauge) across collector only. Describe the equipment.
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field

Field No.	No. of Sets	Each Transformer KVA	Each Rectifier	
			KV Ave./Peak	MaDC

Current density _____ Micro amperes/ft ²	Corona power _____ Watts/1000 ACFM	Corona power density _____ Watts/ft ²

Will a flue gas conditioning system be employed? If yes, describe it.

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Absorption Equipment: NA

Equipment specifications

Manufacturer	Type	Model No	
Design inlet volume (SCFM)	Tower height (ft) and inside diameter (ft)		
Packing type and size (if applicable)	Height of packing (ft) (if applicable)		
Number of trays (if applicable)	Number of bubble caps (if applicable)		
Configuration: ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls			
Absorbent information			
Absorbent type and concentration	Sorbent injection rate	Retention time (sec)	
Attach equilibrium data for absorption (If applicable).			
Attach any additional information regarding auxiliary equipment, reagent (slurry mix) supply system (once through or recirculating, system capacity, etc) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in of water) and liquid flow rate. Describe the equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. ☐ **SELECTIVE CATALYTIC REDUCTION (SCR)**
☐ **SELECTIVE NON-CATALYTIC REDUCTION (SNCR)**
☐ **NON-SELECTIVE CATALYTIC REDUCTION (NSCR)**

Equipment specifications

Manufacturer	Type	Model No
Design inlet volume (SCFM)		Design operating temperature (°F)
Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.		
Attach efficiency and other pertinent information (e.g., Ammonia, urea slip).		

Operating parameters

Volume of gases handled (ACFM) _____ @ _____ (°F)			
Operating temperature range for the SCR/SNCR/NSCR system (°F)		From	To
Reducing agent used, if any.		Oxidation catalyst used, if any.	
State expected range of usage rate and concentration.			
Service life of catalyst		Ammonia slip (ppm)	
Describe fully with a sketch giving locations of equipment, controls system, important parameters and method of operation.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

9. Other Control Equipment: NA

Equipment specifications

Manufacturer	Type	Model No
Design inlet volume (SCFM)		Capacity

Describe pH monitoring and pH adjustment, if any.

Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.

Attach efficiency curve and/ or other efficiency information.

Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.

Operating parameters

Volume of gas handled

_____ @ _____ °F _____ % Moisture

Describe, in detail, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Operating Cost

11 MISCELLANEOUS

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

NA

Attach the maintenance schedule for the control equipment and any part of the process equipment that, if in disrepair, would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if the facility is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below.

☒ Monitoring	☐ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (stack test, CEM etc.): See the emission source's monitoring requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Monitoring device location: See the emission source's monitoring requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter: See the emission source's monitoring requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Testing:

- a. Reference Test Method Citation: NA
- b. Reference Test Method Description: NA

Recordkeeping:

Describe the parameters that will be recorded and the recording frequency: See the emission source's recordkeeping requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Reporting:

- a. Describe the type of information to be reported and the reporting frequency: See the emission source's reporting requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reporting start date: See the emission source's reporting requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Work Practice Standard: Describe each

See the emission source's work practice requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Section F - Flue and Air Contaminant Emission

1. Estimated Maximum Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		**	**	**
PM ₁₀		**	**	**
SO _x		**	**	**
CO		**	**	**
NO _x		**	**	**
VOC		**	**	**
Others: (e.g., HAPs)	-----	-----	-----	-----
PM _{2.5}		**	**	**
HAPs		**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number S107 (Generator 3 - Lift Station Stack)

List Source(s) or source ID exhausted to this stack:
107

% of flow exhausted to stack: 100%

Stack height above grade (ft.) 6
Grade elevation (ft.) 795

Stack diameter (ft) or Outlet duct area (sq. ft.)
0.3 ft

Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.
~330 ft

Does stack height meet Good Engineering Practice (GEP)?
Yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of Stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
S107 (Generator 3 - Lift Station Stack)	40	40	4.44	80	20	7.08

Stack Exhaust

Volume 1,261 ACFM Temperature 1,250 °F Moisture NA%

Exhauster (attach fan curves) _____ in. of water _____ HP @ _____ RPM.

** If the datum and collection method information and codes differ from those provided on the General Information Form - Authorization Application, provide the additional required by that form on a separate sheet.



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 B - Combustion Unit Information

1. Combustion Units: ☐ Coal ☐ Oil ☒ Natural Gas Other: _____

Description: A natural gas-fired emergency generator engine (Generator 4 - Lift Station) that is included under the source referenced as Natural Gas-Fired Emergency Generator Engines (3) (Source ID 107) in PA-04-00740C. Note that Shell is proposing to revise the referenced Natural Gas-Fired Emergency Generator Engines (3) source description to Natural Gas-Fired Emergency Generator Engines (2) because only 2 natural gas-fired emergency generator engines are installed at SPM, not 3.

Manufacturer GM	Model No. Vortec 3.0L	Number of units 1	
Maximum heat input (Btu/hr) 0.37 MMBtu/hr (HHV)	Rated heat input (Btu/hr) 0.37 MMBtu/hr (HHV)	Typical heat input (Btu/hr) 0.37 MMBtu/hr (HHV) -	Furnace Volume
Grate Area (if applicable)	Method of firing		

Indicate how combustion air is supplied to boiler

Indicate the Steam Usage:

Mark and describe soot Cleaning Method: NA

i. Air Blown	iv. Other _____
ii. Steam Blown	v. Frequency of Cleaning _____
iii. Brushed and Vacuumed	

Maximum Operating schedule

Hours/Day	Days/Week	Days/Year	Hours/Year Unlimited emergency use

Operational restrictions taken or requested, if any (e.g., bottlenecks or voluntary restrictions to limit potential to emit)

Capacity (specify units)

Per hour 0.37 MMBtu/hr (HHV)	Per day	Per week	Per year

Typical Operating schedule

Hours/Day	Days/Week	Days/Year	Hours/Year 100 non-emergency use

Seasonal variations (Months): If variations exist, describe them.

Operating using primary fuel: _____	From _____ to _____
Operating using secondary fuel: _____	From _____ to _____
Non-operating: _____	From _____ to _____

2. Specify the primary, secondary and startup fuel. Furnish the details in item 3.
Natural gas

Section B - Combustion Unit Information (Continued)

3. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	0.37 MMBtu/hr (HHV)	X 10 ⁶ Gal	0.5 gr/100 SCF	0%	~1,020 Btu/SCF
Gas (other)		X 10 ⁶ Gal			
Coal					
Other*					

* Note: Describe and furnish information separately for other fuels in Addendum B.

4. Burner

Manufacturer	Model Number	Type of Atomization (Steam, air, press, mech., rotary cup)	
Number of Burners		Maximum fuel firing rate (all burners)	Normal fuel firing rate
If oil, temperature and viscosity.			
Maximum theoretical air requirement			
Percent excess air 100% rating			
Turndown ratio			
Combustion modulation control (on/off, low-high fire, full automatic, manual). Describe.			
Main burner flame ignition method (electric spark, auto gas pilot, hand-held torch, other). Describe.			

5. Nitrogen Oxides (NO_x) control Options

Mark and describe the NO_x control options adopted

Low excess air (LEA)

Flue gas recirculation

Other. _____

Over fire air (OFA)

Burner out of service

Low-NO_x burner

Reburning

Low NO_x burners with over fire
air

Flue gas treatment (SCR /
SNCR)

Section B - Combustion Unit Information (Continued)

6. Miscellaneous Information

Describe fly ash reinjection operation

NA

Describe, in detail, the equipment provided to monitor and to record the source(s) operating conditions, which may affect emissions of air contaminants. Show that they are reasonable and adequate.

See the emission source's monitoring and recordkeeping requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Describe each proposed modification to an existing source.

NA

Describe how emissions will be minimized especially during start up, shut down, combustion upsets and/or disruptions. Provide emission estimates for start up, shut down and upset conditions. Provide duration of start up and shut down.

See the emission source's limitations in PA-04-00740C and the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

Describe in detail with a schematic diagram of the control options adopted for SO₂ (if applicable).

NA

Anticipated milestones:

Expected commencement date of construction/reconstruction: NA

Expected completion date of construction/reconstruction: NA

Anticipated date(s) of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions*

Emission Rate

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM					
PM ₁₀					
SO _x					
CO					
NO _x					
VOC					
Others: (e.g., HAPs)	-----	-----	-----	-----	-----

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations.

2. Gas Conditioning NA

 Water quenching ☐ YES ☐ NO Water injection rate _____ GPM

 Radiation and convection cooling ☐ YES ☐ NO Air dilution ☐ YES ☐ NO
 If YES, _____ CFM

 Forced draft ☐ YES ☐ NO Water cooled duct work ☐ YES ☐ NO

Other _____

Inlet volume _____ ACFM@_____ °F	Outlet volume _____ ACFM@_____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Inertial and Cyclone Collectors NA

Manufacturer		Type		Model No.	
Pressure Drop (in. of water)	Inlet Volume _____ ACFM @ _____ °F		Outlet Volume _____ ACFM @ _____ °F _____ % Moisture		
Number of Individual Cyclone(s)			Outlet Straightening Vanes Used? ☐ Yes ☐ No		
Length of Cyclone(s) Cylinder (ft)		Diameter of Cyclone(s) Cylinder		Length of cyclone(s) cone (ft)	
Inlet Diameter (ft) or Duct Area (ft ²) of Cyclone(s)			Outlet Diameter (ft) or Duct area (ft ²) of cyclone(s)		
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?					
Describe any exhaust gas recirculation loop to be employed.					
Attach particle size efficiency curve					
Emission data					
Inlet		Outlet		Removal Efficiency (%)	

Section C - Air Cleaning Device (Continued)

4. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No.	☐ Pressurized Design ☐ Suction Design
Number of Compartments	Number of Filters Per Compartment		Is Baghouse Insulated? ☐ Yes ☐ No
Can each compartment be isolated for repairs and/or filter replacement?			☐ Yes ☐ No
Are temperature controls provided? (Describe in detail)			☐ Yes ☐ No
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM	
Type of Fabric Material _____ Weight _____ oz/sq.yd Thickness _____ in ☐ Felted ☐ Woven ☐ Felted-Woven ☐ Membrane ☐ Others: List: _____			
Fabric permeability (clean) @ 1/2" water-Δ P _____ CFM/sq.ft.			
Filter dimensions _____ Diameter/Width _____			
Effective area per filter _____		Maximum operating temperature (°F) _____	
Effective air to cloth ratio Minimum _____ Maximum _____			
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.			
Operation and Cleaning			
Volume of gases handled _____ ACFM _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.	
Type of filter cleaning ☐ Manual Cleaning ☐ Mechanical Shakers ☐ Pneumatic Shakers ☐ Bag Collapse ☐ Sonic Cleaning ☐ Reverse Air Flow ☐ Reverse Air Jets ☐ Other: _____			
If compressed air is required for collector operation, describe the equipment with the compressor to provide dry air free from oil.			
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Wet Collection Equipment: NA

Equipment Specifications

Manufacturer	Type	Model No.
Design Inlet Volume (SCFM)		Relative Particulate/Gas Velocity (ejector scrubbers only)
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).		
Describe pH monitoring and pH adjustment systems, if applicable.		
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).		
Attach particulate size efficiency curve.		

Operating Parameters

Inlet volume of gases handled _____ (ACFM) @ _____ °F	Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)	
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.).	
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.	

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

6. Electrostatic Precipitator NA

Equipment specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ YES ☐ NO		Design inlet volume (SCFM) _____ Maximum operating temperature (°F) _____	

Total collecting surface area _____ sq. ft. Collector plates size length _____ ft. x width _____ ft.
 Number of fields _____ Number of collector plates/field _____ Spacing between collector plates _____ inches.
 Maximum gas velocity _____ ft/sec. Minimum gas treatment time: _____ sec.

Total discharge electrode length _____ ft.
 Number of discharge electrodes _____ Number collecting electrode rappers _____

Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____
 Describe in detail _____

Operating parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (water gauge) across collector only. Describe the equipment.
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field

Field No.	No. of Sets	Each Transformer KVA	Each Rectifier	
			KV Ave./Peak	MaDC

Current density _____ Micro amperes/ft ²	Corona power _____ Watts/1000 ACFM	Corona power density _____ Watts/ft ²

Will a flue gas conditioning system be employed? If yes, describe it.

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Absorption Equipment: NA
Equipment specifications

Manufacturer	Type	Model No	
Design inlet volume (SCFM)	Tower height (ft) and inside diameter (ft)		
Packing type and size (if applicable)	Height of packing (ft) (if applicable)		
Number of trays (if applicable)	Number of bubble caps (if applicable)		
Configuration: ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls			
Absorbent information			
Absorbent type and concentration	Sorbent injection rate	Retention time (sec)	
Attach equilibrium data for absorption (If applicable).			
Attach any additional information regarding auxiliary equipment, reagent (slurry mix) supply system (once through or recirculating, system capacity, etc) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in of water) and liquid flow rate. Describe the equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. ☐ **SELECTIVE CATALYTIC REDUCTION (SCR)**
☐ **SELECTIVE NON-CATALYTIC REDUCTION (SNCR)**
☐ **NON-SELECTIVE CATALYTIC REDUCTION (NSCR)**

Equipment specifications

Manufacturer	Type	Model No
Design inlet volume (SCFM)		Design operating temperature (°F)
Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.		
Attach efficiency and other pertinent information (e.g., Ammonia, urea slip).		

Operating parameters

Volume of gases handled (ACFM) _____ @ _____ (°F)			
Operating temperature range for the SCR/SNCR/NSCR system (°F)		From	To
Reducing agent used, if any.		Oxidation catalyst used, if any.	
State expected range of usage rate and concentration.			
Service life of catalyst		Ammonia slip (ppm)	
Describe fully with a sketch giving locations of equipment, controls system, important parameters and method of operation.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

9. Other Control Equipment: NA

Equipment specifications

Manufacturer	Type	Model No
Design inlet volume (SCFM)		Capacity

Describe pH monitoring and pH adjustment, if any.

Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.

Attach efficiency curve and/ or other efficiency information.

Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.

Operating parameters

Volume of gas handled

_____ @ _____ °F _____ % Moisture

Describe, in detail, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Operating Cost

11 MISCELLANEOUS

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

NA

Attach the maintenance schedule for the control equipment and any part of the process equipment that, if in disrepair, would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if the facility is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below.

☒ Monitoring	☐ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (stack test, CEM etc.): See the emission source's monitoring requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Monitoring device location: See the emission source's monitoring requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter: See the emission source's monitoring requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Testing:

- a. Reference Test Method Citation: NA
- b. Reference Test Method Description: NA

Recordkeeping:

Describe the parameters that will be recorded and the recording frequency: See the emission source's recordkeeping requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Reporting:

- a. Describe the type of information to be reported and the reporting frequency: See the emission source's reporting requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reporting start date: See the emission source's reporting requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Work Practice Standard: Describe each

See the emission source's work practice requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Section F - Flue and Air Contaminant Emission

1. Estimated Maximum Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		**	**	**
PM ₁₀		**	**	**
SO _x		**	**	**
CO		**	**	**
NO _x		**	**	**
VOC		**	**	**
Others: (e.g., HAPs)	-----	-----	-----	-----
PM _{2.5}		**	**	**
HAPs		**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number S107 (Generator 4 - Lift Station Stack)

List Source(s) or source ID exhausted to this stack:
107

% of flow exhausted to stack: 100%

Stack height above grade (ft.) 6
Grade elevation (ft.) 795

Stack diameter (ft) or Outlet duct area (sq. ft.)
0.21 ft

Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.
~645 ft

Does stack height meet Good Engineering Practice (GEP)?
Yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of Stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
S107 (Generator 4 - Lift Station Stack)	40	40	2.28	80	20	18.96

Stack Exhaust

Volume 250 ACFM Temperature 1,270 °F Moisture NA%

Exhauster (attach fan curves) _____ in. of water _____ HP @ _____ RPM.

** If the datum and collection method information and codes differ from those provided on the General Information Form - Authorization Application, provide the additional required by that form on a separate sheet.



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 B - Combustion Unit Information

1. Combustion Units: ☐ Coal ☐ Oil ☐ Natural Gas Other: Natural gas/waste gas

Description: A thermal oxidizer that is used to control VOC and HAP emissions at SPM. The thermal oxidizer is referenced as the LP Incinerator (Source ID C204A) and included in the Low Pressure (LP) Header System (Source ID 204) in PA-04-00740A and PA-04-00740C, but Shell is proposing to revise its plan approval source description from the LP Incinerator to the Continuous Vent Thermal Oxidizer (CVTO). The CVTO combusts vent streams from the three polyethylene manufacturing units and specific storage tanks at SPM.

Manufacturer John Zink	Model No. NA	Number of units 1	
Maximum heat input (Btu/hr) 200 MMBtu/hr (HHV)	Rated heat input (Btu/hr) 200 MMBtu/hr (HHV)	Typical heat input (Btu/hr) 179.6 MMBtu/hr (HHV)	Furnace Volume
Grate Area (if applicable)		Method of firing	

Indicate how combustion air is supplied to boiler

Indicate the Steam Usage:

Mark and describe soot Cleaning Method: NA

i. Air Blown	iv. Other _____
ii. Steam Blown	v. Frequency of Cleaning _____
iii. Brushed and Vacuumed	

Maximum Operating schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Operational restrictions taken or requested, if any (e.g., bottlenecks or voluntary restrictions to limit potential to emit)

Capacity (specify units)

Per hour 200 MMBtu/hr (HHV)	Per day	Per week	Per year

Typical Operating schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Seasonal variations (Months): If variations exist, describe them.

Operating using primary fuel: _____	From _____ to _____
Operating using secondary fuel: _____	From _____ to _____
Non-operating: _____	From _____ to _____

2. Specify the primary, secondary and startup fuel. Furnish the details in item 3.
Natural gas

Section B - Combustion Unit Information (Continued)

3. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	200 MMBtu/hr (HHV) natural gas and waste gas	X 10 ⁶ Gal	0.5 gr/100 SCF	0%	~1,020 Btu/SCF
Gas (other)		X 10 ⁶ Gal			
Coal					
Other*					

* Note: Describe and furnish information separately for other fuels in Addendum B.

4. Burner

Manufacturer John Zink	Model Number	Type of Atomization (Steam, air, press, mech., rotary cup) NA	
Number of Burners 1 Natural Gas 42 Waste Gas	Maximum fuel firing rate (all burners) 200 MMBtu/hr (HHV)		Normal fuel firing rate 179.6 MMBtu/hr (HHV)
If oil, temperature and viscosity. NA			
Maximum theoretical air requirement			
Percent excess air 100% rating			
Turndown ratio			
Combustion modulation control (on/off, low-high fire, full automatic, manual). Describe.			
Main burner flame ignition method (electric spark, auto gas pilot, hand-held torch, other). Describe. Natural Gas Pilots			

5. Nitrogen Oxides (NO_x) control Options

Mark and describe the NO_x control options adopted

Low excess air (LEA)

Flue gas recirculation

Other. _____

Over fire air (OFA)

Burner out of service

Low-NO_x burner

Reburning

Low NO_x burners with over fire
air

Flue gas treatment (SCR /
SNCR)

Section B - Combustion Unit Information (Continued)

6. Miscellaneous Information

Describe fly ash reinjection operation

NA

Describe, in detail, the equipment provided to monitor and to record the source(s) operating conditions, which may affect emissions of air contaminants. Show that they are reasonable and adequate.

See the emission source's monitoring and recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Describe each proposed modification to an existing source.

NA

Describe how emissions will be minimized especially during start up, shut down, combustion upsets and/or disruptions. Provide emission estimates for start up, shut down and upset conditions. Provide duration of start up and shut down.

See the emission source's limitations in PA-04-00740A and PA-04-00740C and the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

Describe in detail with a schematic diagram of the control options adopted for SO₂ (if applicable).

NA

Anticipated milestones:

Expected commencement date of construction/reconstruction: NA

Expected completion date of construction/reconstruction: NA

Anticipated date(s) of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions*

Emission Rate

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM					
PM ₁₀					
SO _x					
CO					
NO _x					
VOC					
Others: (e.g., HAPs)	-----	-----	-----	-----	-----

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations.

2. Gas Conditioning NA

 Water quenching ☐ YES ☐ NO Water injection rate _____ GPM

 Radiation and convection cooling ☐ YES ☐ NO Air dilution ☐ YES ☐ NO
 If YES, _____ CFM

 Forced draft ☐ YES ☐ NO Water cooled duct work ☐ YES ☐ NO

Other _____

Inlet volume _____ ACFM@_____ °F	Outlet volume _____ ACFM@_____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Inertial and Cyclone Collectors NA

Manufacturer		Type		Model No.	
Pressure Drop (in. of water)	Inlet Volume _____ ACFM @ _____ °F		Outlet Volume _____ ACFM @ _____ °F _____ % Moisture		
Number of Individual Cyclone(s)			Outlet Straightening Vanes Used? ☐ Yes ☐ No		
Length of Cyclone(s) Cylinder (ft)		Diameter of Cyclone(s) Cylinder		Length of cyclone(s) cone (ft)	
Inlet Diameter (ft) or Duct Area (ft ²) of Cyclone(s)			Outlet Diameter (ft) or Duct area (ft ²) of cyclone(s)		
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?					
Describe any exhaust gas recirculation loop to be employed.					
Attach particle size efficiency curve					
Emission data					
Inlet		Outlet		Removal Efficiency (%)	

Section C - Air Cleaning Device (Continued)

4. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No.	☐ Pressurized Design ☐ Suction Design
Number of Compartments	Number of Filters Per Compartment		Is Baghouse Insulated? ☐ Yes ☐ No
Can each compartment be isolated for repairs and/or filter replacement?			☐ Yes ☐ No
Are temperature controls provided? (Describe in detail)			☐ Yes ☐ No
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM	
Type of Fabric Material _____ Weight _____ oz/sq.yd Thickness _____ in ☐ Felted ☐ Woven ☐ Felted-Woven ☐ Membrane ☐ Others: List: _____			
Fabric permeability (clean) @ 1/2" water-Δ P _____ CFM/sq.ft.			
Filter dimensions _____ Diameter/Width _____			
Effective area per filter _____		Maximum operating temperature (°F) _____	
Effective air to cloth ratio		Minimum _____ Maximum _____	
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.			
Operation and Cleaning			
Volume of gases handled _____ ACFM _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.	
Type of filter cleaning ☐ Manual Cleaning ☐ Mechanical Shakers ☐ Pneumatic Shakers ☐ Bag Collapse ☐ Sonic Cleaning ☐ Reverse Air Flow ☐ Reverse Air Jets ☐ Other: _____			
If compressed air is required for collector operation, describe the equipment with the compressor to provide dry air free from oil.			
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Wet Collection Equipment: NA

Equipment Specifications

Manufacturer	Type	Model No.
Design Inlet Volume (SCFM)		Relative Particulate/Gas Velocity (ejector scrubbers only)
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).		
Describe pH monitoring and pH adjustment systems, if applicable.		
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).		
Attach particulate size efficiency curve.		

Operating Parameters

Inlet volume of gases handled _____ (ACFM) @ _____ °F	Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)	
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.).	
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.	

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

6. Electrostatic Precipitator NA

Equipment specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ YES ☐ NO		Design inlet volume (SCFM) _____ Maximum operating temperature (°F) _____	

Total collecting surface area _____ sq. ft. Collector plates size length _____ ft. x width _____ ft.
 Number of fields _____ Number of collector plates/field _____ Spacing between collector plates _____ inches.
 Maximum gas velocity _____ ft/sec. Minimum gas treatment time: _____ sec.

Total discharge electrode length _____ ft.
 Number of discharge electrodes _____ Number collecting electrode rappers _____

Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____
 Describe in detail _____

Operating parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (water gauge) across collector only. Describe the equipment.
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field

Field No.	No. of Sets	Each Transformer KVA	Each Rectifier	
			KV Ave./Peak	MaDC

Current density _____ Micro amperes/ft ²	Corona power _____ Watts/1000 ACFM	Corona power density _____ Watts/ft ²

Will a flue gas conditioning system be employed? If yes, describe it.

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Absorption Equipment: NA
Equipment specifications

Manufacturer	Type	Model No	
Design inlet volume (SCFM)	Tower height (ft) and inside diameter (ft)		
Packing type and size (if applicable)	Height of packing (ft) (if applicable)		
Number of trays (if applicable)	Number of bubble caps (if applicable)		
Configuration: ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls			
Absorbent information			
Absorbent type and concentration	Sorbent injection rate	Retention time (sec)	
Attach equilibrium data for absorption (If applicable).			
Attach any additional information regarding auxiliary equipment, reagent (slurry mix) supply system (once through or recirculating, system capacity, etc) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in of water) and liquid flow rate. Describe the equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. ☐ **SELECTIVE CATALYTIC REDUCTION (SCR)**
☐ **SELECTIVE NON-CATALYTIC REDUCTION (SNCR)**
☐ **NON-SELECTIVE CATALYTIC REDUCTION (NSCR)**

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Design operating temperature (°F)

Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.

Attach efficiency and other pertinent information (e.g., Ammonia, urea slip).

Operating parameters

Volume of gases handled (ACFM) _____ @ _____ (°F)

Operating temperature range for the SCR/SNCR/NSCR system (°F)	From	To

Reducing agent used, if any.	Oxidation catalyst used, if any.

State expected range of usage rate and concentration.

Service life of catalyst	Ammonia slip (ppm)

Describe fully with a sketch giving locations of equipment, controls system, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

9. Other Control Equipment: NA

Equipment specifications

Manufacturer	Type	Model No
Design inlet volume (SCFM)		Capacity

Describe pH monitoring and pH adjustment, if any.

Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.

Attach efficiency curve and/ or other efficiency information.

Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.

Operating parameters

Volume of gas handled

_____ @ _____ °F _____ % Moisture

Describe, in detail, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Operating Cost

11 MISCELLANEOUS

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

NA

Attach the maintenance schedule for the control equipment and any part of the process equipment that, if in disrepair, would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if the facility is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below.

☒ Monitoring	☒ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (stack test, CEM etc.): See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Monitoring device location: See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter: See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Testing:

- a. Reference Test Method Citation: See the emission source's testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reference Test Method Description: See the emission source's testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Recordkeeping:

Describe the parameters that will be recorded and the recording frequency: See the emission source's recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Reporting:

- a. Describe the type of information to be reported and the reporting frequency: See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reporting start date: See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Work Practice Standard: Describe each

See the emission source's work practice requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Section F - Flue and Air Contaminant Emission

1. Estimated Maximum Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		**	**	**
PM ₁₀		**	**	**
SO _x		**	**	**
CO		**	**	**
NO _x		**	**	**
VOC		**	**	**
Others: (e.g., HAPs)	-----	-----	-----	-----
PM _{2.5}		**	**	**
HAPs		**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number S204A

List Source(s) or source ID exhausted to this stack:
C204A

% of flow exhausted to stack: 100%

Stack height above grade (ft.) 250
Grade elevation (ft.) 795

Stack diameter (ft) or Outlet duct area (sq. ft.)
4.5 ft

Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.
~398 ft

Does stack height meet Good Engineering Practice (GEP)?
Yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of Stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
S204A	40	40	21	80	20	11.76

Stack Exhaust

Volume 177,696 ACFM Temperature 1,600 °F Moisture NA%

Exhauster (attach fan curves) _____ in. of water _____ HP @ _____ RPM.

** If the datum and collection method information and codes differ from those provided on the General Information Form - Authorization Application, provide the additional required by that form on a separate sheet.



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	C204A (CVTO)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740C [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.			
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 NOx, CO, PM10, PM2.5, 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 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 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 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.

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 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
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 (NESHAP Subpart YY - CVTO)
☒	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	☒ 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 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)].			
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)].			

SECTION E. REPORTING

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

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

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).



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	G08 (NESHAP Subpart SS - CVTO)
☒	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	☒ 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 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)].			
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)].			
Reporting Start Date	As specified		

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Section B - Combustion Unit Information

1. Combustion Units: ☐ Coal ☐ Oil ☐ Natural Gas Other: Natural gas/waste gas

Description: A multi-point, perimeter air-assisted ground flare that is used to control VOC and HAP emissions at SPM. The flare is referenced as the LP Multipoint Ground Flare (MPGF) (Source ID C204B) and included in the Low Pressure (LP) Header System (Source ID 204) in PA-04-00740A and PA-04-00740C, but Shell is proposing to revise its plan approval source description from the LP Multipoint Ground Flare (MPGF) to the MPGF. The MPGF consists of three independent headers and combusts vent streams from the three polyethylene manufacturing units, specific storage tanks, and compressor seals at SPM.

Manufacturer Zeeco	Model No. AFDS-6/24 / AFTA-8/18		Number of units 1	
Maximum heat input (Btu/hr) PE1/2 Episodic Vent: 860 MMBtu/hr (HHV) Ethylene Tank Vent: 1,152 MMBtu/hr (HHV) CVTO Trip Vent: 186 MMBtu/hr (HHV)	Rated heat input (Btu/hr) PE1/2 Episodic Vent: 860 MMBtu/hr (HHV) Ethylene Tank Vent: 1,152 MMBtu/hr (HHV) CVTO Trip Vent: 186 MMBtu/hr (HHV)	Typical heat input (Btu/hr) Varies	Furnace Volume	
Grate Area (if applicable)		Method of firing		

Indicate how combustion air is supplied to boiler

Indicate the Steam Usage:

Mark and describe soot Cleaning Method:

i. Air Blown	iv. Other _____
ii. Steam Blown	v. Frequency of Cleaning _____
iii. Brushed and Vacuumed	

Maximum Operating schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Operational restrictions taken or requested, if any (e.g., bottlenecks or voluntary restrictions to limit potential to emit)

Capacity (specify units)

Per hour See max HI above	Per day	Per week	Per year

Typical Operating schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Seasonal variations (Months): If variations exist, describe them.

Operating using primary fuel: _____ From _____ to _____
 Operating using secondary fuel: _____ From _____ to _____
 Non-operating: _____ From _____ to _____

2. Specify the primary, secondary and startup fuel. Furnish the details in item 3.
 Natural gas

Section B - Combustion Unit Information (Continued)

3. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	180 MMBtu/hr (HHV) natural gas and waste gas	X 10 ⁶ Gal	0.5 gr/100 SCF	0%	~1,020 Btu/SCF
Gas (other)		X 10 ⁶ Gal			
Coal					
Other*					

* Note: Describe and furnish information separately for other fuels in Addendum B.

4. Burner

Manufacturer Zeeco	Model Number	Type of Atomization (Steam, air, press, mech., rotary cup) Air
Number of Burners 14 CVTO Trip 17 PE1/2 Episodic 7 Ethylene Tank	Maximum fuel firing rate (all burners) PE1/2 Episodic Vent: 860 MMBtu/hr (HHV) Ethylene Tank Vent: 1,152 MMBtu/hr (HHV) CVTO Trip Vent: 186 MMBtu/hr (HHV)	Normal fuel firing rate Varies
If oil, temperature and viscosity.		
Maximum theoretical air requirement		
Percent excess air 100% rating		
Turndown ratio		
Combustion modulation control (on/off, low-high fire, full automatic, manual). Describe.		
Main burner flame ignition method (electric spark, auto gas pilot, hand-held torch, other). Describe. Natural Gas Pilots		

5. Nitrogen Oxides (NO_x) control Options

Mark and describe the NO_x control options adopted

Low excess air (LEA)

Flue gas recirculation

Other. _____

Over fire air (OFA)

Burner out of service

Low-NO_x burner

Reburning

Low NO_x burners with over fire
air

Flue gas treatment (SCR /
SNCR)

Section B - Combustion Unit Information (Continued)

6. Miscellaneous Information

Describe fly ash reinjection operation

NA

Describe, in detail, the equipment provided to monitor and to record the source(s) operating conditions, which may affect emissions of air contaminants. Show that they are reasonable and adequate.

See the emission source's monitoring and recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Describe each proposed modification to an existing source.

NA

Describe how emissions will be minimized especially during start up, shut down, combustion upsets and/or disruptions. Provide emission estimates for start up, shut down and upset conditions. Provide duration of start up and shut down.

See the emission source's limitations in PA-04-00740A and PA-04-00740C and the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

Describe in detail with a schematic diagram of the control options adopted for SO₂ (if applicable).

NA

Anticipated milestones:

Expected commencement date of construction/reconstruction: NA

Expected completion date of construction/reconstruction: NA

Anticipated date(s) of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions*

Emission Rate

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM					
PM ₁₀					
SO _x					
CO					
NO _x					
VOC					
Others: (e.g., HAPs)	-----	-----	-----	-----	-----

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations.

2. Gas Conditioning NA

 Water quenching ☐ YES ☐ NO Water injection rate _____ GPM

 Radiation and convection cooling ☐ YES ☐ NO Air dilution ☐ YES ☐ NO
 If YES, _____ CFM

 Forced draft ☐ YES ☐ NO Water cooled duct work ☐ YES ☐ NO

Other _____

Inlet volume _____ ACFM@_____ °F	Outlet volume _____ ACFM@_____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Inertial and Cyclone Collectors NA

Manufacturer		Type		Model No.	
Pressure Drop (in. of water)	Inlet Volume _____ ACFM @ _____ °F		Outlet Volume _____ ACFM @ _____ °F _____ % Moisture		
Number of Individual Cyclone(s)			Outlet Straightening Vanes Used? ☐ Yes ☐ No		
Length of Cyclone(s) Cylinder (ft)		Diameter of Cyclone(s) Cylinder		Length of cyclone(s) cone (ft)	
Inlet Diameter (ft) or Duct Area (ft ²) of Cyclone(s)			Outlet Diameter (ft) or Duct area (ft ²) of cyclone(s)		
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?					
Describe any exhaust gas recirculation loop to be employed.					
Attach particle size efficiency curve					
Emission data					
Inlet		Outlet		Removal Efficiency (%)	

Section C - Air Cleaning Device (Continued)

4. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No.	☐ Pressurized Design ☐ Suction Design
Number of Compartments	Number of Filters Per Compartment		Is Baghouse Insulated? ☐ Yes ☐ No
Can each compartment be isolated for repairs and/or filter replacement?			☐ Yes ☐ No
Are temperature controls provided? (Describe in detail)			☐ Yes ☐ No
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM	
Type of Fabric Material _____ Weight _____ oz/sq.yd Thickness _____ in ☐ Felted ☐ Woven ☐ Felted-Woven ☐ Membrane ☐ Others: List: _____			
Fabric permeability (clean) @ 1/2" water-Δ P _____ CFM/sq.ft.			
Filter dimensions _____ Diameter/Width _____			
Effective area per filter _____		Maximum operating temperature (°F) _____	
Effective air to cloth ratio Minimum _____ Maximum _____			
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.			
Operation and Cleaning			
Volume of gases handled _____ ACFM _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.	
Type of filter cleaning ☐ Manual Cleaning ☐ Mechanical Shakers ☐ Pneumatic Shakers ☐ Bag Collapse ☐ Sonic Cleaning ☐ Reverse Air Flow ☐ Reverse Air Jets ☐ Other: _____			
If compressed air is required for collector operation, describe the equipment with the compressor to provide dry air free from oil.			
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Wet Collection Equipment: NA

Equipment Specifications

Manufacturer	Type	Model No.
Design Inlet Volume (SCFM)		Relative Particulate/Gas Velocity (ejector scrubbers only)
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).		
Describe pH monitoring and pH adjustment systems, if applicable.		
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).		
Attach particulate size efficiency curve.		

Operating Parameters

Inlet volume of gases handled _____ (ACFM) @ _____ °F	Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)	
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.).	
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.	

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

6. Electrostatic Precipitator NA

Equipment specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ YES ☐ NO		Design inlet volume (SCFM) _____ Maximum operating temperature (°F) _____	

Total collecting surface area _____ sq. ft. Collector plates size length _____ ft. x width _____ ft.
 Number of fields _____ Number of collector plates/field _____. Spacing between collector plates _____ inches.
 Maximum gas velocity _____ ft/sec. Minimum gas treatment time: _____ sec.

Total discharge electrode length _____ ft.
 Number of discharge electrodes _____ Number collecting electrode rappers _____

Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____
 Describe in detail _____

Operating parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (water gauge) across collector only. Describe the equipment.
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field

Field No.	No. of Sets	Each Transformer KVA	Each Rectifier	
			KV Ave./Peak	MaDC

Current density _____ Micro amperes/ft ²	Corona power _____ Watts/1000 ACFM	Corona power density _____ Watts/ft ²

Will a flue gas conditioning system be employed? If yes, describe it.

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Absorption Equipment: NA
Equipment specifications

Manufacturer	Type	Model No	
Design inlet volume (SCFM)	Tower height (ft) and inside diameter (ft)		
Packing type and size (if applicable)	Height of packing (ft) (if applicable)		
Number of trays (if applicable)	Number of bubble caps (if applicable)		
Configuration: ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls			
Absorbent information			
Absorbent type and concentration	Sorbent injection rate	Retention time (sec)	
Attach equilibrium data for absorption (If applicable).			
Attach any additional information regarding auxiliary equipment, reagent (slurry mix) supply system (once through or recirculating, system capacity, etc) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in of water) and liquid flow rate. Describe the equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. ☐ **SELECTIVE CATALYTIC REDUCTION (SCR)**
☐ **SELECTIVE NON-CATALYTIC REDUCTION (SNCR)**
☐ **NON-SELECTIVE CATALYTIC REDUCTION (NSCR)**

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Design operating temperature (°F)

Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.

Attach efficiency and other pertinent information (e.g., Ammonia, urea slip).

Operating parameters

Volume of gases handled (ACFM) _____ @ _____ (°F)

Operating temperature range for the SCR/SNCR/NSCR system (°F)	From	To

Reducing agent used, if any.	Oxidation catalyst used, if any.

State expected range of usage rate and concentration.

Service life of catalyst	Ammonia slip (ppm)

Describe fully with a sketch giving locations of equipment, controls system, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

9. Other Control Equipment: NA

Equipment specifications

Manufacturer	Type	Model No
Design inlet volume (SCFM)		Capacity

Describe pH monitoring and pH adjustment, if any.

Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.

Attach efficiency curve and/ or other efficiency information.

Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.

Operating parameters

Volume of gas handled

_____ @ _____ °F _____ % Moisture

Describe, in detail, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Operating Cost

11 MISCELLANEOUS

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

NA

Attach the maintenance schedule for the control equipment and any part of the process equipment that, if in disrepair, would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if the facility is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below.

☒ Monitoring	☒ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (stack test, CEM etc.): See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Monitoring device location: See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter: See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Testing:

- a. Reference Test Method Citation: See the emission source's testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reference Test Method Description: See the emission source's testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Recordkeeping:

Describe the parameters that will be recorded and the recording frequency: See the emission source's recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Reporting:

- a. Describe the type of information to be reported and the reporting frequency: See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reporting start date: See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Work Practice Standard: Describe each

See the emission source's work practice requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Section F - Flue and Air Contaminant Emission

1. Estimated Maximum Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		**	**	**
PM ₁₀		**	**	**
SO _x		**	**	**
CO		**	**	**
NO _x		**	**	**
VOC		**	**	**
Others: (e.g., HAPs)	-----	-----	-----	-----
PM _{2.5}		**	**	**
HAPs		**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number S204B

List Source(s) or source ID exhausted to this stack:
C204B

% of flow exhausted to stack: 100%

Stack height above grade (ft.) NA
Grade elevation (ft.) 795

Stack diameter (ft) or Outlet duct area (sq. ft.)
NA

Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.
~190 ft

Does stack height meet Good Engineering Practice (GEP)?
NA

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of Stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
S204B	40	40	22.8	80	20	11.04

Stack Exhaust

Volume NA ACFM Temperature NA °F Moisture NA %

Exhauster (attach fan curves) _____ in. of water _____ HP @ _____ RPM.

** If the datum and collection method information and codes differ from those provided on the General Information Form - Authorization Application, provide the additional required by that form on a separate sheet.



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	MPFG CVTO Trip Header
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740C [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 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 for the MPGF, 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 MPFG CVTO Trip 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 MPFG 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 with the MPGF. Continuously monitoring fan speed or power and using fan curves is an acceptable method for continuously monitoring assist air flow rates at the MPGF.			
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 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 and MPGF Systems 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 and MPGF Systems 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 and MPGF Systems 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. 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 analyses 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, 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.



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	MPFG CVTO Trip Header
☐	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 Part 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).



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	MPFG CVTO Trip Header
☐	Alternative Operating Scenario	Scenario Name	
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. 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)].			
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. [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.

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)].

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 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)].

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	G05 (NESHAP Subpart YY - MPFG CVTO Trip Header)
☒	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	☒ 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. 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)].			
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.			
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)].			

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)].

SECTION E. REPORTING

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

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 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).



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	G08 (NESHAP Subpart SS - MPFG CVTO Trip Header)
☒	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	☒ 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. 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)].			
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.

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.

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). [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)].



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	MPGF Ethylene Tank Header
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740C [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 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 for the MPGF, 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 Ethylene Tank Header shall be calculated and recorded at a minimum of once every 15 minutes based on the volumetric flow rates of the waste gas and supplemental gas in the header and the compositions of the waste gas and supplemental gas. Engineering knowledge can be used to estimate the composition of the waste gas and the composition and volumetric flow rate of the supplemental 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 with the MPGF. Continuously monitoring fan speed or power and using fan curves is an acceptable method for continuously monitoring assist air flow rates at the MPGF.			
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 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 and MPGF Systems 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 and MPGF Systems 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 and MPGF Systems 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. 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 analyses 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, 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.



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	MPGF Ethylene Tank Header
☐	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.			
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	MPGF Ethylene Tank Header
☐	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	☐ 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. 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?	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).			



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	MPGF PE Units 1/2 Episodic Vent Header
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740C [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 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 for the MPGF, 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 with the MPGF. Continuously monitoring fan speed or power and using fan curves is an acceptable method for continuously monitoring assist air flow rates at the MPGF.			
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 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 and MPGF Systems 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 and MPGF Systems 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 and MPGF Systems 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. 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 analyses 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, 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.



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	MPGF PE Units 1/2 Episodic Vent Header
☐	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 Part 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).



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	MPGF PE Units 1/2 Episodic Vent Header
☐	Alternative Operating Scenario	Scenario Name	
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. 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)].			
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. [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.

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)].

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 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)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Section B - Combustion Unit Information

2. Combustion Units: ☐ Coal ☐ Oil ☐ Natural Gas Other: Natural gas/waste gas

Description: 2 identical enclosed pressure-assisted multi-point ground flares that are used to control VOC and HAP emissions at SPM. These flares are referenced as HP Ground Flare #1 (Source ID C205A) and HP Ground Flare #2 (Source ID C205B) and part of High Pressure (HP) Header System (Source ID 205) in PA-04-00740A and PA-04-00740C, but Shell is proposing to revise their plan approval source descriptions from the HP Ground Flare #1 and HP Ground Flare #2 to the Totally Enclosed Ground Flare (TEGF) A and TEGF B, respectively. The TEGF A and TEGF B combust vent streams from the ethylene manufacturing unit, three polyethylene manufacturing units, and specific storage tanks at SPM. Shell is proposing the EACT Project to comply with the 40 CFR 63 Subpart YY pressure-assisted multi-point flare minimum net heating value of flare combustion zone gas (NHV_{cz}) requirement that recently became applicable to the TEGF A and TEGF B.

Manufacturer Zeeco	Model No. NA	Number of units 2	
Maximum heat input (Btu/hr) 13,257 MMBtu/hr (HHV) total	Rated heat input (Btu/hr) 13,257 MMBtu/hr (HHV) total	Typical heat input (Btu/hr) 418.20 MMBtu/hr (HHV) total TEGF A, TEGF B, and HP Elevated Flare	Furnace Volume
Grate Area (if applicable)	Method of firing		

Indicate how combustion air is supplied to boiler

Indicate the Steam Usage:

Mark and describe soot Cleaning Method:

i. Air Blown	iv. Other _____
ii. Steam Blown	v. Frequency of Cleaning _____
iii. Brushed and Vacuumed	

Maximum Operating schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Operational restrictions taken or requested, if any (e.g., bottlenecks or voluntary restrictions to limit potential to emit)

Capacity (specify units)

Per hour 13,257 MMBtu/hr (HHV) total	Per day	Per week	Per year

Typical Operating schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Seasonal variations (Months): If variations exist, describe them.

Operating using primary fuel: _____ From _____ to _____
 Operating using secondary fuel: _____ From _____ to _____
 Non-operating: _____ From _____ to _____

3. Specify the primary, secondary and startup fuel. Furnish the details in item 3.
 Natural gas

Section B - Combustion Unit Information (Continued)

5. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	7,800 MMBtu/hr (HHV) total natural gas and waste gas	X 10 ⁶ Gal	0.5 gr/100 SCF	0%	~1,020 Btu/SCF
Gas (other)		X 10 ⁶ Gal			
Coal					
Other*					

* Note: Describe and furnish information separately for other fuels in Addendum B.

6. Burner

Manufacturer Zeeco	Model Number	Type of Atomization (Steam, air, press, mech., rotary cup) Press	
Number of Burners 207 each	Maximum fuel firing rate (all burners)		Normal fuel firing rate
If oil, temperature and viscosity.			
Maximum theoretical air requirement			
Percent excess air 100% rating			
Turndown ratio			
Combustion modulation control (on/off, low-high fire, full automatic, manual). Describe.			
Main burner flame ignition method (electric spark, auto gas pilot, hand-held torch, other). Describe. Natural Gas Pilots			

5. Nitrogen Oxides (NO_x) control Options

Mark and describe the NO_x control options adopted

Low excess air (LEA)

Flue gas recirculation

Other. _____

Over fire air (OFA)

Burner out of service

Low-NO_x burner

Reburning

Low NO_x burners with over fire
air

Flue gas treatment (SCR /
SNCR)

Section B - Combustion Unit Information (Continued)

6. Miscellaneous Information

Describe fly ash reinjection operation

NA

Describe, in detail, the equipment provided to monitor and to record the source(s) operating conditions, which may affect emissions of air contaminants. Show that they are reasonable and adequate.

See the emission sources' monitoring and recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.

Describe each proposed modification to an existing source.

NA

Describe how emissions will be minimized especially during start up, shut down, combustion upsets and/or disruptions. Provide emission estimates for start up, shut down and upset conditions. Provide duration of start up and shut down.

See the emission sources' limitations in PA-04-00740A and PA-04-00740C and the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

Describe in detail with a schematic diagram of the control options adopted for SO₂ (if applicable).

NA

Anticipated milestones:

Expected commencement date of construction/reconstruction: NA

Expected completion date of construction/reconstruction: NA

Anticipated date(s) of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions*

Emission Rate

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM					
PM ₁₀					
SO _x					
CO					
NO _x					
VOC					
Others: (e.g., HAPs)	-----	-----	-----	-----	-----

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations.

2. Gas Conditioning NA

 Water quenching ☐ YES ☐ NO Water injection rate _____ GPM

 Radiation and convection cooling ☐ YES ☐ NO Air dilution ☐ YES ☐ NO
 If YES, _____ CFM

 Forced draft ☐ YES ☐ NO Water cooled duct work ☐ YES ☐ NO

Other _____

Inlet volume _____ ACFM@_____ °F	Outlet volume _____ ACFM@_____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Inertial and Cyclone Collectors NA

Manufacturer		Type		Model No.	
Pressure Drop (in. of water)	Inlet Volume _____ ACFM @ _____ °F		Outlet Volume _____ ACFM @ _____ °F _____ % Moisture		
Number of Individual Cyclone(s)			Outlet Straightening Vanes Used? ☐ Yes ☐ No		
Length of Cyclone(s) Cylinder (ft)		Diameter of Cyclone(s) Cylinder		Length of cyclone(s) cone (ft)	
Inlet Diameter (ft) or Duct Area (ft ²) of Cyclone(s)			Outlet Diameter (ft) or Duct area (ft ²) of cyclone(s)		
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?					
Describe any exhaust gas recirculation loop to be employed.					
Attach particle size efficiency curve					
Emission data					
Inlet		Outlet		Removal Efficiency (%)	

Section C - Air Cleaning Device (Continued)

4. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No.	☐ Pressurized Design ☐ Suction Design
Number of Compartments	Number of Filters Per Compartment		Is Baghouse Insulated? ☐ Yes ☐ No
Can each compartment be isolated for repairs and/or filter replacement?			☐ Yes ☐ No
Are temperature controls provided? (Describe in detail)			☐ Yes ☐ No
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM	
Type of Fabric Material _____ Weight _____ oz/sq.yd Thickness _____ in ☐ Felted ☐ Woven ☐ Felted-Woven ☐ Membrane ☐ Others: List: _____			
Fabric permeability (clean) @ 1/2" water-Δ P _____ CFM/sq.ft.			
Filter dimensions _____ Diameter/Width _____			
Effective area per filter _____		Maximum operating temperature (°F) _____	
Effective air to cloth ratio		Minimum _____ Maximum _____	
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.			
Operation and Cleaning			
Volume of gases handled _____ ACFM _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.	
Type of filter cleaning ☐ Manual Cleaning ☐ Mechanical Shakers ☐ Pneumatic Shakers ☐ Bag Collapse ☐ Sonic Cleaning ☐ Reverse Air Flow ☐ Reverse Air Jets ☐ Other: _____			
If compressed air is required for collector operation, describe the equipment with the compressor to provide dry air free from oil.			
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Wet Collection Equipment: NA

Equipment Specifications

Manufacturer	Type	Model No.
Design Inlet Volume (SCFM)	Relative Particulate/Gas Velocity (ejector scrubbers only)	

Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).

Describe pH monitoring and pH adjustment systems, if applicable.

Describe mist eliminator or separator (type, configuration, backflush capability, frequency).

Attach particulate size efficiency curve.

Operating Parameters

Inlet volume of gases handled_____ (ACFM) @ _____ °F	Outlet volume of gases handled_____ (ACFM) @ _____ °F _____ % Moisture

Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)

Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc).

State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

6. Electrostatic Precipitator NA

Equipment specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ YES ☐ NO		Design inlet volume (SCFM) _____ Maximum operating temperature (°F) _____	

Total collecting surface area _____ sq. ft. Collector plates size length _____ ft. x width _____ ft.
 Number of fields _____ Number of collector plates/field _____. Spacing between collector plates _____ inches.
 Maximum gas velocity _____ ft/sec. Minimum gas treatment time: _____ sec.

Total discharge electrode length _____ ft.
 Number of discharge electrodes _____ Number collecting electrode rappers _____

Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____
 Describe in detail _____

Operating parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (water gauge) across collector only. Describe the equipment.
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field

Field No.	No. of Sets	Each Transformer KVA	Each Rectifier	
			KV Ave./Peak	MaDC

Current density _____ Micro amperes/ft ²	Corona power _____ Watts/1000 ACFM	Corona power density _____ Watts/ft ²

Will a flue gas conditioning system be employed? If yes, describe it.

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Absorption Equipment: NA

Equipment specifications

Manufacturer	Type	Model No	
Design inlet volume (SCFM)	Tower height (ft) and inside diameter (ft)		
Packing type and size (if applicable)	Height of packing (ft) (if applicable)		
Number of trays (if applicable)	Number of bubble caps (if applicable)		
Configuration: ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls			
Absorbent information			
Absorbent type and concentration	Sorbent injection rate	Retention time (sec)	
Attach equilibrium data for absorption (If applicable).			
Attach any additional information regarding auxiliary equipment, reagent (slurry mix) supply system (once through or recirculating, system capacity, etc) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in of water) and liquid flow rate. Describe the equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. ☐ **SELECTIVE CATALYTIC REDUCTION (SCR)**
☐ **SELECTIVE NON-CATALYTIC REDUCTION (SNCR)**
☐ **NON-SELECTIVE CATALYTIC REDUCTION (NSCR)**

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Design operating temperature (°F)

Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.

Attach efficiency and other pertinent information (e.g., Ammonia, urea slip).

Operating parameters

Volume of gases handled (ACFM) _____ @ _____ (°F)

Operating temperature range for the SCR/SNCR/NSCR system (°F) From To

Reducing agent used, if any.	Oxidation catalyst used, if any.

State expected range of usage rate and concentration.

Service life of catalyst	Ammonia slip (ppm)

Describe fully with a sketch giving locations of equipment, controls system, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

9. Other Control Equipment: NA

Equipment specifications

Manufacturer	Type	Model No
Design inlet volume (SCFM)		Capacity

Describe pH monitoring and pH adjustment, if any.

Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.

Attach efficiency curve and/ or other efficiency information.

Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.

Operating parameters

Volume of gas handled

_____ @ _____ °F _____ % Moisture

Describe, in detail, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Operating Cost

11 MISCELLANEOUS

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

NA

Attach the maintenance schedule for the control equipment and any part of the process equipment that, if in disrepair, would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if the facility is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below.

☒ Monitoring	☒ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (stack test, CEM etc.): See the emission sources' monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.
- b. Monitoring device location: See the emission sources' monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter: See the emission sources' monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.

Testing:

- a. Reference Test Method Citation: See the emission sources' testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.
- b. Reference Test Method Description: See the emission sources' testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.

Recordkeeping:

Describe the parameters that will be recorded and the recording frequency: See the emission sources' recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.

Reporting:

- a. Describe the type of information to be reported and the reporting frequency: See the emission sources' reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.
- b. Reporting start date: See the emission sources' reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.

Work Practice Standard: Describe each

See the emission sources' work practice requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.

Section F - Flue and Air Contaminant Emission

1. Estimated Maximum Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		**	**	**
PM ₁₀		**	**	**
SO _x		**	**	**
CO		**	**	**
NO _x		**	**	**
VOC		**	**	**
Others: (e.g., HAPs)	-----	-----	-----	-----
PM _{2.5}		**	**	**
HAPs		**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number S205A and S205B

List Source(s) or source ID exhausted to this stack:
C205A and C205B

% of flow exhausted to stack: 100%

Stack height above grade (ft.) NA
Grade elevation (ft.) 780

Stack diameter (ft) or Outlet duct area (sq. ft.)
NA

Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.

S205A: ~545 ft; and S205B: ~305 ft

Does stack height meet Good Engineering Practice (GEP)?

NA

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of Stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
S205A	40	40	1.56	80	20	37.32
S205B	40	40	4.08	80	20	39.48

Stack Exhaust

Volume NA ACFM Temperature NA °F Moisture NA %

Exhauster (attach fan curves) _____ in. of water _____ HP @ _____ RPM.

** If the datum and collection method information and codes differ from those provided on the General Information Form - Authorization Application, provide the additional required by that form on a separate sheet.



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	C205A and C205B (TEGF A and TEGF B)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740C [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 63.987(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 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 and TEGF 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).

Minimize flaring resulting from startups, shutdowns, and unforeseeable events by operating 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 and MPGF Systems 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 and MPGF Systems 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 and MPGF Systems 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. 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, 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.



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	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).	



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	C205A and C205B (TEGF A and TEGF B)
☐	Alternative Operating Scenario	Scenario Name	
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 Part 63 Subpart CC. [40 CFR 63.2450(e)(5)(viii)(F)].			
When determining compliance with the combustion zone operating limits specified in 40 CFR 63.670(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 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)].			
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. [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.

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)].

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 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)].

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	G05 (NESHAP Subpart YY - TEGF A and TEGF B)
☒	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	☒ 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 63.1103(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 combustion zone operating limits specified in 40 CFR 63.670(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 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)].			
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.

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)].

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)].

SECTION E. REPORTING

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

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 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).

Section B - Combustion Unit Information

3. Combustion Units: ☐ Coal ☐ Oil ☐ Natural Gas Other: Natural gas/waste gas

Description: An elevated, steam-assisted flare that is used as a secondary flare to the TEGF A and TEGF B to control VOC and HAP emissions at SPM. The flare is referenced as the HP Elevated Flare (Source ID C205C) and part of High Pressure (HP) Header System (Source ID 205) in PA-04-00740A and PA-04-00740C. The HP Elevated Flare combusts vent streams from the ethylene manufacturing unit, three polyethylene manufacturing units, and specific storage tanks at SPM; however, it does not continuously receive these vent streams because it is a secondary flare to TEGF A & B.

Manufacturer Zeeco	Model No. NA		Number of units 1	
Maximum heat input (Btu/hr) 59,659 MMBtu/hr (HHV)	Rated heat input (Btu/hr) 59,659 MMBtu/hr (HHV)	Typical heat input (Btu/hr) 418.20 MMBtu/hr (HHV) total TEGF A, TEGF B, and HP Elevated Flare		Furnace Volume
Grate Area (if applicable)		Method of firing		

Indicate how combustion air is supplied to boiler

Indicate the Steam Usage:

Mark and describe soot Cleaning Method:

i. Air Blown	iv. Other _____
ii. Steam Blown	v. Frequency of Cleaning _____
iii. Brushed and Vacuumed	

Maximum Operating schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Operational restrictions taken or requested, if any (e.g., bottlenecks or voluntary restrictions to limit potential to emit)

Capacity (specify units)

Per hour 3,900 MMBtu/hr (HHV)	Per day	Per week	Per year

Typical Operating schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Seasonal variations (Months): If variations exist, describe them.

Operating using primary fuel: _____	From _____ to _____
Operating using secondary fuel: _____	From _____ to _____
Non-operating: _____	From _____ to _____

4. Specify the primary, secondary and startup fuel. Furnish the details in item 3.
Natural gas

Section B - Combustion Unit Information (Continued)

7. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	3,900 MMBtu/hr (HHV) natural gas and waste gas	X 10 ⁶ Gal	0.5 gr/100 SCF	0%	~1,020 Btu/SCF
Gas (other)		X 10 ⁶ Gal			
Coal					
Other*					

* Note: Describe and furnish information separately for other fuels in Addendum B.

8. Burner

Manufacturer Zeeco	Model Number	Type of Atomization (Steam, air, press, mech., rotary cup) Steam
Number of Burners NA	Maximum fuel firing rate (all burners)	Normal fuel firing rate

If oil, temperature and viscosity.

Maximum theoretical air requirement

Percent excess air 100% rating

Turndown ratio

Combustion modulation control (on/off, low-high fire, full automatic, manual). Describe.

Main burner flame ignition method (electric spark, auto gas pilot, hand-held torch, other). Describe.
Natural Gas Pilots

5. Nitrogen Oxides (NO_x) control Options

Mark and describe the NO_x control options adopted

Low excess air (LEA)

Flue gas recirculation

Other. _____

Over fire air (OFA)

Burner out of service

Low-NO_x burner

Reburning

Low NO_x burners with over fire
air

Flue gas treatment (SCR /
SNCR)

Section B - Combustion Unit Information (Continued)

6. Miscellaneous Information

Describe fly ash reinjection operation

NA

Describe, in detail, the equipment provided to monitor and to record the source(s) operating conditions, which may affect emissions of air contaminants. Show that they are reasonable and adequate.

See the emission source's monitoring and recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Describe each proposed modification to an existing source.

NA

Describe how emissions will be minimized especially during start up, shut down, combustion upsets and/or disruptions. Provide emission estimates for start up, shut down and upset conditions. Provide duration of start up and shut down.

See the emission source's limitations in PA-04-00740A and PA-04-00740C and the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

Describe in detail with a schematic diagram of the control options adopted for SO₂ (if applicable).

NA

Anticipated milestones:

Expected commencement date of construction/reconstruction: NA

Expected completion date of construction/reconstruction: NA

Anticipated date(s) of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions*

Emission Rate

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM					
PM ₁₀					
SO _x					
CO					
NO _x					
VOC					
Others: (e.g., HAPs)	-----	-----	-----		-----

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations.

2. Gas Conditioning NA

 Water quenching ☐ YES ☐ NO Water injection rate _____ GPM

 Radiation and convection cooling ☐ YES ☐ NO Air dilution ☐ YES ☐ NO
 If YES, _____ CFM

 Forced draft ☐ YES ☐ NO Water cooled duct work ☐ YES ☐ NO

Other _____

Inlet volume _____ ACFM@_____ °F	Outlet volume _____ ACFM@_____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Inertial and Cyclone Collectors NA

Manufacturer		Type		Model No.	
Pressure Drop (in. of water)	Inlet Volume _____ ACFM @ _____ °F		Outlet Volume _____ ACFM @ _____ °F _____ % Moisture		
Number of Individual Cyclone(s)			Outlet Straightening Vanes Used? ☐ Yes ☐ No		
Length of Cyclone(s) Cylinder (ft)		Diameter of Cyclone(s) Cylinder		Length of cyclone(s) cone (ft)	
Inlet Diameter (ft) or Duct Area (ft ²) of Cyclone(s)			Outlet Diameter (ft) or Duct area (ft ²) of cyclone(s)		
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?					
Describe any exhaust gas recirculation loop to be employed.					
Attach particle size efficiency curve					
Emission data					
Inlet		Outlet		Removal Efficiency (%)	

Section C - Air Cleaning Device (Continued)

4. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No.	☐ Pressurized Design ☐ Suction Design
Number of Compartments	Number of Filters Per Compartment		Is Baghouse Insulated? ☐ Yes ☐ No
Can each compartment be isolated for repairs and/or filter replacement?			☐ Yes ☐ No
Are temperature controls provided? (Describe in detail)			☐ Yes ☐ No
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM	
Type of Fabric Material _____ Weight _____ oz/sq.yd Thickness _____ in ☐ Felted ☐ Woven ☐ Felted-Woven ☐ Membrane ☐ Others: List: _____			
Fabric permeability (clean) @ 1/2" water-Δ P _____ CFM/sq.ft.			
Filter dimensions _____ Diameter/Width _____			
Effective area per filter _____		Maximum operating temperature (°F) _____	
Effective air to cloth ratio Minimum _____ Maximum _____			
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.			
Operation and Cleaning			
Volume of gases handled _____ ACFM _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.	
Type of filter cleaning ☐ Manual Cleaning ☐ Mechanical Shakers ☐ Pneumatic Shakers ☐ Bag Collapse ☐ Sonic Cleaning ☐ Reverse Air Flow ☐ Reverse Air Jets ☐ Other: _____			
If compressed air is required for collector operation, describe the equipment with the compressor to provide dry air free from oil.			
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Wet Collection Equipment: NA

Equipment Specifications

Manufacturer	Type	Model No.
Design Inlet Volume (SCFM)		Relative Particulate/Gas Velocity (ejector scrubbers only)
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).		
Describe pH monitoring and pH adjustment systems, if applicable.		
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).		
Attach particulate size efficiency curve.		

Operating Parameters

Inlet volume of gases handled _____ (ACFM) @ _____ °F	Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)	
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.).	
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.	

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

6. Electrostatic Precipitator NA

Equipment specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ YES ☐ NO		Design inlet volume (SCFM) _____ Maximum operating temperature (°F) _____	

Total collecting surface area _____ sq. ft. Collector plates size length _____ ft. x width _____ ft.
 Number of fields _____ Number of collector plates/field _____. Spacing between collector plates _____ inches.
 Maximum gas velocity _____ ft/sec. Minimum gas treatment time: _____ sec.

Total discharge electrode length _____ ft.
 Number of discharge electrodes _____ Number collecting electrode rappers _____

Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____
 Describe in detail _____

Operating parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (water gauge) across collector only. Describe the equipment.
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field

Field No.	No. of Sets	Each Transformer KVA	Each Rectifier	
			KV Ave./Peak	MaDC

Current density _____ Micro amperes/ft ²	Corona power _____ Watts/1000 ACFM	Corona power density _____ Watts/ft ²

Will a flue gas conditioning system be employed? If yes, describe it.

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Absorption Equipment: NA
Equipment specifications

Manufacturer	Type	Model No	
Design inlet volume (SCFM)	Tower height (ft) and inside diameter (ft)		
Packing type and size (if applicable)	Height of packing (ft) (if applicable)		
Number of trays (if applicable)	Number of bubble caps (if applicable)		
Configuration: ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls			
Absorbent information			
Absorbent type and concentration	Sorbent injection rate	Retention time (sec)	
Attach equilibrium data for absorption (If applicable).			
Attach any additional information regarding auxiliary equipment, reagent (slurry mix) supply system (once through or recirculating, system capacity, etc) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in of water) and liquid flow rate. Describe the equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. ☐ **SELECTIVE CATALYTIC REDUCTION (SCR)**
☐ **SELECTIVE NON-CATALYTIC REDUCTION (SNCR)**
☐ **NON-SELECTIVE CATALYTIC REDUCTION (NSCR)**

Equipment specifications

Manufacturer	Type	Model No
Design inlet volume (SCFM)		Design operating temperature (°F)

Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.

Attach efficiency and other pertinent information (e.g., Ammonia, urea slip).

Operating parameters

Volume of gases handled (ACFM) _____ @ _____ (°F)			
Operating temperature range for the SCR/SNCR/NSCR system (°F)		From	To
Reducing agent used, if any.		Oxidation catalyst used, if any.	
State expected range of usage rate and concentration.			
Service life of catalyst		Ammonia slip (ppm)	
Describe fully with a sketch giving locations of equipment, controls system, important parameters and method of operation.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

9. Other Control Equipment: NA

Equipment specifications

Manufacturer	Type	Model No
Design inlet volume (SCFM)		Capacity

Describe pH monitoring and pH adjustment, if any.

Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.

Attach efficiency curve and/ or other efficiency information.

Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.

Operating parameters

Volume of gas handled

_____ @ _____ °F _____ % Moisture

Describe, in detail, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Operating Cost

11 MISCELLANEOUS

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

NA

Attach the maintenance schedule for the control equipment and any part of the process equipment that, if in disrepair, would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if the facility is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below.

☒ Monitoring	☒ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (stack test, CEM etc.): See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Monitoring device location: See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter: See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Testing:

- a. Reference Test Method Citation: See the emission source's testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reference Test Method Description: See the emission source's testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Recordkeeping:

Describe the parameters that will be recorded and the recording frequency: See the emission source's recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Reporting:

- a. Describe the type of information to be reported and the reporting frequency: See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reporting start date: See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Work Practice Standard: Describe each

See the emission source's work practice requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Section F - Flue and Air Contaminant Emission

1. Estimated Maximum Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		**	**	**
PM ₁₀		**	**	**
SO _x		**	**	**
CO		**	**	**
NO _x		**	**	**
VOC		**	**	**
Others: (e.g., HAPs)	-----	-----	-----	-----
PM _{2.5}		**	**	**
HAPs		**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number S205C

List Source(s) or source ID exhausted to this stack:
C205C

% of flow exhausted to stack: 100%

Stack height above grade (ft.) 370
Grade elevation (ft.) 780

Stack diameter (ft) or Outlet duct area (sq. ft.)
NA

Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.
~423 ft

Does stack height meet Good Engineering Practice (GEP)?
NA

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of Stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
S205C	40	40	1.56	80	20	40.92

Stack Exhaust

Volume NA ACFM Temperature NA °F Moisture NA %

Exhauster (attach fan curves) _____ in. of water _____ HP @ _____ RPM.

** If the datum and collection method information and codes differ from those provided on the General Information Form - Authorization Application, provide the additional required by that form on a separate sheet.



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	C205C (HP Elevated Flare)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740C [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 63.670 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 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 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 and MPGF Systems 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 and MPGF Systems 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 and MPGF Systems 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. 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, 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.



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	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 Part 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)].



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	C205C (HP Elevated Flare)
☐	Alternative Operating Scenario	Scenario Name	
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. When determining compliance with the combustion zone operating limits specified in 40 CFR 63.670(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 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)].			
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. [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.

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)].

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 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)].

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	G05 (NESHAP Subpart YY - HP Elevated Flare)
☒	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	☒ 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 (NHV _{vg}) 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)].			
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 NHV _{cz} 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)].			
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. 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)].

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)].

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 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).

Section B - Combustion Unit Information

4. Combustion Units: ☐ Coal ☐ Oil ☐ Natural Gas Other: Natural gas/waste gas

Description: A thermal oxidizer that 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 SPM's Wastewater Treatment Plant (WWTP). Additionally, Shell is proposing to control the VOC and organic HAPs contained in the vent streams from the new Wastewater Treatment Vessels by routing their vents to the thermal oxidizer for combustion. The thermal oxidizer is referenced as the Spent Caustic Vent Incinerator (Source ID C206) in PA-04-00740A and PA-04-00740C, but Shell is proposing to revise its plan approval source description from the Spent Caustic Vent Incinerator to the Spent Caustic Thermal Oxidizer (SCTO).

Manufacturer John Zink	Model No. ST12160	Number of units 1	
Maximum heat input (Btu/hr) 11.07 MMBtu/hr (HHV)	Rated heat input (Btu/hr) 11.07 MMBtu/hr (HHV)	Typical heat input (Btu/hr) 11.07 MMBtu/hr (HHV)	Furnace Volume
Grate Area (if applicable)		Method of firing	

Indicate how combustion air is supplied to boiler

Indicate the Steam Usage:

Mark and describe soot Cleaning Method:

i. Air Blown	iv. Other _____
ii. Steam Blown	v. Frequency of Cleaning _____
iii. Brushed and Vacuumed	

Maximum Operating schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Operational restrictions taken or requested, if any (e.g., bottlenecks or voluntary restrictions to limit potential to emit)

Capacity (specify units)

Per hour 11.07 MMBtu/hr (HHV)	Per day	Per week	Per year

Typical Operating schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Seasonal variations (Months): If variations exist, describe them.

Operating using primary fuel: _____	From _____ to _____
Operating using secondary fuel: _____	From _____ to _____
Non-operating: _____	From _____ to _____

5. Specify the primary, secondary and startup fuel. Furnish the details in item 3.
Natural gas

Section B - Combustion Unit Information (Continued)

9. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	11.07 MMBtu/hr (HHV) natural gas and waste gas	X 10 ⁶ Gal	0.5 gr/100 SCF	0%	~1,020 Btu/SCF
Gas (other)					
Coal					
Other*					

* Note: Describe and furnish information separately for other fuels in Addendum B.

10. Burner

Manufacturer John Zink	Model Number NA	Type of Atomization (Steam, air, press, mech., rotary cup) NA
Number of Burners 8	Maximum fuel firing rate (all burners) 11.07 MMBtu/hr (HHV)	Normal fuel firing rate 11.07 MMBtu/hr (HHV)

If oil, temperature and viscosity.

Maximum theoretical air requirement

Percent excess air 100% rating

Turndown ratio

Combustion modulation control (on/off, low-high fire, full automatic, manual). Describe.

Main burner flame ignition method (electric spark, auto gas pilot, hand-held torch, other). Describe.

5. Nitrogen Oxides (NO_x) control Options

Mark and describe the NO_x control options adopted

Low excess air (LEA)

Flue gas recirculation

Other. _____

Over fire air (OFA)

Burner out of service

Low-NO_x burner

Reburning

Low NO_x burners with over fire
air

Flue gas treatment (SCR /
SNCR)

Section B - Combustion Unit Information (Continued)

6. Miscellaneous Information

Describe fly ash reinjection operation

NA

Describe, in detail, the equipment provided to monitor and to record the source(s) operating conditions, which may affect emissions of air contaminants. Show that they are reasonable and adequate.

See the emission source's monitoring and recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Describe each proposed modification to an existing source.

NA

Describe how emissions will be minimized especially during start up, shut down, combustion upsets and/or disruptions. Provide emission estimates for start up, shut down and upset conditions. Provide duration of start up and shut down.

See the emission source's limitations in PA-04-00740A and PA-04-00740C and the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

Describe in detail with a schematic diagram of the control options adopted for SO₂ (if applicable).

NA

Anticipated milestones:

Expected commencement date of construction/reconstruction: NA

Expected completion date of construction/reconstruction: NA

Anticipated date(s) of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions*

Emission Rate

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM					
PM ₁₀					
SO _x					
CO					
NO _x					
VOC					
Others: (e.g., HAPs)	-----	-----	-----	-----	-----

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations.

2. Gas Conditioning NA

 Water quenching ☐ YES ☐ NO Water injection rate _____ GPM

 Radiation and convection cooling ☐ YES ☐ NO Air dilution ☐ YES ☐ NO
 If YES, _____ CFM

 Forced draft ☐ YES ☐ NO Water cooled duct work ☐ YES ☐ NO

Other _____

Inlet volume _____ ACFM@_____ °F	Outlet volume _____ ACFM@_____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Inertial and Cyclone Collectors NA

Manufacturer		Type		Model No.	
Pressure Drop (in. of water)	Inlet Volume _____ ACFM @ _____ °F		Outlet Volume _____ ACFM @ _____ °F _____ % Moisture		
Number of Individual Cyclone(s)			Outlet Straightening Vanes Used? ☐ Yes ☐ No		
Length of Cyclone(s) Cylinder (ft)		Diameter of Cyclone(s) Cylinder		Length of cyclone(s) cone (ft)	
Inlet Diameter (ft) or Duct Area (ft ²) of Cyclone(s)			Outlet Diameter (ft) or Duct area (ft ²) of cyclone(s)		
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?					
Describe any exhaust gas recirculation loop to be employed.					
Attach particle size efficiency curve					
Emission data					
Inlet		Outlet		Removal Efficiency (%)	

Section C - Air Cleaning Device (Continued)

4. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No.	☐ Pressurized Design ☐ Suction Design
Number of Compartments	Number of Filters Per Compartment		Is Baghouse Insulated? ☐ Yes ☐ No
Can each compartment be isolated for repairs and/or filter replacement?			☐ Yes ☐ No
Are temperature controls provided? (Describe in detail)			☐ Yes ☐ No
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM	
Type of Fabric Material _____ ☐ Felted ☐ Membrane Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____ Thickness _____ in ☐ Felted-Woven			
Fabric permeability (clean) @ 1/2" water-Δ P _____ CFM/sq.ft.			
Filter dimensions _____ Diameter/Width _____			
Effective area per filter _____		Maximum operating temperature (°F) _____	
Effective air to cloth ratio		Minimum _____ Maximum _____	
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.			
Operation and Cleaning			
Volume of gases handled _____ ACFM _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.	
Type of filter cleaning ☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets ☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____ ☐ Pneumatic Shakers ☐ Reverse Air Flow			
If compressed air is required for collector operation, describe the equipment with the compressor to provide dry air free from oil.			
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Wet Collection Equipment: NA

Equipment Specifications

Manufacturer	Type	Model No.
Design Inlet Volume (SCFM)		Relative Particulate/Gas Velocity (ejector scrubbers only)
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).		
Describe pH monitoring and pH adjustment systems, if applicable.		
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).		
Attach particulate size efficiency curve.		

Operating Parameters

Inlet volume of gases handled _____ (ACFM) @ _____ °F	Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)	
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.).	
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.	

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

6. Electrostatic Precipitator NA

Equipment specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ YES ☐ NO		Design inlet volume (SCFM) _____ Maximum operating temperature (°F) _____	

Total collecting surface area _____ sq. ft. Collector plates size length _____ ft. x width _____ ft.
 Number of fields _____ Number of collector plates/field _____. Spacing between collector plates _____ inches.
 Maximum gas velocity _____ ft/sec. Minimum gas treatment time: _____ sec.

Total discharge electrode length _____ ft.
 Number of discharge electrodes _____ Number collecting electrode rappers _____

Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____
 Describe in detail _____

Operating parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (water gauge) across collector only. Describe the equipment.
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field

Field No.	No. of Sets	Each Transformer KVA	Each Rectifier	
			KV Ave./Peak	MaDC

Current density _____ Micro amperes/ft ²	Corona power _____ Watts/1000 ACFM	Corona power density _____ Watts/ft ²

Will a flue gas conditioning system be employed? If yes, describe it.

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Absorption Equipment: NA
Equipment specifications

Manufacturer	Type	Model No	
Design inlet volume (SCFM)	Tower height (ft) and inside diameter (ft)		
Packing type and size (if applicable)	Height of packing (ft) (if applicable)		
Number of trays (if applicable)	Number of bubble caps (if applicable)		
Configuration: ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls			
Absorbent information			
Absorbent type and concentration	Sorbent injection rate	Retention time (sec)	
Attach equilibrium data for absorption (If applicable).			
Attach any additional information regarding auxiliary equipment, reagent (slurry mix) supply system (once through or recirculating, system capacity, etc) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in of water) and liquid flow rate. Describe the equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. ☐ **SELECTIVE CATALYTIC REDUCTION (SCR)**
☐ **SELECTIVE NON-CATALYTIC REDUCTION (SNCR)**
☐ **NON-SELECTIVE CATALYTIC REDUCTION (NSCR)**

Equipment specifications

Manufacturer	Type	Model No
Design inlet volume (SCFM)		Design operating temperature (°F)
Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.		
Attach efficiency and other pertinent information (e.g., Ammonia, urea slip).		

Operating parameters

Volume of gases handled (ACFM) _____ @ _____ (°F)			
Operating temperature range for the SCR/SNCR/NSCR system (°F)		From	To
Reducing agent used, if any.		Oxidation catalyst used, if any.	
State expected range of usage rate and concentration.			
Service life of catalyst		Ammonia slip (ppm)	
Describe fully with a sketch giving locations of equipment, controls system, important parameters and method of operation.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

9. Other Control Equipment: NA

Equipment specifications

Manufacturer	Type	Model No
Design inlet volume (SCFM)		Capacity

Describe pH monitoring and pH adjustment, if any.

Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.

Attach efficiency curve and/ or other efficiency information.

Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.

Operating parameters

Volume of gas handled

_____ @ _____ °F _____ % Moisture

Describe, in detail, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Operating Cost

11 MISCELLANEOUS

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

NA

Attach the maintenance schedule for the control equipment and any part of the process equipment that, if in disrepair, would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if the facility is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below.

☒ Monitoring	☒ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (stack test, CEM etc.): See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Monitoring device location: See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter: See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Testing:

- a. Reference Test Method Citation: See the emission source's testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reference Test Method Description: See the emission sources' testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Recordkeeping:

Describe the parameters that will be recorded and the recording frequency: See the emission source's recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Reporting:

- a. Describe the type of information to be reported and the reporting frequency: See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reporting start date: See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Work Practice Standard: Describe each

See the emission source's work practice requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Section F - Flue and Air Contaminant Emission

1. Estimated Maximum Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		**	**	**
PM ₁₀		**	**	**
SO _x		**	**	**
CO		**	**	**
NO _x		**	**	**
VOC		**	**	**
Others: (e.g., HAPs)				
PM _{2.5}		**	**	**
HAPs		**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number S206

List Source(s) or source ID exhausted to this stack:
C206

% of flow exhausted to stack: 100%

Stack height above grade (ft.) 200
Grade elevation (ft.) 714

Stack diameter (ft) or Outlet duct area (sq. ft.)
2.0 ft

Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.
~68 ft

Does stack height meet Good Engineering Practice (GEP)?
Yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of Stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
S206	40	40	3.72	80	20	46.68

Stack Exhaust

Volume 8,481 ACFM Temperature 1,600 °F Moisture NA%

Exhauster (attach fan curves) _____ in. of water _____ HP @ _____ RPM.

** If the datum and collection method information and codes differ from those provided on the General Information Form - Authorization Application, provide the additional required by that form on a separate sheet.



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 (SCTO)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740C [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.			
How will data be reported?	NA		
SECTION C. TESTING			
Reference Test Method Description			
Perform NO _x , CO, PM ₁₀ , PM _{2.5} , and Benzene emission testing upon the SCTO 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.			
Perform VOC destruction efficiency testing upon the SCTO in accordance with 40 CFR 63.985(b)(1)(ii). Initial performance testing is required within 180 days of startup 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 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	206 (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	☒ 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. 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 G - Attachments

Number and list all attachments submitted with this application below:

Appendix A – Plan Approval Application Forms

Appendix B – Potential to Emit Calculations

Appendix C – Process Flow Diagrams

Appendix D – Air Quality Analysis

Appendix E – EPA RBLC Database Information

Appendix F – General Information Form – Authorization Application

Appendix G – Air Pollution Control Act Compliance Review Supplemental Form

Appendix H – Local Municipality and County Notifications and Proof of Receipt

Appendix I – June 28, 2024 Letter from Shell to DEP Regarding NOx and PM_{2.5} ERC Transfers

Appendix J – Summary of SPM Stack Test Results and Emission Source Actual Emissions Reporting Emission Factors



Submit in Triplicate

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

PROCESSES

Application for Plan Approval to Construct, Modify or Reactivate an Air Contamination Source and/or Install an Air Cleaning Device

This application must be submitted with the General Information Form (GIF).

Before completing this form, read the instructions provided for the form.

Section A - Facility Name, Checklist And Certification

Organization Name or Registered Fictitious Name/Facility Name: Shell Polymers Monaca

DEP Client ID# (if known): 311950

Type of Review required and Fees:

- ☐ Source which is not subject to NSPS, NESHAPs, MACT, NSR and PSD: \$
- ☒ Source requiring approval under NSPS or NESHAPs or both: \$7,500
- ☒ Source requiring approval under NSR regulations: \$7,500
- ☐ Source requiring the establishment of a MACT limitation: \$
- ☒ Source requiring approval under PSD: \$32,500

Applicant's Checklist

Check the following list to make sure that all the required documents are included.

- ☒ General Information Form (GIF)
- ☒ Processes Plan Approval Application
- ☒ Compliance Review Form or provide reference of most recently submitted compliance review form for facilities submitting on a periodic basis: See Appendix G – Air Pollution Control Act Compliance Review Supplemental Form in this submittal.
- ☒ Copy and Proof of County and Municipal Notifications
- ☒ Permit Fees
- ☐ Addendum A: Source Applicable Requirements (only applicable to existing Title V facility)

Certification of Truth, Accuracy and Completeness by a Responsible Official

I, James Howell, certify under penalty of law in 18 Pa. C. S. A. §4904, and 35 P.S. §4009(b) (2) that based on information and belief formed after reasonable inquiry, the statements and information in this application are true, accurate and complete.

(Signature): 
Name (Print): James Howell

Date: 9/12/24
Title: Production Manager

OFFICIAL USE ONLY

Application No. _____ Unit ID _____ Site ID _____
DEP Client ID #: _____ APS. ID _____ AUTH. ID _____
Date Received _____ Date Assigned _____ Reviewed By _____
Date of 1st Technical Deficiency _____ Date of 2nd Technical Deficiency _____
Comments: _____

Section B - Processes Information

1. Source Information

Source Description (give type, use, raw materials, product, etc). Attach additional sheets as necessary.

A 6-cell, double-cell row configuration mechanical draft cooling tower that is referenced as the Cogeneration Plant Cooling Tower (Source ID 104) in PA-04-00740A and PA-04-00740C.

Manufacturer NA	Model No. NA	Number of Sources 1
Source Designation 104	Maximum Capacity 120,000 gpm	Rated Capacity 120,000 gpm

Type of Material Processed
Cooling water

Maximum Operating Schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Operational restrictions existing or requested, if any (e.g., bottlenecks or voluntary restrictions to limit PTE)

Capacity (specify units)

Per Hour 120,000 gpm	Per Day	Per Week	Per Year

Operating Schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Seasonal variations (Months) From to

If variations exist, describe them

2. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Gas (other)	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Coal	TPH	Tons	% by wt		Btu/lb
Other *					

*Note: Describe and furnish information separately for other fuels in Addendum B.

Section B - Processes Information (Continued)

3. Burner

Manufacturer	Type and Model No.	Number of Burners
Description:		
Rated Capacity	Maximum Capacity	

4. Process Storage Vessels

A. For Liquids:

Name of material stored		
Tank I.D. No.	Manufacturer	Date Installed
Maximum Pressure	Capacity (gallons/Meter ³)	
Type of relief device (pressure set vent/conservation vent/emergency vent/open vent)		
Relief valve/vent set pressure (psig)	Vapor press. of liquid at storage temp. (psia/kPa)	
Type of Roof: Describe:		
Total Throughput Per Year	Number of fills per day (fill/day): Filling Rate (gal./min.): Duration of fill hr./fill):	

B. For Solids

Type: ☐ Silo ☐ Storage Bin ☐ Other, Describe		Name of Material Stored
Silo/Storage Bin I.D. No.	Manufacturer	Date Installed
State whether the material will be stored in loose or bags in silos		Capacity (Tons)
Turn over per year in tons		Turn over per day in tons
Describe fugitive dust control system for loading and handling operations		
Describe material handling system		

5. Request for Confidentiality

Do you request any information on this application to be treated as "Confidential"? ☐ Yes ☒ No
 If yes, include justification for confidentiality. Place such information on separate pages marked "confidential".

Section B - Processes Information (Continued)

6. Miscellaneous Information

Attach flow diagram of process 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 hoods location, design, airflow and capture efficiency. Describe any restriction requested and how it will be monitored.

See Appendix C – Process Flow Diagrams in this submittal for a quick reference to flow diagrams for SPM's processes and VOC control systems. The remaining information (raw materials, rates, etc.) is available in the potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal. Shell is not requesting restrictions on SPM's production capacity.

Describe fully the facilities provided to monitor and to record process operating conditions, which may affect the emission of air contaminants. Show that they are reasonable and adequate.

See the emission source's monitoring and recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Describe each proposed modification to an existing source.

NA

Identify and describe all fugitive emission points, all relief and emergency valves and any by-pass stacks.

NA

Describe how emissions will be minimized especially during start up, shut down, process upsets and/or disruptions.

NA

Anticipated Milestones:

- i. Expected commencement date of construction/reconstruction/installation: NA
- ii. Expected completion date of construction/reconstruction/installation: NA
- iii. Anticipated date of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions*

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM		30			**
PM ₁₀		18			**
SO _x					
CO					
NO _x					
VOC					
Others: (e.g., HAPs)	-----	-----	-----	-----	-----
PM _{2.5}		0.06			**

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Gas Cooling NA

Water quenching ☐ Yes ☐ No Water injection rate _____ GPM

Radiation and convection cooling ☐ Yes ☐ No Air dilution ☐ Yes ☐ No
If yes, _____ CFM

Forced Draft ☐ Yes ☐ No Water cooled duct work ☐ Yes ☐ No

Other

Inlet Volume _____ ACFM
@ _____ °F _____ % Moisture

Outlet Volume _____ ACFM
@ _____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Settling Chambers NA			
Manufacturer		Volume of gas handled _____ACFM @_____°F	Gas velocity (ft/sec.)
Length of chamber (ft.)	Width of chamber (ft.)	Height of chamber (ft.)	Number of trays
Water injection ☐ Yes ☐ No		Water injection rate (GPM)	
Emissions Data			
Inlet	Outlet		Removal Efficiency (%)
4. Inertial and Cyclone Collectors NA			
Manufacturer		Type	Model No.
Pressure drop (in. of water)		Inlet volume _____ACFM @_____°F	Outlet volume _____ACFM @_____°F
Number of individual cyclone(s)		Outlet straightening vanes used? ☐ Yes ☐ No	
Length of Cyclone(s) Cylinder (ft.)	Diameter of Cyclone(s) Cylinder (ft.)	Length of Cyclone(s) cone (ft.)	
Inlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)		Outlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)	
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?			
Describe any exhaust gas recirculation loop to be employed.			
Attach particle size efficiency curve			
Emissions Data			
Inlet	Outlet		Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No.		☐ Pressurized Design ☐ Suction Design
Number of Compartments	Number of Filters Per Compartment	Is Baghouse Insulated?		
		☐ Yes ☐ No		
Can each compartment be isolated for repairs and/or filter replacement?				☐ Yes ☐ No
Are temperature controls provided? (Describe in detail)				☐ Yes ☐ No
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM		
Type of Fabric Material _____ ☐ Felted ☐ Membrane Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____ Thickness _____ in ☐ Felted-Woven				
Fabric permeability (clean) @ ½" water-Δ P _____ CFM/sq.ft.				
Filter dimensions Length _____ Diameter/Width _____				
Effective area per filter _____			Maximum operating temperature (°F) _____	
Effective air to cloth ratio Minimum _____ Maximum _____				
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.				
Operation and Cleaning				
Volume of gases handled _____ ACFM @ _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.		
Type of filter cleaning ☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets ☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____ ☐ Pneumatic Shakers ☐ Reverse Air Flow				
Describe the equipment provided if dry oil free air is required for collector operation				
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____				
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.				
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.				
Emissions Data				
Pollutant	Inlet	Outlet	Removal Efficiency (%)	

Section C - Air Cleaning Device (Continued)			
6. Wet Collection Equipment NA			
Equipment Specifications			
Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)	Relative Particulate/Gas Velocity (ejector scrubbers only)		
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).			
Describe pH monitoring and pH adjustment systems, if applicable.			
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).			
Attach particulate size efficiency curve.			
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F		Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture	
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)			
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.)			
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Electrostatic Precipitator NA

Equipment Specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ Yes ☐ No		Design Inlet Volume (SCFM) _____ Maximum operating temperature (°F) _____	
Total collecting surface area _____ sq. ft.		Collector plates size length _____ ft. x width _____ ft.	
Number of fields _____		Number of collector plates/field _____	
Spacing between collector plates _____ inches.			
Maximum gas velocity _____ ft./sec.		Minimum gas treatment time: _____ sec.	
Total discharge electrode length _____ ft.			
Number of discharge electrodes _____		Number of collecting electrode rappers _____	
Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____ Describe in detail			

Operating Parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (inches water gauge) across collector only _____ Describe the equipment
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field			
Field No.	No. of Sets	Each Transformer KVA	Each Rectifier KV Ave./Peak Ma DC
Current Density _____ Micro amperes/ft ² .		Corona Power _____ Watts/1000 ACFM	Corona Power Density _____ Watts/ft ² .
Will a flue gas conditioning system be employed? If yes, describe it.			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. Adsorption Equipment NA

Equipment Specifications

Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)	Adsorbent charge per adsorber vessel and number of adsorber vessels		
Length of Mass Transfer Zone (MTZ), supplied by the manufacturer based upon laboratory data.			
Adsorber diameter (ft.) and area ft ² .)	Adsorption bed depth (ft.)		
Adsorbent information			
Adsorbent type and physical properties.			
Working capacity of adsorbent (%)	Heel percent or unrecoverable solvent weight % in the adsorbent after regeneration.		
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F			
Adsorption time per adsorption bed	Breakthrough capacity: Lbs. of solvent / 100 lbs. of adsorbent = _____		
Vapor pressure of solvents at the inlet temperature	Available steam in pounds to regenerate carbon adsorber (if applicable)		
Percent relative saturation of each solvent at the inlet temperature			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
9. Absorption Equipment NA			
Equipment Specifications			
Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)		Tower height (ft.) and inside diameter (ft.)	
Packing type and size (if applicable)		Height of packing (ft.) (if applicable)	
Number of trays (if applicable)		Number of bubble caps (if applicable)	
Configuration ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls.			
Absorbent information			
Absorbent type and concentration.		Retention time (sec.)	
Attach equilibrium data for absorption (if applicable)			
Attach any additional information regarding auxiliary equipment, absorption solution supply system (once through or recirculating, system capacity, etc.) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating Parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in. of water) and liquid flow rate. Describe the monitoring equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. ☐ Selective Catalytic Reduction (SCR)
☐ Selective Non-Catalytic Reduction (SNCR)
☐ Non-Selective Catalytic Reduction (NSCR)

Equipment Specifications

Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)		Design operating temperature (°F)	
Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.			
Attach efficiency and other pertinent information (e.g., ammonia slip)			
Operating Parameters			
Volume of gases handled _____ (ACFM) @ _____ °F			
Operating temperature range for the SCR/SNCR/NSCR system (°F) From _____ °F To _____ °F			
Reducing agent used, if any	Oxidation catalyst used, if any		
State expected range of usage rate and concentration.			
Service life of catalyst	Ammonia slip (ppm)		
Describe fully with a sketch giving locations of equipment, controls systems, important parameters and method of operation.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

11. Oxidizer/Afterburners NA

Equipment Specifications

Manufacturer	Type ☐ Thermal ☐ Catalytic	Model No.	
Design Inlet Volume (SCFM)	Combustion chamber dimensions (length, cross-sectional area, effective chamber volume, etc.)		
Describe design features, which will ensure mixing in combustion chamber.			
Describe method of preheating incoming gases (if applicable).		Describe heat exchanger system used for heat recovery (if applicable).	
Catalyst used	Life of catalyst	Expected temperature rise across catalyst (°F)	Dimensions of bed (in inches). Height: _____ Diameter or Width: _____ Depth: _____
Are temperature sensing devices being provided to measure the temperature rise across the catalyst? ☐ Yes ☐ No If yes, describe.			
Describe any temperature sensing and/or recording devices (including specific location of temperature probe in a drawing or sketch).			
Burner Information			
Burner Manufacturer	Model No.	Fuel Used	
Number and capacity of burners	Rated capacity (each)	Maximum capacity (each)	
Describe the operation of the burner		Attach dimensioned diagram of afterburner	
Operating Parameters			
Inlet flow rate (ACFM) _____ @ _____ °F		Outlet flow rate (ACFM) _____ @ _____ °F	
State pressure drop range across catalytic bed (in. of water).		Describe the method adopted for regeneration or disposal of the used catalyst.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

12. Flares NA

Equipment Specifications

Manufacturer	Type ☐ Elevated flare ☐ Ground flare ☐ Other _____ Describe	Model No.
Design Volume (SCFM)	Dimensions of stack (ft.) Diameter _____ Height _____	
Residence time (sec.) and outlet temperature (°F)	Turn down ratio	Burner details

Describe the flare design (air/steam-assisted or nonassisted), essential auxiliaries including pilot flame monitor of proposed flare with a sketch.

Describe the operation of the flare's ignition system.

Describe the provisions to introduce auxiliary fuel to the flare.

Operation Parameters

Detailed composition of the waste gas	Heat content	Exit velocity
Maximum and average gas flow burned (ACFM)	Operating temperature (°F)	

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)		
13. Other Control Equipment		
Equipment Specifications		
Manufacturer NA	Type Drift eliminator	Model No. NA
Design Volume (SCFM) NA	Capacity NA	
Describe pH monitoring and pH adjustment, if any. NA		
Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. NA		
Attach efficiency curve and/or other efficiency information. NA		
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment. NA		
Operation Parameters		
Volume of gas handled _____ ACFM @ _____ °F _____ % Moisture		
Describe fully giving important parameters and method of operation. A drift eliminator is a passive control device that is located where the air flow exits a cooling tower. A drift eliminator relies on inertial separation caused by direction changes to remove entrained water from the air stream exiting a cooling tower. Designed drift elimination is not to exceed 0.0005% drift loss.		
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements. NA		

Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)
PM/PM ₁₀ /PM _{2.5}	See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	≥98% (not to exceed 0.0005% drift loss)

Section C - Air Cleaning Device (Continued)

14. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Annual Operating Cost

15. Miscellaneous

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

See the previously referenced manufacturer's performance guarantees.

Attach the maintenance schedule for the control equipment and any part of the process equipment that if in disrepair would increase air contaminant emissions.

NA

Section D - Additional Information

Will the construction, modification, etc. of the sources covered by this application increase emissions from other sources at the facility? If so, describe and quantify.

See Section 3.1.1 – Nonattainment New Source Review (NNSR) and Section 3.1.2 – Prevention of Significant Deterioration (PSD) in the plan approval application narrative of this submittal for a discussion and summary of the emissions increases estimated to result from the Plan Approval Reconciliations, WWTP Permanent Controls Project, and EMACT Project.

If this project is subject to any one of the following, attach a demonstration to show compliance with applicable standards.

a. Prevention of Significant Deterioration permit (PSD), 40 CFR 52?	☒ YES	☐ NO
b. New Source Review (NSR), 25 Pa. Code Chapter 127, Subchapter E?	☒ YES	☐ NO
c. New Source Performance Standards (NSPS), 40 CFR Part 60? (If Yes, which subpart) _____	☐ YES	☒ NO
d. National Emissions Standards for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61? (If Yes, which subpart) <u>FF (WWTP Permanent Controls Project)</u>	☒ YES	☐ NO
e. Maximum Achievable Control Technology (MACT) 40 CFR Part 63? (If Yes, which part) <u>XX (WWTP Permanent Controls Project) and YY (WWTP Permanent Controls Project and EMACT Project)</u>	☒ YES	☐ NO

Attach a demonstration showing that the emissions from any new sources will be the minimum attainable through the use of best available technology (BAT).

See Section 4.0 – Lowest Achievable Emission Rate (LAER) and Section 6.0 – Best Available Technology (BAT) in the plan approval application narrative of this submittal.

Provide emission increases and decreases in allowable (or potential) and actual emissions within the last five (5) years for applicable PSD pollutant(s) if the facility is an existing major facility (PSD purposes).

Below is a summary of the decreases and increases in potential emissions of PSD pollutants that resulted from the issuance of PA-04-00740B and PA-04-00740C, respectively. PA-04-00740B authorized the installation of sulfur hexafluoride (SF₆)-insulated high-voltage equipment associated with the initial construction of SPM, and the potential to emit increases resulting from the issuance of this plan approval were reviewed as part of the project to initially construct SPM. PA-04-00740C authorized as-built changes for the initial construction of SPM, and the potential to emit decreases and increases resulting from the issuance of this plan approval were reviewed as part of the project to initially construct SPM.

- PA-04-00740B (potential to emissions change): +854 tpy CO_{2e}
- PA-04-00740C (potential to emissions changes): -19.5 tpy NO_x; -28.3 tpy CO; +3.3 tpy PM (filterable only); +4.9 tpy PM₁₀; +4.7 tpy PM_{2.5}; +1.4 tpy SO₂; -5.8 tpy VOC; and +56,206 tpy CO_{2e}.

Section D - Additional Information (Continued)

Indicate emission increases and decreases in tons per year (tpy), for volatile organic compounds (VOCs) and nitrogen oxides (NOx) for NSR applicability since January 1, 1991 or other applicable dates (see other applicable dates in instructions). The emissions increases include all emissions including stack, fugitive, material transfer, other emission generating activities, quantifiable emissions from exempted source(s), etc.

Permit number (if applicable)	Date issued	Indicate Yes or No if emission increases and decreases were used previously for netting	Source I. D. or Name	VOCs		NOx	
				Emission increases in potential to emit (tpy)	Creditable emission decreases in actual emissions (tpy)	Emission increases in potential to emit (tpy)	Creditable emission decreases in actual emissions (tpy)
NA	-	-	-	-	-	-	-

If the source is subject to 25 Pa. Code Chapter 127, Subchapter E, New Source Review requirements,

- a. Identify Emission Reduction Credits (ERCs) for emission offsets or demonstrate ability to obtain suitable ERCs for emission offsets. See Section 3.1.1.1 in the plan approval application narrative of this submittal for a discussion of the ERC requirements for the Plan Approval Reconciliations and WWTP Permanent Controls Project. See Section 3.1.1.2 in the plan approval application narrative of this submittal for a discussion of the ERC requirements for the EMACT Project.
- b. Provide a demonstration that the lowest achievable emission rate (LAER) control techniques will be employed (if applicable). See Section 4.0 – Lowest Achievable Emission Rate (LAER) in the plan approval application narrative of this submittal.
- c. Provide an analysis of alternate sites, sizes, production processes and environmental control techniques demonstrating that the benefits of the proposed source outweigh the environmental and social costs (if applicable). See Section 7.0 – Alternatives Analysis in the plan approval application narrative of this submittal.

Attach calculations and any additional information necessary to thoroughly evaluate compliance with all the applicable requirements of Article III and applicable requirements of the Clean Air Act adopted thereunder. The Department may request additional information to evaluate the application such as a standby plan, a plan for air pollution emergencies, air quality modeling, etc.

See the potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

Section E - Compliance Demonstration

Note: Complete this section if source is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below

☒ Monitoring	☒ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (Parameter, CEM, etc): See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Monitoring device location: See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter:
See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Testing:

- a. Reference Test Method: Citation See the emission source's testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reference Test Method: Description See the emission source's testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Recordkeeping:

Describe what parameters will be recorded and the recording frequency:
See the emission source's recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Reporting:

- a. Describe what is to be reported and frequency of reporting:
See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reporting start date: See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Work Practice Standard:

Describe each: See the emission source's work practice requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Section F - Flue and Air Contaminant Emission

1. Estimated Atmospheric Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		**	**	**
PM ₁₀		**	**	**
SO _x				
CO				
NO _x				
VOC				
Others: (e.g., HAPs)	-----	-----	-----	-----
PM _{2.5}		**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number Z104

List Source(s) or source ID exhausted to this stack:
104

% of flow exhausted to stack: 100%

Stack height above grade (ft.) 71
Grade elevation (ft.) 795

Stack diameter (ft) or Outlet duct area (sq. ft.)
36.74 ft

f. Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.
~200 ft

Does stack height meet Good Engineering Practice (GEP)?
Yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
Z104 (Cells 1 & 2)	40	40	15.96	80	20	23.64
Z104 (Cells 3 & 4)	40	40	16.32	80	20	22.92
Z104 (Cells 5 & 6)	40	40	16.68	80	20	22.56

Stack exhaust

Volume 1,431,726 ACFM

Temperature 71 °F

Moisture NA %

Indicate on an attached sheet the location of sampling ports with respect to exhaust fan, breeching, etc. Give all necessary dimensions.
NA

Exhauster (attach fan curves)_____ in. of water_____ HP @_____RPM.

** If the data and collection method codes differ from those provided on the General Information Form-Authorization Application, provide the additional detail required by that form on a separate form.



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 04-00740C [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 and electrical conductivity 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.			
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 B - Processes Information

1. Source Information

Source Description (give type, use, raw materials, product, etc). Attach additional sheets as necessary.

2 gas phase polyethylene manufacturing units and 1 liquid phase slurry polyethylene manufacturing unit, which together are referenced as the Polyethylene Manufacturing Lines (Source ID 202) in PA-04-00740A and PA-04-00740C.

Manufacturer NA	Model No. NA	Number of Sources 3
Source Designation 202	Maximum Capacity 2,073,265 tons/yr	Rated Capacity 2,073,265 tons/yr

Type of Material Processed
Ethylene (primary reactant) and polyethylene (product)

Maximum Operating Schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Operational restrictions existing or requested, if any (e.g., bottlenecks or voluntary restrictions to limit PTE)

Capacity (specify units)

Per Hour	Per Day	Per Week	Per Year

Operating Schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Seasonal variations (Months) From to

If variations exist, describe them

2. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Gas (other)	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Coal	TPH	Tons	% by wt		Btu/lb
Other *					

*Note: Describe and furnish information separately for other fuels in Addendum B.

Section B - Processes Information (Continued)

3. Burner

Manufacturer	Type and Model No.	Number of Burners
Description:		
Rated Capacity	Maximum Capacity	

4. Process Storage Vessels

A. For Liquids:

Name of material stored		
Tank I.D. No.	Manufacturer	Date Installed
Maximum Pressure	Capacity (gallons/Meter ³)	
Type of relief device (pressure set vent/conservation vent/emergency vent/open vent)		
Relief valve/vent set pressure (psig)	Vapor press. of liquid at storage temp. (psia/kPa)	
Type of Roof: Describe:		
Total Throughput Per Year	Number of fills per day (fill/day): Filling Rate (gal./min.): Duration of fill hr./fill):	

B. For Solids

Type: ☐ Silo ☐ Storage Bin ☐ Other, Describe		Name of Material Stored
Silo/Storage Bin I.D. No.	Manufacturer	Date Installed
State whether the material will be stored in loose or bags in silos		Capacity (Tons)
Turn over per year in tons		Turn over per day in tons
Describe fugitive dust control system for loading and handling operations		
Describe material handling system		

5. Request for Confidentiality

Do you request any information on this application to be treated as "Confidential"? ☐ Yes ☒ No
 If yes, include justification for confidentiality. Place such information on separate pages marked "confidential".

Section B - Processes Information (Continued)

6. Miscellaneous Information

Attach flow diagram of process 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 hoods location, design, airflow and capture efficiency. Describe any restriction requested and how it will be monitored.

See Appendix C – Process Flow Diagrams in this submittal for a quick reference to flow diagrams for SPM's processes and VOC control systems. The remaining information (raw materials, rates, etc.) is available in the potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal. Shell is not requesting restrictions on SPM's production capacity.

Describe fully the facilities provided to monitor and to record process operating conditions, which may affect the emission of air contaminants. Show that they are reasonable and adequate.

See the emission source's monitoring and recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Describe each proposed modification to an existing source.

NA

Identify and describe all fugitive emission points, all relief and emergency valves and any by-pass stacks.

NA

Describe how emissions will be minimized especially during start up, shut down, process upsets and/or disruptions.

See the emission source's limitations in PA-04-00740A and PA-04-00740C and the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

Anticipated Milestones:

- i. Expected commencement date of construction/reconstruction/installation: NA
- ii. Expected completion date of construction/reconstruction/installation: NA
- iii. Anticipated date of start-up: NA

Section C - Air Cleaning Device

- 1. Precontrol Emissions*** - PM/PM₁₀/PM_{2.5} emissions controlled by filters (Source ID C202) and VOC and HAPs controlled by thermal oxidizers and flares (Source IDs C204A, C204B, C205A, C205B, and C205C).

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM		**			**
PM ₁₀		**			**
SO _x					
CO					
NO _x					
VOC		**			**
Others: (e.g., HAPs)	-----	-----	-----	-----	-----
PM _{2.5}		**			**
HAPs		**			**

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Gas Cooling NA

Water quenching ☐ Yes ☐ No Water injection rate _____ GPM

Radiation and convection cooling
☐ Yes ☐ No

Air dilution ☐ Yes ☐ No
If yes, _____ CFM

Forced Draft ☐ Yes ☐ No

Water cooled duct work ☐ Yes ☐ No

Other

Inlet Volume _____ ACFM
@ _____ °F _____ % Moisture

Outlet Volume _____ ACFM
@ _____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Settling Chambers NA			
Manufacturer		Volume of gas handled _____ACFM @_____°F	Gas velocity (ft/sec.)
Length of chamber (ft.)	Width of chamber (ft.)	Height of chamber (ft.)	Number of trays
Water injection ☐ Yes ☐ No		Water injection rate (GPM)	
Emissions Data			
Inlet	Outlet	Removal Efficiency (%)	
4. Inertial and Cyclone Collectors NA			
Manufacturer		Type	Model No.
Pressure drop (in. of water)	Inlet volume _____ACFM @_____°F		Outlet volume _____ACFM @_____°F
Number of individual cyclone(s)		Outlet straightening vanes used? ☐ Yes ☐ No	
Length of Cyclone(s) Cylinder (ft.)	Diameter of Cyclone(s) Cylinder (ft.)	Length of Cyclone(s) cone (ft.)	
Inlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)		Outlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)	
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?			
Describe any exhaust gas recirculation loop to be employed.			
Attach particle size efficiency curve			
Emissions Data			
Inlet	Outlet	Removal Efficiency (%)	

Section C - Air Cleaning Device (Continued)

5. Fabric Collector Several filters are used in the 3 polyethylene manufacturing units.

Equipment Specifications

Manufacturer Varies		Model No. Varies	☐ Pressurized Design ☐ Suction Design
Number of Compartments Varies	Number of Filters Per Compartment Varies	Is Baghouse Insulated? ☐ Yes ☐ No	
Can each compartment be isolated for repairs and/or filter replacement? ☐ Yes ☐ No			
Are temperature controls provided? (Describe in detail) ☐ Yes ☐ No			
Dew point at maximum moisture Varies _____ °F		Design inlet volume Varies _____ SCFM	
Type of Fabric Material Varies _____ ☐ Felted ☐ Membrane Weight Varies _____ oz/sq.yd ☐ Woven ☐ Others: List: _____ Thickness Varies _____ in ☐ Felted-Woven			
Fabric permeability (clean) @ ½" water-Δ P Varies _____ CFM/sq.ft.			
Filter dimensions Length Varies _____ Diameter/Width Varies _____			
Effective area per filter Varies _____		Maximum operating temperature (°F) Varies _____	
Effective air to cloth ratio Minimum Varies _____ Maximum Varies _____			
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.			
Operation and Cleaning			
Volume of gases handled Varies _____ ACFM @ Varies _____ °F		Pressure drop across collector (in. of water). Varies Describe the equipment to be used to monitor the pressure drop. Pressure transmitters across filter	
Type of filter cleaning ☐ Manual Cleaning ☐ Bag Collapse ☒ Reverse Air Jets ☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____ ☐ Pneumatic Shakers ☐ Reverse Air Flow			
Describe the equipment provided if dry oil free air is required for collector operation Compressed air or nitrogen from plant supply			
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☒ Expected pressure drop range Varies _____ in. of water ☒ Other Specify Manual override option ____			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements. Pressure drop alarms			

Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)
PM/PM ₁₀ /PM _{2.5}	See the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	See the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	≥99%

Section C - Air Cleaning Device (Continued)			
6. Wet Collection Equipment NA			
Equipment Specifications			
Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)	Relative Particulate/Gas Velocity (ejector scrubbers only)		
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).			
Describe pH monitoring and pH adjustment systems, if applicable.			
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).			
Attach particulate size efficiency curve.			
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F		Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture	
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)			
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.)			
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provided to measure the pressure drop. Do not include duct or de-mister losses.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Electrostatic Precipitator NA

Equipment Specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ Yes ☐ No		Design Inlet Volume (SCFM) _____	
		Maximum operating temperature (°F) _____	
Total collecting surface area _____ sq. ft.		Collector plates size length _____ ft. x width _____ ft.	
Number of fields _____		Number of collector plates/field _____	
Spacing between collector plates _____ inches.			
Maximum gas velocity _____ ft./sec.		Minimum gas treatment time: _____ sec.	
Total discharge electrode length _____ ft.			
Number of discharge electrodes _____		Number of collecting electrode rappers _____	
Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____ Describe in detail			

Operating Parameters

Inlet gas temperature (°F) _____	State pressure drop range (inches water gauge) across collector only _____
Outlet gas temperature (°F) _____	Describe the equipment
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field			
Field No.	No. of Sets	Each Transformer KVA	Each Rectifier KV Ave./Peak Ma DC
Current Density _____ Micro amperes/ft ² .	Corona Power _____ Watts/1000 ACFM	Corona Power Density _____ Watts/ft ² .	
Will a flue gas conditioning system be employed? If yes, describe it.			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
8. Adsorption Equipment NA			
Equipment Specifications			
Manufacturer	Type		Model No.
Design Inlet Volume (SCFM)		Adsorbent charge per adsorber vessel and number of adsorber vessels	
Length of Mass Transfer Zone (MTZ), supplied by the manufacturer based upon laboratory data.			
Adsorber diameter (ft.) and area ft ² .)		Adsorption bed depth (ft.)	
Adsorbent information			
Adsorbent type and physical properties.			
Working capacity of adsorbent (%)		Heel percent or unrecoverable solvent weight % in the adsorbent after regeneration.	
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F			
Adsorption time per adsorption bed		Breakthrough capacity: Lbs. of solvent / 100 lbs. of adsorbent = _____	
Vapor pressure of solvents at the inlet temperature		Available steam in pounds to regenerate carbon adsorber (if applicable)	
Percent relative saturation of each solvent at the inlet temperature			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
9. Absorption Equipment NA			
Equipment Specifications			
Manufacturer	Type		Model No.
Design Inlet Volume (SCFM)		Tower height (ft.) and inside diameter (ft.)	
Packing type and size (if applicable)		Height of packing (ft.) (if applicable)	
Number of trays (if applicable)		Number of bubble caps (if applicable)	
Configuration ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls.			
Absorbent information			
Absorbent type and concentration.		Retention time (sec.)	
Attach equilibrium data for absorption (if applicable)			
Attach any additional information regarding auxiliary equipment, absorption solution supply system (once through or recirculating, system capacity, etc.) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating Parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in. of water) and liquid flow rate. Describe the monitoring equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. ☐ Selective Catalytic Reduction (SCR)
☐ Selective Non-Catalytic Reduction (SNCR)
☐ Non-Selective Catalytic Reduction (NSCR)

Equipment Specifications

Manufacturer	Type	Model No.
Design Inlet Volume (SCFM)		Design operating temperature (°F)
Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.		
Attach efficiency and other pertinent information (e.g., ammonia slip)		

Operating Parameters

Volume of gases handled _____ (ACFM) @ _____ °F	
Operating temperature range for the SCR/SNCR/NSCR system (°F) From _____ °F To _____ °F	
Reducing agent used, if any	Oxidation catalyst used, if any
State expected range of usage rate and concentration.	
Service life of catalyst	Ammonia slip (ppm)
Describe fully with a sketch giving locations of equipment, controls systems, important parameters and method of operation.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.	

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

11. Oxidizer/Afterburners CVTO (Source ID C204A)

Equipment Specifications

Manufacturer John Zink	Type ☒ Thermal ☐ Catalytic	Model No. NA
Design Inlet Volume (SCFM) NA	Combustion chamber dimensions (length, cross-sectional area, effective chamber volume, etc.) 25ft L, ~142.2ft ² CSA, ~3,556.2ft ³ Volume	
Describe design features, which will ensure mixing in combustion chamber. Inherent horizontal combustion chamber design with burner and waste gas stream mixing at one end and product of combustion exit at the other end.		
Describe method of preheating incoming gases (if applicable). NA		Describe heat exchanger system used for heat recovery (if applicable). NA
Catalyst used NA	Life of catalyst NA	Expected temperature rise across catalyst (°F) NA
Dimensions of bed (in inches). Height: NA _____ Diameter or Width: NA _____ Depth: NA _____		
Are temperature sensing devices being provided to measure the temperature rise across the catalyst? ☐ Yes ☐ No If yes, describe. NA		
Describe any temperature sensing and/or recording devices (including specific location of temperature probe in a drawing or sketch). See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.		
Burner Information		
Burner Manufacturer John Zink	Model No. NA	Fuel Used Natural gas
Number and capacity of burners 1 Natural gas fuel, 42 Waste gas	Rated capacity (each) 4.65 MMBtu/hr each	Maximum capacity (each) 4.65 MMBtu/hr each
Describe the operation of the burner Natural gas fuel burner ignites the distributed waste gas burners	Attach dimensioned diagram of afterburner NA	
Operating Parameters		
Inlet flow rate (ACFM) _____ Varies @ _____ °F	Outlet flow rate (ACFM) 177,696 @ 1,600 °F	
State pressure drop range across catalytic bed (in. of water). NA	Describe the method adopted for regeneration or disposal of the used catalyst. NA	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements. Low and high alarms are set on the continuously monitored combustion zone temperature.		

Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)
VOC/HAPs	See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	≥99.9%

Section C - Air Cleaning Device (Continued)

12. Flares MPGF (Source ID C204B), TEGF A (Source ID C205A), TEGF B (Source ID C205B), and HP Elevated Flare (Source ID C205C)

Equipment Specifications

Manufacturer Zeeco (for all 4)	Type ☒ Elevated flare ☒ Ground flare ☐ Other _____ Describe	Model No. AFDS-6/24 / AFTA-8/18 for Source ID C204B; NA for other 3 Source IDs	
Design Volume (SCFM) NA	Dimensions of stack (ft.) Diameter <u>NA</u> Height <u>NA</u>		
Residence time (sec.) and outlet temperature (°F) NA	Turn down ratio Varies	Burner details Zeeco proprietary	
Describe the flare design (air/steam-assisted or nonassisted), essential auxiliaries including pilot flame monitor of proposed flare with a sketch. C204B: Perimeter air-assisted flare; C205A and C205B: Pressure-assisted multi-point flares; C205C: Steam-assisted flare.			
Describe the operation of the flare's ignition system. See the emission sources' requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.			
Describe the provisions to introduce auxiliary fuel to the flare. See the emission sources' requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission sources.			
Operation Parameters			
Detailed composition of the waste gas Varies as measured by gas chromatograph	Heat content Varies as measured by gas chromatograph or calorimeter	Exit velocity Varies or NA	
Maximum and average gas flow burned (ACFM) Varies	Operating temperature (°F) Varies		
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements. Alarms set on target NHV, presence of pilots, exit velocity (where applicable).			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)
VOC/HAPs	See the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	See the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	≥99% C3- VOC/HAPs; ≥98% C4+ VOC/HAPs

Section C - Air Cleaning Device (Continued)

13. Other Control Equipment NA

Equipment Specifications

Manufacturer	Type	Model No.	
Design Volume (SCFM)		Capacity	
Describe pH monitoring and pH adjustment, if any.			
Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.			
Attach efficiency curve and/or other efficiency information.			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Operation Parameters			
Volume of gas handled _____ ACFM @ _____ °F _____ % Moisture			
Describe fully giving important parameters and method of operation.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

14. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Annual Operating Cost

15. Miscellaneous

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

See the previously referenced manufacturers' performance guarantees.

Attach the maintenance schedule for the control equipment and any part of the process equipment that if in disrepair would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if source is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below

☒ Monitoring	☒ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (Parameter, CEM, etc): See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Monitoring device location: See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter:
See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Testing:

- a. Reference Test Method: Citation See the emission source's testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reference Test Method: Description See the emission source's testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Recordkeeping:

Describe what parameters will be recorded and the recording frequency:
See the emission source's recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Reporting:

- a. Describe what is to be reported and frequency of reporting:
See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reporting start date: See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Work Practice Standard:

Describe each: See the emission source's work practice requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Section F - Flue and Air Contaminant Emission

1. Estimated Atmospheric Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		**	**	**
PM ₁₀		**	**	**
SO _x				
CO				
NO _x				
VOC				
Others: (e.g., HAPs)	-----	-----	-----	-----
PM _{2.5}		**	**	**
HAPs		**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number S202

List Source(s) or source ID exhausted to this stack:
C202

% of flow exhausted to stack: 100%

Stack height above grade (ft.) See
Appendix D – Air Quality Analysis.
Grade elevation (ft.) 795

Stack diameter (ft) or Outlet duct area (sq. ft.)
See Appendix D – Air Quality Analysis.

f. Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.

See Appendix D – Air Quality Analysis in this submittal.

Does stack height meet Good Engineering Practice (GEP)?

Yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
S202 (Catalyst Vent Filter 1)	40	40	17.04	80	20	2.04
S202 (Catalyst Vent Filter 2)	40	40	17.04	80	20	2.4
S202 (Catalyst Activator A Filter (External))	40	40	12.36	80	20	8.16
S202 (Catalyst Activator B Filter (External))	40	40	12	80	20	8.16
S202 (Additive Unloading Station A)	40	40	11.64	80	20	7.08
S202 (Additive Unloading Station B)	40	40	11.64	80	20	7.08
S202 (Additive Unloading Station C)	40	40	11.64	80	20	7.08
S202 (Additive Unloading Station D)	40	40	11.64	80	20	7.08
S202 (FIBC Compactor)	40	40	10.92	80	20	7.08
S202 (Additive Feeder A)	40	40	11.64	80	20	6.72
S202 (Additive Feeder B)	40	40	11.64	80	20	6.72
S202 (Additive Feeder C)	40	40	11.64	80	20	6.72
S202 (Additive Feeder D)	40	40	11.64	80	20	6.72
S202 (Extruder Vent)	40	40	11.64	80	20	6.36
S202 (Pellet Dryer Vent)	40	40	10.92	80	20	6.72
S202 (Vacuum Cleaning System)	40	40	11.28	80	20	5.64
S202 (PE 1 LDPE Vents)	40	40	17.04	80	19	57.72
S202 (PE 2 LDPE Vents)	40	40	17.04	80	20	2.4
S202 (Railcar to Truck Talc Transfer)	40	40	19.2	80	19	51.6
Stack exhaust - See Appendix D – Air Quality Analysis Volume _____ ACFM Temperature _____ °F Moisture <u>NA</u> %						
Indicate on an attached sheet the location of sampling ports with respect to exhaust fan, breeching, etc. Give all necessary dimensions. NA						
Exhauster (attach fan curves) _____ in. of water _____ HP @ _____ RPM.						
** If the data and collection method codes differ from those provided on the General Information Form-Authorization Application, provide the additional detail required by that form on a separate form.						



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 04-00740C [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
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	G08 (NESHAP Subpart SS - Polyethylene Manufacturing Lines)
☒	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	☒ 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. 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)].			
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.

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.

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). [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)].



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 (NESHAP Subpart FFFF - Polyethylene Manufacturing Lines)
☒	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
☒	Record Keeping	☒	Reporting
		☒	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. 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].			
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)].

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)].

Section B - Processes Information

1. Source Information

Source Description (give type, use, raw materials, product, etc). Attach additional sheets as necessary.

A 26-cell, double-cell row configuration mechanical draft cooling tower that is referenced as the Process Cooling Tower (Source ID 203) in PA-04-00740A and PA-04-00740C.

Manufacturer NA	Model No. NA	Number of Sources 1
Source Designation 203	Maximum Capacity 295,900 gpm	Rated Capacity 295,900 gpm

Type of Material Processed
Cooling water

Maximum Operating Schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Operational restrictions existing or requested, if any (e.g., bottlenecks or voluntary restrictions to limit PTE)

Capacity (specify units)

Per Hour 295,900 gpm	Per Day	Per Week	Per Year

Operating Schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Seasonal variations (Months) From to

If variations exist, describe them

2. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Gas (other)	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Coal	TPH	Tons	% by wt		Btu/lb
Other *					

*Note: Describe and furnish information separately for other fuels in Addendum B.

Section B - Processes Information (Continued)

3. Burner

Manufacturer	Type and Model No.	Number of Burners
Description:		
Rated Capacity	Maximum Capacity	

4. Process Storage Vessels

A. For Liquids:

Name of material stored		
Tank I.D. No.	Manufacturer	Date Installed
Maximum Pressure	Capacity (gallons/Meter ³)	
Type of relief device (pressure set vent/conservation vent/emergency vent/open vent)		
Relief valve/vent set pressure (psig)	Vapor press. of liquid at storage temp. (psia/kPa)	
Type of Roof: Describe:		
Total Throughput Per Year	Number of fills per day (fill/day): Filling Rate (gal./min.): Duration of fill hr./fill):	

B. For Solids

Type: ☐ Silo ☐ Storage Bin ☐ Other, Describe		Name of Material Stored
Silo/Storage Bin I.D. No.	Manufacturer	Date Installed
State whether the material will be stored in loose or bags in silos		Capacity (Tons)
Turn over per year in tons		Turn over per day in tons
Describe fugitive dust control system for loading and handling operations		
Describe material handling system		

5. Request for Confidentiality

Do you request any information on this application to be treated as "Confidential"? ☐ Yes ☒ No
 If yes, include justification for confidentiality. Place such information on separate pages marked "confidential".

Section B - Processes Information (Continued)

6. Miscellaneous Information

Attach flow diagram of process 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 hoods location, design, airflow and capture efficiency. Describe any restriction requested and how it will be monitored.

See Appendix C – Process Flow Diagrams in this submittal for a quick reference to flow diagrams for SPM's processes and VOC control systems. The remaining information (raw materials, rates, etc.) is available in the potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal. Shell is not requesting restrictions on SPM's production capacity.

Describe fully the facilities provided to monitor and to record process operating conditions, which may affect the emission of air contaminants. Show that they are reasonable and adequate.

See the emission source's monitoring and recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Describe each proposed modification to an existing source.

NA

Identify and describe all fugitive emission points, all relief and emergency valves and any by-pass stacks.

NA

Describe how emissions will be minimized especially during start up, shut down, process upsets and/or disruptions.

NA

Anticipated Milestones:

- i. Expected commencement date of construction/reconstruction/installation: NA
- ii. Expected completion date of construction/reconstruction/installation: NA
- iii. Anticipated date of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions*

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM		78			**
PM ₁₀		52			**
SO _x					
CO					
NO _x					
VOC					
Others: (e.g., HAPs)	-----	-----	-----	-----	-----
PM _{2.5}		0.13			**

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Gas Cooling NA

Water quenching ☐ Yes ☐ No Water injection rate _____ GPM

Radiation and convection cooling

☐ Yes ☐ No

Air dilution ☐ Yes ☐ No

If yes, _____ CFM

Forced Draft ☐ Yes ☐ No

Water cooled duct work ☐ Yes ☐ No

Other

Inlet Volume _____ ACFM

@ _____ °F _____ % Moisture

Outlet Volume _____ ACFM

@ _____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Settling Chambers NA			
Manufacturer		Volume of gas handled _____ACFM @_____°F	
Gas velocity (ft/sec.)			
Length of chamber (ft.)	Width of chamber (ft.)	Height of chamber (ft.)	Number of trays
Water injection ☐ Yes ☐ No		Water injection rate (GPM)	
Emissions Data			
Inlet	Outlet		Removal Efficiency (%)
4. Inertial and Cyclone Collectors NA			
Manufacturer		Type	Model No.
Pressure drop (in. of water)		Inlet volume _____ACFM @_____°F	Outlet volume _____ACFM @_____°F
Number of individual cyclone(s)		Outlet straightening vanes used? ☐ Yes ☐ No	
Length of Cyclone(s) Cylinder (ft.)	Diameter of Cyclone(s) Cylinder (ft.)	Length of Cyclone(s) cone (ft.)	
Inlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)		Outlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)	
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?			
Describe any exhaust gas recirculation loop to be employed.			
Attach particle size efficiency curve			
Emissions Data			
Inlet	Outlet		Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No. ☐ Pressurized Design ☐ Suction Design	
Number of Compartments	Number of Filters Per Compartment	Is Baghouse Insulated? ☐ Yes ☐ No	
Can each compartment be isolated for repairs and/or filter replacement? ☐ Yes ☐ No			
Are temperature controls provided? (Describe in detail) ☐ Yes ☐ No			
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM	
Type of Fabric Material _____ ☐ Felted ☐ Membrane Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____ Thickness _____ in ☐ Felted-Woven			
Fabric permeability (clean) @ ½" water-Δ P _____ CFM/sq.ft.			
Filter dimensions Length _____ Diameter/Width _____			
Effective area per filter _____		Maximum operating temperature (°F) _____	
Effective air to cloth ratio Minimum _____ Maximum _____			
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.			
Operation and Cleaning			
Volume of gases handled _____ ACFM @ _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.	
Type of filter cleaning ☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets ☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____ ☐ Pneumatic Shakers ☐ Reverse Air Flow			
Describe the equipment provided if dry oil free air is required for collector operation			
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
6. Wet Collection Equipment NA			
Equipment Specifications			
Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)	Relative Particulate/Gas Velocity (ejector scrubbers only)		
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).			
Describe pH monitoring and pH adjustment systems, if applicable.			
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).			
Attach particulate size efficiency curve.			
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F		Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture	
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)			
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.)			
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Electrostatic Precipitator NA

Equipment Specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ Yes ☐ No		Design Inlet Volume (SCFM) _____ Maximum operating temperature (°F) _____	
Total collecting surface area _____ sq. ft.		Collector plates size length _____ ft. x width _____ ft.	
Number of fields _____		Number of collector plates/field _____	
Spacing between collector plates _____ inches.			
Maximum gas velocity _____ ft./sec.		Minimum gas treatment time: _____ sec.	
Total discharge electrode length _____ ft.			
Number of discharge electrodes _____		Number of collecting electrode rappers _____	
Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____ Describe in detail			

Operating Parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (inches water gauge) across collector only _____ Describe the equipment
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field			
Field No.	No. of Sets	Each Transformer KVA	Each Rectifier KV Ave./Peak Ma DC
Current Density _____ Micro amperes/ft ² .	Corona Power _____ Watts/1000 ACFM		Corona Power Density _____ Watts/ft ² .
Will a flue gas conditioning system be employed? If yes, describe it.			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. Adsorption Equipment NA

Equipment Specifications

Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)	Adsorbent charge per adsorber vessel and number of adsorber vessels		
Length of Mass Transfer Zone (MTZ), supplied by the manufacturer based upon laboratory data.			
Adsorber diameter (ft.) and area ft ² .)	Adsorption bed depth (ft.)		
Adsorbent information			
Adsorbent type and physical properties.			
Working capacity of adsorbent (%)	Heel percent or unrecoverable solvent weight % in the adsorbent after regeneration.		
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F			
Adsorption time per adsorption bed	Breakthrough capacity: Lbs. of solvent / 100 lbs. of adsorbent = _____		
Vapor pressure of solvents at the inlet temperature	Available steam in pounds to regenerate carbon adsorber (if applicable)		
Percent relative saturation of each solvent at the inlet temperature			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
9. Absorption Equipment NA			
Equipment Specifications			
Manufacturer	Type		Model No.
Design Inlet Volume (SCFM)		Tower height (ft.) and inside diameter (ft.)	
Packing type and size (if applicable)		Height of packing (ft.) (if applicable)	
Number of trays (if applicable)		Number of bubble caps (if applicable)	
Configuration ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls.			
Absorbent information			
Absorbent type and concentration.		Retention time (sec.)	
Attach equilibrium data for absorption (if applicable)			
Attach any additional information regarding auxiliary equipment, absorption solution supply system (once through or recirculating, system capacity, etc.) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating Parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in. of water) and liquid flow rate. Describe the monitoring equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. ☐ Selective Catalytic Reduction (SCR)
☐ Selective Non-Catalytic Reduction (SNCR)
☐ Non-Selective Catalytic Reduction (NSCR)

Equipment Specifications

Manufacturer	Type	Model No.
Design Inlet Volume (SCFM)		Design operating temperature (°F)
Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.		
Attach efficiency and other pertinent information (e.g., ammonia slip)		

Operating Parameters

Volume of gases handled _____ (ACFM) @ _____ °F	
Operating temperature range for the SCR/SNCR/NSCR system (°F) From _____ °F To _____ °F	
Reducing agent used, if any	Oxidation catalyst used, if any
State expected range of usage rate and concentration.	
Service life of catalyst	Ammonia slip (ppm)
Describe fully with a sketch giving locations of equipment, controls systems, important parameters and method of operation.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.	

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

11. Oxidizer/Afterburners NA

Equipment Specifications

Manufacturer	Type ☐ Thermal ☐ Catalytic	Model No.	
Design Inlet Volume (SCFM)	Combustion chamber dimensions (length, cross-sectional area, effective chamber volume, etc.)		
Describe design features, which will ensure mixing in combustion chamber.			
Describe method of preheating incoming gases (if applicable).		Describe heat exchanger system used for heat recovery (if applicable).	
Catalyst used	Life of catalyst	Expected temperature rise across catalyst (°F)	Dimensions of bed (in inches). Height: _____ Diameter or Width: _____ Depth: _____
Are temperature sensing devices being provided to measure the temperature rise across the catalyst? ☐ Yes ☐ No If yes, describe.			
Describe any temperature sensing and/or recording devices (including specific location of temperature probe in a drawing or sketch).			
Burner Information			
Burner Manufacturer	Model No.	Fuel Used	
Number and capacity of burners	Rated capacity (each)	Maximum capacity (each)	
Describe the operation of the burner		Attach dimensioned diagram of afterburner	
Operating Parameters			
Inlet flow rate (ACFM) _____ @ _____ °F		Outlet flow rate (ACFM) _____ @ _____ °F	
State pressure drop range across catalytic bed (in. of water).		Describe the method adopted for regeneration or disposal of the used catalyst.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

12. Flares NA

Equipment Specifications

Manufacturer	Type ☐ Elevated flare ☐ Ground flare ☐ Other _____ Describe	Model No.
Design Volume (SCFM)	Dimensions of stack (ft.) Diameter _____ Height _____	
Residence time (sec.) and outlet temperature (°F)	Turn down ratio	Burner details

Describe the flare design (air/steam-assisted or nonassisted), essential auxiliaries including pilot flame monitor of proposed flare with a sketch.

Describe the operation of the flare's ignition system.

Describe the provisions to introduce auxiliary fuel to the flare.

Operation Parameters

Detailed composition of the waste gas	Heat content	Exit velocity
Maximum and average gas flow burned (ACFM)		Operating temperature (°F)

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

13. Other Control Equipment

Equipment Specifications

Manufacturer NA	Type Drift eliminator	Model No. NA
Design Volume (SCFM) NA	Capacity NA	
Describe pH monitoring and pH adjustment, if any. NA		
Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. NA		
Attach efficiency curve and/or other efficiency information. NA		
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment. NA		
Operation Parameters		
Volume of gas handled _____ ACFM @ _____ °F _____ % Moisture		
Describe fully giving important parameters and method of operation. A drift eliminator is a passive control device that is located where the air flow exits a cooling tower. A drift eliminator relies on inertial separation caused by direction changes to remove entrained water from the air stream exiting a cooling tower. Designed drift elimination is not to exceed 0.0005% drift loss.		
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements. NA		

Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)
PM/PM ₁₀ /PM _{2.5}	See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	≥98% (not to exceed 0.0005% drift loss)

Section C - Air Cleaning Device (Continued)

14. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Annual Operating Cost

15. Miscellaneous

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

See the previously referenced manufacturer's performance guarantees.

Attach the maintenance schedule for the control equipment and any part of the process equipment that if in disrepair would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if source is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below

☒ Monitoring	☒ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (Parameter, CEM, etc): See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Monitoring device location: See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter:
See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Testing:

- a. Reference Test Method: Citation See the emission source's testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reference Test Method: Description See the emission source's testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Recordkeeping:

Describe what parameters will be recorded and the recording frequency:
See the emission source's recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Reporting:

- a. Describe what is to be reported and frequency of reporting:
See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reporting start date: See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Work Practice Standard:

Describe each: See the emission source's work practice requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Section F - Flue and Air Contaminant Emission

1. Estimated Atmospheric Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		**	**	**
PM ₁₀		**	**	**
SO _x				
CO				
NO _x				
VOC		**	**	**
Others: (e.g., HAPs)	-----	-----	-----	-----
PM _{2.5}		**	**	**
HAPs		**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number Z203

List Source(s) or source ID exhausted to this stack:
203

% of flow exhausted to stack: 100%

Stack height above grade (ft.) 71
Grade elevation (ft.) 795

Stack diameter (ft) or Outlet duct area (sq. ft.)
36.74 ft

f. Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.

~200 ft

Does stack height meet Good Engineering Practice (GEP)?

Yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
Z203 (Cells 1 & 2)	40	40	17.04	80	20	22.2
Z203 (Cells 3 & 4)	40	40	17.4	80	20	21.48
Z203 (Cells 5 & 6)	40	40	17.76	80	20	21.12
Z203 (Cells 7 & 8)	40	40	18.12	80	20	20.4
Z203 (Cells 9 & 10)	40	40	18.48	80	20	20.04
Z203 (Cells 11 & 12)	40	40	18.84	80	20	19.32
Z203 (Cells 13 & 14)	40	40	19.2	80	20	18.96
Z203 (Cells 15 & 16)	40	40	19.56	80	20	18.24
Z203 (Cells 17 & 18)	40	40	19.92	80	20	17.88
Z203 (Cells 19 & 20)	40	40	20.28	80	20	17.16
Z203 (Cells 21 & 22)	40	40	21	80	20	16.08
Z203 (Cells 23 & 24)	40	40	21.36	80	20	15.72
Z203 (Cells 25 & 26)	40	40	21.36	80	20	15.36
Stack exhaust Volume <u>1,644,834</u> ACFM Temperature <u>71</u> °F Moisture <u>NA</u> %						
Indicate on an attached sheet the location of sampling ports with respect to exhaust fan, breeching, etc. Give all necessary dimensions. NA						
Exhauster (attach fan curves) _____ in. of water _____ HP @ _____ RPM.						
** If the data and collection method codes differ from those provided on the General Information Form-Authorization Application, provide the additional detail required by that form on a separate form.						



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 04-00740C [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 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 and electrical conductivity 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.			
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.



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 (NESHAP Subpart YY - Process Cooling Tower)
☒	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	☒ 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 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)].			
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)].			

SECTION E. REPORTING

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

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

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).



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	G06 (NESHAP Subpart XX - Process Cooling Tower)
☒	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 (e), 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.

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(a) through (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)].

Section B - Processes Information

1. Source Information

Source Description (give type, use, raw materials, product, etc). Attach additional sheets as necessary.

An MPGF header that receives vent streams from the CVTO Header System when the CVTO is unavailable and directs the vent streams to the MPGF for combustion. Shell proposes to reference this MPGF header as the MPGF CVTO Trip Header in the plan approval under a separate Source ID. This is currently part of Source IDs 204 and C204. The CVTO Header System receives vent streams from the three polyethylene manufacturing units and specific storage tanks at SPM. Therefore, the MPGF CVTO Trip Header will receive the same vent streams from the CVTO Header System when the CVTO is unavailable.

Manufacturer NA	Model No. NA	Number of Sources 1
Source Designation	Maximum Capacity 3.49 tph VOC	Rated Capacity

Type of Material Processed
Waste gas

Maximum Operating Schedule

Hours/Day	Days/Week	Days/Year	Hours/Year 336

Operational restrictions existing or requested, if any (e.g., bottlenecks or voluntary restrictions to limit PTE)

Capacity (specify units)

Per Hour 3.49 tph VOC	Per Day	Per Week	Per Year

Operating Schedule

Hours/Day	Days/Week	Days/Year	Hours/Year 336

Seasonal variations (Months) From to

If variations exist, describe them

2. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Gas (other)	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Coal	TPH	Tons	% by wt		Btu/lb
Other *					

*Note: Describe and furnish information separately for other fuels in Addendum B.

Section B - Processes Information (Continued)

3. Burner

Manufacturer	Type and Model No.	Number of Burners
Description:		
Rated Capacity		Maximum Capacity

4. Process Storage Vessels

A. For Liquids:

Name of material stored		
Tank I.D. No.	Manufacturer	Date Installed
Maximum Pressure		Capacity (gallons/Meter ³)
Type of relief device (pressure set vent/conservation vent/emergency vent/open vent)		
Relief valve/vent set pressure (psig)		Vapor press. of liquid at storage temp. (psia/kPa)
Type of Roof: Describe:		
Total Throughput Per Year		Number of fills per day (fill/day): Filling Rate (gal./min.): Duration of fill hr./fill):

B. For Solids

Type: ☐ Silo ☐ Storage Bin ☐ Other, Describe		Name of Material Stored
Silo/Storage Bin I.D. No.	Manufacturer	Date Installed
State whether the material will be stored in loose or bags in silos		Capacity (Tons)
Turn over per year in tons		Turn over per day in tons
Describe fugitive dust control system for loading and handling operations		
Describe material handling system		

5. Request for Confidentiality

Do you request any information on this application to be treated as "Confidential"? ☐ Yes ☒ No
 If yes, include justification for confidentiality. Place such information on separate pages marked "confidential".

Section B - Processes Information (Continued)

6. Miscellaneous Information

Attach flow diagram of process 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 hoods location, design, airflow and capture efficiency. Describe any restriction requested and how it will be monitored.

See Appendix C – Process Flow Diagrams in this submittal for a quick reference to flow diagrams for SPM's processes and VOC control systems. The remaining information (raw materials, rates, etc.) is available in the potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal. Shell is not requesting restrictions on SPM's production capacity.

Describe fully the facilities provided to monitor and to record process operating conditions, which may affect the emission of air contaminants. Show that they are reasonable and adequate.

See the emission source's monitoring and recordkeeping requirements in the attached Addendum 1 – Method of Compliance Worksheet.

Describe each proposed modification to an existing source.

NA

Identify and describe all fugitive emission points, all relief and emergency valves and any by-pass stacks.

NA

Describe how emissions will be minimized especially during start up, shut down, process upsets and/or disruptions.

NA

Anticipated Milestones:

- i. Expected commencement date of construction/reconstruction/installation: NA
- ii. Expected completion date of construction/reconstruction/installation: NA
- iii. Anticipated date of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions*

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM					
PM ₁₀					
SO _x					
CO					
NO _x					
VOC		6980			**
Others: (e.g., HAPs)	-----	-----	-----	-----	-----
HAPs		1			**

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Gas Cooling NA

Water quenching ☐ Yes ☐ No Water injection rate _____ GPM

Radiation and convection cooling

☐ Yes ☐ No

Air dilution ☐ Yes ☐ No

If yes, _____ CFM

Forced Draft ☐ Yes ☐ No

Water cooled duct work ☐ Yes ☐ No

Other

Inlet Volume _____ ACFM

@ _____ °F _____ % Moisture

Outlet Volume _____ ACFM

@ _____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Settling Chambers NA			
Manufacturer		Volume of gas handled _____ACFM @_____°F	Gas velocity (ft/sec.)
Length of chamber (ft.)	Width of chamber (ft.)	Height of chamber (ft.)	Number of trays
Water injection ☐ Yes ☐ No		Water injection rate (GPM)	
Emissions Data			
Inlet	Outlet	Removal Efficiency (%)	
4. Inertial and Cyclone Collectors NA			
Manufacturer		Type	Model No.
Pressure drop (in. of water)		Inlet volume _____ACFM @_____°F	Outlet volume _____ACFM @_____°F
Number of individual cyclone(s)		Outlet straightening vanes used? ☐ Yes ☐ No	
Length of Cyclone(s) Cylinder (ft.)	Diameter of Cyclone(s) Cylinder (ft.)	Length of Cyclone(s) cone (ft.)	
Inlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)		Outlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)	
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?			
Describe any exhaust gas recirculation loop to be employed.			
Attach particle size efficiency curve			
Emissions Data			
Inlet	Outlet	Removal Efficiency (%)	

Section C - Air Cleaning Device (Continued)

5. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No.		☐ Pressurized Design ☐ Suction Design
Number of Compartments	Number of Filters Per Compartment	Is Baghouse Insulated?		
		☐ Yes ☐ No		
Can each compartment be isolated for repairs and/or filter replacement?				☐ Yes ☐ No
Are temperature controls provided? (Describe in detail)				☐ Yes ☐ No
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM		
Type of Fabric Material _____ ☐ Felted ☐ Membrane Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____ Thickness _____ in ☐ Felted-Woven				
Fabric permeability (clean) @ ½" water-Δ P _____ CFM/sq.ft.				
Filter dimensions Length _____ Diameter/Width _____				
Effective area per filter _____			Maximum operating temperature (°F) _____	
Effective air to cloth ratio Minimum _____ Maximum _____				
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.				
Operation and Cleaning				
Volume of gases handled _____ ACFM @ _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.		
Type of filter cleaning ☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets ☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____ ☐ Pneumatic Shakers ☐ Reverse Air Flow				
Describe the equipment provided if dry oil free air is required for collector operation				
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____				
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.				
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.				
Emissions Data				
Pollutant	Inlet	Outlet	Removal Efficiency (%)	

Section C - Air Cleaning Device (Continued)			
6. Wet Collection Equipment NA			
Equipment Specifications			
Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)	Relative Particulate/Gas Velocity (ejector scrubbers only)		
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).			
Describe pH monitoring and pH adjustment systems, if applicable.			
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).			
Attach particulate size efficiency curve.			
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F		Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture	
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)			
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.)			
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Electrostatic Precipitator NA

Equipment Specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ Yes ☐ No		Design Inlet Volume (SCFM) _____	
		Maximum operating temperature (°F) _____	
Total collecting surface area _____ sq. ft.		Collector plates size length _____ ft. x width _____ ft.	
Number of fields _____		Number of collector plates/field _____	
Spacing between collector plates _____ inches.			
Maximum gas velocity _____ ft./sec.		Minimum gas treatment time: _____ sec.	
Total discharge electrode length _____ ft.			
Number of discharge electrodes _____		Number of collecting electrode rappers _____	
Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____ Describe in detail			

Operating Parameters

Inlet gas temperature (°F) _____	State pressure drop range (inches water gauge) across collector only _____
Outlet gas temperature (°F) _____	Describe the equipment
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field			
Field No.	No. of Sets	Each Transformer KVA	Each Rectifier KV Ave./Peak Ma DC
Current Density _____ Micro amperes/ft ² .	Corona Power _____ Watts/1000 ACFM	Corona Power Density _____ Watts/ft ² .	
Will a flue gas conditioning system be employed? If yes, describe it.			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
8. Adsorption Equipment NA			
Equipment Specifications			
Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)	Adsorbent charge per adsorber vessel and number of adsorber vessels		
Length of Mass Transfer Zone (MTZ), supplied by the manufacturer based upon laboratory data.			
Adsorber diameter (ft.) and area ft ² .)	Adsorption bed depth (ft.)		
Adsorbent information			
Adsorbent type and physical properties.			
Working capacity of adsorbent (%)	Heel percent or unrecoverable solvent weight % in the adsorbent after regeneration.		
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F			
Adsorption time per adsorption bed	Breakthrough capacity: Lbs. of solvent / 100 lbs. of adsorbent = _____		
Vapor pressure of solvents at the inlet temperature	Available steam in pounds to regenerate carbon adsorber (if applicable)		
Percent relative saturation of each solvent at the inlet temperature			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
9. Absorption Equipment NA			
Equipment Specifications			
Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)		Tower height (ft.) and inside diameter (ft.)	
Packing type and size (if applicable)		Height of packing (ft.) (if applicable)	
Number of trays (if applicable)		Number of bubble caps (if applicable)	
Configuration ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls.			
Absorbent information			
Absorbent type and concentration.		Retention time (sec.)	
Attach equilibrium data for absorption (if applicable)			
Attach any additional information regarding auxiliary equipment, absorption solution supply system (once through or recirculating, system capacity, etc.) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating Parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in. of water) and liquid flow rate. Describe the monitoring equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. ☐ Selective Catalytic Reduction (SCR)
☐ Selective Non-Catalytic Reduction (SNCR)
☐ Non-Selective Catalytic Reduction (NSCR)

Equipment Specifications

Manufacturer	Type	Model No.
Design Inlet Volume (SCFM)		Design operating temperature (°F)
Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.		
Attach efficiency and other pertinent information (e.g., ammonia slip)		

Operating Parameters

Volume of gases handled _____ (ACFM) @ _____ °F	
Operating temperature range for the SCR/SNCR/NSCR system (°F) From _____ °F To _____ °F	
Reducing agent used, if any	Oxidation catalyst used, if any
State expected range of usage rate and concentration.	
Service life of catalyst	Ammonia slip (ppm)
Describe fully with a sketch giving locations of equipment, controls systems, important parameters and method of operation.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.	

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

11. Oxidizer/Afterburners NA

Equipment Specifications

Manufacturer	Type ☐ Thermal ☐ Catalytic	Model No.	
Design Inlet Volume (SCFM)	Combustion chamber dimensions (length, cross-sectional area, effective chamber volume, etc.)		
Describe design features, which will ensure mixing in combustion chamber.			
Describe method of preheating incoming gases (if applicable).		Describe heat exchanger system used for heat recovery (if applicable).	
Catalyst used	Life of catalyst	Expected temperature rise across catalyst (°F)	Dimensions of bed (in inches). Height: _____ Diameter or Width: _____ Depth: _____
Are temperature sensing devices being provided to measure the temperature rise across the catalyst? ☐ Yes ☐ No If yes, describe.			
Describe any temperature sensing and/or recording devices (including specific location of temperature probe in a drawing or sketch).			
Burner Information			
Burner Manufacturer	Model No.		Fuel Used
Number and capacity of burners	Rated capacity (each)		Maximum capacity (each)
Describe the operation of the burner		Attach dimensioned diagram of afterburner	
Operating Parameters			
Inlet flow rate (ACFM) _____ @ _____ °F		Outlet flow rate (ACFM) _____ @ _____ °F	
State pressure drop range across catalytic bed (in. of water).		Describe the method adopted for regeneration or disposal of the used catalyst.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

12. Flares MPGF (Source ID C204B)

Equipment Specifications

Manufacturer Zeeco	Type ☐ Elevated flare ☒ Ground flare ☐ Other _____ Describe	Model No. AFDS-6/24 / AFTA-8/18	
Design Volume (SCFM) NA	Dimensions of stack (ft.) Diameter <u>NA</u> Height <u>NA</u>		
Residence time (sec.) and outlet temperature (°F) NA	Turn down ratio NA	Burner details Zeeco proprietary	
Describe the flare design (air/steam-assisted or nonassisted), essential auxiliaries including pilot flame monitor of proposed flare with a sketch. Perimeter air-assisted flare.			
Describe the operation of the flare's ignition system. See the emission source's requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.			
Describe the provisions to introduce auxiliary fuel to the flare. See the emission source's requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.			
Operation Parameters			
Detailed composition of the waste gas Varies as measured by gas chromatograph	Heat content Varies as measured by gas chromatograph or calorimeter	Exit velocity Varies	
Maximum and average gas flow burned (ACFM) Varies	Operating temperature (°F) Varies		
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements. Alarms are set on target NHV, presence of pilots, and exit velocity.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)
VOC/HAPs	See the source's potential to emit calculations in Appendix B – Potential Emissions Calculations in this submittal.	See the source's potential to emit calculations in Appendix B – Potential Emissions Calculations in this submittal	≥99% C3- VOC/HAPs; ≥98% C4+ VOC/HAPs

Section C - Air Cleaning Device (Continued)

13. Other Control Equipment NA

Equipment Specifications

Manufacturer	Type	Model No.	
Design Volume (SCFM)		Capacity	
Describe pH monitoring and pH adjustment, if any.			
Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.			
Attach efficiency curve and/or other efficiency information.			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Operation Parameters			
Volume of gas handled _____ ACFM @ _____ °F _____ % Moisture			
Describe fully giving important parameters and method of operation.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

14. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Annual Operating Cost

15. Miscellaneous

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

See previously referenced manufacturer's performance guarantee.

Attach the maintenance schedule for the control equipment and any part of the process equipment that if in disrepair would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if source is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below

- ☒ Monitoring
 ☒ Testing
 ☒ Reporting
☒ Recordkeeping
 ☒ Work Practice Standard

Monitoring:

- a. Monitoring device type (Parameter, CEM, etc): See the emission source's monitoring requirements in the attached Addendum 1 – Method of Compliance Worksheet.
- b. Monitoring device location: See the emission source's monitoring requirements in the attached Addendum 1 – Method of Compliance Worksheet.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter:
See the emission source's monitoring requirements in the attached Addendum 1 – Method of Compliance Worksheet.

Testing:

- a. Reference Test Method: Citation See the emission source's testing requirements in the attached Addendum 1 – Method of Compliance Worksheet.
- b. Reference Test Method: Description See the emission source's testing requirements in the attached Addendum 1 – Method of Compliance Worksheet.

Recordkeeping:

Describe what parameters will be recorded and the recording frequency:
See the emission source's recordkeeping requirements in the attached Addendum 1 – Method of Compliance Worksheet.

Reporting:

- a. Describe what is to be reported and frequency of reporting:
See the emission source's reporting requirements in the attached Addendum 1 – Method of Compliance Worksheet.
- b. Reporting start date: See the emission source's reporting requirements in the attached Addendum 1 – Method of Compliance Worksheet.

Work Practice Standard:

Describe each: See the emission source's work practice requirements in the attached Addendum 1 – Method of Compliance Worksheet.

Section F - Flue and Air Contaminant Emission

1. Estimated Atmospheric Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		**	**	**
PM ₁₀		**	**	**
SO _x		**	**	**
CO		**	**	**
NO _x		**	**	**
VOC		**	**	**
Others: (e.g., HAPs)	-----	-----	-----	-----
PM _{2.5}		**	**	**
HAPs		**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number S204B

List Source(s) or source ID exhausted to this stack:
C204B

% of flow exhausted to stack: 100%

Stack height above grade (ft.) NA
Grade elevation (ft.) 795

Stack diameter (ft) or Outlet duct area (sq. ft.)
NA

f. Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.

~190 ft

Does stack height meet Good Engineering Practice (GEP)?

Yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
S204B	40	40	22.8	80	20	11.04

Stack exhaust

Volume NA_____ ACFM

Temperature NA_____ °F

Moisture NA %

Indicate on an attached sheet the location of sampling ports with respect to exhaust fan, breeching, etc. Give all necessary dimensions.

NA

Exhauster (attach fan curves)_____ in. of water_____ HP @_____RPM.

** If the data and collection method codes differ from those provided on the General Information Form-Authorization Application, provide the additional detail required by that form on a separate form.



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	MPFG CVTO Trip Header
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740C [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 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 for the MPGF, 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 MPFG CVTO Trip 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 MPFG 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 with the MPGF. Continuously monitoring fan speed or power and using fan curves is an acceptable method for continuously monitoring assist air flow rates at the MPGF.			
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 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 and MPGF Systems 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 and MPGF Systems 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 and MPGF Systems 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. 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 analyses 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, 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.



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	MPFG CVTO Trip Header
☐	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 Part 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).



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	MPFG CVTO Trip Header
☐	Alternative Operating Scenario	Scenario Name	
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. 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)].			
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. [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.

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)].

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 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)].

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	G05 (NESHAP Subpart YY - MPFG CVTO Trip Header)
☒	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	☒ 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. 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)].			
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.			
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)].			

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)].

SECTION E. REPORTING

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

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 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).



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	G08 (NESHAP Subpart SS - MPFG CVTO Trip Header)
☒	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	☒ 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. 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)].			
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.

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.

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). [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)].

Section B - Processes Information

1. Source Information

Source Description (give type, use, raw materials, product, etc). Attach additional sheets as necessary.

An MPGF header that is used to route intermittent vent streams from the Refrigerated Ethylene Storage Tank and ethylene gas recovery system to the MPGF for combustion. Shell proposes to reference this MPGF header as the MPGF Ethylene Tank Header in the plan approval under a separate Source ID. This is currently part of Source IDs 204 and C204.

Manufacturer NA	Model No. NA	Number of Sources 1
Source Designation	Maximum Capacity 0.45 tph VOC	Rated Capacity

Type of Material Processed
Waste gas

Maximum Operating Schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Operational restrictions existing or requested, if any (e.g., bottlenecks or voluntary restrictions to limit PTE)

Capacity (specify units)

Per Hour 0.45 tph VOC	Per Day	Per Week	Per Year

Operating Schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Seasonal variations (Months) From to

If variations exist, describe them

2. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Gas (other)	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Coal	TPH	Tons	% by wt		Btu/lb
Other *					

*Note: Describe and furnish information separately for other fuels in Addendum B.

Section B - Processes Information (Continued)

3. Burner

Manufacturer	Type and Model No.	Number of Burners
Description:		
Rated Capacity	Maximum Capacity	

4. Process Storage Vessels

A. For Liquids:

Name of material stored		
Tank I.D. No.	Manufacturer	Date Installed
Maximum Pressure	Capacity (gallons/Meter ³)	
Type of relief device (pressure set vent/conservation vent/emergency vent/open vent)		
Relief valve/vent set pressure (psig)	Vapor press. of liquid at storage temp. (psia/kPa)	
Type of Roof: Describe:		
Total Throughput Per Year	Number of fills per day (fill/day): Filling Rate (gal./min.): Duration of fill hr./fill):	

B. For Solids

Type: ☐ Silo ☐ Storage Bin ☐ Other, Describe		Name of Material Stored
Silo/Storage Bin I.D. No.	Manufacturer	Date Installed
State whether the material will be stored in loose or bags in silos		Capacity (Tons)
Turn over per year in tons		Turn over per day in tons
Describe fugitive dust control system for loading and handling operations		
Describe material handling system		

5. Request for Confidentiality

Do you request any information on this application to be treated as "Confidential"? ☐ Yes ☒ No
 If yes, include justification for confidentiality. Place such information on separate pages marked "confidential".

Section B - Processes Information (Continued)

6. Miscellaneous Information

Attach flow diagram of process 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 hoods location, design, airflow and capture efficiency. Describe any restriction requested and how it will be monitored.

See Appendix C – Process Flow Diagrams in this submittal for a quick reference to flow diagrams for SPM's processes and VOC control systems. The remaining information (raw materials, rates, etc.) is available in the potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal. Shell is not requesting restrictions on SPM's production capacity.

Describe fully the facilities provided to monitor and to record process operating conditions, which may affect the emission of air contaminants. Show that they are reasonable and adequate.

See the emission source's monitoring and recordkeeping requirements in the attached Addendum 1 – Method of Compliance Worksheet.

Describe each proposed modification to an existing source.

NA

Identify and describe all fugitive emission points, all relief and emergency valves and any by-pass stacks.

NA

Describe how emissions will be minimized especially during start up, shut down, process upsets and/or disruptions.

NA

Anticipated Milestones:

- i. Expected commencement date of construction/reconstruction/installation: NA
- ii. Expected completion date of construction/reconstruction/installation: NA
- iii. Anticipated date of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions*

Pollutant	Maximum Emission Rate			Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year
PM				
PM ₁₀				
SO _x				
CO				
NO _x				
VOC		900		
Others: (e.g., HAPs)	-----	-----	-----	-----

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Gas Cooling NA

Water quenching ☐ Yes ☐ No Water injection rate _____ GPM

Radiation and convection cooling

☐ Yes ☐ No

Air dilution ☐ Yes ☐ No

If yes, _____ CFM

Forced Draft ☐ Yes ☐ No

Water cooled duct work ☐ Yes ☐ No

Other

Inlet Volume _____ ACFM

@ _____ °F _____ % Moisture

Outlet Volume _____ ACFM

@ _____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Settling Chambers NA			
Manufacturer		Volume of gas handled _____ACFM @_____°F	Gas velocity (ft/sec.)
Length of chamber (ft.)	Width of chamber (ft.)	Height of chamber (ft.)	Number of trays
Water injection ☐ Yes ☐ No		Water injection rate (GPM)	
Emissions Data			
Inlet	Outlet		Removal Efficiency (%)
4. Inertial and Cyclone Collectors NA			
Manufacturer		Type	Model No.
Pressure drop (in. of water)		Inlet volume _____ACFM @_____°F	Outlet volume _____ACFM @_____°F
Number of individual cyclone(s)		Outlet straightening vanes used? ☐ Yes ☐ No	
Length of Cyclone(s) Cylinder (ft.)	Diameter of Cyclone(s) Cylinder (ft.)	Length of Cyclone(s) cone (ft.)	
Inlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)		Outlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)	
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?			
Describe any exhaust gas recirculation loop to be employed.			
Attach particle size efficiency curve			
Emissions Data			
Inlet	Outlet		Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No. ☐ Pressurized Design ☐ Suction Design	
Number of Compartments	Number of Filters Per Compartment	Is Baghouse Insulated? ☐ Yes ☐ No	
Can each compartment be isolated for repairs and/or filter replacement? ☐ Yes ☐ No			
Are temperature controls provided? (Describe in detail) ☐ Yes ☐ No			
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM	
Type of Fabric Material _____ ☐ Felted ☐ Membrane Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____ Thickness _____ in ☐ Felted-Woven			
Fabric permeability (clean) @ ½" water-Δ P _____ CFM/sq.ft.			
Filter dimensions Length _____ Diameter/Width _____			
Effective area per filter _____		Maximum operating temperature (°F) _____	
Effective air to cloth ratio Minimum _____ Maximum _____			
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.			
Operation and Cleaning			
Volume of gases handled _____ ACFM @ _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.	
Type of filter cleaning ☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets ☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____ ☐ Pneumatic Shakers ☐ Reverse Air Flow			
Describe the equipment provided if dry oil free air is required for collector operation			
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
6. Wet Collection Equipment NA			
Equipment Specifications			
Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)	Relative Particulate/Gas Velocity (ejector scrubbers only)		
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).			
Describe pH monitoring and pH adjustment systems, if applicable.			
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).			
Attach particulate size efficiency curve.			
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F		Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture	
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)			
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.)			
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Electrostatic Precipitator NA

Equipment Specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ Yes ☐ No		Design Inlet Volume (SCFM) _____ Maximum operating temperature (°F) _____	
Total collecting surface area _____ sq. ft.		Collector plates size length _____ ft. x width _____ ft.	
Number of fields _____		Number of collector plates/field _____	
Spacing between collector plates _____ inches.			
Maximum gas velocity _____ ft./sec.		Minimum gas treatment time: _____ sec.	
Total discharge electrode length _____ ft.			
Number of discharge electrodes _____		Number of collecting electrode rappers _____	
Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____ Describe in detail			

Operating Parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (inches water gauge) across collector only _____ Describe the equipment
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field			
Field No.	No. of Sets	Each Transformer KVA	Each Rectifier KV Ave./Peak Ma DC
Current Density _____ Micro amperes/ft ² .		Corona Power _____ Watts/1000 ACFM	Corona Power Density _____ Watts/ft ² .
Will a flue gas conditioning system be employed? If yes, describe it.			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
8. Adsorption Equipment NA			
Equipment Specifications			
Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)	Adsorbent charge per adsorber vessel and number of adsorber vessels		
Length of Mass Transfer Zone (MTZ), supplied by the manufacturer based upon laboratory data.			
Adsorber diameter (ft.) and area ft ² .)	Adsorption bed depth (ft.)		
Adsorbent information			
Adsorbent type and physical properties.			
Working capacity of adsorbent (%)	Heel percent or unrecoverable solvent weight % in the adsorbent after regeneration.		
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F			
Adsorption time per adsorption bed	Breakthrough capacity: Lbs. of solvent / 100 lbs. of adsorbent = _____		
Vapor pressure of solvents at the inlet temperature	Available steam in pounds to regenerate carbon adsorber (if applicable)		
Percent relative saturation of each solvent at the inlet temperature			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
9. Absorption Equipment NA			
Equipment Specifications			
Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)		Tower height (ft.) and inside diameter (ft.)	
Packing type and size (if applicable)		Height of packing (ft.) (if applicable)	
Number of trays (if applicable)		Number of bubble caps (if applicable)	
Configuration ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls.			
Absorbent information			
Absorbent type and concentration.		Retention time (sec.)	
Attach equilibrium data for absorption (if applicable)			
Attach any additional information regarding auxiliary equipment, absorption solution supply system (once through or recirculating, system capacity, etc.) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating Parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in. of water) and liquid flow rate. Describe the monitoring equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. ☐ Selective Catalytic Reduction (SCR)
☐ Selective Non-Catalytic Reduction (SNCR)
☐ Non-Selective Catalytic Reduction (NSCR)

Equipment Specifications

Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)	Design operating temperature (°F)		
Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.			
Attach efficiency and other pertinent information (e.g., ammonia slip)			
Operating Parameters			
Volume of gases handled _____ (ACFM) @ _____ °F			
Operating temperature range for the SCR/SNCR/NSCR system (°F) From _____ °F To _____ °F			
Reducing agent used, if any	Oxidation catalyst used, if any		
State expected range of usage rate and concentration.			
Service life of catalyst	Ammonia slip (ppm)		
Describe fully with a sketch giving locations of equipment, controls systems, important parameters and method of operation.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

11. Oxidizer/Afterburners NA

Equipment Specifications

Manufacturer	Type ☐ Thermal ☐ Catalytic	Model No.	
Design Inlet Volume (SCFM)	Combustion chamber dimensions (length, cross-sectional area, effective chamber volume, etc.)		
Describe design features, which will ensure mixing in combustion chamber.			
Describe method of preheating incoming gases (if applicable).		Describe heat exchanger system used for heat recovery (if applicable).	
Catalyst used	Life of catalyst	Expected temperature rise across catalyst (°F)	Dimensions of bed (in inches). Height: _____ Diameter or Width: _____ Depth: _____
Are temperature sensing devices being provided to measure the temperature rise across the catalyst? ☐ Yes ☐ No If yes, describe.			
Describe any temperature sensing and/or recording devices (including specific location of temperature probe in a drawing or sketch).			
Burner Information			
Burner Manufacturer	Model No.		Fuel Used
Number and capacity of burners	Rated capacity (each)		Maximum capacity (each)
Describe the operation of the burner		Attach dimensioned diagram of afterburner	
Operating Parameters			
Inlet flow rate (ACFM) _____ @ _____ °F		Outlet flow rate (ACFM) _____ @ _____ °F	
State pressure drop range across catalytic bed (in. of water).		Describe the method adopted for regeneration or disposal of the used catalyst.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

12. Flares MPGF (Source ID C204B)

Equipment Specifications

Manufacturer Zeeco	Type ☐ Elevated flare ☒ Ground flare ☐ Other _____ Describe	Model No. AFDS-6/24 / AFTA-8/18	
Design Volume (SCFM) NA	Dimensions of stack (ft.) Diameter _____ NA Height _____ NA		
Residence time (sec.) and outlet temperature (°F) NA	Turn down ratio NA	Burner details Zeeco proprietary	
Describe the flare design (air/steam-assisted or nonassisted), essential auxiliaries including pilot flame monitor of proposed flare with a sketch. Perimeter air-assisted flare.			
Describe the operation of the flare's ignition system. See the emission source's requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.			
Describe the provisions to introduce auxiliary fuel to the flare. See the emission source's requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.			
Operation Parameters			
Detailed composition of the waste gas Varies as measured by gas chromatograph	Heat content Varies as measured by gas chromatograph or calorimeter	Exit velocity Varies	
Maximum and average gas flow burned (ACFM) Varies	Operating temperature (°F) Varies		
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements. Alarms set on target NHV, presence of pilots, and exit velocity.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)
VOC	See the source's potential to emit calculations in Appendix B – Potential Emissions Calculations in this submittal.	See the source's potential to emit calculations in Appendix B – Potential Emissions Calculations in this submittal.	≥99% C3- VOC; ≥98% C4+ VOC

Section C - Air Cleaning Device (Continued)

13. Other Control Equipment NA

Equipment Specifications

Manufacturer	Type	Model No.	
Design Volume (SCFM)		Capacity	
Describe pH monitoring and pH adjustment, if any.			
Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.			
Attach efficiency curve and/or other efficiency information.			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Operation Parameters			
Volume of gas handled _____ ACFM @ _____ °F _____ % Moisture			
Describe fully giving important parameters and method of operation.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

14. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Annual Operating Cost

15. Miscellaneous

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

See the previously referenced manufacturer's performance guarantees.

Attach the maintenance schedule for the control equipment and any part of the process equipment that if in disrepair would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if source is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below

☒ Monitoring	☒ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (Parameter, CEM, etc): See the emission source's monitoring requirements in the attached Addendum 1 – Method of Compliance Worksheet.
- b. Monitoring device location: See the emission source's monitoring requirements in the attached Addendum 1 – Method of Compliance Worksheet.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter:
See the emission source's monitoring requirements in the attached Addendum 1 – Method of Compliance Worksheet.

Testing:

- a. Reference Test Method: Citation See the emission source's testing requirements in the attached Addendum 1 – Method of Compliance Worksheet.
- b. Reference Test Method: Description See the emission source's testing requirements in the attached Addendum 1 – Method of Compliance Worksheet.

Recordkeeping:

Describe what parameters will be recorded and the recording frequency:
See the emission source's recordkeeping requirements in the attached Addendum 1 – Method of Compliance Worksheet.

Reporting:

- a. Describe what is to be reported and frequency of reporting:
See the emission source's reporting requirements in the attached Addendum 1 – Method of Compliance Worksheet.
- b. Reporting start date: See the emission source's reporting requirements in the attached Addendum 1 – Method of Compliance Worksheet.

Work Practice Standard:

Describe each: See the emission source's work practice requirements in the attached Addendum 1 – Method of Compliance Worksheet.

Section F - Flue and Air Contaminant Emission

1. Estimated Atmospheric Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM	**	**	**	**
PM ₁₀	**	**	**	**
SO _x	**	**	**	**
CO	**	**	**	**
NO _x	**	**	**	**
VOC	**	**	**	**
Others: (e.g., HAPs)	-----	-----	-----	-----
PM _{2.5}	**	**	**	**
HAPs	**	**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number S204B

List Source(s) or source ID exhausted to this stack:
C204B

% of flow exhausted to stack: 100%

Stack height above grade (ft.) NA
Grade elevation (ft.) 795

Stack diameter (ft) or Outlet duct area (sq. ft.)
NA

f. Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.

~190 ft

Does stack height meet Good Engineering Practice (GEP)?

Yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
S204B	40	40	22.8	80	20	11.04

Stack exhaust

Volume NA ACFM

Temperature NA °F

Moisture NA %

Indicate on an attached sheet the location of sampling ports with respect to exhaust fan, breeching, etc. Give all necessary dimensions.

NA

Exhauster (attach fan curves)_____ in. of water_____ HP @_____RPM.

** If the data and collection method codes differ from those provided on the General Information Form-Authorization Application, provide the additional detail required by that form on a separate form.



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	MPGF Ethylene Tank Header
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740C [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 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 for the MPGF, 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 Ethylene Tank Header shall be calculated and recorded at a minimum of once every 15 minutes based on the volumetric flow rates of the waste gas and supplemental gas in the header and the compositions of the waste gas and supplemental gas. Engineering knowledge can be used to estimate the composition of the waste gas and the composition and volumetric flow rate of the supplemental 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 with the MPGF. Continuously monitoring fan speed or power and using fan curves is an acceptable method for continuously monitoring assist air flow rates at the MPGF.			
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 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 and MPGF Systems 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 and MPGF Systems 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 and MPGF Systems 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. 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 analyses 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, 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.



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	MPGF Ethylene Tank Header
☐	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.			
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	MPGF Ethylene Tank Header
☐	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	☐ 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. 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?	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).			

Section B - Processes Information

1. Source Information

Source Description (give type, use, raw materials, product, etc). Attach additional sheets as necessary.

An MPGF header that is used to periodically route vent streams from PE Units 1 and 2 to the MPGF for combustion. Shell proposes to reference this MPGF header as the MPGF PE Units 1/2 Episodic Vent Header in the plan approval under a separate Source ID. This is currently part of Source IDs 204 and C204. A sweep gas stream routinely flows through the MPGF PE Units 1/2 Episodic Vent Header.

Manufacturer NA	Model No. NA	Number of Sources 1
Source Designation	Maximum Capacity 6.5 tph VOC	Rated Capacity

Type of Material Processed
Waste gas

Maximum Operating Schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Operational restrictions existing or requested, if any (e.g., bottlenecks or voluntary restrictions to limit PTE)

Capacity (specify units)

Per Hour 6.5 tph VOC	Per Day	Per Week	Per Year

Operating Schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Seasonal variations (Months) From to

If variations exist, describe them

2. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Gas (other)	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Coal	TPH	Tons	% by wt		Btu/lb
Other *					

*Note: Describe and furnish information separately for other fuels in Addendum B.

Section B - Processes Information (Continued)

3. Burner

Manufacturer	Type and Model No.	Number of Burners
Description:		
Rated Capacity		Maximum Capacity

4. Process Storage Vessels

A. For Liquids:

Name of material stored		
Tank I.D. No.	Manufacturer	Date Installed
Maximum Pressure		Capacity (gallons/Meter ³)
Type of relief device (pressure set vent/conservation vent/emergency vent/open vent)		
Relief valve/vent set pressure (psig)		Vapor press. of liquid at storage temp. (psia/kPa)
Type of Roof: Describe:		
Total Throughput Per Year		Number of fills per day (fill/day): Filling Rate (gal./min.): Duration of fill hr./fill):

B. For Solids

Type: ☐ Silo ☐ Storage Bin ☐ Other, Describe		Name of Material Stored
Silo/Storage Bin I.D. No.	Manufacturer	Date Installed
State whether the material will be stored in loose or bags in silos		Capacity (Tons)
Turn over per year in tons		Turn over per day in tons
Describe fugitive dust control system for loading and handling operations		
Describe material handling system		

5. Request for Confidentiality

Do you request any information on this application to be treated as "Confidential"? ☐ Yes ☒ No
 If yes, include justification for confidentiality. Place such information on separate pages marked "confidential".

Section B - Processes Information (Continued)

6. Miscellaneous Information

Attach flow diagram of process 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 hoods location, design, airflow and capture efficiency. Describe any restriction requested and how it will be monitored.

See Appendix C – Process Flow Diagrams in this submittal for a quick reference to flow diagrams for SPM's processes and VOC control systems. The remaining information (raw materials, rates, etc.) is available in the potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal. Shell is not requesting restrictions on SPM's production capacity.

Describe fully the facilities provided to monitor and to record process operating conditions, which may affect the emission of air contaminants. Show that they are reasonable and adequate.

See the emission source's monitoring and recordkeeping requirements in the attached Addendum 1 – Method of Compliance Worksheet.

Describe each proposed modification to an existing source.

NA

Identify and describe all fugitive emission points, all relief and emergency valves and any by-pass stacks.

NA

Describe how emissions will be minimized especially during start up, shut down, process upsets and/or disruptions.

NA

Anticipated Milestones:

- i. Expected commencement date of construction/reconstruction/installation: NA
- ii. Expected completion date of construction/reconstruction/installation: NA
- iii. Anticipated date of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions*

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM					
PM ₁₀					
SO _x					
CO					
NO _x					
VOC		13,000			**
Others: (e.g., HAPs)	-----	-----	-----	-----	-----

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Gas Cooling NA

Water quenching ☐ Yes ☐ No Water injection rate _____ GPM

Radiation and convection cooling

☐ Yes ☐ No

Air dilution ☐ Yes ☐ No

If yes, _____ CFM

Forced Draft ☐ Yes ☐ No

Water cooled duct work ☐ Yes ☐ No

Other

Inlet Volume _____ ACFM

@ _____ °F _____ % Moisture

Outlet Volume _____ ACFM

@ _____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Settling Chambers NA			
Manufacturer		Volume of gas handled _____ACFM @_____°F	Gas velocity (ft/sec.)
Length of chamber (ft.)	Width of chamber (ft.)	Height of chamber (ft.)	Number of trays
Water injection ☐ Yes ☐ No		Water injection rate (GPM)	
Emissions Data			
Inlet	Outlet	Removal Efficiency (%)	
4. Inertial and Cyclone Collectors NA			
Manufacturer		Type	Model No.
Pressure drop (in. of water)		Inlet volume _____ACFM @_____°F	Outlet volume _____ACFM @_____°F
Number of individual cyclone(s)		Outlet straightening vanes used? ☐ Yes ☐ No	
Length of Cyclone(s) Cylinder (ft.)	Diameter of Cyclone(s) Cylinder (ft.)	Length of Cyclone(s) cone (ft.)	
Inlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)		Outlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)	
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?			
Describe any exhaust gas recirculation loop to be employed.			
Attach particle size efficiency curve			
Emissions Data			
Inlet	Outlet	Removal Efficiency (%)	

Section C - Air Cleaning Device (Continued)

5. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No. ☐ Pressurized Design ☐ Suction Design	
Number of Compartments	Number of Filters Per Compartment	Is Baghouse Insulated? ☐ Yes ☐ No	
Can each compartment be isolated for repairs and/or filter replacement? ☐ Yes ☐ No			
Are temperature controls provided? (Describe in detail) ☐ Yes ☐ No			
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM	
Type of Fabric Material _____ ☐ Felted ☐ Membrane Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____ Thickness _____ in ☐ Felted-Woven			
Fabric permeability (clean) @ ½" water-Δ P _____ CFM/sq.ft.			
Filter dimensions Length _____ Diameter/Width _____			
Effective area per filter _____		Maximum operating temperature (°F) _____	
Effective air to cloth ratio Minimum _____ Maximum _____			
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.			
Operation and Cleaning			
Volume of gases handled _____ ACFM @ _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.	
Type of filter cleaning ☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets ☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____ ☐ Pneumatic Shakers ☐ Reverse Air Flow			
Describe the equipment provided if dry oil free air is required for collector operation			
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
6. Wet Collection Equipment NA			
Equipment Specifications			
Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)	Relative Particulate/Gas Velocity (ejector scrubbers only)		
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).			
Describe pH monitoring and pH adjustment systems, if applicable.			
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).			
Attach particulate size efficiency curve.			
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F		Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture	
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)			
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.)			
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Electrostatic Precipitator NA

Equipment Specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ Yes ☐ No		Design Inlet Volume (SCFM) _____	
		Maximum operating temperature (°F) _____	
Total collecting surface area _____ sq. ft.		Collector plates size length _____ ft. x width _____ ft.	
Number of fields _____		Number of collector plates/field _____	
Spacing between collector plates _____ inches.			
Maximum gas velocity _____ ft./sec.		Minimum gas treatment time: _____ sec.	
Total discharge electrode length _____ ft.			
Number of discharge electrodes _____		Number of collecting electrode rappers _____	
Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____ Describe in detail			

Operating Parameters

Inlet gas temperature (°F) _____	State pressure drop range (inches water gauge) across collector only _____
Outlet gas temperature (°F) _____	Describe the equipment
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field			
Field No.	No. of Sets	Each Transformer KVA	Each Rectifier KV Ave./Peak Ma DC
Current Density _____ Micro amperes/ft ² .	Corona Power _____ Watts/1000 ACFM	Corona Power Density _____ Watts/ft ² .	
Will a flue gas conditioning system be employed? If yes, describe it.			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
8. Adsorption Equipment NA			
Equipment Specifications			
Manufacturer	Type		Model No.
Design Inlet Volume (SCFM)		Adsorbent charge per adsorber vessel and number of adsorber vessels	
Length of Mass Transfer Zone (MTZ), supplied by the manufacturer based upon laboratory data.			
Adsorber diameter (ft.) and area ft ² .)		Adsorption bed depth (ft.)	
Adsorbent information			
Adsorbent type and physical properties.			
Working capacity of adsorbent (%)		Heel percent or unrecoverable solvent weight % in the adsorbent after regeneration.	
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F			
Adsorption time per adsorption bed		Breakthrough capacity: Lbs. of solvent / 100 lbs. of adsorbent = _____	
Vapor pressure of solvents at the inlet temperature		Available steam in pounds to regenerate carbon adsorber (if applicable)	
Percent relative saturation of each solvent at the inlet temperature			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
9. Absorption Equipment NA			
Equipment Specifications			
Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)		Tower height (ft.) and inside diameter (ft.)	
Packing type and size (if applicable)		Height of packing (ft.) (if applicable)	
Number of trays (if applicable)		Number of bubble caps (if applicable)	
Configuration ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls.			
Absorbent information			
Absorbent type and concentration.		Retention time (sec.)	
Attach equilibrium data for absorption (if applicable)			
Attach any additional information regarding auxiliary equipment, absorption solution supply system (once through or recirculating, system capacity, etc.) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating Parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in. of water) and liquid flow rate. Describe the monitoring equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. ☐ Selective Catalytic Reduction (SCR)
☐ Selective Non-Catalytic Reduction (SNCR)
☐ Non-Selective Catalytic Reduction (NSCR)

Equipment Specifications

Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)		Design operating temperature (°F)	
Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.			
Attach efficiency and other pertinent information (e.g., ammonia slip)			
Operating Parameters			
Volume of gases handled _____ (ACFM) @ _____ °F			
Operating temperature range for the SCR/SNCR/NSCR system (°F) From _____ °F To _____ °F			
Reducing agent used, if any		Oxidation catalyst used, if any	
State expected range of usage rate and concentration.			
Service life of catalyst		Ammonia slip (ppm)	
Describe fully with a sketch giving locations of equipment, controls systems, important parameters and method of operation.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

11. Oxidizer/Afterburners NA

Equipment Specifications

Manufacturer	Type ☐ Thermal ☐ Catalytic	Model No.	
Design Inlet Volume (SCFM)	Combustion chamber dimensions (length, cross-sectional area, effective chamber volume, etc.)		
Describe design features, which will ensure mixing in combustion chamber.			
Describe method of preheating incoming gases (if applicable).		Describe heat exchanger system used for heat recovery (if applicable).	
Catalyst used	Life of catalyst	Expected temperature rise across catalyst (°F)	Dimensions of bed (in inches). Height: _____ Diameter or Width: _____ Depth: _____
Are temperature sensing devices being provided to measure the temperature rise across the catalyst? ☐ Yes ☐ No If yes, describe.			
Describe any temperature sensing and/or recording devices (including specific location of temperature probe in a drawing or sketch).			
Burner Information			
Burner Manufacturer	Model No.		Fuel Used
Number and capacity of burners	Rated capacity (each)		Maximum capacity (each)
Describe the operation of the burner		Attach dimensioned diagram of afterburner	
Operating Parameters			
Inlet flow rate (ACFM) _____ @ _____ °F		Outlet flow rate (ACFM) _____ @ _____ °F	
State pressure drop range across catalytic bed (in. of water).		Describe the method adopted for regeneration or disposal of the used catalyst.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

12. Flares MPGF (Source ID C204B)

Equipment Specifications

Manufacturer Zeeco	Type ☐ Elevated flare ☒ Ground flare ☐ Other _____ Describe	Model No. AFDS-6/24 / AFTA-8/18
Design Volume (SCFM) NA	Dimensions of stack (ft.) Diameter <u>NA</u> Height <u>NA</u>	
Residence time (sec.) and outlet temperature (°F) NA	Turn down ratio NA	Burner details Zeeco proprietary

Describe the flare design (air/steam-assisted or nonassisted), essential auxiliaries including pilot flame monitor of proposed flare with a sketch. Perimeter air-assisted flare.

Describe the operation of the flare's ignition system.

See the emission source's requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Describe the provisions to introduce auxiliary fuel to the flare.

See the emission source's requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Operation Parameters

Detailed composition of the waste gas Varies as measured by gas chromatograph	Heat content Varies as measured by gas chromatograph	Exit velocity Varies
Maximum and average gas flow burned (ACFM) Varies	Operating temperature (°F) Varies	

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Alarms set on target NHV, presence of pilots, and exit velocity.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)
VOC	See the source's potential to emit calculations in Appendix B – Potential Emissions Calculations in this submittal.	See the source's potential to emit calculations in Appendix B – Potential Emissions Calculations in this submittal.	≥99% C3- VOC; ≥98% C4+ VOC

Section C - Air Cleaning Device (Continued)

13. Other Control Equipment NA

Equipment Specifications

Manufacturer	Type	Model No.	
Design Volume (SCFM)		Capacity	
Describe pH monitoring and pH adjustment, if any.			
Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.			
Attach efficiency curve and/or other efficiency information.			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Operation Parameters			
Volume of gas handled _____ ACFM @ _____ °F _____ % Moisture			
Describe fully giving important parameters and method of operation.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

14. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Annual Operating Cost

15. Miscellaneous

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

See the previously referenced manufacturer's performance guarantees.

Attach the maintenance schedule for the control equipment and any part of the process equipment that if in disrepair would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if source is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below

☒ Monitoring	☒ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (Parameter, CEM, etc): See the emission source's monitoring requirements in the attached Addendum 1 – Method of Compliance Worksheet.
- b. Monitoring device location: See the emission source's monitoring requirements in the attached Addendum 1 – Method of Compliance Worksheet.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter:
See the emission source's monitoring requirements in the attached Addendum 1 – Method of Compliance Worksheet.

Testing:

- a. Reference Test Method: Citation See the emission source's testing requirements in the attached Addendum 1 – Method of Compliance Worksheet.
- b. Reference Test Method: Description See the emission source's testing requirements in the attached Addendum 1 – Method of Compliance Worksheet.

Recordkeeping:

Describe what parameters will be recorded and the recording frequency:
See the emission source's recordkeeping requirements in the attached Addendum 1 – Method of Compliance Worksheet.

Reporting:

- a. Describe what is to be reported and frequency of reporting:
See the emission source's reporting requirements in the attached Addendum 1 – Method of Compliance Worksheet.
- b. Reporting start date: See the emission source's reporting requirements in the attached Addendum 1 – Method of Compliance Worksheet.

Work Practice Standard:

Describe each: See the emission source's work practice requirements in the attached Addendum 1 – Method of Compliance Worksheet.

Section F - Flue and Air Contaminant Emission

1. Estimated Atmospheric Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		**	**	**
PM ₁₀		**	**	**
SO _x		**	**	**
CO		**	**	**
NO _x		**	**	**
VOC		**	**	**
Others: (e.g., HAPs)	-----	-----	-----	-----
PM _{2.5}	**	**	**	**
HAPs	**	**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number S204B

List Source(s) or source ID exhausted to this stack:
C204B

% of flow exhausted to stack: 100%

Stack height above grade (ft.) NA
Grade elevation (ft.) 795

Stack diameter (ft) or Outlet duct area (sq. ft.)
NA

f. Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.

~190 ft

Does stack height meet Good Engineering Practice (GEP)?

Yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
S204B	40	40	22.8	80	20	11.04

Stack exhaust

Volume NA ACFM

Temperature NA °F

Moisture NA %

Indicate on an attached sheet the location of sampling ports with respect to exhaust fan, breeching, etc. Give all necessary dimensions.

NA

Exhauster (attach fan curves)_____ in. of water_____ HP @_____RPM.

** If the data and collection method codes differ from those provided on the General Information Form-Authorization Application, provide the additional detail required by that form on a separate form.



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	MPGF PE Units 1/2 Episodic Vent Header
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740C [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 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 for the MPGF, 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 with the MPGF. Continuously monitoring fan speed or power and using fan curves is an acceptable method for continuously monitoring assist air flow rates at the MPGF.			
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 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 and MPGF Systems 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 and MPGF Systems 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 and MPGF Systems 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. 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 analyses 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, 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.



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	MPGF PE Units 1/2 Episodic Vent Header
☐	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 Part 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).



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	MPGF PE Units 1/2 Episodic Vent Header
☐	Alternative Operating Scenario	Scenario Name	
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. 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)].			
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. [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.

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)].

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 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)].

Reporting Start Date As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Section B - Processes Information

1. Source Information

Source Description (give type, use, raw materials, product, etc). Attach additional sheets as necessary.
Polyethylene pellet blending, storage, handling, and loading equipment and operations that are referenced as Polyethylene Pellet Material Storage/Handling/Loadout (Source ID 301) in PA-04-00740A and PA-04-00740C.

Manufacturer NA	Model No. NA	Number of Sources 1
Source Designation 301	Maximum Capacity 2,073,265 tons/yr	Rated Capacity 2,073,265 tons/yr

Type of Material Processed
Polyethylene pellets

Maximum Operating Schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Operational restrictions existing or requested, if any (e.g., bottlenecks or voluntary restrictions to limit PTE)

Capacity (specify units)

Per Hour	Per Day	Per Week	Per Year

Operating Schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Seasonal variations (Months) From To

If variations exist, describe them

2. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Gas (other)	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Coal	TPH	Tons	% by wt		Btu/lb
Other *					

*Note: Describe and furnish information separately for other fuels in Addendum B.

Section B - Processes Information (Continued)

3. Burner

Manufacturer	Type and Model No.	Number of Burners
Description:		
Rated Capacity		Maximum Capacity

4. Process Storage Vessels

A. For Liquids:

Name of material stored		
Tank I.D. No.	Manufacturer	Date Installed
Maximum Pressure		Capacity (gallons/Meter ³)
Type of relief device (pressure set vent/conservation vent/emergency vent/open vent)		
Relief valve/vent set pressure (psig)		Vapor press. of liquid at storage temp. (psia/kPa)
Type of Roof: Describe:		
Total Throughput Per Year		Number of fills per day (fill/day): Filling Rate (gal./min.): Duration of fill hr./fill):

B. For Solids

Type: ☐ Silo ☐ Storage Bin ☐ Other, Describe		Name of Material Stored
Silo/Storage Bin I.D. No.	Manufacturer	Date Installed
State whether the material will be stored in loose or bags in silos		Capacity (Tons)
Turn over per year in tons		Turn over per day in tons
Describe fugitive dust control system for loading and handling operations		
Describe material handling system		

5. Request for Confidentiality

Do you request any information on this application to be treated as "Confidential"? ☐ Yes ☒ No
 If yes, include justification for confidentiality. Place such information on separate pages marked "confidential".

Section B - Processes Information (Continued)

6. Miscellaneous Information

Attach flow diagram of process 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 hoods location, design, airflow and capture efficiency. Describe any restriction requested and how it will be monitored.

See Appendix C – Process Flow Diagrams in this submittal for a quick reference to flow diagrams for SPM's processes and VOC control systems. The remaining information (raw materials, rates, etc.) is available in the potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal. Shell is not requesting restrictions on SPM's production capacity.

Describe fully the facilities provided to monitor and to record process operating conditions, which may affect the emission of air contaminants. Show that they are reasonable and adequate.

See the emission source's monitoring and recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet for the emission source.

Describe each proposed modification to an existing source.

NA

Identify and describe all fugitive emission points, all relief and emergency valves and any by-pass stacks.

NA

Describe how emissions will be minimized especially during start up, shut down, process upsets and/or disruptions.

NA

Anticipated Milestones:

- i. Expected commencement date of construction/reconstruction/installation: NA
- ii. Expected completion date of construction/reconstruction/installation: NA
- iii. Anticipated date of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions* Multiple fabric filters

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM		368			**
PM ₁₀		127			**
SO _x					
CO					
NO _x					
VOC					
Others: (e.g., HAPs)	-----	-----	-----	-----	-----
PM _{2.5}		127			**

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Gas Cooling NA

 Water quenching ☐ Yes ☐ No Water injection rate _____ GPM

Radiation and convection cooling ☐ Yes ☐ No	Air dilution ☐ Yes ☐ No If yes, _____ CFM

Forced Draft ☐ Yes ☐ No	Water cooled duct work ☐ Yes ☐ No

Other

 Inlet Volume _____ ACFM
 @ _____ °F _____ % Moisture

 Outlet Volume _____ ACFM
 @ _____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Settling Chambers NA			
Manufacturer		Volume of gas handled _____ACFM @_____°F	Gas velocity (ft/sec.)
Length of chamber (ft.)	Width of chamber (ft.)	Height of chamber (ft.)	Number of trays
Water injection ☐ Yes ☐ No		Water injection rate (GPM)	
Emissions Data			
Inlet	Outlet		Removal Efficiency (%)
4. Inertial and Cyclone Collectors NA			
Manufacturer		Type	Model No.
Pressure drop (in. of water)		Inlet volume _____ACFM @_____°F	Outlet volume _____ACFM @_____°F
Number of individual cyclone(s)		Outlet straightening vanes used? ☐ Yes ☐ No	
Length of Cyclone(s) Cylinder (ft.)	Diameter of Cyclone(s) Cylinder (ft.)	Length of Cyclone(s) cone (ft.)	
Inlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)		Outlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)	
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?			
Describe any exhaust gas recirculation loop to be employed.			
Attach particle size efficiency curve			
Emissions Data			
Inlet	Outlet		Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Fabric Collector Several filters are used in the polyethylene pellet blending, storage, handling, and loading operations.

Equipment Specifications

Manufacturer Varies		Model No. Varies	☐ Pressurized Design ☐ Suction Design
Number of Compartments Varies	Number of Filters Per Compartment Varies	Is Baghouse Insulated? ☐ Yes ☐ No	
Can each compartment be isolated for repairs and/or filter replacement?		☐ Yes ☐ No	
Are temperature controls provided? (Describe in detail)		☐ Yes ☐ No	
Dew point at maximum moisture Varies _____ °F		Design inlet volume Varies _____ SCFM	
Type of Fabric Material Varies _____ ☐ Felted ☐ Membrane Weight Varies _____ oz/sq.yd ☐ Woven ☐ Others: List: _____ Thickness Varies _____ in ☐ Felted-Woven			
Fabric permeability (clean) @ ½" water-Δ P Varies _____ CFM/sq.ft.			
Filter dimensions Length Varies _____		Diameter/Width Varies _____	
Effective area per filter Varies _____		Maximum operating temperature (°F) Varies _____	
Effective air to cloth ratio Minimum Varies _____		Maximum Varies _____	
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.			
Operation and Cleaning			
Volume of gases handled Varies _____ ACFM @ Varies _____ °F		Pressure drop across collector (in. of water). Varies Describe the equipment to be used to monitor the pressure drop. Pressure transmitters across filter	
Type of filter cleaning ☐ Manual Cleaning ☐ Bag Collapse ☒ Reverse Air Jets ☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____ ☐ Pneumatic Shakers ☐ Reverse Air Flow			
Describe the equipment provided if dry oil free air is required for collector operation Compressed air or nitrogen from plan supply			
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☒ Expected pressure drop range Varies _____ in. of water ☒ Other Specify Manual override option _____			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements. Pressure drop alarms			

Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)
PM/PM ₁₀ /PM _{2.5}	See the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	See the emission sources' potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	≥99%

Section C - Air Cleaning Device (Continued)			
6. Wet Collection Equipment NA			
Equipment Specifications			
Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)	Relative Particulate/Gas Velocity (ejector scrubbers only)		
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).			
Describe pH monitoring and pH adjustment systems, if applicable.			
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).			
Attach particulate size efficiency curve.			
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F		Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture	
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)			
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.)			
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Electrostatic Precipitator NA

Equipment Specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ Yes ☐ No		Design Inlet Volume (SCFM) _____ Maximum operating temperature (°F) _____	
Total collecting surface area _____ sq. ft.		Collector plates size length _____ ft. x width _____ ft.	
Number of fields _____		Number of collector plates/field _____	
Spacing between collector plates _____ inches.			
Maximum gas velocity _____ ft./sec.		Minimum gas treatment time: _____ sec.	
Total discharge electrode length _____ ft.			
Number of discharge electrodes _____		Number of collecting electrode rappers _____	
Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____ Describe in detail			

Operating Parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (inches water gauge) across collector only _____ Describe the equipment
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field			
Field No.	No. of Sets	Each Transformer KVA	Each Rectifier KV Ave./Peak Ma DC
Current Density _____ Micro amperes/ft ² .		Corona Power _____ Watts/1000 ACFM	Corona Power Density _____ Watts/ft ² .
Will a flue gas conditioning system be employed? If yes, describe it.			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
8. Adsorption Equipment NA			
Equipment Specifications			
Manufacturer		Type	Model No.
Design Inlet Volume (SCFM)		Adsorbent charge per adsorber vessel and number of adsorber vessels	
Length of Mass Transfer Zone (MTZ), supplied by the manufacturer based upon laboratory data.			
Adsorber diameter (ft.) and area ft ² .)		Adsorption bed depth (ft.)	
Adsorbent information			
Adsorbent type and physical properties.			
Working capacity of adsorbent (%)		Heel percent or unrecoverable solvent weight % in the adsorbent after regeneration.	
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F			
Adsorption time per adsorption bed		Breakthrough capacity: Lbs. of solvent / 100 lbs. of adsorbent = _____	
Vapor pressure of solvents at the inlet temperature		Available steam in pounds to regenerate carbon adsorber (if applicable)	
Percent relative saturation of each solvent at the inlet temperature			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
9. Absorption Equipment NA			
Equipment Specifications			
Manufacturer	Type		Model No.
Design Inlet Volume (SCFM)		Tower height (ft.) and inside diameter (ft.)	
Packing type and size (if applicable)		Height of packing (ft.) (if applicable)	
Number of trays (if applicable)		Number of bubble caps (if applicable)	
Configuration ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls.			
Absorbent information			
Absorbent type and concentration.		Retention time (sec.)	
Attach equilibrium data for absorption (if applicable)			
Attach any additional information regarding auxiliary equipment, absorption solution supply system (once through or recirculating, system capacity, etc.) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating Parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in. of water) and liquid flow rate. Describe the monitoring equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. ☐ Selective Catalytic Reduction (SCR)
☐ Selective Non-Catalytic Reduction (SNCR)
☐ Non-Selective Catalytic Reduction (NSCR)

Equipment Specifications

Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)		Design operating temperature (°F)	
Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.			
Attach efficiency and other pertinent information (e.g., ammonia slip)			
Operating Parameters			
Volume of gases handled _____ (ACFM) @ _____ °F			
Operating temperature range for the SCR/SNCR/NSCR system (°F) From _____ °F To _____ °F			
Reducing agent used, if any		Oxidation catalyst used, if any	
State expected range of usage rate and concentration.			
Service life of catalyst		Ammonia slip (ppm)	
Describe fully with a sketch giving locations of equipment, controls systems, important parameters and method of operation.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

11. Oxidizer/Afterburners NA

Equipment Specifications

Manufacturer	Type ☐ Thermal ☐ Catalytic	Model No.	
Design Inlet Volume (SCFM)	Combustion chamber dimensions (length, cross-sectional area, effective chamber volume, etc.)		
Describe design features, which will ensure mixing in combustion chamber.			
Describe method of preheating incoming gases (if applicable).		Describe heat exchanger system used for heat recovery (if applicable).	
Catalyst used	Life of catalyst	Expected temperature rise across catalyst (°F)	Dimensions of bed (in inches). Height: _____ Diameter or Width: _____ Depth: _____
Are temperature sensing devices being provided to measure the temperature rise across the catalyst? ☐ Yes ☐ No If yes, describe.			
Describe any temperature sensing and/or recording devices (including specific location of temperature probe in a drawing or sketch).			
Burner Information			
Burner Manufacturer	Model No.		Fuel Used
Number and capacity of burners	Rated capacity (each)		Maximum capacity (each)
Describe the operation of the burner		Attach dimensioned diagram of afterburner	
Operating Parameters			
Inlet flow rate (ACFM) _____ @ _____ °F		Outlet flow rate (ACFM) _____ @ _____ °F	
State pressure drop range across catalytic bed (in. of water).		Describe the method adopted for regeneration or disposal of the used catalyst.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

12. Flares NA

Equipment Specifications

Manufacturer	Type ☐ Elevated flare ☐ Ground flare ☐ Other _____ Describe	Model No.
Design Volume (SCFM)	Dimensions of stack (ft.) Diameter _____ Height _____	
Residence time (sec.) and outlet temperature (°F)	Turn down ratio	Burner details

Describe the flare design (air/steam-assisted or nonassisted), essential auxiliaries including pilot flame monitor of proposed flare with a sketch.

Describe the operation of the flare's ignition system.

Describe the provisions to introduce auxiliary fuel to the flare.

Operation Parameters

Detailed composition of the waste gas	Heat content	Exit velocity
Maximum and average gas flow burned (ACFM)	Operating temperature (°F)	

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

13. Other Control Equipment NA

Equipment Specifications

Manufacturer	Type	Model No.	
Design Volume (SCFM)		Capacity	
Describe pH monitoring and pH adjustment, if any.			
Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.			
Attach efficiency curve and/or other efficiency information.			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Operation Parameters			
Volume of gas handled _____ ACFM @ _____ °F _____ % Moisture			
Describe fully giving important parameters and method of operation.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

14. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Annual Operating Cost

15. Miscellaneous

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

See previously referenced manufacturer's performance guarantee.

Attach the maintenance schedule for the control equipment and any part of the process equipment that if in disrepair would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if source is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below

☒ Monitoring	☒ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (Parameter, CEM, etc): See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Monitoring device location: See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter:
See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Testing:

- a. Reference Test Method: Citation See the emission source's testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reference Test Method: Description See the emission source's testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Recordkeeping:

Describe what parameters will be recorded and the recording frequency:
See the emission source's recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Reporting:

- a. Describe what is to be reported and frequency of reporting:
See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reporting start date: See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Work Practice Standard:

Describe each: See the emission source's work practice requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Section F - Flue and Air Contaminant Emission

1. Estimated Atmospheric Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		**	**	**
PM ₁₀		**	**	**
SO _x				
CO				
NO _x				
VOC		**	**	**
Others: (e.g., HAPs)	-----	-----	-----	-----
PM _{2.5}		**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number S301

List Source(s) or source ID exhausted to this stack:
301

% of flow exhausted to stack: 100%

Stack height above grade (ft.) See Appendix D – Air Quality Analysis.
Grade elevation (ft.) See Appendix D – Air Quality Analysis.

Stack diameter (ft) or Outlet duct area (sq. ft.)
NA

f. Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.

PE Blending Silos Stack ~710 ft; PE Railcar Loading Silos Stack ~490 ft; PE Truck Loading Silos Stack ~508 ft

Does stack height meet Good Engineering Practice (GEP)?
Yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
S301 (PE Blending Silos Stack)	40	40	12.36	80	20	2.4
S301 (PE Railcar Loading Silos Stack)	40	40	12.36	80	19	58.08
S301 (PE Truck Loading Silos Stack)	40	40	5.88	80	19	50.52

Stack exhaust

Volume NA ACFM

Temperature NA °F

Moisture NA %

Indicate on an attached sheet the location of sampling ports with respect to exhaust fan, breeching, etc. Give all necessary dimensions.

NA

Exhauster (attach fan curves) _____ in. of water _____ HP @ _____ RPM.

** If the data and collection method codes differ from those provided on the General Information Form-Authorization Application, provide the additional detail required by that form on a separate form.



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	301 (Polyethylene Pellet Material Storage/Handling/Loadout)
☐	Alternative Operating Scenario	Scenario Name	
Citation No.	Plan Approval 04-00740C [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 once per reactor grade change for each polyethylene manufacturing line. Measurement shall be conducted 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. Facility may request sampling burden reduction 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).



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	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 B - Processes Information

1. Source Information

Source Description (give type, use, raw materials, product, etc). Attach additional sheets as necessary.

The loading of pyrolysis fuel oil, light gasoline, and PE3 heavies into railcars at SPM. These loading activities are referenced as Liquid Loadout (Pyrolysis Fuel Oil, Light Gasoline) (Source ID 303) in PA-04-007-40A and PA-04-007-40C, but Shell is proposing to revise the source's plan approval source description from Liquid Loadout (Pyrolysis Fuel Oil, Light Gasoline) to Liquid Loadout (Pyrolysis Fuel Oil, Light Gasoline, PE3 Heavies). Shell originally planned to blend PE3 heavies into light gasoline. However, PE3 heavies is loaded separately from light gasoline into railcars at SPM, and the vapors generated during the loading of PE3 heavies into railcars are collected and routed through a closed system to the CVTO or MPGF, the same as originally planned when the PE3 heavies were to be blended into light gasoline.

Manufacturer NA	Model No. NA	Number of Sources 1
Source Designation 303	Maximum Capacity	Rated Capacity

Type of Material Processed
Organic liquids

Maximum Operating Schedule

Hours/Day	Days/Week	Days/Year	Hours/Year

Operational restrictions existing or requested, if any (e.g., bottlenecks or voluntary restrictions to limit PTE)

Capacity (specify units)

Per Hour	Per Day	Per Week	Per Year

Operating Schedule

Hours/Day	Days/Week	Days/Year	Hours/Year

Seasonal variations (Months) From to

If variations exist, describe them

2. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Gas (other)	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Coal	TPH	Tons	% by wt		Btu/lb
Other *					

*Note: Describe and furnish information separately for other fuels in Addendum B.

Section B - Processes Information (Continued)

3. Burner

Manufacturer	Type and Model No.	Number of Burners
Description:		
Rated Capacity	Maximum Capacity	

4. Process Storage Vessels**A. For Liquids:**

Name of material stored		
Tank I.D. No.	Manufacturer	Date Installed
Maximum Pressure	Capacity (gallons/Meter ³)	
Type of relief device (pressure set vent/conservation vent/emergency vent/open vent)		
Relief valve/vent set pressure (psig)	Vapor press. of liquid at storage temp. (psia/kPa)	
Type of Roof: Describe:		
Total Throughput Per Year	Number of fills per day (fill/day): Filling Rate (gal./min.): Duration of fill hr./fill):	

B. For Solids

Type: ☐ Silo ☐ Storage Bin ☐ Other, Describe		Name of Material Stored
Silo/Storage Bin I.D. No.	Manufacturer	Date Installed
State whether the material will be stored in loose or bags in silos		Capacity (Tons)
Turn over per year in tons		Turn over per day in tons
Describe fugitive dust control system for loading and handling operations		
Describe material handling system		

5. Request for Confidentiality

Do you request any information on this application to be treated as "Confidential"? ☐ Yes ☒ No
 If yes, include justification for confidentiality. Place such information on separate pages marked "**confidential**".

Section B - Processes Information (Continued)

6. Miscellaneous Information

Attach flow diagram of process 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 hoods location, design, airflow and capture efficiency. Describe any restriction requested and how it will be monitored.

See Appendix C – Process Flow Diagrams in this submittal for a quick reference to flow diagrams for SPM's processes and VOC control systems. The remaining information (raw materials, rates, etc.) is available in the potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal. Shell is not requesting restrictions on SPM's production capacity.

Describe fully the facilities provided to monitor and to record process operating conditions, which may affect the emission of air contaminants. Show that they are reasonable and adequate.

See the emission source's monitoring and recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Describe each proposed modification to an existing source.

NA

Identify and describe all fugitive emission points, all relief and emergency valves and any by-pass stacks.

NA

Describe how emissions will be minimized especially during start up, shut down, process upsets and/or disruptions.

NA

Anticipated Milestones:

- i. Expected commencement date of construction/reconstruction/installation: NA
- ii. Expected completion date of construction/reconstruction/installation: NA
- iii. Anticipated date of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions*

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM					
PM ₁₀					
SO _x					
CO					
NO _x					
VOC					
Others: (e.g., HAPs)	-----	-----	-----	-----	-----

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations.

2. Gas Cooling NA

Water quenching ☐ Yes ☐ No Water injection rate _____ GPM

Radiation and convection cooling

☐ Yes ☐ No

Air dilution

☐ Yes ☐ No

If yes, _____ CFM

Forced Draft ☐ Yes ☐ No

Water cooled duct work ☐ Yes ☐ No

Other

Inlet Volume _____ ACFM

@ _____ °F _____ % Moisture

Outlet Volume _____ ACFM

@ _____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Settling Chambers NA			
Manufacturer		Volume of gas handled _____ACFM @_____°F	Gas velocity (ft/sec.)
Length of chamber (ft.)	Width of chamber (ft.)	Height of chamber (ft.)	Number of trays
Water injection ☐ Yes ☐ No		Water injection rate (GPM)	
Emissions Data			
Inlet	Outlet	Removal Efficiency (%)	
4. Inertial and Cyclone Collectors NA			
Manufacturer		Type	Model No.
Pressure drop (in. of water)		Inlet volume _____ACFM @_____°F	Outlet volume _____ACFM @_____°F
Number of individual cyclone(s)		Outlet straightening vanes used? ☐ Yes ☐ No	
Length of Cyclone(s) Cylinder (ft.)	Diameter of Cyclone(s) Cylinder (ft.)	Length of Cyclone(s) cone (ft.)	
Inlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)		Outlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)	
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?			
Describe any exhaust gas recirculation loop to be employed.			
Attach particle size efficiency curve			
Emissions Data			
Inlet	Outlet	Removal Efficiency (%)	

Section C - Air Cleaning Device (Continued)

5. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No.		☐ Pressurized Design ☐ Suction Design
Number of Compartments	Number of Filters Per Compartment	Is Baghouse Insulated?		
		☐ Yes ☐ No		
Can each compartment be isolated for repairs and/or filter replacement?				☐ Yes ☐ No
Are temperature controls provided? (Describe in detail)				☐ Yes ☐ No
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM		
Type of Fabric Material _____ ☐ Felted ☐ Membrane Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____ Thickness _____ in ☐ Felted-Woven				
Fabric permeability (clean) @ ½" water-Δ P _____ CFM/sq.ft.				
Filter dimensions Length _____ Diameter/Width _____				
Effective area per filter _____		Maximum operating temperature (°F) _____		
Effective air to cloth ratio Minimum _____ Maximum _____				
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.				
Operation and Cleaning				
Volume of gases handled _____ ACFM @ _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.		
Type of filter cleaning ☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets ☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____ ☐ Pneumatic Shakers ☐ Reverse Air Flow				
Describe the equipment provided if dry oil free air is required for collector operation				
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____				
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.				
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.				
Emissions Data				
Pollutant	Inlet	Outlet	Removal Efficiency (%)	

Section C - Air Cleaning Device (Continued)			
6. Wet Collection Equipment NA			
Equipment Specifications			
Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)	Relative Particulate/Gas Velocity (ejector scrubbers only)		
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).			
Describe pH monitoring and pH adjustment systems, if applicable.			
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).			
Attach particulate size efficiency curve.			
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F		Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture	
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)			
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.)			
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Electrostatic Precipitator NA

Equipment Specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ Yes ☐ No		Design Inlet Volume (SCFM) _____	
		Maximum operating temperature (°F) _____	
Total collecting surface area _____ sq. ft.		Collector plates size length _____ ft. x width _____ ft.	
Number of fields _____		Number of collector plates/field _____	
Spacing between collector plates _____ inches.			
Maximum gas velocity _____ ft./sec.		Minimum gas treatment time: _____ sec.	
Total discharge electrode length _____ ft.			
Number of discharge electrodes _____		Number of collecting electrode rappers _____	
Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____ Describe in detail			

Operating Parameters

Inlet gas temperature (°F) _____	State pressure drop range (inches water gauge) across collector only _____
Outlet gas temperature (°F) _____	Describe the equipment
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field			
Field No.	No. of Sets	Each Transformer KVA	Each Rectifier KV Ave./Peak Ma DC
Current Density _____ Micro amperes/ft ² .	Corona Power _____ Watts/1000 ACFM	Corona Power Density _____ Watts/ft ² .	
Will a flue gas conditioning system be employed? If yes, describe it.			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
8. Adsorption Equipment NA			
Equipment Specifications			
Manufacturer		Type	Model No.
Design Inlet Volume (SCFM)		Adsorbent charge per adsorber vessel and number of adsorber vessels	
Length of Mass Transfer Zone (MTZ), supplied by the manufacturer based upon laboratory data.			
Adsorber diameter (ft.) and area ft ² .)		Adsorption bed depth (ft.)	
Adsorbent information			
Adsorbent type and physical properties.			
Working capacity of adsorbent (%)		Heel percent or unrecoverable solvent weight % in the adsorbent after regeneration.	
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F			
Adsorption time per adsorption bed		Breakthrough capacity: Lbs. of solvent / 100 lbs. of adsorbent = _____	
Vapor pressure of solvents at the inlet temperature		Available steam in pounds to regenerate carbon adsorber (if applicable)	
Percent relative saturation of each solvent at the inlet temperature			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
9. Absorption Equipment NA			
Equipment Specifications			
Manufacturer	Type		Model No.
Design Inlet Volume (SCFM)		Tower height (ft.) and inside diameter (ft.)	
Packing type and size (if applicable)		Height of packing (ft.) (if applicable)	
Number of trays (if applicable)		Number of bubble caps (if applicable)	
Configuration ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls.			
Absorbent information			
Absorbent type and concentration.		Retention time (sec.)	
Attach equilibrium data for absorption (if applicable)			
Attach any additional information regarding auxiliary equipment, absorption solution supply system (once through or recirculating, system capacity, etc.) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating Parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in. of water) and liquid flow rate. Describe the monitoring equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. ☐ Selective Catalytic Reduction (SCR)
☐ Selective Non-Catalytic Reduction (SNCR)
☐ Non-Selective Catalytic Reduction (NSCR)

Equipment Specifications

Manufacturer	Type	Model No.
Design Inlet Volume (SCFM)		Design operating temperature (°F)
Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.		
Attach efficiency and other pertinent information (e.g., ammonia slip)		

Operating Parameters

Volume of gases handled _____ (ACFM) @ _____ °F	
Operating temperature range for the SCR/SNCR/NSCR system (°F) From _____ °F To _____ °F	
Reducing agent used, if any	Oxidation catalyst used, if any
State expected range of usage rate and concentration.	
Service life of catalyst	Ammonia slip (ppm)
Describe fully with a sketch giving locations of equipment, controls systems, important parameters and method of operation.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.	

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

11. Oxidizer/Afterburners CVTO (Source ID C204A)

Equipment Specifications

Manufacturer John Zink	Type ☒ Thermal ☐ Catalytic	Model No. NA
Design Inlet Volume (SCFM) NA	Combustion chamber dimensions (length, cross-sectional area, effective chamber volume, etc.) 25ft L, ~142.2ft ² CSA, ~3,556.2ft ³ Volume	
Describe design features, which will ensure mixing in combustion chamber. Inherent horizontal combustion chamber design with burner and waste gas stream mixing at one end and product of combustion at the other end.		
Describe method of preheating incoming gases (if applicable). NA		Describe heat exchanger system used for heat recovery (if applicable). NA
Catalyst used NA	Life of catalyst NA	Expected temperature rise across catalyst (°F) NA
Dimensions of bed (in inches). Height: NA _____ Diameter or Width: NA _____ Depth: NA _____		
Are temperature sensing devices being provided to measure the temperature rise across the catalyst? ☐ Yes ☐ No If yes, describe. NA		
Describe any temperature sensing and/or recording devices (including specific location of temperature probe in a drawing or sketch). See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.		
Burner Information		
Burner Manufacturer John Zink	Model No. NA	Fuel Used Natural gas
Number and capacity of burners 1 Natural gas fuel, 42 Waste gas	Rated capacity (each) 4.65 MMBtu/hr each	Maximum capacity (each) 4.65 MMBtu/hr each
Describe the operation of the burner Natural gas fuel burner ignites the distributed waste gas burners	Attach dimensioned diagram of afterburner NA	
Operating Parameters		
Inlet flow rate (ACFM) Varies _____ @ _____ °F	Outlet flow rate (ACFM) 177,696 _____ @ 1,600 _____ °F	
State pressure drop range across catalytic bed (in. of water). NA	Describe the method adopted for regeneration or disposal of the used catalyst. NA	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements. Low and high alarms are set on the continuously monitored combustion zone temperature.		

Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)
VOC/HAPs	See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	≥99.9%

Section C - Air Cleaning Device (Continued)

12. Flares MPGF (Source ID C204B)

Equipment Specifications

Manufacturer Zeeco	Type ☐ Elevated flare ☒ Ground flare ☐ Other _____ Describe	Model No. AFDS-6/24 / AFTA-8/18	
Design Volume (SCFM) NA	Dimensions of stack (ft.) Diameter <u>NA</u> Height <u>NA</u>		
Residence time (sec.) and outlet temperature (°F) NA	Turn down ratio NA	Burner details Zeeco proprietary	
Describe the flare design (air/steam-assisted or nonassisted), essential auxiliaries including pilot flame monitor of proposed flare with a sketch. Perimeter air-assisted flare.			
Describe the operation of the flare's ignition system. See the emission source's requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.			
Describe the provisions to introduce auxiliary fuel to the flare. See the emission source's requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.			
Operation Parameters			
Detailed composition of the waste gas Varies as measured by gas chromatograph	Heat content Varies as measured by gas chromatograph or calorimeter	Exit velocity Varies or NA	
Maximum and average gas flow burned (ACFM) Varies	Operating temperature (°F) Varies		
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements. Alarms set on target NHV, presence of pilots, exit velocity (where applicable)			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)
VOC/HAPs	See the source's potential to emit calculations in Appendix B – Potential Emissions Calculations in this submittal.	See the source's potential to emit calculations in Appendix B – Potential Emissions Calculations in this submittal	≥99% C3- VOC/HAPs; ≥98% C4+ VOC/HAPs

Section C - Air Cleaning Device (Continued)

13. Other Control Equipment NA

Equipment Specifications

Manufacturer	Type	Model No.	
Design Volume (SCFM)		Capacity	
Describe pH monitoring and pH adjustment, if any.			
Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.			
Attach efficiency curve and/or other efficiency information.			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Operation Parameters			
Volume of gas handled _____ ACFM @ _____ °F _____ % Moisture			
Describe fully giving important parameters and method of operation.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

14. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Annual Operating Cost

15. Miscellaneous

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

NA

Attach the maintenance schedule for the control equipment and any part of the process equipment that if in disrepair would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if source is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below

☒ Monitoring	☒ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (Parameter, CEM, etc): See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Monitoring device location: See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter:
See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Testing:

- a. Reference Test Method: Citation See the emission source's testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reference Test Method: Description See the emission source's testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Recordkeeping:

Describe what parameters will be recorded and the recording frequency:
See the emission source's recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Reporting:

- a. Describe what is to be reported and frequency of reporting:
See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reporting start date: See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Work Practice Standard:

Describe each: See the emission source's work practice requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Section F - Flue and Air Contaminant Emission

1. Estimated Atmospheric Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM				
PM ₁₀				
SO _x				
CO				
NO _x				
VOC		**		**
Others: (e.g., HAPs)	-----	-----	-----	-----
HAPs		**		**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the potential to emit calculations for the CVTO (Source ID 204A) and MPGF (Source ID 204B) in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number: NA

List Source(s) or source ID exhausted to this stack:

% of flow exhausted to stack:

Stack height above grade (ft.)
Grade elevation (ft.)

Stack diameter (ft) or Outlet duct area (sq. ft.)

f. Weather Cap
☐ YES ☐ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.

Does stack height meet Good Engineering Practice (GEP)?

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions.

Location of stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds

Stack exhaust

Volume ____ ACFM

Temperature ____ °F

Moisture ____ %

Indicate on an attached sheet the location of sampling ports with respect to exhaust fan, breeching, etc. Give all necessary dimensions.

Exhauster (attach fan curves)_____ in. of water_____ HP @_____RPM.

** If the data and collection method codes differ from those provided on the General Information Form-Authorization Application, provide the additional detail required by that form on a separate form.



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 (NESHAP Subpart YY - Liquid Loadout (Pyrolysis Fuel Oil, Light Gasoline, PE3 Heavies))
☒	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	☒ 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			
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)].			

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)].

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)].

SECTION E. REPORTING

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

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

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).



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	G10 (Liquid Loadout - Liquid Loadout (C3+, Butene, Isopentane, Isobutane, C3 Ref))	
☐ Single Source	Unit ID		
☐ Alternative Operating Scenario	Scenario Name		
Citation No.	Plan Approval 04-00740C [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

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.

Section B - Processes Information

1. Source Information

Source Description (give type, use, raw materials, product, etc). Attach additional sheets as necessary.

The loading of C₃₊ into railcars to be transported offsite, and the unloading of butene, isopentane, isobutane, and C₃ refrigerant from railcars into storage tanks at SPM. These loading and unloading activities are referenced as Liquid Loadout (C₃₊, Butene, Isopentane, Isobutane, C₃₊ Ref) (Source ID 304) in PA-04-007-40C. Shell is proposing to revise the source's description in the plan approval from Liquid Loadout (C₃₊, Butene, Isopentane, Isobutane, C₃₊ Ref) to Liquid Loadout (C₃₊, Butene, Isopentane, Isobutane, C₃ Ref) so that the refrigerant material included in the description is correctly identified as C₃ refrigerant rather than C₃₊ refrigerant.

Manufacturer NA	Model No. NA	Number of Sources 1

Source Designation 304	Maximum Capacity	Rated Capacity r

Type of Material Processed
Organic liquids

Maximum Operating Schedule

Hours/Day	Days/Week	Days/Year	Hours/Year

Operational restrictions existing or requested, if any (e.g., bottlenecks or voluntary restrictions to limit PTE)

Capacity (specify units)

Per Hour	Per Day	Per Week	Per Year

Operating Schedule

Hours/Day	Days/Week	Days/Year	Hours/Year

Seasonal variations (Months) From _____ to _____

If variations exist, describe them

2. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number _____	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number _____	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Gas (other) _____	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Coal _____	TPH	Tons	% by wt		Btu/lb
Other * _____					

*Note: Describe and furnish information separately for other fuels in Addendum B.

Section B - Processes Information (Continued)

3. Burner

Manufacturer	Type and Model No.	Number of Burners
Description:		
Rated Capacity	Maximum Capacity	

4. Process Storage Vessels

A. For Liquids:

Name of material stored		
Tank I.D. No.	Manufacturer	Date Installed
Maximum Pressure	Capacity (gallons/Meter ³)	
Type of relief device (pressure set vent/conservation vent/emergency vent/open vent)		
Relief valve/vent set pressure (psig)	Vapor press. of liquid at storage temp. (psia/kPa)	
Type of Roof: Describe:		
Total Throughput Per Year	Number of fills per day (fill/day): Filling Rate (gal./min.): Duration of fill hr./fill):	

B. For Solids

Type: ☐ Silo ☐ Storage Bin ☐ Other, Describe		Name of Material Stored
Silo/Storage Bin I.D. No.	Manufacturer	Date Installed
State whether the material will be stored in loose or bags in silos		Capacity (Tons)
Turn over per year in tons		Turn over per day in tons
Describe fugitive dust control system for loading and handling operations		
Describe material handling system		

5. Request for Confidentiality

Do you request any information on this application to be treated as "Confidential"? ☐ Yes ☒ No
 If yes, include justification for confidentiality. Place such information on separate pages marked "confidential".

Section B - Processes Information (Continued)

6. Miscellaneous Information

Attach flow diagram of process 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 hoods location, design, airflow and capture efficiency. Describe any restriction requested and how it will be monitored.

See Appendix C – Process Flow Diagrams in this submittal for a quick reference to flow diagrams for SPM's processes and VOC control systems. The remaining information (raw materials, rates, etc.) is available in the potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal. Shell is not requesting restrictions on SPM's production capacity.

Describe fully the facilities provided to monitor and to record process operating conditions, which may affect the emission of air contaminants. Show that they are reasonable and adequate.

See the emission source's monitoring and recordkeeping requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Describe each proposed modification to an existing source.

NA

Identify and describe all fugitive emission points, all relief and emergency valves and any by-pass stacks.

NA

Describe how emissions will be minimized especially during start up, shut down, process upsets and/or disruptions.

NA

Anticipated Milestones:

- i. Expected commencement date of construction/reconstruction/installation: NA
- ii. Expected completion date of construction/reconstruction/installation: NA
- iii. Anticipated date of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions*

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM					
PM ₁₀					
SO _x					
CO					
NO _x					
VOC					
Others: (e.g., HAPs)	-----	-----	-----	-----	-----

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations.

2. Gas Cooling NA

Water quenching ☐ Yes ☐ No		Water injection rate _____ GPM	
Radiation and convection cooling ☐ Yes ☐ No		Air dilution ☐ Yes ☐ No If yes, _____ CFM	
Forced Draft ☐ Yes ☐ No		Water cooled duct work ☐ Yes ☐ No	
Other			
Inlet Volume _____ ACFM @ _____ °F _____ % Moisture		Outlet Volume _____ ACFM @ _____ °F _____ % Moisture	

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Settling Chambers NA			
Manufacturer		Volume of gas handled _____ACFM @_____°F	Gas velocity (ft/sec.)
Length of chamber (ft.)	Width of chamber (ft.)	Height of chamber (ft.)	Number of trays
Water injection ☐ Yes ☐ No		Water injection rate (GPM)	
Emissions Data			
Inlet	Outlet	Removal Efficiency (%)	
4. Inertial and Cyclone Collectors NA			
Manufacturer		Type	Model No.
Pressure drop (in. of water)	Inlet volume _____ACFM @_____°F		Outlet volume _____ACFM @_____°F
Number of individual cyclone(s)		Outlet straightening vanes used? ☐ Yes ☐ No	
Length of Cyclone(s) Cylinder (ft.)	Diameter of Cyclone(s) Cylinder (ft.)	Length of Cyclone(s) cone (ft.)	
Inlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)		Outlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)	
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?			
Describe any exhaust gas recirculation loop to be employed.			
Attach particle size efficiency curve			
Emissions Data			
Inlet	Outlet	Removal Efficiency (%)	

Section C - Air Cleaning Device (Continued)

5. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No.		☐ Pressurized Design ☐ Suction Design
Number of Compartments	Number of Filters Per Compartment	Is Baghouse Insulated?		
		☐ Yes ☐ No		
Can each compartment be isolated for repairs and/or filter replacement?				☐ Yes ☐ No
Are temperature controls provided? (Describe in detail)				☐ Yes ☐ No
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM		
Type of Fabric Material _____ ☐ Felted ☐ Membrane Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____ Thickness _____ in ☐ Felted-Woven				
Fabric permeability (clean) @ ½" water-Δ P _____ CFM/sq.ft.				
Filter dimensions Length _____ Diameter/Width _____				
Effective area per filter _____		Maximum operating temperature (°F) _____		
Effective air to cloth ratio Minimum _____ Maximum _____				
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.				
Operation and Cleaning				
Volume of gases handled _____ ACFM @ _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.		
Type of filter cleaning ☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets ☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____ ☐ Pneumatic Shakers ☐ Reverse Air Flow				
Describe the equipment provided if dry oil free air is required for collector operation				
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____				
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.				
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.				
Emissions Data				
Pollutant	Inlet	Outlet	Removal Efficiency (%)	

Section C - Air Cleaning Device (Continued)			
6. Wet Collection Equipment NA			
Equipment Specifications			
Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)	Relative Particulate/Gas Velocity (ejector scrubbers only)		
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).			
Describe pH monitoring and pH adjustment systems, if applicable.			
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).			
Attach particulate size efficiency curve.			
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F		Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture	
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)			
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.)			
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Electrostatic Precipitator NA

Equipment Specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ Yes ☐ No		Design Inlet Volume (SCFM) _____ Maximum operating temperature (°F) _____	
Total collecting surface area _____ sq. ft.		Collector plates size length _____ ft. x width _____ ft.	
Number of fields _____		Number of collector plates/field _____	
Spacing between collector plates _____ inches.			
Maximum gas velocity _____ ft./sec.		Minimum gas treatment time: _____ sec.	
Total discharge electrode length _____ ft.			
Number of discharge electrodes _____		Number of collecting electrode rappers _____	
Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____ Describe in detail			

Operating Parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (inches water gauge) across collector only _____ Describe the equipment
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field			
Field No.	No. of Sets	Each Transformer KVA	Each Rectifier KV Ave./Peak Ma DC
Current Density _____ Micro amperes/ft ² .		Corona Power _____ Watts/1000 ACFM	Corona Power Density _____ Watts/ft ² .
Will a flue gas conditioning system be employed? If yes, describe it.			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
8. Adsorption Equipment NA			
Equipment Specifications			
Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)	Adsorbent charge per adsorber vessel and number of adsorber vessels		
Length of Mass Transfer Zone (MTZ), supplied by the manufacturer based upon laboratory data.			
Adsorber diameter (ft.) and area ft ² .)	Adsorption bed depth (ft.)		
Adsorbent information			
Adsorbent type and physical properties.			
Working capacity of adsorbent (%)	Heel percent or unrecoverable solvent weight % in the adsorbent after regeneration.		
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F			
Adsorption time per adsorption bed	Breakthrough capacity: Lbs. of solvent / 100 lbs. of adsorbent = _____		
Vapor pressure of solvents at the inlet temperature	Available steam in pounds to regenerate carbon adsorber (if applicable)		
Percent relative saturation of each solvent at the inlet temperature			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
9. Absorption Equipment NA			
Equipment Specifications			
Manufacturer	Type		Model No.
Design Inlet Volume (SCFM)		Tower height (ft.) and inside diameter (ft.)	
Packing type and size (if applicable)		Height of packing (ft.) (if applicable)	
Number of trays (if applicable)		Number of bubble caps (if applicable)	
Configuration ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls.			
Absorbent information			
Absorbent type and concentration.		Retention time (sec.)	
Attach equilibrium data for absorption (if applicable)			
Attach any additional information regarding auxiliary equipment, absorption solution supply system (once through or recirculating, system capacity, etc.) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating Parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in. of water) and liquid flow rate. Describe the monitoring equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. ☐ Selective Catalytic Reduction (SCR)
☐ Selective Non-Catalytic Reduction (SNCR)
☐ Non-Selective Catalytic Reduction (NSCR)

Equipment Specifications

Manufacturer	Type	Model No.
Design Inlet Volume (SCFM)		Design operating temperature (°F)
Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.		
Attach efficiency and other pertinent information (e.g., ammonia slip)		

Operating Parameters

Volume of gases handled _____ (ACFM) @ _____ °F	
Operating temperature range for the SCR/SNCR/NSCR system (°F) From _____ °F To _____ °F	
Reducing agent used, if any	Oxidation catalyst used, if any
State expected range of usage rate and concentration.	
Service life of catalyst	Ammonia slip (ppm)
Describe fully with a sketch giving locations of equipment, controls systems, important parameters and method of operation.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.	

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

11. Oxidizer/Afterburners NA

Equipment Specifications

Manufacturer	Type ☐ Thermal ☐ Catalytic	Model No.	
Design Inlet Volume (SCFM)	Combustion chamber dimensions (length, cross-sectional area, effective chamber volume, etc.)		
Describe design features, which will ensure mixing in combustion chamber.			
Describe method of preheating incoming gases (if applicable).		Describe heat exchanger system used for heat recovery (if applicable).	
Catalyst used	Life of catalyst	Expected temperature rise across catalyst (°F)	Dimensions of bed (in inches). Height: _____ Diameter or Width: _____ Depth: _____
Are temperature sensing devices being provided to measure the temperature rise across the catalyst? ☐ Yes ☐ No If yes, describe.			
Describe any temperature sensing and/or recording devices (including specific location of temperature probe in a drawing or sketch).			
Burner Information			
Burner Manufacturer	Model No.	Fuel Used	
Number and capacity of burners	Rated capacity (each)	Maximum capacity (each)	
Describe the operation of the burner		Attach dimensioned diagram of afterburner	
Operating Parameters			
Inlet flow rate (ACFM) _____ @ _____ °F		Outlet flow rate (ACFM) _____ @ _____ °F	
State pressure drop range across catalytic bed (in. of water).		Describe the method adopted for regeneration or disposal of the used catalyst.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

12. Flares NA

Equipment Specifications

Manufacturer	Type ☐ Elevated flare ☐ Ground flare ☐ Other _____ Describe	Model No.
Design Volume (SCFM)	Dimensions of stack (ft.) Diameter _____ Height _____	
Residence time (sec.) and outlet temperature (°F)	Turn down ratio	Burner details

Describe the flare design (air/steam-assisted or nonassisted), essential auxiliaries including pilot flame monitor of proposed flare with a sketch.

Describe the operation of the flare's ignition system.

Describe the provisions to introduce auxiliary fuel to the flare.

Operation Parameters

Detailed composition of the waste gas	Heat content	Exit velocity
Maximum and average gas flow burned (ACFM)	Operating temperature (°F)	

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

13. Other Control Equipment NA

Equipment Specifications

Manufacturer	Type	Model No.	
Design Volume (SCFM)		Capacity	
Describe pH monitoring and pH adjustment, if any.			
Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.			
Attach efficiency curve and/or other efficiency information.			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Operation Parameters			
Volume of gas handled _____ ACFM @ _____ °F _____ % Moisture			
Describe fully giving important parameters and method of operation.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

14. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Annual Operating Cost

15. Miscellaneous

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

NA

Attach the maintenance schedule for the control equipment and any part of the process equipment that if in disrepair would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if source is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below

☒ Monitoring	☒ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (Parameter, CEM, etc): See the emission source's monitoring requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Monitoring device location: See the emission source's monitoring requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter:
See the emission source's monitoring requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Testing:

- a. Reference Test Method: Citation See the emission source's testing requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reference Test Method: Description See the emission source's testing requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Recordkeeping:

Describe what parameters will be recorded and the recording frequency:

See the emission source's recordkeeping requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Reporting:

- a. Describe what is to be reported and frequency of reporting:
See the emission source's reporting requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reporting start date: See the emission source's reporting requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Work Practice Standard:

Describe each: See the emission source's work practice requirements in PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Section F - Flue and Air Contaminant Emission

1. Estimated Atmospheric Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM				
PM ₁₀				
SO _x				
CO				
NO _x				
VOC		**		**
Others: (e.g., HAPs)	-----	-----	-----	-----
HAPs		**		**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number: Z302

List Source(s) or source ID exhausted to this stack:
302 and 304

% of flow exhausted to stack: 100%

Stack height above grade (ft.) 24
Grade elevation (ft.) 750

Stack diameter (ft) or Outlet duct area (sq. ft.)
NA

f. Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.

~ 270 ft

Does stack height meet Good Engineering Practice (GEP)?

Yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
Z302	40	40	0.84	80	20	46.32

Stack exhaust

Volume NA ACFM

Temperature NA °F

Moisture NA %

Indicate on an attached sheet the location of sampling ports with respect to exhaust fan, breeching, etc. Give all necessary dimensions.

NA

Exhauster (attach fan curves)_____ in. of water_____ HP @_____RPM.

** If the data and collection method codes differ from those provided on the General Information Form-Authorization Application, provide the additional detail required by that form on a separate form.



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 (NESHAP Subpart YY - Liquid Loadout (C3+, Butene, Isopentane, Isobutane, C3 Ref))
☒	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	☒ 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			
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)].			

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)].

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)].

SECTION E. REPORTING

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

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

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).



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	G10 (Liquid Loadout - Liquid Loadout (C3+, Butene, Isopentane, Isobutane, C3 Ref))	
☐ Single Source	Unit ID		
☐ Alternative Operating Scenario	Scenario Name		
Citation No.	Plan Approval 04-00740C [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

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.

Section B - Processes Information

1. Source Information

Source Description (give type, use, raw materials, product, etc). Attach additional sheets as necessary.
The pumps, compressors, pressure relief devices, valves, flanges, etc. fugitive emission components at SPM that are referenced as Equipment Components (Source ID 501) in PA-04-007-40A and PA-04-007-40C.

Manufacturer NA	Model No. NA	Number of Sources 1
Source Designation 501	Maximum Capacity NA	Rated Capacity NA

Type of Material Processed
Varies

Maximum Operating Schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Operational restrictions existing or requested, if any (e.g., bottlenecks or voluntary restrictions to limit PTE)

Capacity (specify units)

Per Hour	Per Day	Per Week	Per Year

Operating Schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Seasonal variations (Months) From to

If variations exist, describe them

2. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Gas (other)	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Coal	TPH	Tons	% by wt		Btu/lb
Other *					

*Note: Describe and furnish information separately for other fuels in Addendum B.

Section B - Processes Information (Continued)

3. Burner

Manufacturer	Type and Model No.	Number of Burners
Description:		
Rated Capacity	Maximum Capacity	

4. Process Storage Vessels

A. For Liquids:

Name of material stored		
Tank I.D. No.	Manufacturer	Date Installed
Maximum Pressure	Capacity (gallons/Meter ³)	
Type of relief device (pressure set vent/conservation vent/emergency vent/open vent)		
Relief valve/vent set pressure (psig)	Vapor press. of liquid at storage temp. (psia/kPa)	
Type of Roof: Describe:		
Total Throughput Per Year	Number of fills per day (fill/day): Filling Rate (gal./min.): Duration of fill hr./fill):	

B. For Solids

Type: ☐ Silo ☐ Storage Bin ☐ Other, Describe		Name of Material Stored
Silo/Storage Bin I.D. No.	Manufacturer	Date Installed
State whether the material will be stored in loose or bags in silos		Capacity (Tons)
Turn over per year in tons		Turn over per day in tons
Describe fugitive dust control system for loading and handling operations		
Describe material handling system		

5. Request for Confidentiality

Do you request any information on this application to be treated as "Confidential"? ☐ Yes ☒ No
 If yes, include justification for confidentiality. Place such information on separate pages marked "confidential".

Section B - Processes Information (Continued)

6. Miscellaneous Information

Attach flow diagram of process 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 hoods location, design, airflow and capture efficiency. Describe any restriction requested and how it will be monitored.

See Appendix C – Process Flow Diagrams in this submittal for a quick reference to flow diagrams for SPM's processes and VOC control systems. The remaining information (raw materials, rates, etc.) is available in the potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal. Shell is not requesting restrictions on SPM's production capacity.

Describe fully the facilities provided to monitor and to record process operating conditions, which may affect the emission of air contaminants. Show that they are reasonable and adequate.

See the emission source's monitoring and recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Describe each proposed modification to an existing source.

NA

Identify and describe all fugitive emission points, all relief and emergency valves and any by-pass stacks.

See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

Describe how emissions will be minimized especially during start up, shut down, process upsets and/or disruptions.

NA

Anticipated Milestones:

- i. Expected commencement date of construction/reconstruction/installation: NA
- ii. Expected completion date of construction/reconstruction/installation: NA
- iii. Anticipated date of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions*

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM					
PM ₁₀					
SO _x					
CO					
NO _x					
VOC					
Others: (e.g., HAPs)	-----	-----	-----	-----	-----

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations.

2. Gas Cooling NA

Water quenching ☐ Yes ☐ No Water injection rate _____ GPM

Radiation and convection cooling

☐ Yes ☐ No

Air dilution

☐ Yes ☐ No

If yes, _____ CFM

Forced Draft ☐ Yes ☐ No

Water cooled duct work ☐ Yes ☐ No

Other

Inlet Volume _____ ACFM

@ _____ °F _____ % Moisture

Outlet Volume _____ ACFM

@ _____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Settling Chambers NA			
Manufacturer		Volume of gas handled _____ACFM @_____°F	Gas velocity (ft/sec.)
Length of chamber (ft.)	Width of chamber (ft.)	Height of chamber (ft.)	Number of trays
Water injection ☐ Yes ☐ No		Water injection rate (GPM)	
Emissions Data			
Inlet	Outlet		Removal Efficiency (%)
4. Inertial and Cyclone Collectors NA			
Manufacturer		Type	Model No.
Pressure drop (in. of water)	Inlet volume _____ACFM @_____°F		Outlet volume _____ACFM @_____°F
Number of individual cyclone(s)		Outlet straightening vanes used? ☐ Yes ☐ No	
Length of Cyclone(s) Cylinder (ft.)	Diameter of Cyclone(s) Cylinder (ft.)	Length of Cyclone(s) cone (ft.)	
Inlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)		Outlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)	
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?			
Describe any exhaust gas recirculation loop to be employed.			
Attach particle size efficiency curve			
Emissions Data			
Inlet	Outlet		Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No. ☐ Pressurized Design ☐ Suction Design	
Number of Compartments	Number of Filters Per Compartment	Is Baghouse Insulated? ☐ Yes ☐ No	
Can each compartment be isolated for repairs and/or filter replacement? ☐ Yes ☐ No			
Are temperature controls provided? (Describe in detail) ☐ Yes ☐ No			
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM	
Type of Fabric Material _____ ☐ Felted ☐ Membrane Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____ Thickness _____ in ☐ Felted-Woven			
Fabric permeability (clean) @ ½" water-Δ P _____ CFM/sq.ft.			
Filter dimensions Length _____ Diameter/Width _____			
Effective area per filter _____		Maximum operating temperature (°F) _____	
Effective air to cloth ratio Minimum _____ Maximum _____			
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.			
Operation and Cleaning			
Volume of gases handled _____ ACFM @ _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.	
Type of filter cleaning ☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets ☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____ ☐ Pneumatic Shakers ☐ Reverse Air Flow			
Describe the equipment provided if dry oil free air is required for collector operation			
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
6. Wet Collection Equipment NA			
Equipment Specifications			
Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)	Relative Particulate/Gas Velocity (ejector scrubbers only)		
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).			
Describe pH monitoring and pH adjustment systems, if applicable.			
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).			
Attach particulate size efficiency curve.			
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F		Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture	
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)			
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.)			
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Electrostatic Precipitator NA

Equipment Specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ Yes ☐ No		Design Inlet Volume (SCFM) _____ Maximum operating temperature (°F) _____	
Total collecting surface area _____ sq. ft.		Collector plates size length _____ ft. x width _____ ft.	
Number of fields _____		Number of collector plates/field _____	
Spacing between collector plates _____ inches.			
Maximum gas velocity _____ ft./sec.		Minimum gas treatment time: _____ sec.	
Total discharge electrode length _____ ft.			
Number of discharge electrodes _____		Number of collecting electrode rappers _____	
Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____ Describe in detail			

Operating Parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (inches water gauge) across collector only _____ Describe the equipment
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field			
Field No.	No. of Sets	Each Transformer KVA	Each Rectifier KV Ave./Peak Ma DC
Current Density _____ Micro amperes/ft ² .	Corona Power _____ Watts/1000 ACFM	Corona Power Density _____ Watts/ft ² .	
Will a flue gas conditioning system be employed? If yes, describe it.			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. Adsorption Equipment NA

Equipment Specifications

Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)	Adsorbent charge per adsorber vessel and number of adsorber vessels		
Length of Mass Transfer Zone (MTZ), supplied by the manufacturer based upon laboratory data.			
Adsorber diameter (ft.) and area ft ² .)	Adsorption bed depth (ft.)		
Adsorbent information			
Adsorbent type and physical properties.			
Working capacity of adsorbent (%)	Heel percent or unrecoverable solvent weight % in the adsorbent after regeneration.		
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F			
Adsorption time per adsorption bed	Breakthrough capacity: Lbs. of solvent / 100 lbs. of adsorbent = _____		
Vapor pressure of solvents at the inlet temperature	Available steam in pounds to regenerate carbon adsorber (if applicable)		
Percent relative saturation of each solvent at the inlet temperature			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
9. Absorption Equipment NA			
Equipment Specifications			
Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)		Tower height (ft.) and inside diameter (ft.)	
Packing type and size (if applicable)		Height of packing (ft.) (if applicable)	
Number of trays (if applicable)		Number of bubble caps (if applicable)	
Configuration ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls.			
Absorbent information			
Absorbent type and concentration.		Retention time (sec.)	
Attach equilibrium data for absorption (if applicable)			
Attach any additional information regarding auxiliary equipment, absorption solution supply system (once through or recirculating, system capacity, etc.) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating Parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in. of water) and liquid flow rate. Describe the monitoring equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. ☐ Selective Catalytic Reduction (SCR)
☐ Selective Non-Catalytic Reduction (SNCR)
☐ Non-Selective Catalytic Reduction (NSCR)

Equipment Specifications

Manufacturer	Type	Model No.
Design Inlet Volume (SCFM)		Design operating temperature (°F)
Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.		
Attach efficiency and other pertinent information (e.g., ammonia slip)		

Operating Parameters

Volume of gases handled _____ (ACFM) @ _____ °F	
Operating temperature range for the SCR/SNCR/NSCR system (°F) From _____ °F To _____ °F	
Reducing agent used, if any	Oxidation catalyst used, if any
State expected range of usage rate and concentration.	
Service life of catalyst	Ammonia slip (ppm)
Describe fully with a sketch giving locations of equipment, controls systems, important parameters and method of operation.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.	

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

11. Oxidizer/Afterburners NA

Equipment Specifications

Manufacturer	Type ☐ Thermal ☐ Catalytic	Model No.	
Design Inlet Volume (SCFM)	Combustion chamber dimensions (length, cross-sectional area, effective chamber volume, etc.)		
Describe design features, which will ensure mixing in combustion chamber.			
Describe method of preheating incoming gases (if applicable).		Describe heat exchanger system used for heat recovery (if applicable).	
Catalyst used	Life of catalyst	Expected temperature rise across catalyst (°F)	Dimensions of bed (in inches). Height: _____ Diameter or Width: _____ Depth: _____
Are temperature sensing devices being provided to measure the temperature rise across the catalyst? ☐ Yes ☐ No If yes, describe.			
Describe any temperature sensing and/or recording devices (including specific location of temperature probe in a drawing or sketch).			
Burner Information			
Burner Manufacturer	Model No.	Fuel Used	
Number and capacity of burners	Rated capacity (each)	Maximum capacity (each)	
Describe the operation of the burner		Attach dimensioned diagram of afterburner	
Operating Parameters			
Inlet flow rate (ACFM) _____ @ _____ °F		Outlet flow rate (ACFM) _____ @ _____ °F	
State pressure drop range across catalytic bed (in. of water).		Describe the method adopted for regeneration or disposal of the used catalyst.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

12. Flares NA

Equipment Specifications

Manufacturer	Type ☐ Elevated flare ☐ Ground flare ☐ Other _____ Describe	Model No.
Design Volume (SCFM)	Dimensions of stack (ft.) Diameter _____ Height _____	
Residence time (sec.) and outlet temperature (°F)	Turn down ratio	Burner details

Describe the flare design (air/steam-assisted or nonassisted), essential auxiliaries including pilot flame monitor of proposed flare with a sketch.

Describe the operation of the flare's ignition system.

Describe the provisions to introduce auxiliary fuel to the flare.

Operation Parameters

Detailed composition of the waste gas	Heat content	Exit velocity
Maximum and average gas flow burned (ACFM)		Operating temperature (°F)

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

13. Other Control Equipment NA

Equipment Specifications

Manufacturer	Type	Model No.	
Design Volume (SCFM)		Capacity	
Describe pH monitoring and pH adjustment, if any.			
Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.			
Attach efficiency curve and/or other efficiency information.			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Operation Parameters			
Volume of gas handled _____ ACFM @ _____ °F _____ % Moisture			
Describe fully giving important parameters and method of operation.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

14. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Annual Operating Cost

15. Miscellaneous

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

NA

Attach the maintenance schedule for the control equipment and any part of the process equipment that if in disrepair would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if source is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below

☒ Monitoring	☒ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (Parameter, CEM, etc): See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Monitoring device location: See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter:
See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Testing:

- a. Reference Test Method: Citation See the emission source's testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reference Test Method: Description See the emission source's testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Recordkeeping:

Describe what parameters will be recorded and the recording frequency:
See the emission source's recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Reporting:

- a. Describe what is to be reported and frequency of reporting:
See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reporting start date: See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Work Practice Standard:

Describe each: See the emission source's work practice requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Section F - Flue and Air Contaminant Emission

1. Estimated Atmospheric Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM				
PM ₁₀				
SO _x				
CO		**	**	**
NO _x				
VOC		**	**	**
Others: (e.g., HAPs)	-----	-----	-----	-----
HAPs		**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number: Z501

List Source(s) or source ID exhausted to this stack:
501

% of flow exhausted to stack: 100%

Stack height above grade (ft.) NA
Grade elevation (ft.) 795

Stack diameter (ft) or Outlet duct area (sq. ft.)
NA

f. Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.

~ 50 ft

Does stack height meet Good Engineering Practice (GEP)?

NA

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
Z501	40	40	10.56	80	20	12.84

Stack exhaust

Volume NA ACFM

Temperature NA °F

Moisture NA %

Indicate on an attached sheet the location of sampling ports with respect to exhaust fan, breeching, etc. Give all necessary dimensions.

NA

Exhauster (attach fan curves)_____ in. of water_____ HP @_____RPM.

** If the data and collection method codes differ from those provided on the General Information Form-Authorization Application, provide the additional detail required by that form on a separate form.



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)].



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	G04 (NESHAP Subpart UU - Equipment Components)
☒	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)].



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 (NESHAP Subpart YY - Equipment Components)
☒	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	☒ 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 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)].			

SECTION E. REPORTING

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

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

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)].



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 (NESHAP Subpart FFFF - Equipment Components)
☒	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.)			
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.			
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].			
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 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)].

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)].

Section B - Processes Information

1. Source Information

Source Description (give type, use, raw materials, product, etc). Attach additional sheets as necessary.

The primary treatment, secondary treatment, and tertiary treatment equipment and operations that comprise SPM's WWTP. These equipment and operations are referenced as the Wastewater Treatment Plant (Source ID 502) in PA-04-007-40A and PA-04-007-40C. Shell is proposing to implement the Wastewater Treatment Plant (WWTP) Permanent Controls Project to install permanent equipment at SPM that will improve the oils, grease, and VOC removal efficiency of the primary treatment section of SPM's WWTP. The VOC and HAP emissions from specific existing vessels in the WWTP are controlled by the SCTO. The VOC and HAP emissions from the new Wastewater Treatment Vessels proposed to be installed in the WWTP with the WWTP Permanent Controls Project will be controlled by the SCTO.

Manufacturer NA	Model No. NA	Number of Sources 1
Source Designation 502	Maximum Capacity	Rated Capacity

Type of Material Processed
Wastewater

Maximum Operating Schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Operational restrictions existing or requested, if any (e.g., bottlenecks or voluntary restrictions to limit PTE)

Capacity (specify units)

Per Hour	Per Day	Per Week	Per Year

Operating Schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Seasonal variations (Months) From to

If variations exist, describe them

2. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Gas (other)	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Coal	TPH	Tons	% by wt		Btu/lb
Other *					

*Note: Describe and furnish information separately for other fuels in Addendum B.

Section B - Processes Information (Continued)

3. Burner

Manufacturer	Type and Model No.	Number of Burners
Description:		
Rated Capacity		Maximum Capacity

4. Process Storage Vessels

A. For Liquids:

Name of material stored		
Tank I.D. No.	Manufacturer	Date Installed
Maximum Pressure		Capacity (gallons/Meter ³)
Type of relief device (pressure set vent/conservation vent/emergency vent/open vent)		
Relief valve/vent set pressure (psig)		Vapor press. of liquid at storage temp. (psia/kPa)
Type of Roof: Describe:		
Total Throughput Per Year		Number of fills per day (fill/day): Filling Rate (gal./min.): Duration of fill hr./fill):

B. For Solids

Type: ☐ Silo ☐ Storage Bin ☐ Other, Describe		Name of Material Stored
Silo/Storage Bin I.D. No.	Manufacturer	Date Installed
State whether the material will be stored in loose or bags in silos		Capacity (Tons)
Turn over per year in tons		Turn over per day in tons
Describe fugitive dust control system for loading and handling operations		
Describe material handling system		

5. Request for Confidentiality

Do you request any information on this application to be treated as "Confidential"? ☐ Yes ☒ No
 If yes, include justification for confidentiality. Place such information on separate pages marked "confidential".

Section B - Processes Information (Continued)

6. Miscellaneous Information

Attach flow diagram of process 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 hoods location, design, airflow and capture efficiency. Describe any restriction requested and how it will be monitored.

See Appendix C – Process Flow Diagrams in this submittal for a quick reference to flow diagrams for SPM's processes and VOC control systems. The remaining information (raw materials, rates, etc.) is available in the potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal. Shell is not requesting restrictions on SPM's production capacity.

Describe fully the facilities provided to monitor and to record process operating conditions, which may affect the emission of air contaminants. Show that they are reasonable and adequate.

See the emission source's monitoring and recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Describe each proposed modification to an existing source.

NA

Identify and describe all fugitive emission points, all relief and emergency valves and any by-pass stacks.

NA

Describe how emissions will be minimized especially during start up, shut down, process upsets and/or disruptions.

NA

Anticipated Milestones: (WWTP Permanent Controls Project)

- i. Expected commencement date of construction/reconstruction/installation: 3rd quarter 2025
- ii. Expected completion date of construction/reconstruction/installation: 2nd quarter 2026
- iii. Anticipated date of start-up: 3rd quarter 2026

Section C - Air Cleaning Device

1. Precontrol Emissions*

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM					
PM ₁₀					
SO _x					
CO					
NO _x					
VOC		**			**
Others: (e.g., HAPs)	-----	-----	-----	-----	-----
HAPs		**			**

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Gas Cooling NA

Water quenching ☐ Yes ☐ No Water injection rate _____ GPM

Radiation and convection cooling ☐ Yes ☐ No Air dilution ☐ Yes ☐ No
If yes, _____ CFM

Forced Draft ☐ Yes ☐ No Water cooled duct work ☐ Yes ☐ No

Other

Inlet Volume _____ ACFM
@ _____ °F _____ % Moisture

Outlet Volume _____ ACFM
@ _____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Settling Chambers NA			
Manufacturer		Volume of gas handled _____ACFM @_____°F	Gas velocity (ft/sec.)
Length of chamber (ft.)	Width of chamber (ft.)	Height of chamber (ft.)	Number of trays
Water injection ☐ Yes ☐ No		Water injection rate (GPM)	
Emissions Data			
Inlet	Outlet		Removal Efficiency (%)
4. Inertial and Cyclone Collectors NA			
Manufacturer		Type	Model No.
Pressure drop (in. of water)	Inlet volume _____ACFM @_____°F		Outlet volume _____ACFM @_____°F
Number of individual cyclone(s)		Outlet straightening vanes used? ☐ Yes ☐ No	
Length of Cyclone(s) Cylinder (ft.)	Diameter of Cyclone(s) Cylinder (ft.)	Length of Cyclone(s) cone (ft.)	
Inlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)		Outlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)	
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?			
Describe any exhaust gas recirculation loop to be employed.			
Attach particle size efficiency curve			
Emissions Data			
Inlet	Outlet		Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No. ☐ Pressurized Design ☐ Suction Design	
Number of Compartments	Number of Filters Per Compartment	Is Baghouse Insulated? ☐ Yes ☐ No	
Can each compartment be isolated for repairs and/or filter replacement? ☐ Yes ☐ No			
Are temperature controls provided? (Describe in detail) ☐ Yes ☐ No			
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM	
Type of Fabric Material _____ ☐ Felted ☐ Membrane Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____ Thickness _____ in ☐ Felted-Woven			
Fabric permeability (clean) @ ½" water-Δ P _____ CFM/sq.ft.			
Filter dimensions Length _____ Diameter/Width _____			
Effective area per filter _____		Maximum operating temperature (°F) _____	
Effective air to cloth ratio Minimum _____ Maximum _____			
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.			
Operation and Cleaning			
Volume of gases handled _____ ACFM @ _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.	
Type of filter cleaning ☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets ☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____ ☐ Pneumatic Shakers ☐ Reverse Air Flow			
Describe the equipment provided if dry oil free air is required for collector operation			
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
6. Wet Collection Equipment NA			
Equipment Specifications			
Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)	Relative Particulate/Gas Velocity (ejector scrubbers only)		
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).			
Describe pH monitoring and pH adjustment systems, if applicable.			
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).			
Attach particulate size efficiency curve.			
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F		Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture	
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)			
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.)			
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Electrostatic Precipitator NA

Equipment Specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ Yes ☐ No		Design Inlet Volume (SCFM) _____	
		Maximum operating temperature (°F) _____	
Total collecting surface area _____ sq. ft.		Collector plates size length _____ ft. x width _____ ft.	
Number of fields _____		Number of collector plates/field _____	
Spacing between collector plates _____ inches.			
Maximum gas velocity _____ ft./sec.		Minimum gas treatment time: _____ sec.	
Total discharge electrode length _____ ft.			
Number of discharge electrodes _____		Number of collecting electrode rappers _____	
Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____ Describe in detail			

Operating Parameters

Inlet gas temperature (°F) _____	State pressure drop range (inches water gauge) across collector only _____
Outlet gas temperature (°F) _____	
Describe the equipment	
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field			
Field No.	No. of Sets	Each Transformer KVA	Each Rectifier KV Ave./Peak Ma DC
Current Density _____ Micro amperes/ft ² .	Corona Power _____ Watts/1000 ACFM	Corona Power Density _____ Watts/ft ² .	
Will a flue gas conditioning system be employed? If yes, describe it.			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. Adsorption Equipment NA

Equipment Specifications

Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)		Adsorbent charge per adsorber vessel and number of adsorber vessels	
Length of Mass Transfer Zone (MTZ), supplied by the manufacturer based upon laboratory data.			
Adsorber diameter (ft.) and area ft ² .)		Adsorption bed depth (ft.)	
Adsorbent information			
Adsorbent type and physical properties.			
Working capacity of adsorbent (%)		Heel percent or unrecoverable solvent weight % in the adsorbent after regeneration.	
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F			
Adsorption time per adsorption bed		Breakthrough capacity: Lbs. of solvent / 100 lbs. of adsorbent = _____	
Vapor pressure of solvents at the inlet temperature		Available steam in pounds to regenerate carbon adsorber (if applicable)	
Percent relative saturation of each solvent at the inlet temperature			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
9. Absorption Equipment NA			
Equipment Specifications			
Manufacturer	Type		Model No.
Design Inlet Volume (SCFM)		Tower height (ft.) and inside diameter (ft.)	
Packing type and size (if applicable)		Height of packing (ft.) (if applicable)	
Number of trays (if applicable)		Number of bubble caps (if applicable)	
Configuration ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls.			
Absorbent information			
Absorbent type and concentration.		Retention time (sec.)	
Attach equilibrium data for absorption (if applicable)			
Attach any additional information regarding auxiliary equipment, absorption solution supply system (once through or recirculating, system capacity, etc.) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating Parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in. of water) and liquid flow rate. Describe the monitoring equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. ☐ Selective Catalytic Reduction (SCR)
☐ Selective Non-Catalytic Reduction (SNCR)
☐ Non-Selective Catalytic Reduction (NSCR)

Equipment Specifications

Manufacturer	Type	Model No.
Design Inlet Volume (SCFM)		Design operating temperature (°F)
Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.		
Attach efficiency and other pertinent information (e.g., ammonia slip)		

Operating Parameters

Volume of gases handled _____ (ACFM) @ _____ °F	
Operating temperature range for the SCR/SNCR/NSCR system (°F) From _____ °F To _____ °F	
Reducing agent used, if any	Oxidation catalyst used, if any
State expected range of usage rate and concentration.	
Service life of catalyst	Ammonia slip (ppm)
Describe fully with a sketch giving locations of equipment, controls systems, important parameters and method of operation.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.	

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

11. Oxidizer/Afterburners SCTO (Source ID C206)

Equipment Specifications

Manufacturer John Zink	Type ☒ Thermal ☐ Catalytic	Model No. ST12160
Design Inlet Volume (SCFM) NA	Combustion chamber dimensions (length, cross-sectional area, effective chamber volume, etc.) ~19.85ft L, ~17.72ft ² CSA, 351.8ft ³ Volume	
Describe design features, which will ensure mixing in combustion chamber. Inherent horizontal combustion chamber design with burner and waste gas stream mixing at one end and product of combustion exit at the other end.		
Describe method of preheating incoming gases (if applicable). NA		Describe heat exchanger system used for heat recovery (if applicable). NA
Catalyst used NA	Life of catalyst NA	Expected temperature rise across catalyst (°F) NA
Dimensions of bed (in inches). Height: NA _____ Diameter or Width: NA _____ Depth: NA _____		
Are temperature sensing devices being provided to measure the temperature rise across the catalyst? ☐ Yes ☐ No If yes, describe. NA		
Describe any temperature sensing and/or recording devices (including specific location of temperature probe in a drawing or sketch). See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source		
Burner Information		
Burner Manufacturer John Zink	Model No. NA	Fuel Used Natural gas
Number and capacity of burners 1 Natural gas fuel, 8 waste gas	Rated capacity (each) 1.23 MMBtu/hr each	Maximum capacity (each) 1.23 MMBtu/hr each
Describe the operation of the burner Natural gas fuel burner ignites the distributed waste gas burners		Attach dimensioned diagram of afterburner NA
Operating Parameters		
Inlet flow rate (ACFM) Varies ____ @ Varies ____ °F		Outlet flow rate (ACFM) 2,173 scfm @ 1,600 °F
State pressure drop range across catalytic bed (in. of water). NA		Describe the method adopted for regeneration or disposal of the used catalyst. NA
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements. Low and high alarms are set on the continuously monitored combustion zone temperature.		

Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)
VOC/HAPs	See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.	≥99.9%

Section C - Air Cleaning Device (Continued)

12. Flares NA

Equipment Specifications

Manufacturer	Type ☐ Elevated flare ☐ Ground flare ☐ Other _____ Describe	Model No.
Design Volume (SCFM)	Dimensions of stack (ft.) Diameter _____ Height _____	
Residence time (sec.) and outlet temperature (°F)	Turn down ratio	Burner details

Describe the flare design (air/steam-assisted or nonassisted), essential auxiliaries including pilot flame monitor of proposed flare with a sketch.

Describe the operation of the flare's ignition system.

Describe the provisions to introduce auxiliary fuel to the flare.

Operation Parameters

Detailed composition of the waste gas	Heat content	Exit velocity
Maximum and average gas flow burned (ACFM)	Operating temperature (°F)	

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

13. Other Control Equipment NA

Equipment Specifications

Manufacturer	Type	Model No.	
Design Volume (SCFM)		Capacity	
Describe pH monitoring and pH adjustment, if any.			
Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.			
Attach efficiency curve and/or other efficiency information.			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Operation Parameters			
Volume of gas handled _____ ACFM @ _____ °F _____ % Moisture			
Describe fully giving important parameters and method of operation.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

14. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Annual Operating Cost

15. Miscellaneous

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

See the previously referenced manufacturer's performance guarantee.

Attach the maintenance schedule for the control equipment and any part of the process equipment that if in disrepair would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if source is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below

☒ Monitoring	☒ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (Parameter, CEM, etc): See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Monitoring device location: See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter:
See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Testing:

- a. Reference Test Method: Citation See the emission source's testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reference Test Method: Description See the emission source's testing requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Recordkeeping:

Describe what parameters will be recorded and the recording frequency:
See the emission source's recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Reporting:

- a. Describe what is to be reported and frequency of reporting:
See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reporting start date: See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Work Practice Standard:

Describe each: See the emission source's work practice requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Section F - Flue and Air Contaminant Emission

1. Estimated Atmospheric Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM				
PM ₁₀				
SO _x				
CO				
NO _x				
VOC		**	**	**
Others: (e.g., HAPs)	-----	-----	-----	-----
HAPs		**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number: Z502 and S206

List Source(s) or source ID exhausted to this stack:
502 and C206

% of flow exhausted to stack: 100%

Stack height above grade (ft.) Z502: NA;
S206: 200 ft
Grade elevation (ft.) Z502: 715; S206: 714

Stack diameter (ft) or Outlet duct area (sq. ft.)
Z502: NA; S206: 2 ft

f. Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.

Z502: ~ 25 ft; S206: ~68 ft

Does stack height meet Good Engineering Practice (GEP)?

Yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
Z502	40	39	58.68	80	20	51.36
S206	40	40	3.72	80	20	46.68

Stack exhaust

Volume S206: 2,173 SCFM

Temperature S206: 1,600 °F

Moisture NA %

Indicate on an attached sheet the location of sampling ports with respect to exhaust fan, breeching, etc. Give all necessary dimensions.

NA

Exhauster (attach fan curves)_____ in. of water_____ HP @_____RPM.

** If the data and collection method codes differ from those provided on the General Information Form-Authorization Application, provide the additional detail required by that form on a separate form.



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)
☐	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?			
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 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). 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)].	



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 (NESHAP Subpart YY - Wastewater Treatment Plant)
☒	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	☒ 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 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)].

SECTION E. REPORTING

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

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).



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	G06 (NESHAP Subpart XX - Wastewater Treatment Plant)
☒	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.)			
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.			
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)].			
Reporting Start Date	As specified		
SECTION F. WORK PRACTICE STANDARD			
Describe any work practice standard(s).			

Section B - Processes Information

1. Source Information

Source Description (give type, use, raw materials, product, etc). Attach additional sheets as necessary.
The paved roads at SPM that are used for the truck transport of talc and other materials inside the facility. These roads are referenced as the Plant Roadways (Source ID 503) in PA-04-007-40A and PA-04-007-40C.

Manufacturer NA	Model No. NA	Number of Sources 1
Source Designation 503	Maximum Capacity NA	Rated Capacity NA
Type of Material Processed		

Maximum Operating Schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760
Operational restrictions existing or requested, if any (e.g., bottlenecks or voluntary restrictions to limit PTE)			

Capacity (specify units)

Per Hour	Per Day	Per Week	Per Year

Operating Schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760
Seasonal variations (Months) From to			

If variations exist, describe them

2. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Gas (other)	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Coal	TPH	Tons	% by wt		Btu/lb
Other *					

*Note: Describe and furnish information separately for other fuels in Addendum B.

Section B - Processes Information (Continued)

3. Burner

Manufacturer	Type and Model No.	Number of Burners
Description:		
Rated Capacity	Maximum Capacity	

4. Process Storage Vessels

A. For Liquids:

Name of material stored		
Tank I.D. No.	Manufacturer	Date Installed
Maximum Pressure	Capacity (gallons/Meter ³)	
Type of relief device (pressure set vent/conservation vent/emergency vent/open vent)		
Relief valve/vent set pressure (psig)	Vapor press. of liquid at storage temp. (psia/kPa)	
Type of Roof: Describe:		
Total Throughput Per Year	Number of fills per day (fill/day): Filling Rate (gal./min.): Duration of fill hr./fill):	

B. For Solids

Type: ☐ Silo ☐ Storage Bin ☐ Other, Describe		Name of Material Stored
Silo/Storage Bin I.D. No.	Manufacturer	Date Installed
State whether the material will be stored in loose or bags in silos		Capacity (Tons)
Turn over per year in tons		Turn over per day in tons
Describe fugitive dust control system for loading and handling operations		
Describe material handling system		

5. Request for Confidentiality

Do you request any information on this application to be treated as "Confidential"? ☐ Yes ☒ No
 If yes, include justification for confidentiality. Place such information on separate pages marked "confidential".

Section B - Processes Information (Continued)

6. Miscellaneous Information

Attach flow diagram of process 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 hoods location, design, airflow and capture efficiency. Describe any restriction requested and how it will be monitored.

See Appendix C – Process Flow Diagrams in this submittal for a quick reference to flow diagrams for SPM's processes and VOC control systems. The remaining information (raw materials, rates, etc.) is available in the potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal. Shell is not requesting restrictions on SPM's production capacity.

Describe fully the facilities provided to monitor and to record process operating conditions, which may affect the emission of air contaminants. Show that they are reasonable and adequate.

See the emission source's monitoring and recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Describe each proposed modification to an existing source.

NA

Identify and describe all fugitive emission points, all relief and emergency valves and any by-pass stacks.

NA

Describe how emissions will be minimized especially during start up, shut down, process upsets and/or disruptions.

NA

Anticipated Milestones:

- i. Expected commencement date of construction/reconstruction/installation: NA
- ii. Expected completion date of construction/reconstruction/installation: NA
- iii. Anticipated date of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions*

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM					
PM ₁₀					
SO _x					
CO					
NO _x					
VOC					
Others: (e.g., HAPs)	-----	-----	-----	-----	-----

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations

2. Gas Cooling NA

Water quenching ☐ Yes ☐ No Water injection rate _____ GPM

Radiation and convection cooling

☐ Yes ☐ No

Air dilution

☐ Yes ☐ No

If yes, _____ CFM

Forced Draft ☐ Yes ☐ No

Water cooled duct work ☐ Yes ☐ No

Other

Inlet Volume _____ ACFM

@ _____ °F _____ % Moisture

Outlet Volume _____ ACFM

@ _____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Settling Chambers NA			
Manufacturer		Volume of gas handled _____ACFM @_____°F	Gas velocity (ft/sec.)
Length of chamber (ft.)	Width of chamber (ft.)	Height of chamber (ft.)	Number of trays
Water injection ☐ Yes ☐ No		Water injection rate (GPM)	
Emissions Data			
Inlet	Outlet		Removal Efficiency (%)
4. Inertial and Cyclone Collectors NA			
Manufacturer		Type	Model No.
Pressure drop (in. of water)	Inlet volume _____ACFM @_____°F		Outlet volume _____ACFM @_____°F
Number of individual cyclone(s)		Outlet straightening vanes used? ☐ Yes ☐ No	
Length of Cyclone(s) Cylinder (ft.)	Diameter of Cyclone(s) Cylinder (ft.)	Length of Cyclone(s) cone (ft.)	
Inlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)		Outlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)	
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?			
Describe any exhaust gas recirculation loop to be employed.			
Attach particle size efficiency curve			
Emissions Data			
Inlet	Outlet		Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No. ☐ Pressurized Design ☐ Suction Design	
Number of Compartments	Number of Filters Per Compartment	Is Baghouse Insulated? ☐ Yes ☐ No	
Can each compartment be isolated for repairs and/or filter replacement? ☐ Yes ☐ No			
Are temperature controls provided? (Describe in detail) ☐ Yes ☐ No			
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM	
Type of Fabric Material _____ ☐ Felted ☐ Membrane Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____ Thickness _____ in ☐ Felted-Woven			
Fabric permeability (clean) @ ½" water-Δ P _____ CFM/sq.ft.			
Filter dimensions Length _____ Diameter/Width _____			
Effective area per filter _____		Maximum operating temperature (°F) _____	
Effective air to cloth ratio Minimum _____ Maximum _____			
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.			
Operation and Cleaning			
Volume of gases handled _____ ACFM @ _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.	
Type of filter cleaning ☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets ☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____ ☐ Pneumatic Shakers ☐ Reverse Air Flow			
Describe the equipment provided if dry oil free air is required for collector operation			
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
6. Wet Collection Equipment NA			
Equipment Specifications			
Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)	Relative Particulate/Gas Velocity (ejector scrubbers only)		
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).			
Describe pH monitoring and pH adjustment systems, if applicable.			
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).			
Attach particulate size efficiency curve.			
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F		Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture	
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)			
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.)			
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Electrostatic Precipitator NA

Equipment Specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ Yes ☐ No		Design Inlet Volume (SCFM) _____ Maximum operating temperature (°F) _____	
Total collecting surface area _____ sq. ft.		Collector plates size length _____ ft. x width _____ ft.	
Number of fields _____		Number of collector plates/field _____	
Spacing between collector plates _____ inches.			
Maximum gas velocity _____ ft./sec.		Minimum gas treatment time: _____ sec.	
Total discharge electrode length _____ ft.			
Number of discharge electrodes _____		Number of collecting electrode rappers _____	
Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____ Describe in detail			

Operating Parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (inches water gauge) across collector only _____ Describe the equipment
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field			
Field No.	No. of Sets	Each Transformer KVA	Each Rectifier KV Ave./Peak Ma DC
Current Density _____ Micro amperes/ft ² .		Corona Power _____ Watts/1000 ACFM	Corona Power Density _____ Watts/ft ² .
Will a flue gas conditioning system be employed? If yes, describe it.			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
8. Adsorption Equipment NA			
Equipment Specifications			
Manufacturer	Type		Model No.
Design Inlet Volume (SCFM)		Adsorbent charge per adsorber vessel and number of adsorber vessels	
Length of Mass Transfer Zone (MTZ), supplied by the manufacturer based upon laboratory data.			
Adsorber diameter (ft.) and area ft ² .)		Adsorption bed depth (ft.)	
Adsorbent information			
Adsorbent type and physical properties.			
Working capacity of adsorbent (%)		Heel percent or unrecoverable solvent weight % in the adsorbent after regeneration.	
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F			
Adsorption time per adsorption bed		Breakthrough capacity: Lbs. of solvent / 100 lbs. of adsorbent = _____	
Vapor pressure of solvents at the inlet temperature		Available steam in pounds to regenerate carbon adsorber (if applicable)	
Percent relative saturation of each solvent at the inlet temperature			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
9. Absorption Equipment NA			
Equipment Specifications			
Manufacturer	Type		Model No.
Design Inlet Volume (SCFM)		Tower height (ft.) and inside diameter (ft.)	
Packing type and size (if applicable)		Height of packing (ft.) (if applicable)	
Number of trays (if applicable)		Number of bubble caps (if applicable)	
Configuration ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls.			
Absorbent information			
Absorbent type and concentration.		Retention time (sec.)	
Attach equilibrium data for absorption (if applicable)			
Attach any additional information regarding auxiliary equipment, absorption solution supply system (once through or recirculating, system capacity, etc.) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating Parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in. of water) and liquid flow rate. Describe the monitoring equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. ☐ Selective Catalytic Reduction (SCR)
☐ Selective Non-Catalytic Reduction (SNCR)
☐ Non-Selective Catalytic Reduction (NSCR)

Equipment Specifications

Manufacturer	Type	Model No.
Design Inlet Volume (SCFM)		Design operating temperature (°F)
Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.		
Attach efficiency and other pertinent information (e.g., ammonia slip)		

Operating Parameters

Volume of gases handled _____ (ACFM) @ _____ °F	
Operating temperature range for the SCR/SNCR/NSCR system (°F) From _____ °F To _____ °F	
Reducing agent used, if any	Oxidation catalyst used, if any
State expected range of usage rate and concentration.	
Service life of catalyst	Ammonia slip (ppm)
Describe fully with a sketch giving locations of equipment, controls systems, important parameters and method of operation.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.	

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

11. Oxidizer/Afterburners NA

Equipment Specifications

Manufacturer	Type ☐ Thermal ☐ Catalytic	Model No.	
Design Inlet Volume (SCFM)	Combustion chamber dimensions (length, cross-sectional area, effective chamber volume, etc.)		
Describe design features, which will ensure mixing in combustion chamber.			
Describe method of preheating incoming gases (if applicable).		Describe heat exchanger system used for heat recovery (if applicable).	
Catalyst used	Life of catalyst	Expected temperature rise across catalyst (°F)	Dimensions of bed (in inches). Height: _____ Diameter or Width: _____ Depth: _____
Are temperature sensing devices being provided to measure the temperature rise across the catalyst? ☐ Yes ☐ No If yes, describe.			
Describe any temperature sensing and/or recording devices (including specific location of temperature probe in a drawing or sketch).			
Burner Information			
Burner Manufacturer	Model No.	Fuel Used	
Number and capacity of burners	Rated capacity (each)	Maximum capacity (each)	
Describe the operation of the burner		Attach dimensioned diagram of afterburner	
Operating Parameters			
Inlet flow rate (ACFM) _____ @ _____ °F		Outlet flow rate (ACFM) _____ @ _____ °F	
State pressure drop range across catalytic bed (in. of water).		Describe the method adopted for regeneration or disposal of the used catalyst.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

12. Flares NA

Equipment Specifications

Manufacturer	Type ☐ Elevated flare ☐ Ground flare ☐ Other _____ Describe	Model No.
Design Volume (SCFM)	Dimensions of stack (ft.) Diameter _____ Height _____	
Residence time (sec.) and outlet temperature (°F)	Turn down ratio	Burner details

Describe the flare design (air/steam-assisted or nonassisted), essential auxiliaries including pilot flame monitor of proposed flare with a sketch.

Describe the operation of the flare's ignition system.

Describe the provisions to introduce auxiliary fuel to the flare.

Operation Parameters

Detailed composition of the waste gas	Heat content	Exit velocity
Maximum and average gas flow burned (ACFM)	Operating temperature (°F)	

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

13. Other Control Equipment Watering and sweeping trucks

Equipment Specifications

Manufacturer Various	Type Water application and sweeping	Model No. NA	
Design Volume (SCFM) NA	Capacity NA		
Describe pH monitoring and pH adjustment, if any. NA			
Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. NA			
Attach efficiency curve and/or other efficiency information. NA			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment. Roadway controls applied as-needed according to roadway dust control plan.			
Operation Parameters			
Volume of gas handled NA _____ ACFM @ NA _____ °F NA _____ % Moisture			
Describe fully giving important parameters and method of operation. Roadway controls applied as-needed according to roadway dust control plan.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements. NA			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

14. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Annual Operating Cost

15. Miscellaneous

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

NA

Attach the maintenance schedule for the control equipment and any part of the process equipment that if in disrepair would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if source is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below

☒ Monitoring	☐ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (Parameter, CEM, etc): See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Monitoring device location: See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter:
See the emission source's monitoring requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Testing:

- a. Reference Test Method: Citation
- b. Reference Test Method: Description

Recordkeeping:

Describe what parameters will be recorded and the recording frequency:
See the emission source's recordkeeping requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Reporting:

- a. Describe what is to be reported and frequency of reporting:
See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reporting start date: See the emission source's reporting requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Work Practice Standard:

Describe each: See the emission source's work practice requirements in PA-04-00740A and PA-04-00740C, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Section F - Flue and Air Contaminant Emission

1. Estimated Atmospheric Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		**	**	**
PM ₁₀		**	**	**
SO _x				
CO				
NO _x				
VOC				
Others: (e.g., HAPs)	-----	-----	-----	-----
PM _{2.5}		**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number Z503

List Source(s) or source ID exhausted to this stack:
503

% of flow exhausted to stack: 100%

Stack height above grade (ft.) NA
Grade elevation (ft.) NA

Stack diameter (ft) or Outlet duct area (sq. ft.)
NA

f. Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.
~ 50 ft

Does stack height meet Good Engineering Practice (GEP)?
NA

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. See Appendix D – Air Quality Analysis in this submittal.

Location of stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
Z503	40	40	10.56	80	20	12.84

Stack exhaust

Volume NA ACFM

Temperature NA °F

Moisture NA %

Indicate on an attached sheet the location of sampling ports with respect to exhaust fan, breeching, etc. Give all necessary dimensions.
NA



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 04-00740C [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.			

Exhauster (attach fan curves)_____ in. of water_____ HP @_____RPM.

** If the data and collection method codes differ from those provided on the General Information Form-Authorization Application, provide the additional detail required by that form on a separate form.

Section B - Processes Information

1. Source Information

Source Description (give type, use, raw materials, product, etc). Attach additional sheets as necessary.
The sulfur hexafluoride (SF₆)-insulated high-voltage equipment at SPM that is referenced as the Gas Insulated Switchgear (SF6) (Source ID 504) in PA-04-007-40B.

Manufacturer NA	Model No. NA	Number of Sources 1
Source Designation 504	Maximum Capacity NA	Rated Capacity NA

Type of Material Processed

Maximum Operating Schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Operational restrictions existing or requested, if any (e.g., bottlenecks or voluntary restrictions to limit PTE)

Capacity (specify units)

Per Hour	Per Day	Per Week	Per Year

Operating Schedule

Hours/Day 24	Days/Week 7	Days/Year 365	Hours/Year 8,760

Seasonal variations (Months) From to

If variations exist, describe them

2. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10 ³ Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Gas (other)	SCFH	X 10 ⁶ SCF	grain/100 SCF		Btu/SCF
Coal	TPH	Tons	% by wt		Btu/lb
Other *					

*Note: Describe and furnish information separately for other fuels in Addendum B.

Section B - Processes Information (Continued)

3. Burner

Manufacturer	Type and Model No.	Number of Burners
Description:		
Rated Capacity	Maximum Capacity	

4. Process Storage Vessels

A. For Liquids:

Name of material stored		
Tank I.D. No.	Manufacturer	Date Installed
Maximum Pressure	Capacity (gallons/Meter ³)	
Type of relief device (pressure set vent/conservation vent/emergency vent/open vent)		
Relief valve/vent set pressure (psig)	Vapor press. of liquid at storage temp. (psia/kPa)	
Type of Roof: Describe:		
Total Throughput Per Year	Number of fills per day (fill/day): Filling Rate (gal./min.): Duration of fill hr./fill):	

B. For Solids

Type: ☐ Silo ☐ Storage Bin ☐ Other, Describe		Name of Material Stored
Silo/Storage Bin I.D. No.	Manufacturer	Date Installed
State whether the material will be stored in loose or bags in silos		Capacity (Tons)
Turn over per year in tons		Turn over per day in tons
Describe fugitive dust control system for loading and handling operations		
Describe material handling system		

5. Request for Confidentiality

Do you request any information on this application to be treated as "Confidential"? ☐ Yes ☒ No
 If yes, include justification for confidentiality. Place such information on separate pages marked "confidential".

Section B - Processes Information (Continued)

6. Miscellaneous Information

Attach flow diagram of process 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 hoods location, design, airflow and capture efficiency. Describe any restriction requested and how it will be monitored.

See Appendix C – Process Flow Diagrams in this submittal for a quick reference to flow diagrams for SPM's processes and VOC control systems. The remaining information (raw materials, rates, etc.) is available in the potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal. Shell is not requesting restrictions on SPM's production capacity.

Describe fully the facilities provided to monitor and to record process operating conditions, which may affect the emission of air contaminants. Show that they are reasonable and adequate.

See the emission source's monitoring and recordkeeping requirements in PA-04-00740B, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Describe each proposed modification to an existing source.

NA

Identify and describe all fugitive emission points, all relief and emergency valves and any by-pass stacks.

NA

Describe how emissions will be minimized especially during start up, shut down, process upsets and/or disruptions.

NA

Anticipated Milestones:

- i. Expected commencement date of construction/reconstruction/installation: NA
- ii. Expected completion date of construction/reconstruction/installation: NA
- iii. Anticipated date of start-up: NA

Section C - Air Cleaning Device

1. Precontrol Emissions*

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM					
PM ₁₀					
SO _x					
CO					
NO _x					
VOC					
Others: (e.g., HAPs)	-----	-----	-----	-----	-----

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations.

2. Gas Cooling NA

Water quenching ☐ Yes ☐ No Water injection rate _____ GPM

Radiation and convection cooling

☐ Yes ☐ No

Air dilution

☐ Yes ☐ No

If yes, _____ CFM

Forced Draft ☐ Yes ☐ No

Water cooled duct work ☐ Yes ☐ No

Other

Inlet Volume _____ ACFM

@ _____ °F _____ % Moisture

Outlet Volume _____ ACFM

@ _____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Settling Chambers NA			
Manufacturer		Volume of gas handled _____ACFM @_____°F	
Gas velocity (ft/sec.)			
Length of chamber (ft.)	Width of chamber (ft.)	Height of chamber (ft.)	Number of trays
Water injection ☐ Yes ☐ No		Water injection rate (GPM)	
Emissions Data			
Inlet	Outlet	Removal Efficiency (%)	
4. Inertial and Cyclone Collectors NA			
Manufacturer		Type	
Model No.			
Pressure drop (in. of water)		Inlet volume _____ACFM @_____°F	
Outlet volume _____ACFM @_____°F			
Number of individual cyclone(s)		Outlet straightening vanes used? ☐ Yes ☐ No	
Length of Cyclone(s) Cylinder (ft.)	Diameter of Cyclone(s) Cylinder (ft.)	Length of Cyclone(s) cone (ft.)	
Inlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)		Outlet Diameter (ft.) or duct area (ft. ²) of cyclone(s)	
If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?			
Describe any exhaust gas recirculation loop to be employed.			
Attach particle size efficiency curve			
Emissions Data			
Inlet	Outlet	Removal Efficiency (%)	

Section C - Air Cleaning Device (Continued)

5. Fabric Collector NA

Equipment Specifications

Manufacturer		Model No. ☐ Pressurized Design ☐ Suction Design	
Number of Compartments	Number of Filters Per Compartment	Is Baghouse Insulated? ☐ Yes ☐ No	
Can each compartment be isolated for repairs and/or filter replacement? ☐ Yes ☐ No			
Are temperature controls provided? (Describe in detail) ☐ Yes ☐ No			
Dew point at maximum moisture _____ °F		Design inlet volume _____ SCFM	
Type of Fabric Material _____ ☐ Felted ☐ Membrane Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____ Thickness _____ in ☐ Felted-Woven			
Fabric permeability (clean) @ ½" water-Δ P _____ CFM/sq.ft.			
Filter dimensions Length _____ Diameter/Width _____			
Effective area per filter _____		Maximum operating temperature (°F) _____	
Effective air to cloth ratio Minimum _____ Maximum _____			
Drawing of Fabric Filter A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.			
Operation and Cleaning			
Volume of gases handled _____ ACFM @ _____ °F		Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.	
Type of filter cleaning ☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets ☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____ ☐ Pneumatic Shakers ☐ Reverse Air Flow			
Describe the equipment provided if dry oil free air is required for collector operation			
Cleaning Initiated By ☐ Timer Frequency if timer actuated _____ ☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
6. Wet Collection Equipment NA			
Equipment Specifications			
Manufacturer	Type	Model No.	
Design Inlet Volume (SCFM)	Relative Particulate/Gas Velocity (ejector scrubbers only)		
Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).			
Describe pH monitoring and pH adjustment systems, if applicable.			
Describe mist eliminator or separator (type, configuration, backflush capability, frequency).			
Attach particulate size efficiency curve.			
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F		Outlet volume of gases handled _____ (ACFM) @ _____ °F _____ % Moisture	
Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)			
Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.)			
State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Electrostatic Precipitator NA

Equipment Specifications

Manufacturer	Model No.	☐ Wet	☐ Dry
		☐ Single-Stage	☐ Two-Stage
Gas distribution grids ☐ Yes ☐ No		Design Inlet Volume (SCFM) _____	
		Maximum operating temperature (°F) _____	
Total collecting surface area _____ sq. ft.		Collector plates size length _____ ft. x width _____ ft.	
Number of fields _____		Number of collector plates/field _____	
Spacing between collector plates _____ inches.			
Maximum gas velocity _____ ft./sec.		Minimum gas treatment time: _____ sec.	
Total discharge electrode length _____ ft.			
Number of discharge electrodes _____		Number of collecting electrode rappers _____	
Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____ Describe in detail			

Operating Parameters

Inlet gas temperature (°F) _____	State pressure drop range (inches water gauge) across collector only _____
Outlet gas temperature (°F) _____	Describe the equipment
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field			
Field No.	No. of Sets	Each Transformer KVA	Each Rectifier KV Ave./Peak Ma DC
Current Density _____ Micro amperes/ft ² .	Corona Power _____ Watts/1000 ACFM	Corona Power Density _____ Watts/ft ² .	
Will a flue gas conditioning system be employed? If yes, describe it.			
Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
8. Adsorption Equipment NA			
Equipment Specifications			
Manufacturer	Type		Model No.
Design Inlet Volume (SCFM)		Adsorbent charge per adsorber vessel and number of adsorber vessels	
Length of Mass Transfer Zone (MTZ), supplied by the manufacturer based upon laboratory data.			
Adsorber diameter (ft.) and area ft ² .)		Adsorption bed depth (ft.)	
Adsorbent information			
Adsorbent type and physical properties.			
Working capacity of adsorbent (%)		Heel percent or unrecoverable solvent weight % in the adsorbent after regeneration.	
Operating Parameters			
Inlet volume of gases handled _____ (ACFM) @ _____ °F			
Adsorption time per adsorption bed		Breakthrough capacity: Lbs. of solvent / 100 lbs. of adsorbent = _____	
Vapor pressure of solvents at the inlet temperature		Available steam in pounds to regenerate carbon adsorber (if applicable)	
Percent relative saturation of each solvent at the inlet temperature			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)			
9. Absorption Equipment NA			
Equipment Specifications			
Manufacturer	Type		Model No.
Design Inlet Volume (SCFM)		Tower height (ft.) and inside diameter (ft.)	
Packing type and size (if applicable)		Height of packing (ft.) (if applicable)	
Number of trays (if applicable)		Number of bubble caps (if applicable)	
Configuration ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow			
Describe pH and/or other monitoring and controls.			
Absorbent information			
Absorbent type and concentration.		Retention time (sec.)	
Attach equilibrium data for absorption (if applicable)			
Attach any additional information regarding auxiliary equipment, absorption solution supply system (once through or recirculating, system capacity, etc.) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.			
Operating Parameters			
Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in. of water) and liquid flow rate. Describe the monitoring equipment.	
State operating range for pH and/or absorbent concentration in scrubber liquid.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. ☐ Selective Catalytic Reduction (SCR)
☐ Selective Non-Catalytic Reduction (SNCR)
☐ Non-Selective Catalytic Reduction (NSCR)

Equipment Specifications

Manufacturer	Type	Model No.
Design Inlet Volume (SCFM)		Design operating temperature (°F)
Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.		
Attach efficiency and other pertinent information (e.g., ammonia slip)		

Operating Parameters

Volume of gases handled _____ (ACFM) @ _____ °F	
Operating temperature range for the SCR/SNCR/NSCR system (°F) From _____ °F To _____ °F	
Reducing agent used, if any	Oxidation catalyst used, if any
State expected range of usage rate and concentration.	
Service life of catalyst	Ammonia slip (ppm)
Describe fully with a sketch giving locations of equipment, controls systems, important parameters and method of operation.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.	

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

11. Oxidizer/Afterburners NA

Equipment Specifications

Manufacturer	Type ☐ Thermal ☐ Catalytic	Model No.	
Design Inlet Volume (SCFM)	Combustion chamber dimensions (length, cross-sectional area, effective chamber volume, etc.)		
Describe design features, which will ensure mixing in combustion chamber.			
Describe method of preheating incoming gases (if applicable).		Describe heat exchanger system used for heat recovery (if applicable).	
Catalyst used	Life of catalyst	Expected temperature rise across catalyst (°F)	Dimensions of bed (in inches). Height: _____ Diameter or Width: _____ Depth: _____
Are temperature sensing devices being provided to measure the temperature rise across the catalyst? ☐ Yes ☐ No If yes, describe.			
Describe any temperature sensing and/or recording devices (including specific location of temperature probe in a drawing or sketch).			
Burner Information			
Burner Manufacturer	Model No.	Fuel Used	
Number and capacity of burners	Rated capacity (each)	Maximum capacity (each)	
Describe the operation of the burner		Attach dimensioned diagram of afterburner	
Operating Parameters			
Inlet flow rate (ACFM) _____ @ _____ °F		Outlet flow rate (ACFM) _____ @ _____ °F	
State pressure drop range across catalytic bed (in. of water).		Describe the method adopted for regeneration or disposal of the used catalyst.	
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

12. Flares NA

Equipment Specifications

Manufacturer	Type ☐ Elevated flare ☐ Ground flare ☐ Other _____ Describe	Model No.
Design Volume (SCFM)	Dimensions of stack (ft.) Diameter _____ Height _____	
Residence time (sec.) and outlet temperature (°F)	Turn down ratio	Burner details

Describe the flare design (air/steam-assisted or nonassisted), essential auxiliaries including pilot flame monitor of proposed flare with a sketch.

Describe the operation of the flare's ignition system.

Describe the provisions to introduce auxiliary fuel to the flare.

Operation Parameters

Detailed composition of the waste gas	Heat content	Exit velocity
Maximum and average gas flow burned (ACFM)	Operating temperature (°F)	

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

13. Other Control Equipment NA

Equipment Specifications

Manufacturer	Type	Model No.	
Design Volume (SCFM)		Capacity	
Describe pH monitoring and pH adjustment, if any.			
Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.			
Attach efficiency curve and/or other efficiency information.			
Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.			
Operation Parameters			
Volume of gas handled _____ ACFM @ _____ °F _____ % Moisture			
Describe fully giving important parameters and method of operation.			
Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.			
Emissions Data			
Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

14. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Annual Operating Cost

15. Miscellaneous

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

NA

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

NA

Attach the maintenance schedule for the control equipment and any part of the process equipment that if in disrepair would increase air contaminant emissions.

NA

Section E - Compliance Demonstration

Note: Complete this section if source is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below

☒ Monitoring	☒ Testing	☒ Reporting
☒ Recordkeeping	☒ Work Practice Standard	

Monitoring:

- a. Monitoring device type (Parameter, CEM, etc): See the emission source's monitoring requirements in PA-04-00740B, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Monitoring device location: See the emission source's monitoring requirements in PA-04-00740B, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter:
See the emission source's monitoring requirements in PA-04-00740B, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Testing:

- a. Reference Test Method: Citation See the emission source's testing requirements in PA-04-00740B, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reference Test Method: Description See the emission source's testing requirements in PA-04-00740B, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Recordkeeping:

Describe what parameters will be recorded and the recording frequency:

See the emission source's recordkeeping requirements in PA-04-00740B, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Reporting:

- a. Describe what is to be reported and frequency of reporting:
See the emission source's reporting requirements in PA-04-00740B, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.
- b. Reporting start date: See the emission source's reporting requirements in PA-04-00740B, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Work Practice Standard:

Describe each: See the emission source's work practice requirements in PA-04-00740B, as well as the attached Addendum 1 – Method of Compliance Worksheet, for the emission source.

Section F - Flue and Air Contaminant Emission

1. Estimated Atmospheric Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM				
PM ₁₀				
SO _x				
CO				
NO _x				
VOC				
Others: (e.g., HAPs)	-----	-----	-----	-----
GHGs		**	**	**

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. **See the emission source's potential to emit calculations in Appendix B – Potential to Emit Calculations in this submittal.

2. Stack and Exhauster

Stack Designation/Number Z504

List Source(s) or source ID exhausted to this stack:
504

% of flow exhausted to stack: 100%

Stack height above grade (ft.) NA
Grade elevation (ft.) NA

Stack diameter (ft) or Outlet duct area (sq. ft.)
NA

f. Weather Cap
☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.

~ 300 ft

Does stack height meet Good Engineering Practice (GEP)?

NA

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions.

Location of stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
Z504	40	40	10.56	80	20	12.84

Stack exhaust

Volume NA ACFM

Temperature NA °F

Moisture NA %

Indicate on an attached sheet the location of sampling ports with respect to exhaust fan, breeching, etc. Give all necessary dimensions.

NA

Exhauster (attach fan curves)_____ in. of water_____ HP @_____RPM.

** If the data and collection method codes differ from those provided on the General Information Form-Authorization Application, provide the additional detail required by that form on a separate form.



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 leak detection and repair (LDAR) program inspection conducted during the reporting period.

Reporting Start Date	As specified

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Implement an SF6 leak detection and repair (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 G - Attachments

Number and list all attachments submitted with this application below:

Appendix A – Plan Approval Application Forms

Appendix B – Potential to Emit Calculations

Appendix C – Process Flow Diagrams

Appendix D – Air Quality Analysis

Appendix E – EPA RBLC Database Information

Appendix F – General Information Form – Authorization Application

Appendix G – Air Pollution Control Act Compliance Review Supplemental Form

Appendix H – Local Municipality and County Notifications and Proof of Receipt

Appendix I – June 28, 2024 Letter from Shell to DEP Regarding NOx and PM_{2.5} ERC Transfers

Appendix J – Summary of SPM Stack Test Results and Emission Source Actual Emissions Reporting Emission Factors

Potential to Emit Calculations

SPM Facility-Wide Potential to Emit Summary

Source ID	Source Description	CO	NOx	PM	PM ₁₀	PM _{2.5}	SO ₂	VOC	CO ₂ e	Lead	H ₂ SO ₄	Ammonia	HAPs
		Annual (tpy)	Annual (tpy)	Annual (tpy)	Annual (tpy)	Annual (tpy)	Annual (tpy)	Annual (tpy)	Annual (tpy)	Annual (tpy)	Annual (tpy)	Annual (tpy)	Annual (tpy)
031	Ethane Cracking Furnace #1	58.47	25.90	4.87	12.40	12.40	0.67	2.61	158,998	2.24E-04	0.03	10.45	0.73
032	Ethane Cracking Furnace #2	58.47	25.90	4.87	12.40	12.40	0.67	2.61	158,998	2.24E-04	0.03	10.45	0.73
033	Ethane Cracking Furnace #3	58.47	25.90	4.87	12.40	12.40	0.67	2.61	158,998	2.24E-04	0.03	10.45	0.73
034	Ethane Cracking Furnace #4	58.47	25.90	4.87	12.40	12.40	0.67	2.61	158,998	2.24E-04	0.03	10.45	0.73
035	Ethane Cracking Furnace #5	58.47	25.90	4.87	12.40	12.40	0.67	2.61	158,998	2.24E-04	0.03	10.45	0.73
036	Ethane Cracking Furnace #6	58.47	25.90	4.87	12.40	12.40	0.67	2.61	158,998	2.24E-04	0.03	10.45	0.73
037	Ethane Cracking Furnace #7	58.47	25.90	4.87	12.40	12.40	0.67	2.61	158,998	2.24E-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	366,921	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	366,921	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	366,921	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	-	2.39E-04
105	Diesel-Fired Emergency Generator Engines (2); Generator 2 - Telecom Hut	0.01	0.02	0.002	0.002	0.001	3.65E-05	0.001	4	-	1.79E-06	-	1.55E-04
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	-	0.001
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	-	0.001
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	-	0.01
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
202	Polyethylene Manufacturing Lines	-	-	3.43	3.43	3.43	-	-	-	-	-	-	1.36E-04
203	Process Cooling Tower	-	-	6.49	4.12	0.01	-	38.88	-	-	-	-	0.97
C204A	Continuous Vent Thermal Oxidizer (CVTO)	64.78	53.49	1.47	5.86	5.86	1.16	30.60	109,125	3.86E-04	0.06	-	0.10

SPM Facility-Wide Potential to Emit Summary

Source ID	Source Description	CO	NOx	PM	PM ₁₀	PM _{2.5}	SO ₂	VOC	CO ₂ e	Lead	H ₂ SO ₄	Ammonia	HAPs
		Annual (tpy)	Annual (tpy)	Annual (tpy)	Annual (tpy)	Annual (tpy)	Annual (tpy)	Annual (tpy)	Annual (tpy)	Annual (tpy)	Annual (tpy)	Annual (tpy)	Annual (tpy)
C204B	Multi-Point Gound Flare (MPGF) (MPGF CVTO Trip Header)	9.33	2.05	0.06	0.22	0.22	0.04	15.79	4,173	1.47E-05	0.002	-	0.01
C204B	MPGF (MPGF Ethylene Tank Header)	13.04	2.86	0.08	0.31	0.31	0.06	2.49	5,551	2.06E-05	0.003	-	0.005
C204B	MPGF (MPGF PE Units 1/2 Episodic Vent Header)	107.00	23.47	0.64	2.57	2.57	0.51	5.09	45,547	1.69E-04	0.02	-	0.04
C205A	Totally Enclosed Ground Flare (TEGF) A	567.76	124.54	3.41	13.65	13.65	2.69	156.67	186,553	0.001	0.13	-	8.04
C205B	TEGF B												
C205C	HP Elevated Flare												
C206	Spent Caustic Thermal Oxidizer (SCTO)	3.99	3.30	0.09	0.57	0.57	4.19	0.21	6,044	-	0.21	-	0.13
301	Polyethylene Pellet Material Storage/Handling/Loadout	-	-	8.36	2.88	2.88	-	103.66	-	-	-	-	-
302	Liquid Loadout (Recovered Oil)	-	-	-	-	-	-	0.10	-	-	-	-	0.10
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	3.13	-	-	-	-	-	34.40	314	-	-	-	4.95
502	Wastewater Treatment Plant	-	-	-	-	-	-	0.21	-	-	-	-	0.21
503	Plant Roadways	-	-	0.64	0.13	0.03	-	-	-	-	-	-	-
504	Gas Insulated Switchgear (SF6)	-	-	-	-	-	-	-	854	-	-	-	-
Total (tpy)		1,223.76	461.67	79.26	184.27	178.40	27.17	439.61	2,571,991	0.01	1.33	137.23	25.29
Current Plan Approval (tpy)		983.7	328.5	74.3	168.9	163.7	22.4	516.2	2,305,353	-	-	154	32.0
Change (tpy)		240.06	133.17	4.96	15.37	14.70	4.77	-76.59	266,638	-	-	-16.77	-6.71

<i>Source IDs</i> = <i>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	336.2	TG	-	-	7,509	6.20	3.10	11.77
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
<i>Annual Emissions =</i>									
<i>Decoking Cycle ST Rates =</i>							4.33	1.86	52.20
<i>Normal Ops ST Rates =</i>							9.30	3.10	21.70
<i>Normal Ops LT Rates =</i>							6.20	3.10	11.77
<i>Average Annual Rates =</i>							5.91	2.83	13.35

<i>Source IDs</i>	<i>= 031 - 037 Ethane Cracking Furnaces #1 - #7</i>											
Furnace Operating Modes	NO_x EF lb/MMBtu	PM EF lb/MMBtu	PM_{10/2.5} 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	0.002	0.005	0.035	0.0002	0.0019	63.4	0.0012	0.00022	63.5	1.2E-05	8.0E-08
Normal Operation (LT)	0.010	0.002	0.005	0.035	0.0002	0.0019	63.4	0.0012	0.00022	63.5	1.2E-05	8.0E-08
Decoking	0.015	0.010	0.010	0.290	0.0002	0.0019	71.5	0.0012	0.00022	71.6	1.2E-05	8.0E-08
Feed In	0.015	0.002	0.005	0.035	0.0015	0.0019	117.0	0.0022	0.00022	117.1	7.2E-05	4.9E-07
Feed Out	0.015	0.002	0.005	0.035	0.0015	0.0019	117.0	0.0022	0.00022	117.1	7.2E-05	4.9E-07
Hot Steam Standby	0.025	0.002	0.005	0.035	0.0015	0.0019	117.0	0.0022	0.00022	117.1	7.2E-05	4.9E-07
Startup	0.180	0.002	0.005	0.290	0.0015	0.0019	117.0	0.0022	0.00022	117.1	7.2E-05	4.9E-07
Shutdown	0.180	0.002	0.005	0.290	0.0015	0.0019	117.0	0.0022	0.00022	117.1	7.2E-05	4.9E-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 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	11.64	44.18	0.56	2.40	147,646	2.78	0.51	147,868	0.03	1.9E-04
Decoking	0.58	0.40	0.40	11.28	0.01	0.07	2,782	0.05	0.01	2,785	4.6E-04	3.1E-06
Feed In	0.05	0.01	0.02	0.12	0.005	0.01	389	0.01	0.001	389	2.4E-04	1.6E-06
Feed Out	0.05	0.01	0.02	0.12	0.005	0.01	389	0.01	0.001	389	2.4E-04	1.6E-06
Hot Steam Standby	1.56	0.12	0.31	2.19	0.09	0.12	7,316	0.14	0.01	7,323	0.005	3.1E-05
Startup	0.19	0.002	0.01	0.30	0.002	0.002	121	0.002	2.3E-04	122	7.5E-05	5.1E-07
Shutdown	0.19	0.002	0.01	0.30	0.002	0.002	121	0.002	2.3E-04	122	7.5E-05	5.1E-07
Annual Emissions =	25.90	4.87	12.40	58.47	0.67	2.61	158,764	2.99	0.54	158,998	0.03	2.2E-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 54.2% 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 16.3% 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:	
• PM emissions do not include condensable particulate. • 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 normalized 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 45.8% where applicable. • N2O emissions factor for NG 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, 25, and 298 respectively.	
Lead	
• All Modes: Pb EF based on AP-42 natural gas emissions factor (see Table 1.4-2) and an average natural gas firing rate of 16.3% 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		
Max CH4+NG Heat Input [HHV]=		336.2 MMBtu/hr		Based on 620 MMBtu/hr and 54.2% of heat input from CH4+NG.*		
Annual Hours @ 100% Load =		8,760 hr/yr		Conservatively assumes continuous operation at 100% load		
Hourly PTE =		(Max Heat Input - MMBtu/hr) x (EF - lb/MMBtu)				
Annual PTE =		(Max 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	7.91E-06	3.46E-05
3-Methylchloranthrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.93E-07	2.60E-06
7,12-Dimethylbenz(a)anthracene	YES	<1.6E-05	<1.57E-08	AP-42, Table 1.4-3	5.27E-06	2.31E-05
Acenaphthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.93E-07	2.60E-06
Anthracene	YES	<2.4E-06	<2.35E-09	AP-42, Table 1.4-3	7.91E-07	3.46E-06
Benzo(a)anthracene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.93E-07	2.60E-06
Benzene	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-3	0.001	0.003
Benzo(a)pyrene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	3.96E-07	1.73E-06
Benzo(b)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.93E-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	1.73E-06
Benzo(k)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.93E-07	2.60E-06
Butane	NO	2.10E+00	2.06E-03	AP-42, Table 1.4-3	0.69	3.03
Chrysene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.93E-07	2.60E-06
Dibenzo(a,h)anthracene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	3.96E-07	1.73E-06
Dichlorobenzene	YES	1.20E-03	1.18E-06	AP-42, Table 1.4-3	3.96E-04	0.002
Ethane	NO	3.10E+00	3.04E-03	AP-42, Table 1.4-3	1.02	4.48
Fluoranthene	YES	3.00E-06	2.94E-09	AP-42, Table 1.4-3	9.89E-07	4.33E-06
Fluorene	YES	2.80E-06	2.75E-09	AP-42, Table 1.4-3	9.23E-07	4.04E-06
Formaldehyde	YES	7.50E-02	7.35E-05	AP-42, Table 1.4-3	0.02	0.11
Hexane	YES	-	4.07E-04	Stack Test Data	0.14	0.60
Indeno(1,2,3-cd)pyrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.93E-07	2.60E-06
Naphthalene	YES	6.10E-04	5.98E-07	AP-42, Table 1.4-3	2.01E-04	0.001
Pentane	NO	2.60E+00	2.55E-03	AP-42, Table 1.4-3	0.86	3.75
Phenanthrene	YES	1.70E-05	1.67E-08	AP-42, Table 1.4-3	5.60E-06	2.45E-05
Propane	NO	1.60E+00	1.57E-03	AP-42, Table 1.4-3	0.53	2.31
Pyrene	YES	5.00E-06	4.90E-09	AP-42, Table 1.4-3	1.65E-06	7.22E-06
Toluene	YES	3.40E-03	3.33E-06	AP-42, Table 1.4-3	0.001	0.005
Arsenic	YES	2.00E-04	1.96E-07	AP-42, Table 1.4-4	6.59E-05	2.89E-04
Barium	NO	4.40E-03	4.31E-06	AP-42, Table 1.4-4	0.001	0.01
Beryllium	YES	<1.2E-05	<1.18E-08	AP-42, Table 1.4-4	3.96E-06	1.73E-05
Cadmium	YES	1.10E-03	1.08E-06	AP-42, Table 1.4-4	3.63E-04	0.002
Chromium**	YES	1.40E-03	1.37E-06	AP-42, Table 1.4-4	4.61E-04	0.002
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	2.80E-04	0.001
Lead	YES	5.00E-04	4.90E-07	AP-42, Table 1.4-4	1.65E-04	0.001
Manganese	YES	3.80E-04	3.73E-07	AP-42, Table 1.4-4	1.25E-04	0.001
Mercury	YES	2.60E-04	2.55E-07	AP-42, Table 1.4-4	8.57E-05	3.75E-04
Molybdenum	NO	1.10E-03	1.08E-06	AP-42, Table 1.4-4	3.63E-04	0.002
Nickel	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-4	0.001	0.003
Selenium	YES	<2.4E-05	<2.35E-08	AP-42, Table 1.4-4	7.91E-06	3.46E-05
Vanadium	NO	2.30E-03	2.25E-06	AP-42, Table 1.4-4	0.001	0.003
Zinc	NO	2.90E-02	2.84E-05	AP-42, Table 1.4-4	0.01	0.04
Total \$112 HAPs from 1 Cracking Furnace =					0.17	0.73
Total \$112 HAPs from 7 Cracking Furnaces =					1.16	5.09

* No HAP emissions attributed to the combustion of H2 in the cracking furnaces.

**All the Chromium emitted from the cracking furnaces is conservatively assumed to be hexavalent.

*** Ammonia emission factor calculated per 40 CFR 60, Method 19 based on 10 ppmvd ammonia @ 3% O2 in 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 (54.2% CH4+NG/45.8% H2)	7,456	dscf/MMBtu 54.2% of heat input from CH4+NG and 45.8% 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 NOx EF		=	113	lb/hr	Design estimate							
Startup CO EF		=	276	lb/hr	Design estimate							
Startup 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 Hours) + (Startup NOx EF) x (Startup 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 Hours) + (Startup CO EF) x (Startup 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		=	366,921	T/yr	= Sum of CO2, N2O and CH4 emissions adjusted for NO2 and CH4 GWPs of 298 and 25							
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	= Annual Average Value 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 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		=	83,772	lb/hr	= Sum of CO2, N2O and CH4 emissions adjusted for NO2 and CH4 GWPs of 298 and 25							
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	366,921	
3 Units	=	17.86	62.04	62.04	33.10	70.34	13.82	45.00	0.68	0.005	1,100,762	

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	4.88	21.36
1,3-Butadiene :	YES	<4.30E-07	<3.01E-07	AP-42, Table 3.1-3	2.2E-04	9.4E-04
Acetaldehyde :	YES	4.00E-05	2.80E-05	AP-42, Table 3.1-3	0.02	0.09
Acrolein :	YES	6.40E-06	4.48E-06	AP-42, Table 3.1-3	0.003	0.01
Benzene :	YES	-	1.57E-06	11/2022 Stack Test Data	0.001	0.005
Ethylbenzene :	YES	3.20E-05	2.24E-05	AP-42, Table 3.1-3	0.02	0.07
Formaldehyde :	YES	-	2.30E-04	11/2022 Stack Test Data	0.16	0.72
Naphthalene :	YES	1.30E-06	9.09E-07	AP-42, Table 3.1-3	0.001	0.003
PAH :	YES	2.20E-06	1.54E-06	AP-42, Table 3.1-3	0.001	0.005
Propylene Oxide :	YES	<2.90E-05	<2.03E-05	AP-42, Table 3.1-3	0.01	0.06
Toluene :	YES	-	2.44E-04	11/2022 Stack Test Data	0.17	0.76
Xylenes :	YES	6.40E-05	4.48E-05	AP-42, Table 3.1-3	0.03	0.14
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 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 hrs/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 =	5.88	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 =	5.90	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	5.90	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 =		3.82	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 =		3.84	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	6.06E-04	0.02	3.65E-05	0.005	3.84	1.79E-06	
lb/hr-annualized =	3.78E-04	3.63E-04	3.40E-04	1.38E-04	0.00	8.32E-06	0.001	0.88	4.09E-07	

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 =	27.95	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	27.95	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	27.95	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	9.33E-04	6.53E-06	1.59E-04	1.59E-04
Toluene	4.09E-04	2.86E-06	6.99E-05	6.99E-05
Xylenes	2.85E-04	2.00E-06	4.87E-05	4.87E-05
Propylene	2.58E-03	1.81E-05	4.41E-04	4.41E-04
1,3-Butadiene	3.92E-05	2.74E-07	6.70E-06	6.70E-06
Formaldehyde	1.18E-03	8.26E-06	2.02E-04	2.02E-04
Acetaldehyde	7.67E-04	5.37E-06	1.31E-04	1.31E-04
Acrolein	9.25E-05	6.48E-07	1.58E-05	1.58E-05
Naphthalene	8.48E-05	5.94E-07	1.45E-05	1.45E-05
PAH	1.68E-04	1.18E-06	2.87E-05	2.87E-05
Acenaphthylene	5.06E-06	3.54E-08	8.64E-07	8.64E-07
Acenaphthene	1.42E-06	9.94E-09	2.43E-07	2.43E-07
Anthracene	1.87E-06	1.31E-08	3.19E-07	3.19E-07
Benzo(a)anthracene	1.68E-06	1.18E-08	2.87E-07	2.87E-07
Benzo(b)fluoranthene	9.91E-08	6.94E-10	1.69E-08	1.69E-08
Benzo(k)fluoranthene	1.55E-07	1.09E-09	2.65E-08	2.65E-08
Benzo(a)pyrene	1.88E-07	1.32E-09	3.21E-08	3.21E-08
Benzo(g,h,i)perylene	4.89E-07	3.42E-09	8.35E-08	8.35E-08
Chrysene	3.53E-07	2.47E-09	6.03E-08	6.03E-08
Dibenzo(a,h)anthracene	5.83E-07	4.08E-09	9.96E-08	9.96E-08
Fluoranthene	7.61E-06	5.33E-08	1.30E-06	1.30E-06
Fluorene	2.92E-05	2.04E-07	4.99E-06	4.99E-06
Indeno(1,2,3-cd)pyrene	3.75E-07	2.63E-09	6.41E-08	6.41E-08
Phenanthrene	2.94E-05	2.06E-07	5.02E-06	5.02E-06
Pyrene	4.78E-06	3.35E-08	8.16E-07	8.16E-07

^bEmission factors from AP-42 Section 3.3 Gasoline and Diesel Industrial Engines, Table 3.3-2. Average brake-specific fuel consumption of 7,000 Btu/hp-hr was used to convert from lb/MMBtu to lb/hp-hr.

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 =	220	lb/hr	= Sum of CO2, N2O and CH4 emissions adjusted for NO2 and CH4 GWPs of 298 and 25							
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 =	10.59	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 =	11.00	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	220	4.10E-05	
tpy =	0.001	0.001	0.001	0.02	0.03	4.17E-05	0.01	11.00	2.05E-06	
lb/hr-annualized =	1.54E-04	3.14E-04	3.14E-04	0.004	0.01	9.51E-06	0.003	2.51	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 =	85	lb/hr	= Sum of CO2, N2O and CH4 emissions adjusted for NO2 and CH4 GWPs of 298 and 25							
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 =	3.65	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 =	4.23	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	85	1.08E-05	
tpy =	1.44E-06	1.86E-04	1.86E-04	0.002	0.03	1.10E-05	0.13	4.23	5.40E-07	
lb/hr-annualized =	3.29E-07	4.26E-05	4.26E-05	0.001	0.01	2.51E-06	0.03	0.97	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	Natural Gas
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 ^a	Diesel ^b		Generator 1 - Parking Garage	Generator 2 - Telecom Hut	Generator 3 - Lift Station	Generator 4 - Lift Station
Benzene	4.40E-04	9.33E-04	6.53E-06	3.36E-05	2.19E-05	3.12E-05	8.21E-06
Toluene	4.08E-04	4.09E-04	2.86E-06	1.47E-05	9.59E-06	2.89E-05	7.62E-06
Xylenes	1.84E-04	2.85E-04	2.00E-06	1.03E-05	6.68E-06	1.30E-05	3.43E-06
Propylene	-	2.58E-03	1.81E-05	9.30E-05	6.05E-05	-	-
1,3-Butadiene	2.67E-04	3.92E-05	2.74E-07	1.41E-06	9.19E-07	1.89E-05	4.98E-06
Formaldehyde	5.28E-02	1.18E-03	8.26E-06	4.25E-05	2.77E-05	3.74E-03	9.86E-04
Acetaldehyde	8.36E-03	7.67E-04	5.37E-06	2.77E-05	1.80E-05	5.92E-04	1.56E-04
Acrolein	5.14E-03	9.25E-05	6.48E-07	3.33E-06	2.17E-06	3.64E-04	9.59E-05
Naphthalene	7.44E-05	8.48E-05	5.94E-07	3.06E-06	1.99E-06	5.27E-06	1.39E-06
PAH	2.69E-05	1.68E-04	1.18E-06	6.06E-06	3.94E-06	1.91E-06	5.02E-07
Acenaphthylene	-	5.06E-06	3.54E-08	1.82E-07	1.19E-07	-	-
Acenaphthene	-	1.42E-06	9.94E-09	5.12E-08	3.33E-08	-	-
Anthracene	-	1.87E-06	1.31E-08	6.74E-08	4.39E-08	-	-
Benzo(a)anthracene	-	1.68E-06	1.18E-08	6.06E-08	3.94E-08	-	-
Benzo(b)fluoranthene	-	9.91E-08	6.94E-10	3.57E-09	2.32E-09	-	-
Benzo(k)fluoranthene	-	1.55E-07	1.09E-09	5.59E-09	3.63E-09	-	-
Benzo(a)pyrene	-	1.88E-07	1.32E-09	6.78E-09	4.41E-09	-	-
Benzo(g,h,i)perylene	-	4.89E-07	3.42E-09	1.76E-08	1.15E-08	-	-
Biphenyl	2.12E-04	-	-	-	-	1.50E-05	3.96E-06
Butyr/Isobutyraldehyde	1.01E-04	-	-	-	-	7.15E-06	1.89E-06
Carbon Tetrachloride	3.67E-05	-	-	-	-	2.60E-06	6.85E-07
Chlorobenzene	3.04E-05	-	-	-	-	2.15E-06	5.67E-07
Chloroethane	1.87E-06	-	-	-	-	1.32E-07	3.49E-08
Chloroform	2.85E-05	-	-	-	-	2.02E-06	5.32E-07
Chrysene	-	3.53E-07	2.47E-09	1.27E-08	8.28E-09	-	-
Cyclopentane	2.27E-04	-	-	-	-	1.61E-05	4.24E-06
Dibenzo(a,h)anthracene	-	5.83E-07	4.08E-09	2.10E-08	1.37E-08	-	-
Ethylbenzene	3.97E-05	-	-	-	-	2.81E-06	7.41E-07
Ethylene Dibromide	4.43E-05	-	-	-	-	3.14E-06	8.27E-07
Fluoranthene	-	7.61E-06	5.33E-08	2.74E-07	1.78E-07	-	-
Fluorene	-	2.92E-05	2.04E-07	1.05E-06	6.85E-07	-	-
Methanol	2.50E-03	-	-	-	-	1.77E-04	4.67E-05
Methylcyclohexane	1.23E-03	-	-	-	-	8.71E-05	2.30E-05
Methylene Chloride	2.00E-05	-	-	-	-	1.42E-06	3.73E-07
Hexane	1.11E-03	-	-	-	-	7.86E-05	2.07E-05
Indeno(1,2,3-cd)pyrene	-	3.75E-07	2.63E-09	1.35E-08	8.79E-09	-	-
Phenanthrene	-	2.94E-05	2.06E-07	1.06E-06	6.89E-07	-	-
Phenol	2.40E-05	-	-	-	-	1.70E-06	4.48E-07
Pyrene	1.36E-06	4.78E-06	3.35E-08	1.72E-07	1.12E-07	9.63E-08	2.54E-08
Styrene	2.36E-05	-	-	-	-	1.67E-06	4.41E-07
Tetrachloroethane	2.48E-06	-	-	-	-	1.76E-07	4.63E-08
Vinyl Chloride	1.49E-05	-	-	-	-	1.06E-06	2.78E-07
1,1,2,2-Tetrachloroethane	4.00E-05	-	-	-	-	2.83E-06	7.47E-07
1,1,2-Trichloroethane	3.18E-05	-	-	-	-	2.25E-06	5.94E-07
1,1-Dichloroethane	2.36E-05	-	-	-	-	1.67E-06	4.41E-07
1,2,3-Trimethylbenzene	2.30E-05	-	-	-	-	1.63E-06	4.29E-07
1,2,4-Trimethylbenzene	1.43E-05	-	-	-	-	1.01E-06	2.67E-07
1,2-Dichloroethane	2.36E-05	-	-	-	-	1.67E-06	4.41E-07
1,2-Dichloropropane	2.69E-05	-	-	-	-	1.91E-06	5.02E-07
1,3,5-Trimethylbenzene	3.38E-05	-	-	-	-	2.39E-06	6.31E-07
1,3-Dichloropropene	2.64E-05	-	-	-	-	1.87E-06	4.93E-07
2-Methylnaphthalene	3.32E-05	-	-	-	-	2.35E-06	6.20E-07
2,2,4-Trimethylpentane	2.50E-04	-	-	-	-	1.77E-05	4.67E-06

^aEmission factors from AP-42 Section 3.2 Natural Gas-fired Reciprocating Engines, Table 3.2-2.

^bEmission factors from AP-42 Section 3.3 Gasoline and Diesel Industrial Engines, Table 3.3-2. Average brake-specific fuel consumption of 7,000 Btu/hp-hr was used to convert

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 negligible/nil; therefore, these vents are not included in the modeling analysis. 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.

Source ID = 202 Polyethylene Manufacturing Lines (PE Unit 3 Process Vent Particulate Emissions)							
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 =						0.352	1.176

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 hrs/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	=		C204A	Continuous Vent Thermal Oxidizer (CVTO)												
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	197.6	3.84 t/hr	-	0.068	-	-	-	-	-	-	-	0.0824	-	0.0075	-	-
CVTO / Normal Ops	179.6	3.49 t/hr	99.9% DRE	0.068	0.0015	0.0075	0.0389	138.1	0.0099	0.0013	138.7	0.0824	0.0019	0.0075	7.2E-05	4.9E-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	197.6	[A]		13.43	-	-	-	-	-	-	-	16.27	-	1.47	-	-
CVTO / Normal Ops	179.6	[B]		12.21	-	-	-	-	-	-	-	14.79	-	1.34	-	-
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	1,573,295		53.49	1.16	5.86	30.60	108,621	7.77	1.04	109,125	64.8	1.47	5.86	0.06	3.9E-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 = AP-42, Table 13.5-1.	
• 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 3.84 t/hr VOC, which is maximum anticipated rate.	
[B] - CVTO / Annual Average Emission Rates:	
• Annual average heat input based on combusting 3.49 t/hr VOC, which is average anticipated rate.	

Source ID =		C204A Continuous Vent Thermal Oxidizer (CVTO)								
Short-Term Max Heat Input (HHV)		197.6	MMBtu/hr - Maximum expected short term rates based on design and process data							
Normal Ops Heat Input (HHV)		179.6	MMBtu/hr - Represents reasonably anticipated venting, maintenance events, startups and shutdowns, supplemental gas, and sweep gas							
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 =		(Normal Ops 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	4.65E-06	1.85E-05	-	-	4.65E-06	1.85E-05
3-Methylchloranthrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.49E-07	1.39E-06	-	-	3.49E-07	1.39E-06
7,12-Dimethylbenz(a)anthracene	YES	<1.6E-05	<1.57E-08	AP-42, Table 1.4-3	3.10E-06	1.23E-05	-	-	3.10E-06	1.23E-05
Acenaphthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.49E-07	1.39E-06	-	-	3.49E-07	1.39E-06
Anthracene	YES	<2.4E-06	<2.35E-09	AP-42, Table 1.4-3	4.65E-07	1.85E-06	-	-	4.65E-07	1.85E-06
Benzo(a)anthracene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.49E-07	1.39E-06	-	-	3.49E-07	1.39E-06
Benzene	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-3	4.07E-04	1.62E-03	8.40E-04	3.68E-03	1.25E-03	5.30E-03
Benzo(a)pyrene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	2.32E-07	9.25E-07	-	-	2.32E-07	9.25E-07
Benzo(b)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.49E-07	1.39E-06	-	-	3.49E-07	1.39E-06
Benzo(g,h,i)perylene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	2.32E-07	9.25E-07	-	-	2.32E-07	9.25E-07
Benzo(k)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.49E-07	1.39E-06	-	-	3.49E-07	1.39E-06
Chrysene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.49E-07	1.39E-06	-	-	3.49E-07	1.39E-06
Dibenzo(a,h)anthracene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	2.32E-07	9.25E-07	-	-	2.32E-07	9.25E-07
Dichlorobenzene	YES	1.20E-03	1.18E-06	AP-42, Table 1.4-3	2.32E-04	9.25E-04	-	-	2.32E-04	9.25E-04
Fluoranthene	YES	3.00E-06	2.94E-09	AP-42, Table 1.4-3	5.81E-07	2.31E-06	-	-	5.81E-07	2.31E-06
Fluorene	YES	2.80E-06	2.75E-09	AP-42, Table 1.4-3	5.42E-07	2.16E-06	-	-	5.42E-07	2.16E-06
Formaldehyde	YES	7.50E-02	7.35E-05	AP-42, Table 1.4-3	1.45E-02	5.78E-02	-	-	1.45E-02	5.78E-02
Hexane	YES	2.90E-02	2.84E-05	Ventura County APCD, AB 2588 Combustions EF, May 2001	5.62E-03	2.24E-02	2.98E-04	1.30E-03	5.91E-03	2.37E-02
Indeno(1,2,3-cd)pyrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.49E-07	1.39E-06	-	-	3.49E-07	1.39E-06
Naphthalene	YES	6.10E-04	5.98E-07	AP-42, Table 1.4-3	1.18E-04	4.70E-04	-	-	1.18E-04	4.70E-04
Phenanthrene	YES	1.70E-05	1.67E-08	AP-42, Table 1.4-3	3.29E-06	1.31E-05	-	-	3.29E-06	1.31E-05
Pyrene	YES	5.00E-06	4.90E-09	AP-42, Table 1.4-3	9.68E-07	3.86E-06	-	-	9.68E-07	3.86E-06
Toluene	YES	3.40E-03	3.33E-06	AP-42, Table 1.4-3	6.59E-04	2.62E-03	-	-	6.59E-04	2.62E-03
Arsenic	YES	2.00E-04	1.96E-07	AP-42, Table 1.4-4	3.87E-05	1.54E-04	-	-	3.87E-05	1.54E-04
Barium	NO	4.40E-03	4.31E-06	AP-42, Table 1.4-4	8.52E-04	3.39E-03	-	-	8.52E-04	3.39E-03
Beryllium	YES	<1.2E-05	<1.18E-08	AP-42, Table 1.4-4	2.32E-06	9.25E-06	-	-	2.32E-06	9.25E-06
Cadmium	YES	1.10E-03	1.08E-06	AP-42, Table 1.4-4	2.13E-04	8.48E-04	-	-	2.13E-04	8.48E-04
Chromium	YES	1.40E-03	1.37E-06	AP-42, Table 1.4-4	2.71E-04	1.08E-03	-	-	2.71E-04	1.08E-03
Cobalt	YES	8.40E-05	8.24E-08	AP-42, Table 1.4-4	1.63E-05	6.48E-05	-	-	1.63E-05	6.48E-05
Copper	NO	8.50E-04	8.33E-07	AP-42, Table 1.4-4	1.65E-04	6.56E-04	-	-	1.65E-04	6.56E-04
Lead	YES	5.00E-04	4.90E-07	AP-42, Table 1.4-2	9.68E-05	3.86E-04	-	-	9.68E-05	3.86E-04

Source ID = C204A Continuous Vent Thermal Oxidizer (CVTO)										
Short-Term Max Heat Input (HHV)		197.6	MMBtu/hr - Maximum expected short term rates based on design and process data							
Normal Ops Heat Input (HHV)		179.6	MMBtu/hr - Represents reasonably anticipated venting, maintenance events, startups and shutdowns, supplemental gas, and sweep gas							
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 =		(Normal Ops 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)
Manganese	YES	3.80E-04	3.73E-07	AP-42, Table 1.4-4	7.36E-05	2.93E-04	-	-	7.36E-05	2.93E-04
Mercury	YES	2.60E-04	2.55E-07	AP-42, Table 1.4-4	5.04E-05	2.01E-04	-	-	5.04E-05	2.01E-04
Molybdenum	NO	1.10E-03	1.08E-06	AP-42, Table 1.4-4	2.13E-04	8.48E-04	-	-	2.13E-04	8.48E-04
Nickel	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-4	4.07E-04	1.62E-03	-	-	4.07E-04	1.62E-03
Selenium	YES	<2.4E-05	<2.35E-08	AP-42, Table 1.4-4	4.65E-06	1.85E-05	-	-	4.65E-06	1.85E-05
Vanadium	NO	2.30E-03	2.25E-06	AP-42, Table 1.4-4	4.45E-04	1.77E-03	-	-	4.45E-04	1.77E-03
Zinc	NO	2.90E-02	2.84E-05	AP-42, Table 1.4-4	5.62E-03	2.24E-02	-	-	5.62E-03	2.24E-02
Total §112 HAPs =					0.02	0.09	1.1E-03	5.0E-03	0.02	0.10

* 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.

Source ID = C204B Multi-Point Ground Flare (MPGF) (MPGF CVTO Trip Header)																
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 / Short-Term Max	179.6	3.49 t/hr	-	0.068	-	-	-	-	-	-	-	0.31	-	0.0075	-	-
MPGF CVTO Trip Header / Annual Avg	6.9	0.13 t/hr	99% C3-/98% C4+	0.068	0.0015	0.0075	0.5250	138.1	0.0099	0.0013	138.7	0.31	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 CVTO Trip Header / Short-Term Max		179.6	[A]	0.47	-	-	-	-	-	-	-	55.68	-	1.34	-	-
MPGF CVTO Trip Header / Annual Avg		6.9	[B]	0.47	-	-	-	-	-	-	-	2.13	-	0.05	-	-
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 / Annual Avg		8,760	60,166	2.05	0.04	0.22	15.79	4,154	0.30	0.04	4,173	9.33	0.06	0.22	0.002	1.5E-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/NO2 and CO = AP-42, Tables 13.5-1 and 13.5-2, respectively.
• 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 99% DRE for incoming C3- VOC and 98% DRE for incoming C4+ VOC consistent with TCEQ and EPA approvals/testing and DEP guidance.
• 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 assumed to result from ethane flaring = ethane CO2 emission factor from 40 CFR 98, Table C-1.
• CH4 and N2O from pilot fuel is based on natural gas firing = NG emission factors from 40 CFR 98, Table C-2.
• CH4 and N2O from VOC flaring is assumed to result from fuel gas flaring = fuel gas emissions factors 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 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 3.49 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).
• Heat input also includes 1.0 MMBtu/hr of pilot gas at all times.
[B] - MPGF CVTO Trip Header / Annual Average Emission Rates:
• Annual average heat input based on assuming up to two weeks of CVTO trips per year.
• Annual average heat input also includes 1.0 MMBtu/hr of pilot gas at all times.

Source ID =		C204B		Multi-Point Ground Flare (MPGF) (MPGF CVTO Trip Header)						
Short-Term Max Heat Input (HHV)		179.6	MMBtu/hr - Maximum expected short term rates based on design and process data							
Annual Avg Heat Input (HHV)		6.9	MMBtu/hr - Represents reasonably anticipated venting, maintenance events, startups and shutdowns, supplemental gas, and sweep gas							
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	4.23E-06	7.08E-07	-	-	4.23E-06	7.08E-07
3-Methylchloranthrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.17E-07	5.31E-08	-	-	3.17E-07	5.31E-08
7,12-Dimethylbenz(a)anthracene	YES	<1.6E-05	<1.57E-08	AP-42, Table 1.4-3	2.82E-06	4.72E-07	-	-	2.82E-06	4.72E-07
Acenaphthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.17E-07	5.31E-08	-	-	3.17E-07	5.31E-08
Anthracene	YES	<2.4E-06	<2.35E-09	AP-42, Table 1.4-3	4.23E-07	7.08E-08	-	-	4.23E-07	7.08E-08
Benzo(a)anthracene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.17E-07	5.31E-08	-	-	3.17E-07	5.31E-08
Benzene	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-3	3.70E-04	6.19E-05	1.24E-02	2.81E-03	1.28E-02	2.88E-03
Benzo(a)pyrene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	2.11E-07	3.54E-08	-	-	2.11E-07	3.54E-08
Benzo(b)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.17E-07	5.31E-08	-	-	3.17E-07	5.31E-08
Benzo(g,h,i)perylene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	2.11E-07	3.54E-08	-	-	2.11E-07	3.54E-08
Benzo(k)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.17E-07	5.31E-08	-	-	3.17E-07	5.31E-08
Chrysene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.17E-07	5.31E-08	-	-	3.17E-07	5.31E-08
Dibenzo(a,h)anthracene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	2.11E-07	3.54E-08	-	-	2.11E-07	3.54E-08
Dichlorobenzene	YES	1.20E-03	1.18E-06	AP-42, Table 1.4-3	2.11E-04	3.54E-05	-	-	2.11E-04	3.54E-05
Fluoranthene	YES	3.00E-06	2.94E-09	AP-42, Table 1.4-3	5.28E-07	8.85E-08	-	-	5.28E-07	8.85E-08
Fluorene	YES	2.80E-06	2.75E-09	AP-42, Table 1.4-3	4.93E-07	8.26E-08	-	-	4.93E-07	8.26E-08
Formaldehyde	YES	7.50E-02	7.35E-05	AP-42, Table 1.4-3	1.32E-02	2.21E-03	-	-	1.32E-02	2.21E-03
Hexane	YES	2.90E-02	2.84E-05	Ventura County APCD, AB 2588 Combustions EF, May 2001	5.11E-03	8.55E-04	4.39E-03	9.97E-04	9.50E-03	1.85E-03
Indeno(1,2,3-cd)pyrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.17E-07	5.31E-08	-	-	3.17E-07	5.31E-08
Naphthalene	YES	6.10E-04	5.98E-07	AP-42, Table 1.4-3	1.07E-04	1.80E-05	-	-	1.07E-04	1.80E-05
Phenanthrene	YES	1.70E-05	1.67E-08	AP-42, Table 1.4-3	2.99E-06	5.01E-07	-	-	2.99E-06	5.01E-07
Pyrene	YES	5.00E-06	4.90E-09	AP-42, Table 1.4-3	8.80E-07	1.47E-07	-	-	8.80E-07	1.47E-07
Toluene	YES	3.40E-03	3.33E-06	AP-42, Table 1.4-3	5.99E-04	1.00E-04	-	-	5.99E-04	1.00E-04
Arsenic	YES	2.00E-04	1.96E-07	AP-42, Table 1.4-4	3.52E-05	5.90E-06	-	-	3.52E-05	5.90E-06
Barium	NO	4.40E-03	4.31E-06	AP-42, Table 1.4-4	7.75E-04	1.30E-04	-	-	7.75E-04	1.30E-04
Beryllium	YES	<1.2E-05	<1.18E-08	AP-42, Table 1.4-4	2.11E-06	3.54E-07	-	-	2.11E-06	3.54E-07
Cadmium	YES	1.10E-03	1.08E-06	AP-42, Table 1.4-4	1.94E-04	3.24E-05	-	-	1.94E-04	3.24E-05
Chromium	YES	1.40E-03	1.37E-06	AP-42, Table 1.4-4	2.47E-04	4.13E-05	-	-	2.47E-04	4.13E-05
Cobalt	YES	8.40E-05	8.24E-08	AP-42, Table 1.4-4	1.48E-05	2.48E-06	-	-	1.48E-05	2.48E-06
Copper	NO	8.50E-04	8.33E-07	AP-42, Table 1.4-4	1.50E-04	2.51E-05	-	-	1.50E-04	2.51E-05
Lead	YES	5.00E-04	4.90E-07	AP-42, Table 1.4-2	8.80E-05	1.47E-05	-	-	8.80E-05	1.47E-05
Manganese	YES	3.80E-04	3.73E-07	AP-42, Table 1.4-4	6.69E-05	1.12E-05	-	-	6.69E-05	1.12E-05
Mercury	YES	2.60E-04	2.55E-07	AP-42, Table 1.4-4	4.58E-05	7.67E-06	-	-	4.58E-05	7.67E-06
Molybdenum	NO	1.10E-03	1.08E-06	AP-42, Table 1.4-4	1.94E-04	3.24E-05	-	-	1.94E-04	3.24E-05
Nickel	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-4	3.70E-04	6.19E-05	-	-	3.70E-04	6.19E-05
Selenium	YES	<2.4E-05	<2.35E-08	AP-42, Table 1.4-4	4.23E-06	7.08E-07	-	-	4.23E-06	7.08E-07
Vanadium	NO	2.30E-03	2.25E-06	AP-42, Table 1.4-4	4.05E-04	6.78E-05	-	-	4.05E-04	6.78E-05
Zinc	NO	2.90E-02	2.84E-05	AP-42, Table 1.4-4	5.11E-03	8.55E-04	-	-	5.11E-03	8.55E-04
Total \$112 HAPs =					0.02	0.003	0.02	3.8E-03	0.04	0.01

* 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.

Source ID	=	C204B	Multi-Point Ground Flare (MPGF) (MPGF Ethylene Tank Header)													
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 / Short-Term Max	27.6	0.45 t/hr	-	0.068	-	-	-	-	-	-	-	0.31	-	0.0075	-	-
MPGF Ethylene Tank Header / Annual Avg	9.6	0.03 t/hr	99% C3-/98% C4+	0.068	0.0015	0.0075	0.0593	131.4	0.0066	0.0013	132.0	0.31	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 / Short-Term Max	27.6	[A]		0.65	-	-	-	-	-	-	-	8.56	-	0.21	-	-
MPGF Ethylene Tank Header / Annual Avg	9.6	[B]		0.65	-	-	-	-	-	-	-	2.98	-	0.07	-	-
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 / Annual Avg	8,760	84,133		2.86	0.06	0.31	2.49	5,527	0.28	0.06	5,551	13.04	0.08	0.31	0.003	2.1E-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/NO2 and CO = AP-42, Tables 13.5-1 and 13.5-2, respectively.
• 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 99% DRE for incoming C3- VOC and 98% DRE for incoming C4+ VOC consistent with TCEQ and EPA approvals/testing and DEP guidance.
• CO2 is assumed to result from ethane flaring = ethane CO2 emission factor from 40 CFR 98, Table C-1.
• CH4 and N2O is assumed to result from fuel gas flaring = fuel gas emissions factors 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 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 Ethylene Tank Header / Short-Term Maximum Emission Rates:
• 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.
• Heat input also includes 1.0 MMBtu/hr of pilot gas at all times.
[B] - MPGF Ethylene Tank Header / Annual Average Emission Rates:
• Annual average heat input is based on two weeks of venting above baseline rates and baseline ethylene and nitrogen rates to the flare the remainder of the year based on actual process data.
• Annual average heat input also includes supplemental gas needed to maintain a combustion zone heating value of 500 Btu/scf.
• Annual average heat input also includes 1.0 MMBtu/hr of pilot gas at all times.

Source ID		=	C204B		Multi-Point Ground Flare (MPGF) (MPGF Ethylene Tank Header)					
Short-Term Max Heat Input (HHV)			27.6	MMBtu/hr - Maximum expected short term rates based on design and process data						
Annual Avg Heat Input (HHV)			9.6	MMBtu/hr - Represents reasonably anticipated venting, maintenance events, startups and shutdowns, supplemental gas, and sweep gas						
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	6.49E-07	9.90E-07	-	-	6.49E-07	9.90E-07
3-Methylchloranthrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	4.87E-08	7.42E-08	-	-	4.87E-08	7.42E-08
7,12-Dimethylbenz(a)anthracene	YES	<1.6E-05	<1.57E-08	AP-42, Table 1.4-3	4.33E-07	6.60E-07	-	-	4.33E-07	6.60E-07
Acenaphthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	4.87E-08	7.42E-08	-	-	4.87E-08	7.42E-08
Anthracene	YES	<2.4E-06	<2.35E-09	AP-42, Table 1.4-3	6.49E-08	9.90E-08	-	-	6.49E-08	9.90E-08
Benzo(a)anthracene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	4.87E-08	7.42E-08	-	-	4.87E-08	7.42E-08
Benzene	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-3	5.68E-05	8.66E-05	-	-	5.68E-05	8.66E-05
Benzo(a)pyrene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	3.25E-08	4.95E-08	-	-	3.25E-08	4.95E-08
Benzo(b)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	4.87E-08	7.42E-08	-	-	4.87E-08	7.42E-08
Benzo(g,h,i)perylene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	3.25E-08	4.95E-08	-	-	3.25E-08	4.95E-08
Benzo(k)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	4.87E-08	7.42E-08	-	-	4.87E-08	7.42E-08
Chrysene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	4.87E-08	7.42E-08	-	-	4.87E-08	7.42E-08
Dibenzo(a,h)anthracene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	3.25E-08	4.95E-08	-	-	3.25E-08	4.95E-08
Dichlorobenzene	YES	1.20E-03	1.18E-06	AP-42, Table 1.4-3	3.25E-05	4.95E-05	-	-	3.25E-05	4.95E-05
Fluoranthene	YES	3.00E-06	2.94E-09	AP-42, Table 1.4-3	8.12E-08	1.24E-07	-	-	8.12E-08	1.24E-07
Fluorene	YES	2.80E-06	2.75E-09	AP-42, Table 1.4-3	7.58E-08	1.15E-07	-	-	7.58E-08	1.15E-07
Formaldehyde	YES	7.50E-02	7.35E-05	AP-42, Table 1.4-3	2.03E-03	3.09E-03	-	-	2.03E-03	3.09E-03
Hexane	YES	2.90E-02	2.84E-05	Ventura County APCD, AB 2588 Combustions EF, May 2001	7.85E-04	1.20E-03	-	-	7.85E-04	1.20E-03
Indeno(1,2,3-cd)pyrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	4.87E-08	7.42E-08	-	-	4.87E-08	7.42E-08
Naphthalene	YES	6.10E-04	5.98E-07	AP-42, Table 1.4-3	1.65E-05	2.52E-05	-	-	1.65E-05	2.52E-05
Phenanthrene	YES	1.70E-05	1.67E-08	AP-42, Table 1.4-3	4.60E-07	7.01E-07	-	-	4.60E-07	7.01E-07
Pyrene	YES	5.00E-06	4.90E-09	AP-42, Table 1.4-3	1.35E-07	2.06E-07	-	-	1.35E-07	2.06E-07
Toluene	YES	3.40E-03	3.33E-06	AP-42, Table 1.4-3	9.20E-05	1.40E-04	-	-	9.20E-05	1.40E-04
Arsenic	YES	2.00E-04	1.96E-07	AP-42, Table 1.4-4	5.41E-06	8.25E-06	-	-	5.41E-06	8.25E-06
Barium	NO	4.40E-03	4.31E-06	AP-42, Table 1.4-4	1.19E-04	1.81E-04	-	-	1.19E-04	1.81E-04
Beryllium	YES	<1.2E-05	<1.18E-08	AP-42, Table 1.4-4	3.25E-07	4.95E-07	-	-	3.25E-07	4.95E-07
Cadmium	YES	1.10E-03	1.08E-06	AP-42, Table 1.4-4	2.98E-05	4.54E-05	-	-	2.98E-05	4.54E-05
Chromium	YES	1.40E-03	1.37E-06	AP-42, Table 1.4-4	3.79E-05	5.77E-05	-	-	3.79E-05	5.77E-05
Cobalt	YES	8.40E-05	8.24E-08	AP-42, Table 1.4-4	2.27E-06	3.46E-06	-	-	2.27E-06	3.46E-06
Copper	NO	8.50E-04	8.33E-07	AP-42, Table 1.4-4	2.30E-05	3.51E-05	-	-	2.30E-05	3.51E-05
Lead	YES	5.00E-04	4.90E-07	AP-42, Table 1.4-2	1.35E-05	2.06E-05	-	-	1.35E-05	2.06E-05
Manganese	YES	3.80E-04	3.73E-07	AP-42, Table 1.4-4	1.03E-05	1.57E-05	-	-	1.03E-05	1.57E-05
Mercury	YES	2.60E-04	2.55E-07	AP-42, Table 1.4-4	7.04E-06	1.07E-05	-	-	7.04E-06	1.07E-05
Molybdenum	NO	1.10E-03	1.08E-06	AP-42, Table 1.4-4	2.98E-05	4.54E-05	-	-	2.98E-05	4.54E-05
Nickel	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-4	5.68E-05	8.66E-05	-	-	5.68E-05	8.66E-05
Selenium	YES	<2.4E-05	<2.35E-08	AP-42, Table 1.4-4	6.49E-07	9.90E-07	-	-	6.49E-07	9.90E-07
Vanadium	NO	2.30E-03	2.25E-06	AP-42, Table 1.4-4	6.22E-05	9.49E-05	-	-	6.22E-05	9.49E-05
Zinc	NO	2.90E-02	2.84E-05	AP-42, Table 1.4-4	7.85E-04	1.20E-03	-	-	7.85E-04	1.20E-03
Total \$112 HAPs					3.2E-03	4.8E-03	0	0	3.2E-03	4.8E-03

* Emissions from the combustion of natural gas and waste gas based on natural gas combustion emission factors.

** Waste gas consists of ethylene and nitrogen only (i.e., no HAPs).

Source ID	=	C204B	Multi-Point Ground Flare (MPGF) (MPGF PE Units 1/2 Episodic Vent Header)													
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 PE Units 1/2 Episodic Vent Header / Short-Term Max	180	6.50 t/hr	-	0.068	-	-	-	-	-	-	-	0.31	-	0.0075	-	-
MPGF PE Units 1/2 Episodic Vent Header / Annual Avg	78.8	0.04 t/hr	99% C3-/98% C4+	0.068	0.0015	0.0075	0.0148	131.4	0.0066	0.0013	132.0	0.31	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 PE Units 1/2 Episodic Vent Header / Short-Term Max	180	[A]		5.36	-	-	-	-	-	-	-	55.80	-	1.34	-	-
MPGF PE Units 1/2 Episodic Vent Header / Annual Avg	78.8	[B]		5.36	-	-	-	-	-	-	-	24.43	-	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
MPGF PE Units 1/2 Episodic Vent Header / Annual Avg	8,760	690,338		23.47	0.51	2.57	5.09	45,354	2.28	0.46	45,547	107.00	0.64	2.57	0.02	1.7E-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/NO2 and CO = AP-42, Tables 13.5-1 and 13.5-2, respectively.
• 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 99% DRE for incoming C3- VOC and 98% DRE for incoming C4+ VOC consistent with TCEQ and EPA approvals/testing and DEP guidance.
• CO2 is assumed to result from ethane flaring = ethane CO2 emission factor from 40 CFR 98, Table C-1.
• CH4 and N2O is assumed to result from fuel gas flaring = fuel gas emissions factors 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 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 set equal to the annual rate as PE Unit 1 and 1 PE Unit 2 vent recovery shutdown events are expected to occur at most once per year and last less than 24 hours (i.e., not likely to contribute significantly to the annual distribution of the daily maximum concentrations).
• Heat input also includes 1.0 MMBtu/hr of pilot gas at all times.
[B] - MPGF PE Units 1/2 Episodic Vent Header / Annual Average Emission Rates:
• Annual average heat input based on assuming 1 PE Unit 1 and 1 PE Unit 2 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.
• Annual average heat input also includes 1.0 MMBtu/hr of pilot gas at all times.

Source ID = C204B		Multi-Point Ground Flare (MPGF) (MPGF PE Units 1/2 Episodic Vent Header)								
Short-Term Max Heat Input (HHV)		180	MMBtu/hr - Maximum expected short term rate based on design and process data							
Annual Avg Heat Input (HHV)		78.8	MMBtu/hr - Represents reasonably anticipated venting, maintenance events, startups and shutdowns, supplemental gas, and sweep gas							
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	4.24E-06	8.12E-06	-	-	4.24E-06	8.12E-06
3-Methylchloranthrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.18E-07	6.09E-07	-	-	3.18E-07	6.09E-07
7,12-Dimethylbenz(a)anthracene	YES	<1.6E-05	<1.57E-08	AP-42, Table 1.4-3	2.82E-06	5.41E-06	-	-	2.82E-06	5.41E-06
Acenaphthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.18E-07	6.09E-07	-	-	3.18E-07	6.09E-07
Anthracene	YES	<2.4E-06	<2.35E-09	AP-42, Table 1.4-3	4.24E-07	8.12E-07	-	-	4.24E-07	8.12E-07
Benzo(a)anthracene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.18E-07	6.09E-07	-	-	3.18E-07	6.09E-07
Benzene	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-3	3.71E-04	7.11E-04	-	-	3.71E-04	7.11E-04
Benzo(a)pyrene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	2.12E-07	4.06E-07	-	-	2.12E-07	4.06E-07
Benzo(b)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.18E-07	6.09E-07	-	-	3.18E-07	6.09E-07
Benzo(g,h,i)perylene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	2.12E-07	4.06E-07	-	-	2.12E-07	4.06E-07
Benzo(k)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.18E-07	6.09E-07	-	-	3.18E-07	6.09E-07
Chrysene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.18E-07	6.09E-07	-	-	3.18E-07	6.09E-07
Dibenzo(a,h)anthracene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	2.12E-07	4.06E-07	-	-	2.12E-07	4.06E-07
Dichlorobenzene	YES	1.20E-03	1.18E-06	AP-42, Table 1.4-3	2.12E-04	4.06E-04	-	-	2.12E-04	4.06E-04
Fluoranthene	YES	3.00E-06	2.94E-09	AP-42, Table 1.4-3	5.29E-07	1.02E-06	-	-	5.29E-07	1.02E-06
Fluorene	YES	2.80E-06	2.75E-09	AP-42, Table 1.4-3	4.94E-07	9.48E-07	-	-	4.94E-07	9.48E-07
Formaldehyde	YES	7.50E-02	7.35E-05	AP-42, Table 1.4-3	1.32E-02	2.54E-02	-	-	1.32E-02	2.54E-02
Hexane	YES	2.90E-02	2.84E-05	Ventura County APCD, AB 2588 Combustions EF, May 2001	5.12E-03	9.81E-03	-	-	5.12E-03	9.81E-03
Indeno(1,2,3-cd)pyrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	3.18E-07	6.09E-07	-	-	3.18E-07	6.09E-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
Phenanthrene	YES	1.70E-05	1.67E-08	AP-42, Table 1.4-3	3.00E-06	5.75E-06	-	-	3.00E-06	5.75E-06
Pyrene	YES	5.00E-06	4.90E-09	AP-42, Table 1.4-3	8.82E-07	1.69E-06	-	-	8.82E-07	1.69E-06
Toluene	YES	3.40E-03	3.33E-06	AP-42, Table 1.4-3	6.00E-04	1.15E-03	-	-	6.00E-04	1.15E-03
Arsenic	YES	2.00E-04	1.96E-07	AP-42, Table 1.4-4	3.53E-05	6.77E-05	-	-	3.53E-05	6.77E-05
Barium	NO	4.40E-03	4.31E-06	AP-42, Table 1.4-4	7.76E-04	1.49E-03	-	-	7.76E-04	1.49E-03
Beryllium	YES	<1.2E-05	<1.18E-08	AP-42, Table 1.4-4	2.12E-06	4.06E-06	-	-	2.12E-06	4.06E-06
Cadmium	YES	1.10E-03	1.08E-06	AP-42, Table 1.4-4	1.94E-04	3.72E-04	-	-	1.94E-04	3.72E-04
Chromium	YES	1.40E-03	1.37E-06	AP-42, Table 1.4-4	2.47E-04	4.74E-04	-	-	2.47E-04	4.74E-04
Cobalt	YES	8.40E-05	8.24E-08	AP-42, Table 1.4-4	1.48E-05	2.84E-05	-	-	1.48E-05	2.84E-05
Copper	NO	8.50E-04	8.33E-07	AP-42, Table 1.4-4	1.50E-04	2.88E-04	-	-	1.50E-04	2.88E-04
Lead	YES	5.00E-04	4.90E-07	AP-42, Table 1.4-2	8.82E-05	1.69E-04	-	-	8.82E-05	1.69E-04
Manganese	YES	3.80E-04	3.73E-07	AP-42, Table 1.4-4	6.71E-05	1.29E-04	-	-	6.71E-05	1.29E-04
Mercury	YES	2.60E-04	2.55E-07	AP-42, Table 1.4-4	4.59E-05	8.80E-05	-	-	4.59E-05	8.80E-05
Molybdenum	NO	1.10E-03	1.08E-06	AP-42, Table 1.4-4	1.94E-04	3.72E-04	-	-	1.94E-04	3.72E-04
Nickel	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-4	3.71E-04	7.11E-04	-	-	3.71E-04	7.11E-04
Selenium	YES	<2.4E-05	<2.35E-08	AP-42, Table 1.4-4	4.24E-06	8.12E-06	-	-	4.24E-06	8.12E-06
Vanadium	NO	2.30E-03	2.25E-06	AP-42, Table 1.4-4	4.06E-04	7.78E-04	-	-	4.06E-04	7.78E-04
Zinc	NO	2.90E-02	2.84E-05	AP-42, Table 1.4-4	5.12E-03	9.81E-03	-	-	5.12E-03	9.81E-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.

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 / Short-Term Max	7,800	111.84 MT/hr	21.44 MT/hr	99% DRE	98% DRE	0.068	-	-	-	-	-	-	-	0.31	-	0.0075	-	-
HP Elevated Flare / Short-Term Max	3,900	55.92 MT/hr	10.72 MT/hr	99% DRE	98% DRE	0.068	-	-	-	-	-	-	-	0.31	-	0.0075	-	-
TEGF A, TEGF B, and HP Elevated Flare / Annual Avg	165.4	1.20 MT/hr	0.18 MT/hr	99% DRE	98% DRE	0.068	0.0015	0.0075	0.2080	Variable	Variable	0.0013	Variable	0.31	0.0019	0.0075	7.2E-05	4.9E-07
TEGF A, TEGF B, and HP Elevated Flare Supplemental Gas / Ann Avg	252.7	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
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 / Short-Term Max	7,800				[A]	106.08	-	-	-	-	-	-	-	2,418.00	-	35.38	-	-
HP Elevated Flare / Short-Term Max	3,900				[B]	53.04	-	-	-	-	-	-	-	1,209.00	-	17.69	-	-
TEGF A, TEGF B, and HP Elevated Flare / Annual Avg	165.4				[C]	11.25	-	-	-	-	-	-	-	51.29	-	1.23	-	-
TEGF A, TEGF B, and HP Elevated Flare Supplemental Gas / Ann Avg	252.7				[D]	17.18	-	-	-	-	-	-	-	78.34	-	1.88	-	-
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 HP Elevated Flare / Annual Avg	8,760				1,449,301	49.28	1.07	5.40	150.70	91,052	122.47	0.96	94,399	224.64	1.35	5.40	0.05	3.6E-04
TEGF A, TEGF B, and HP Elevated Flare Supplemental Gas / Ann Avg	8,760				2,213,694	75.27	1.63	8.25	5.97	88,001	154.93	0.94	92,154	343.12	2.06	8.25	0.08	5.4E-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 HP Elevated Flare / Annual Avg	8,760				3,662,995	124.54	2.69	13.65	156.67	179,053	277.40	1.90	186,553	567.76	3.41	13.65	0.13	8.98E-04

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 Emissions Factors:	
- NOx/NO2 and CO = AP-42, Tables 13.5-1 and 13.5-2, respectively. - 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 based on 99% DRE for incoming C3- VOC and 98% DRE for incoming C4+ VOC consistent with TCEQ and EPA approvals/testing and DEP guidance. - VOC emission factor for 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 99% 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 1.0 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 the approved modeling protocol, 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 five years.	
[B] - HP Elevated Flare Short-Term Max Emission Rates:	
Short term heat input estimated to equal the firing rate of 1 TEGF.	
[C] - TEGF A, TEGF B, and HP Elevated Flare Annual Average Emission Rates:	
- Annual average heat input based on actual process data. - 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 1.0 MMBtu/hr of 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. - 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.	

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)**		7,800	MMBtu/hr - Maximum expected short term rate based on design and process data							
HP Elevated Flare / Short-Term Max (HHV)**		3,900	MMBtu/hr - Estimated to equal the heat input of 1 TEGF							
TEGF A, TEGF B, and HP Elevated Flare/ Annual Average (HHV)**		418.2	MMBtu/hr - Based on actual process data and includes flaring events associated with reasonably anticipated maintenance events and PE unit releases							
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	4.31E-05	-	-	4.31E-05
3-Methylchloranthrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	1.38E-05	6.88E-06	3.23E-06	-	-	3.23E-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	2.87E-05	-	-	2.87E-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	3.23E-06	-	-	3.23E-06
Anthracene	YES	<2.4E-06	<2.35E-09	AP-42, Table 1.4-3	1.84E-05	9.18E-06	4.31E-06	-	-	4.31E-06
Benzo(a)anthracene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	1.38E-05	6.88E-06	3.23E-06	-	-	3.23E-06
Benzene	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-3	1.61E-02	8.03E-03	3.77E-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	2.15E-06	-	-	2.15E-06
Benzo(b)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	1.38E-05	6.88E-06	3.23E-06	-	-	3.23E-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	2.15E-06	-	-	2.15E-06
Benzo(k)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	1.38E-05	6.88E-06	3.23E-06	-	-	3.23E-06
Chrysene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	1.38E-05	6.88E-06	3.23E-06	-	-	3.23E-06
Dibenzo(a,h)anthracene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	9.18E-06	4.59E-06	2.15E-06	-	-	2.15E-06
Dichlorobenzene	YES	1.20E-03	1.18E-06	AP-42, Table 1.4-3	9.18E-03	4.59E-03	2.15E-03	-	-	2.15E-03
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	5.39E-06	-	-	5.39E-06
Fluorene	YES	2.80E-06	2.75E-09	AP-42, Table 1.4-3	2.14E-05	1.07E-05	5.03E-06	-	-	5.03E-06
Formaldehyde	YES	7.50E-02	7.35E-05	AP-42, Table 1.4-3	5.74E-01	2.87E-01	1.35E-01	-	-	1.35E-01
Hexane	YES	2.90E-02	2.84E-05	Ventura County APCD, AB 2588 Combustions EF, May 2001	2.22E-01	1.11E-01	5.21E-02	2.20E+00	8.33E-01	8.85E-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	3.23E-06	-	-	3.23E-06
Naphthalene	YES	6.10E-04	5.98E-07	AP-42, Table 1.4-3	4.66E-03	2.33E-03	1.10E-03	-	-	1.10E-03
Phenanthrene	YES	1.70E-05	1.67E-08	AP-42, Table 1.4-3	1.30E-04	6.50E-05	3.05E-05	-	-	3.05E-05
Pyrene	YES	5.00E-06	4.90E-09	AP-42, Table 1.4-3	3.82E-05	1.91E-05	8.98E-06	-	-	8.98E-06
Toluene	YES	3.40E-03	3.33E-06	AP-42, Table 1.4-3	2.60E-02	1.30E-02	6.10E-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	3.59E-04	-	-	3.59E-04
Barium	NO	4.40E-03	4.31E-06	AP-42, Table 1.4-4	3.36E-02	1.68E-02	7.90E-03	-	-	7.90E-03
Beryllium	YES	<1.2E-05	<1.18E-08	AP-42, Table 1.4-4	9.18E-05	4.59E-05	2.15E-05	-	-	2.15E-05
Cadmium	YES	1.10E-03	1.08E-06	AP-42, Table 1.4-4	8.41E-03	4.21E-03	1.98E-03	-	-	1.98E-03
Chromium	YES	1.40E-03	1.37E-06	AP-42, Table 1.4-4	1.07E-02	5.35E-03	2.51E-03	-	-	2.51E-03
Cobalt	YES	8.40E-05	8.24E-08	AP-42, Table 1.4-4	6.42E-04	3.21E-04	1.51E-04	-	-	1.51E-04
Copper	NO	8.50E-04	8.33E-07	AP-42, Table 1.4-4	6.50E-03	3.25E-03	1.53E-03	-	-	1.53E-03
Lead	YES	5.00E-04	4.90E-07	AP-42, Table 1.4-2	3.82E-03	1.91E-03	8.98E-04	-	-	8.98E-04
Manganese	YES	3.80E-04	3.73E-07	AP-42, Table 1.4-4	2.91E-03	1.45E-03	6.82E-04	-	-	6.82E-04
Mercury	YES	2.60E-04	2.55E-07	AP-42, Table 1.4-4	1.99E-03	9.94E-04	4.67E-04	-	-	4.67E-04
Molybdenum	NO	1.10E-03	1.08E-06	AP-42, Table 1.4-4	8.41E-03	4.21E-03	1.98E-03	-	-	1.98E-03
Nickel	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-4	1.61E-02	8.03E-03	3.77E-03	-	-	3.77E-03
Selenium	YES	<2.4E-05	<2.35E-08	AP-42, Table 1.4-4	1.84E-04	9.18E-05	4.31E-05	-	-	4.31E-05
Vanadium	NO	2.30E-03	2.25E-06	AP-42, Table 1.4-4	1.76E-02	8.79E-03	4.13E-03	-	-	4.13E-03
Zinc	NO	2.90E-02	2.84E-05	AP-42, Table 1.4-4	2.22E-01	1.11E-01	5.21E-02	-	-	5.21E-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 H2 for conservative estimate.

*** Emission rates based on actual process data and engineering judgement.

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		=	0.0117	lb/MMBtu	AP-42, Table 1.4-2 (filterable + condensable) + H2SO4 EF calculated below							
PM2.5 EF		=	0.0117	lb/MMBtu	AP-42, Table 1.4-2 (filterable + condensable) + H2SO4 EF calculated below							
VOC EF		=	0.0043	lb/MMBtu	Controlled EF: based on actual process data plus VOC from WWTP and 99.9% DRE							
NOx EF		=	0.068	lb/MMBtu	AP-42, Table 13.5-1							
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							
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		=	0.57	T/yr	= (Design Heat Input [HHV]) x (PM10 EF) x (Annual Hours) / (2000 lb/T)							
PM2.5 Emissions		=	0.57	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		=	3.30	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)							
CO2e Emissions		=	6,044	T/yr	= Sum of CO2, N2O and CH4 emissions adjusted for NO2 and CH4 GWPs of 298 and 25							
Short-Term PTE Calculations:												
PM Emissions		=	0.02	lb/hr	= (Design Heat Input [HHV]) x (PM EF)							
PM10 Emissions		=	0.13	lb/hr	= (Design Heat Input [HHV]) x (PM10 EF)							
PM2.5 Emissions		=	0.13	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		=	0.75	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)							
CO2e 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)							
CO2e Emissions		=	1,380	lb/hr	= Sum of CO2, N2O and CH4 emissions adjusted for NO2 and CH4 GWPs of 298 and 25							
Summary of Annual PTE Emission Rates:												
			PTE Emission Rates (T/yr)									
			PM	PM10	PM2.5	VOC	NOx	SO2	CO	GHGm	CO2e	H2SO4
PTE	=		0.09	0.57	0.57	0.21	3.30	4.19	3.99	6,039	6,044	0.21

Source ID = C206 Spent Caustic Thermal Oxidizer (SCTO)													
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	N/A	N/A	N/A	-	-	-	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-Methylchloranthrene	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	N/A	N/A	N/A	-	-	-	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
Chloroform	YES	N/A	N/A	N/A	-	-	-	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	N/A	N/A	N/A	-	-	-	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
Ethylbenzene	YES	N/A	N/A	N/A	-	-	-	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
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	N/A	N/A	N/A	-	-	-	2.29E-04	2.29E-04	1.00E-03	2.29E-04	2.29E-04	1.00E-03
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	N/A	N/A	N/A	-	-	-	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	N/A	N/A	N/A	-	-	-	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

Source ID = C206 Spent Caustic Thermal Oxidizer (SCTO)													
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)
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
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
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.

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
Source / Basis		
<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 =	50 ppmw	LAER limit
Fraction of Residual VOC Emitted =	100%	Worst-case assumption
<u>Annual Emission Calculation</u>		
VOC PTE =	103.66 tons/yr	= (Annual PE Pellet Production Rate - tons/yr) x (PE Pellet Residual VOC Concentration - ppmw) x (Fraction of Residual VOC Emitted) / (1,000,000 ppmw)

NOTES:

- Residual VOC in PE pellets contains no OHAP.

<i>Source ID = 302 Liquid Loadout (Recovered Oil)</i>			
Parameter	Recovered Oil Loading	Units	Source / Basis
Material Loaded	Recovered Oil		
Material Temperature	30	°C	Process data
Material Temperature	546	°R	= (Material Temperature - °C) x (1.8) + (32) + (460)
VOC Vapor Pressure (VP)	0.5	psia	Per LAER review for low VP liquids, no limit/controls for liquids with VP < 0.5 psia required
VOC Vapor MW	130	lb/lb-mole	TANKS 4.09D 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 rates are based on ethylene manufacturing unit material balance data
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	0%	wt. %	Recovered Oil is uncontrolled due to its low VP
Annual VOC Emission Rate	0.10	T/yr	= (Annual Loading Rate) x (VOC Loading Loss Factor) x (1 - Control Efficiency) / (2000 lb/T)
VOC Vapor Pressure	3.45	kPa	= (6.895 kPa/psi) x (VOC Vapor Pressure (VP) (psia))
Estimated HAP Fraction	100%	wt. %	Worst-case estimate
Annual HAP Emission Rate	0.10	T/yr	= (Annual VOC Emission Rate) x (Estimated HAP Fraction)

Emissions Estimates based on Equation 1 in AP-42, 5.2 - Transportation and Marketing of Petroleum Liquids:

$$L_L = 12.46 \frac{\text{SPM}}{T}$$

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 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 =	2.4E-04 lb/hr		
Benzene =	7.3E-05 lb/hr		
Toluene =	6.1E-06 lb/hr		

Source ID = 406 Storage Tanks (Diesel Fuel > 150 Gallons)										
Tank Name	EU ID	Tank Type	Volume [m3]	Diameter [m]	Height / Length [m]	Operating Temperature [°C]	Surrogate Liquid	Annual Throughput (gal/yr)	Emission Control	Uncontrolled 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.

Source ID		=		501 Equipment Components (Ethylene Manufacturing Unit)										
Equipment	Service	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 PTE (tpy)	HAP PTE (tpy)	CO PTE (tpy)	CO2e PTE (tpy)
Valves	Gas/Vapor	C3 Fraction	0.0132	97	100	49.79	0	0	0	3	5.20E-03	2.59E-03	0.00E+00	0.00E+00
	Gas/Vapor	ECU C2 Fraction	0.0132	97	89.98	4.44	0	0	0	415	6.48E-01	3.20E-02	0.00E+00	0.00E+00
	Gas/Vapor	ECU C3 Fraction	0.0132	97	100	49.79	0	0	0	158	2.74E-01	1.36E-01	0.00E+00	0.00E+00
	Gas/Vapor	ECU Cold Gas Flare	0.0132	97	0	0	100	0	0	9	0.00E+00	0.00E+00	0.00E+00	3.90E-01
	Gas/Vapor	ECU Cracked Gas	0.0132	97	56.94	5.35	5.9	0.03	0.03	794	7.84E-01	7.37E-02	4.13E-04	2.03E+00
	Gas/Vapor	ECU Ethane Gas	0.0132	97	4.1	0	1.8	0	0	768	5.46E-02	0.00E+00	0.00E+00	5.99E-01
	Gas/Vapor	ECU Ethylene	0.0132	97	99.84	0	0.01	0	0	315	5.45E-01	0.00E+00	0.00E+00	1.37E-03
	Gas/Vapor	ECU Flare Gas	0.0132	97	1	0	69	0	0	867	1.50E-02	0.00E+00	0.00E+00	2.59E+01
	Gas/Vapor	ECU Fuel Gas	0.0132	97	1	0	69	0.08	0.08	1,498	2.60E-02	0.00E+00	2.08E-03	4.48E+01
	Gas/Vapor	ECU GN	0.0132	97	2.38	0	95.295	0	0	227	9.37E-03	0.00E+00	0.00E+00	9.38E+00
	Gas/Vapor	ECU Hydrocarbon Gas	0.0132	97	38.7	0	61.3	0	0	27	1.81E-02	0.00E+00	0.00E+00	7.18E-01
	Gas/Vapor	ECU Propane	0.0132	97	98.21	0	0.1	0	0	312	5.31E-01	0.00E+00	0.00E+00	1.35E-02
	Gas/Vapor	ECU Regeneration Gas	0.0132	97	1	0	61	0.08	0.08	51	8.85E-04	0.00E+00	7.08E-05	1.35E+00
	Gas/Vapor	ECU Tail Gas/Exhaust Gas	0.0132	97	1	0	61	0.08	0.08	126	2.19E-03	0.00E+00	1.75E-04	3.33E+00
	Gas/Vapor	ECU Warm Flare	0.0132	97	1	0	69	0	0	31	5.38E-04	0.00E+00	0.00E+00	9.28E-01
	Gas/Vapor	ECU Waste Gas	0.0132	97	4.52	1.66	80.14	0	0	2	1.57E-04	5.76E-05	0.00E+00	6.95E-02
	Gas/Vapor	Flare Gas	0.0132	97	1	0	69	0	0	1	1.73E-05	0.00E+00	0.00E+00	2.99E-02
	Gas/Vapor	GN	0.0132	97	0	0	100	0	0	120	0.00E+00	0.00E+00	0.00E+00	5.20E+00
	Light Liquid	Coke/Tar/Water	0.0089	0	4	3.5	0.5	0	0	28	4.37E-02	3.82E-02	0.00E+00	1.36E-01
	Light Liquid	Contaminated Process Water	0.0089	97	99.5	3.5	0.5	0	0	1	1.16E-03	4.09E-05	0.00E+00	1.46E-04
	Light Liquid	ECU Chemical Drain	0.0089	0	0.2	0.2	0	0	0	32	2.49E-03	2.49E-03	0.00E+00	0.00E+00
	Light Liquid	ECU Contaminated Process Water	0.0089	97	98.5	2.5	0.5	0	0	248	2.86E-01	7.25E-03	0.00E+00	3.63E-02
	Light Liquid	ECU Corrosion Inhibitor	0.0089	97	100	0	0	0	0	149	1.74E-01	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	ECU Cracked Gas Condensate	0.0089	97	99.17	31.99	0.03	0	0	54	6.26E-02	2.02E-02	0.00E+00	4.74E-04
	Light Liquid	ECU Dimethylsulfide	0.0089	97	100	0	0	0	0	87	1.02E-01	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	ECU Gasoline	0.0089	97	98.99	91.01	0	0	0	204	2.36E-01	2.17E-01	0.00E+00	0.00E+00
	Light Liquid	ECU Heavy Gasoline	0.0089	97	100	43.85	0	0	0	85	9.94E-02	4.36E-02	0.00E+00	0.00E+00
	Light Liquid	ECU Light Gasoline	0.0089	97	99	90.91	0	0	0	120	1.39E-01	1.28E-01	0.00E+00	0.00E+00
	Light Liquid	ECU Methanol	0.0089	97	100	100	0	0	0	153	1.79E-01	1.79E-01	0.00E+00	0.00E+00
	Light Liquid	ECU Quench Water	0.0089	97	99.5	3.5	0.5	0	0	126	1.47E-01	5.16E-03	0.00E+00	1.84E-02
	Light Liquid	ECU Slop	0.0089	97	76.71	59.87	1.16	0	0	21	1.88E-02	1.47E-02	0.00E+00	7.12E-03
	Light Liquid	ECU Spent Caustic	0.0089	0	0.21	0.21	0	0	0	76	6.22E-03	6.22E-03	0.00E+00	0.00E+00
	Light Liquid	ECU Wash Oil	0.0089	97	100	5.04	0	0	0	31	3.63E-02	1.83E-03	0.00E+00	0.00E+00
	Light Liquid	ECU Waste Water	0.0089	0	0.6	0.6	0	0	0	2	4.68E-04	4.68E-04	0.00E+00	0.00E+00
	Light Liquid	ECU Worse Case	0.0089	97	90	47	5	0	0	154	1.62E-01	8.46E-02	0.00E+00	2.25E-01
	Gas/Vapor	ECU Worse Case	0.0132	97	90	47	5	0	0	1,359	2.12E+00	1.11E+00	0.00E+00	2.95E+00

Source ID = 501		Equipment Components (Ethylene Manufacturing Unit)												
Equipment	Service	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 PTE (tpy)	HAP PTE (tpy)	CO PTE (tpy)	CO2e PTE (tpy)
Connectors/Flanges	Gas/Vapor	C2 Fraction	0.0039	97	89.98	4.44	0	0	0	1,053	4.86E-01	2.40E-02	0.00E+00	0.00E+00
	Gas/Vapor	C3 Fraction	0.0039	97	100	49.79	0	0	0	440	2.25E-01	1.12E-01	0.00E+00	0.00E+00
	Gas/Vapor	Cold Flare	0.0039	97	0	0	100	0	0	27	0.00E+00	0.00E+00	0.00E+00	3.46E-01
	Gas/Vapor	Cracked Gas	0.0039	97	56.94	5.35	5.9	0.03	0.03	2,612	7.62E-01	7.16E-02	4.02E-04	1.97E+00
	Gas/Vapor	Dimethidisulfide	0.0039	97	100	0	0	0	0	58	2.97E-02	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	ECU Cracked Gas	0.0039	97	56.94	56.94	5.35	5.9	0.03	100	2.93E-02	2.93E-02	3.03E-03	6.88E-02
	Gas/Vapor	ECU Ethane Gas	0.0039	97	3.5	0	1.8	0	0	1	1.79E-05	0.00E+00	0.00E+00	2.31E-04
	Gas/Vapor	ECU Ethylene	0.0039	97	99.84	0	0.01	0	0	1	5.12E-04	0.00E+00	0.00E+00	1.28E-06
	Gas/Vapor	ECU Flare Gas	0.0039	97	67.46	20.08	0.93	0	0	159	5.50E-02	1.64E-02	0.00E+00	1.89E-02
	Gas/Vapor	ECU Fuel Gas	0.0039	97	1	0	69	0.08	0.08	3	1.54E-05	0.00E+00	1.23E-06	2.65E-02
	Gas/Vapor	ECU GN	0.0039	97	2.38	0	95.295	0	0	1	1.22E-05	0.00E+00	0.00E+00	1.22E-02
	Gas/Vapor	ECU Propane	0.0039	97	98.21	0	0.1	0	0	2	1.01E-03	0.00E+00	0.00E+00	2.56E-05
	Gas/Vapor	Ethane	0.0039	97	0	0	0	0	0	1,275	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	Ethylene	0.0039	97	100	0	0	0	0	779	3.99E-01	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	Flare Gas	0.0039	97	1	0	69	0	0	1,780	9.12E-03	0.00E+00	0.00E+00	1.57E+01
	Gas/Vapor	Fuel Gas	0.0039	97	1	0	69	0.08	0.08	5,899	3.02E-02	0.00E+00	2.42E-03	5.21E+01
	Gas/Vapor	GN	0.0039	97	0	0	100	0	0	1,007	0.00E+00	0.00E+00	0.00E+00	1.29E+01
	Gas/Vapor	Hydrocarbon Gas	0.0039	97	93.79	0	1.45	0	0	62	2.98E-02	0.00E+00	0.00E+00	1.15E-02
	Gas/Vapor	Propane	0.0039	97	100	0	0	0	0	826	4.23E-01	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	Regen Gas	0.0039	97	1	0	61	0.08	0.08	148	7.58E-04	0.00E+00	6.07E-05	1.16E+00
	Gas/Vapor	Tail Gas	0.0039	97	1	0	61	0.08	0.08	273	1.40E-03	0.00E+00	1.12E-04	2.13E+00
	Gas/Vapor	Warm Flare	0.0039	97	67.46	20.08	0.93	0	0	69	2.39E-02	7.10E-03	0.00E+00	8.22E-03
	Light Liquid	Chemical Drain	0.0005	0	0.2	0.2	0	0	0	63	2.76E-04	2.76E-04	0.00E+00	0.00E+00
	Light Liquid	Contaminated Process Water	0.0005	97	99.5	3.5	0.5	0	0	1,272	8.32E-02	2.92E-03	0.00E+00	1.04E-02
	Light Liquid	Corrosion Inhibitor	0.0005	97	100	0	0	0	0	419	2.75E-02	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	Cracked Gas Condensate	0.0005	97	99.17	31.99	0.03	0	0	119	7.75E-03	2.50E-03	0.00E+00	5.86E-05
	Light Liquid	ECU Dimethylsulfide	0.0005	97	100	0	0	0	0	2	1.31E-04	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	ECU Slop	0.0005	97	76.71	59.87	1.16	0	0	41	2.07E-03	1.61E-03	0.00E+00	7.81E-04
	Light Liquid	Gasoline	0.0005	97	98.99	91.01	0	0	0	444	2.89E-02	2.65E-02	0.00E+00	0.00E+00
	Light Liquid	Heavy Gasoline	0.0005	97	100	43.85	0	0	0	162	1.06E-02	4.67E-03	0.00E+00	0.00E+00
	Light Liquid	Light Gasoline	0.0005	97	99	90.91	0	0	0	1,117	7.27E-02	6.67E-02	0.00E+00	0.00E+00
	Light Liquid	Methanol	0.0005	97	100	100	0	0	0	475	3.12E-02	3.12E-02	0.00E+00	0.00E+00
	Light Liquid	Quench Water	0.0005	97	99.5	3.5	0.5	0	0	227	1.48E-02	5.22E-04	0.00E+00	1.86E-03
	Light Liquid	Spent Caustic	0.0005	0	0.2	0.2	0	0	0	148	6.48E-04	6.48E-04	0.00E+00	0.00E+00
	Light Liquid	Wash Oil	0.0005	97	100	5.04	0	0	0	48	3.15E-03	1.59E-04	0.00E+00	0.00E+00
	Light Liquid	ECU Worse Case	0.0005	97	90	47	5	0	0	339	2.00E-02	1.05E-02	0.00E+00	2.78E-02
	Gas/Vapor	ECU Worse Case	0.0039	97	90	47	5	0	0	1,213	5.59E-01	2.92E-01	0.00E+00	7.77E-01

Source ID		501 Equipment Components (Ethylene Manufacturing Unit)												
Equipment	Service	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 PTE (tpy)	HAP PTE (tpy)	CO PTE (tpy)	CO2e PTE (tpy)
Relief Valves	Gas/Vapor	ECU C2 Fraction	0.2293	97	89.98	4.44	0	0	0	2	5.42E-02	2.68E-03	0.00E+00	0.00E+00
	Gas/Vapor	ECU C2 Fraction	0.2293	100	89.98	4.44	0	0	0	3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	ECU Cracked Gas	0.2293	97	56.94	5.35	5.9	0.03	0.03	19	3.26E-01	3.06E-02	1.72E-04	8.45E-01
	Gas/Vapor	ECU Cracked Gas	0.2293	100	56.94	5.35	5.9	0.03	0.03	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	ECU Ethylene	0.2293	97	99.84	0	0.01	0	0	1	3.01E-02	0.00E+00	0.00E+00	7.53E-05
	Gas/Vapor	ECU Flare Gas	0.2293	97	1	0	69	0	0	13	3.92E-03	0.00E+00	0.00E+00	6.76E+00
	Gas/Vapor	ECU Flare Gas	0.2293	100	1	0	69	0	0	99	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	ECU Gas to Flare CVS	0.2293	97	1	0	69	0	0	23	6.93E-03	0.00E+00	0.00E+00	1.20E+01
	Gas/Vapor	ECU Gas to Flare CVS	0.2293	100	1	0	69	0	0	29	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	ECU Flare Liquid CVS	0.2293	97	67.46	20.08	0.93	0	0	1	2.03E-02	6.05E-03	0.00E+00	7.01E-03
	Light Liquid	ECU Flare Liquid CVS	0.2293	100	67.46	20.08	0.93	0	0	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	ECU Gasoline	0.2293	100	98.99	91.01	0	0	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	ECU Heavy Gasoline	0.2293	97	100	43.85	0	0	0	1	3.01E-02	1.32E-02	0.00E+00	0.00E+00
	Light Liquid	ECU Heavy Gasoline	0.2293	100	100	43.85	0	0	0	3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	ECU Light Gasoline	0.2293	100	99	90.91	0	0	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	ECU Methanol	0.2293	97	100	100	0	0	0	7	2.11E-01	2.11E-01	0.00E+00	0.00E+00
	Light Liquid	ECU Methanol	0.2293	100	100	100	0	0	0	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	ECU Worse Case	0.2293	97	90	47	5	0	0	2	5.42E-02	2.83E-02	0.00E+00	7.53E-02
	Gas/Vapor	ECU Worse Case	0.2293	100	90	47	5	0	0	11	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pumps	Light Liquid	ECU C2 Fraction	0.0439	93	89.98	4.44	0	0	0	2	2.42E-02	1.20E-03	0.00E+00	0.00E+00
	Light Liquid	ECU C3 Fraction	0.0439	93	100	49.79	0	0	0	2	2.69E-02	1.34E-02	0.00E+00	0.00E+00
	Light Liquid	ECU Contaminated Process Water	0.0439	93	98.5	2.5	0.5	0	0	4	5.30E-02	1.35E-03	0.00E+00	6.73E-03
	Light Liquid	ECU Corrosion Inhibitor	0.0439	93	100	0	0	0	0	11	1.48E-01	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	ECU Cracked Gas Condensate	0.0439	93	99.17	31.99	0.03	0	0	2	2.67E-02	8.61E-03	0.00E+00	2.02E-04
	Light Liquid	ECU Dimethylsulfide	0.0439	93	100	0	0	0	0	2	2.69E-02	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	ECU Flare Liquid CVS	0.0439	93	67.46	20.08	0.93	0	0	2	1.82E-02	5.41E-03	0.00E+00	6.26E-03
	Light Liquid	ECU Gasoline	0.0439	93	98.99	91.01	0	0	0	2	2.66E-02	2.45E-02	0.00E+00	0.00E+00
	Light Liquid	ECU Light Gasoline	0.0439	93	99	90.91	0	0	0	4	5.33E-02	4.89E-02	0.00E+00	0.00E+00
	Light Liquid	ECU Methanol	0.0439	93	100	100	0	0	0	8	1.08E-01	1.08E-01	0.00E+00	0.00E+00
	Light Liquid	ECU Quench Water	0.0439	93	99.5	3.5	0.5	0	0	2	2.68E-02	9.42E-04	0.00E+00	3.36E-03
	Light Liquid	ECU Slop	0.0439	93	76.71	59.87	1.16	0	0	3	3.10E-02	2.42E-02	0.00E+00	1.17E-02
	Light Liquid	ECU Wash Oil	0.0439	93	100	5.04	0	0	0	3	4.04E-02	2.04E-03	0.00E+00	0.00E+00
Compressor Seals	Gas/Vapor	ECU C2 Fraction	0.5027	100	89.98	4.44	0	0	0	7	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	ECU Ethylene	0.5027	100	99.4	0	0.01	0	0	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	ECU Propane	0.5027	100	98.21	0	0.1	0	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total											11.45	3.33	0.01	205.21

Source ID = 501 Equipment Components (Polyethylene Manufacturing Units 1 and 2)														
Equipment	Service	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 PTE (tpy)	HAP PTE (tpy)	CO PTE (tpy)	CO2e PTE (tpy)
Valves	Gas/Vapor	Conveying Gas	0.0132	97	14.8786	0	0.565	0	0	10	2.58E-03	0.00E+00	0.00E+00	2.45E-03
	Gas/Vapor	Cycle Gas	0.0132	97	93.79	0	1.45	0	0	197	3.20E-01	0.00E+00	0.00E+00	1.24E-01
	Gas/Vapor	Ethylene	0.0132	97	100	0	0	0	0	157	2.72E-01	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	PE 12 Butene Reaction	0.0132	97	100	0	0	0	0	35	6.07E-02	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	PE 12 Conveying Gas	0.0132	97	97.945	0	0.565	0	0	75	1.27E-01	0.00E+00	0.00E+00	1.84E-02
	Gas/Vapor	PE 12 Cycle Gas	0.0132	97	93.79	0	1.45	0	0	103	1.68E-01	0.00E+00	0.00E+00	6.48E-02
	Gas/Vapor	PE 12 Ethylene	0.0132	97	100	0	0	0	0	117	2.03E-01	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	PE12 Flare	0.0132	97	98.724	0	0.291	0	0	149	2.55E-01	0.00E+00	0.00E+00	1.88E-02
	Gas/Vapor	PE 12 GN	0.0132	97	2.38	0	95.295	0	0	9	3.72E-04	0.00E+00	0.00E+00	3.72E-01
	Gas/Vapor	PE 12 Hydrocarbon Gas	0.0132	97	93.79	0	1.45	0	0	21	3.42E-02	0.00E+00	0.00E+00	1.32E-02
	Gas/Vapor	PE 12 Process Gas	0.0132	97	93.79	0	1.45	0	0	3	4.88E-03	0.00E+00	0.00E+00	1.89E-03
	Gas/Vapor	PE 12 Recovered Gas	0.0132	97	99.48	0	0.02	0	0	38	6.56E-02	0.00E+00	0.00E+00	3.30E-04
	Gas/Vapor	PE 12 Recycle Gas	0.0132	97	99.491	0	0.02	0	0	15	2.59E-02	0.00E+00	0.00E+00	1.30E-04
	Gas/Vapor	PE 12 Vent Gas	0.0132	97	93.387	0	0.291	0	0	7	1.13E-02	0.00E+00	0.00E+00	8.83E-04
	Gas/Vapor	Process Gas	0.0132	97	84.33	0	1.45	0	0	159	2.33E-01	0.00E+00	0.00E+00	1.00E-01
	Light Liquid	Butene	0.0089	97	100	0	0	0	0	198	2.32E-01	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	Flare	0.0089	97	98.724	0	0.291	0	0	33	3.81E-02	0.00E+00	0.00E+00	2.81E-03
	Light Liquid	Hexene	0.0089	97	100	0	0	0	0	171	2.00E-01	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	ICA	0.0089	97	100	0	0	0	0	177	2.07E-01	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	Isopentane	0.0089	97	100	0	0	0	0	41	4.79E-02	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	PE12 Blowdown	0.0089	97	98.724	0	0.291	0	0	5	5.77E-03	0.00E+00	0.00E+00	4.25E-04
	Light Liquid	PE12 Butene	0.0089	97	100	0	0	0	0	5	5.85E-03	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	PE 12 ICA	0.0089	97	100	0	0	0	0	88	1.03E-01	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	PE 12 Isopentane	0.0089	97	100	0	0	0	0	10	1.17E-02	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	PE 12 Recovered Liquid	0.0089	97	99.48	0	0.02	0	0	194	2.26E-01	0.00E+00	0.00E+00	1.13E-03
	Light Liquid	Propane	0.0089	97	100	0	0	0	0	104	1.22E-01	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	Recovered Liquid	0.0089	97	98.23	0	0.02	0	0	394	4.53E-01	0.00E+00	0.00E+00	2.30E-03
	Light Liquid	PE 12 Worse Case	0.0089	97	100	0	0	0	0	38	4.44E-02	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	PE 12 Worse Case	0.0089	97	100	0	0	0	0	2,143	2.51E+00	0.00E+00	0.00E+00	0.00E+00

Source ID = 501 Equipment Components (Polyethylene Manufacturing Units 1 and 2)														
Equipment	Service	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 PTE (tpy)	HAP PTE (tpy)	CO PTE (tpy)	CO2e PTE (tpy)
Connectors/Flanges	Gas/Vapor	Butene Reaction	0.0039	97	100	0	0	0	0	73	3.74E-02	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	Conveying Gas	0.0039	97	14.8786	0	0.565	0	0	185	1.41E-02	0.00E+00	0.00E+00	1.34E-02
	Gas/Vapor	Cycle Gas	0.0039	97	93.79	0	1.45	0	0	540	2.60E-01	0.00E+00	0.00E+00	1.00E-01
	Gas/Vapor	Ethylene	0.0039	97	100	0	0	0	0	496	2.54E-01	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	Flare	0.0039	97	98.724	0	0.291	0	0	437	2.21E-01	0.00E+00	0.00E+00	1.63E-02
	Gas/Vapor	Hydrocarbon Gas	0.0039	97	93.79	0	1.45	0	0	42	2.02E-02	0.00E+00	0.00E+00	7.80E-03
	Gas/Vapor	PE 12 Ethylene	0.0039	97	100	0	0	0	0	31	1.59E-02	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	GN	0.0039	97	2.38	0	95.295	0	0	20	2.44E-04	0.00E+00	0.00E+00	2.44E-01
	Gas/Vapor	Process Gas	0.0039	97	84.33	0	1.45	0	0	238	1.03E-01	0.00E+00	0.00E+00	4.42E-02
	Gas/Vapor	Recovered Gas	0.0039	97	55.96	0.01	1.73	0	0	90	2.58E-02	4.61E-06	0.00E+00	1.99E-02
	Gas/Vapor	Recycle Gas	0.0039	97	98.23	0	0.0244	0	0	33	1.66E-02	0.00E+00	0.00E+00	1.03E-04
	Gas/Vapor	Vent Gas	0.0039	97	57.078	3.378	0.291	0	0	16	4.68E-03	2.77E-04	0.00E+00	5.97E-04
	Light Liquid	Butene	0.0005	97	100	0	0	0	0	340	2.23E-02	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	Flare	0.0005	97	98.724	0	0.291	0	0	4	2.59E-04	0.00E+00	0.00E+00	1.91E-05
	Light Liquid	Hexene	0.0005	97	100	0	0	0	0	287	1.89E-02	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	ICA	0.0005	97	100	0	0	0	0	436	2.86E-02	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	Isopentane	0.0005	97	100	0	0	0	0	89	5.85E-03	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	PE 12 Blowdown	0.0005	97	98.724	0	0.291	0	0	12	7.78E-04	0.00E+00	0.00E+00	5.74E-05
	Light Liquid	PE 12 Recovered Liquid	0.0005	97	99.48	0	0.02	0	0	2	1.31E-04	0.00E+00	0.00E+00	6.57E-07
	Light Liquid	Propane	0.0005	97	100	0	0	0	0	204	1.34E-02	0.00E+00	0.00E+00	0.00E+00
Relief Valves	Light Liquid	Recovered Liquid	0.0005	97	98.23	0	0.02	0	0	297	1.92E-02	0.00E+00	0.00E+00	9.76E-05
	Light Liquid	PE 12 Worse Case	0.0005	97	100	0	0	0	0	1	6.57E-05	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	PE 12 Worse Case	0.0005	97	100	0	0	0	0	5,616	3.69E-01	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	Cycle Gas	0.2293	97	93.79	0	1.45	0	0	5	1.41E-01	0.00E+00	0.00E+00	5.46E-02
	Gas/Vapor	Ethylene	0.2293	100	100	0	0	0	0	3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	PE 12 Butene Reaction	0.2293	100	100	0	0	0	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	PE 12 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
	Gas/Vapor	PE 12 Flare	0.2293	97	98.724	0	0.291	0	0	2	5.95E-02	0.00E+00	0.00E+00	4.38E-03
	Gas/Vapor	PE 12 Flare	0.2293	100	98.724	0	0.291	0	0	3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	PE 12 Flare Gas CVS	0.2293	97	98.724	0	0.291	0	0	8	2.38E-01	0.00E+00	0.00E+00	1.75E-02
	Gas/Vapor	PE 12 Flare Gas CVS	0.2293	100	98.724	0	0.291	0	0	26	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	PE 12 Recovered Gas	0.2293	97	99.48	0	0.02	0	0	4	1.20E-01	0.00E+00	0.00E+00	6.03E-04
	Gas/Vapor	PE 12 Vent Gas	0.2293	97	93.387	0	0.291	0	0	1	2.81E-02	0.00E+00	0.00E+00	2.19E-03
	Gas/Vapor	Process Gas	0.2293	97	84.33	0	1.45	0	0	3	7.62E-02	0.00E+00	0.00E+00	3.28E-02
	Gas/Vapor	Process Gas	0.2293	100	84.33	0	1.45	0	0	11	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	Flare	0.2293	100	98.724	0	0.291	0	0	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	PE 12 Flare	0.2293	97	98.724	0	0.291	0	0	1	2.97E-02	0.00E+00	0.00E+00	2.19E-03
	Light Liquid	PE 12 Flare	0.2293	100	98.724	0	0.291	0	0	11	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	Propane	0.2293	100	100	0	0	0	0	4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	PE 12 Worse Case	0.2293	97	100	0	0	0	0	1	3.01E-02	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	PE 12 Worse Case	0.2293	97	100	0	0	0	0	5	1.51E-01	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	PE 12 Worse Case	0.2293	100	100	0	0	0	0	37	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Source ID = 501 Equipment Components (Polyethylene Manufacturing Units 1 and 2)														
Equipment	Service	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 PTE (tpy)	HAP PTE (tpy)	CO PTE (tpy)	CO2e PTE (tpy)
Pumps	Light Liquid	Butene	0.0439	93	100	0	0	0	0	1	1.35E-02	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	ICA	0.0439	93	100	0	0	0	0	1	1.35E-02	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	PE 12 ICA	0.0439	93	100	0	0	0	0	2	2.69E-02	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	PE 12 Recovered Liquid	0.0439	93	99.48	0	0.02	0	0	3	4.02E-02	0.00E+00	0.00E+00	2.02E-04
	Light Liquid	Recovered Liquid	0.0439	93	98.23	0	0.02	0	0	2	2.64E-02	0.00E+00	0.00E+00	1.35E-04
Compressor Seals	Gas/Vapor	PE 12 Propane	0.5027	100	100	0	0	0	0	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	PE 12 Flare	0.5027	100	98.724	0	0.291	0	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	PE 12 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
	Gas/Vapor	PE 12 Recovered Gas	0.5027	100	99.48	0	0.02	0	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total											8.43	0.00	0.00	1.28

Source ID = 501		Equipment Components (Polyethylene Manufacturing Unit 3)												
Equipment	Service	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 PTE (tpy)	HAP PTE (tpy)	CO PTE (tpy)	CO2e PTE (tpy)
Valves	Gas/Vapor	Cycle Gas	0.0132	97	93.79	0	1.45	0	0	15	2.44E-02	0.00E+00	0.00E+00	9.43E-03
	Gas/Vapor	Ethylene	0.0132	97	100	0	0	0	0	165	2.86E-01	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	Flare	0.0132	97	98.724	0	0.291	0	0	616	1.05E+00	0.00E+00	0.00E+00	7.77E-02
	Gas/Vapor	GN	0.0132	97	2.38	0	95.295	0	0	82	3.39E-03	0.00E+00	0.00E+00	3.39E+00
	Gas/Vapor	Hydrocarbon Gas	0.0132	97	93.79	0	1.45	0	0	426	6.93E-01	0.00E+00	0.00E+00	2.68E-01
	Gas/Vapor	Kill Gas	0.0132	0	0	0	0	10	10	292	0.00E+00	0.00E+00	1.69E+00	1.69E+00
	Gas/Vapor	Process Hydrocarbon	0.0132	97	93.79	0	1.45	0	0	51	8.30E-02	0.00E+00	0.00E+00	3.21E-02
	Gas/Vapor	Process Hydrocarbon Gas	0.0132	97	93.79	0	1.45	0	0	38	6.18E-02	0.00E+00	0.00E+00	2.39E-02
	Gas/Vapor	Tail Gas	0.0132	97	57.71	0.01	1.73	0	0	37	3.70E-02	6.42E-06	0.00E+00	2.78E-02
	Light Liquid	Butene	0.0089	97	100	0	0	0	0	12	1.40E-02	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	Flare	0.0089	97	98.724	0	0.291	0	0	2	2.31E-03	0.00E+00	0.00E+00	1.70E-04
	Light Liquid	Heavies Removal	0.0089	97	100	0	0	0	0	17	1.99E-02	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	Hexene Liquid	0.0089	97	100	0	0	0	0	16	1.87E-02	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	HSR	0.0089	97	99.29	0	0.03	0	0	24	2.79E-02	0.00E+00	0.00E+00	2.11E-04
	Light Liquid	Isobutane	0.0089	97	100	0	0	0	0	23	2.69E-02	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	LSR	0.0089	97	99.27	0	0.03	0	0	123	1.43E-01	0.00E+00	0.00E+00	1.08E-03
	Light Liquid	LSR-Isobutane	0.0089	97	99.27	0	0.03	0	0	4	4.64E-03	0.00E+00	0.00E+00	3.51E-05
	Light Liquid	Process Hydrocarbon	0.0089	97	93.79	0	1.45	0	0	123	1.35E-01	0.00E+00	0.00E+00	5.21E-02
Connectors/Flanges	Gas/Vapor	Cycle Gas	0.0039	97	93.79	0	1.45	0	0	47	2.26E-02	0.00E+00	0.00E+00	8.73E-03
	Gas/Vapor	Ethylene	0.0039	97	100	0	0	0	0	342	1.75E-01	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	Flare	0.0039	97	98.724	0	0.291	0	0	1,436	7.27E-01	0.00E+00	0.00E+00	5.35E-02
	Gas/Vapor	GN	0.0039	97	2.38	0	95.295	0	0	283	3.45E-03	0.00E+00	0.00E+00	3.46E+00
	Gas/Vapor	Hydrocarbon Gas	0.0039	97	93.79	0	1.45	0	0	926	4.45E-01	0.00E+00	0.00E+00	1.72E-01
	Gas/Vapor	Kill Gas	0.0039	0	0	0	0	10	10	602	0.00E+00	0.00E+00	1.03E+00	1.03E+00
	Gas/Vapor	Process Hydrocarbon	0.0039	97	93.79	0	1.45	0	0	139	6.68E-02	0.00E+00	0.00E+00	2.58E-02
	Gas/Vapor	Waste Gas	0.0039	97	2.98	1.66	80.14	1.55	1.55	478	7.30E-03	4.07E-03	3.80E-03	4.91E+00
	Gas/Vapor	Tail Gas	0.0039	97	57.71	0.01	1.73	0	0	115	3.40E-02	5.89E-06	0.00E+00	2.55E-02
	Gas/Vapor	Waste Gas Vapor	0.0039	97	2.98	1.66	80.14	0	0	86	1.31E-03	7.32E-04	0.00E+00	8.83E-01
	Gas/Vapor	Process Hydrocarbon Gas	0.0039	97	93.79	0	1.45	0	0	94	4.52E-02	0.00E+00	0.00E+00	1.75E-02
	Light Liquid	Butene	0.0005	97	100	0	0	0	0	38	2.50E-03	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	Flare	0.0005	97	98.724	0	0.291	0	0	4	2.59E-04	0.00E+00	0.00E+00	1.91E-05
	Light Liquid	Heavies Removal	0.0005	97	100	0	0	0	0	87	5.72E-03	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	Hexene	0.0005	97	100	0	0	0	0	54	3.55E-03	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	HSR	0.0005	97	99.29	0	0.03	0	0	51	3.33E-03	0.00E+00	0.00E+00	2.51E-05
	Light Liquid	Isobutane	0.0005	97	100	0	0	0	0	126	8.28E-03	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	LSR	0.0005	97	99.27	0	0.03	0	0	266	1.73E-02	0.00E+00	0.00E+00	1.31E-04
	Light Liquid	LSR-Isobutane	0.0005	97	99.27	0	0.03	0	0	15	9.78E-04	0.00E+00	0.00E+00	7.39E-06
	Light Liquid	Process Hydrocarbon	0.0005	97	93.79	0	1.45	0	0	221	1.36E-02	0.00E+00	0.00E+00	5.26E-03
	Light Liquid	Spent Caustic	0.0005	97	87.43	0	0	0	0	613	3.52E-02	0.00E+00	0.00E+00	0.00E+00

Source ID = 501 Equipment Components (Polyethylene Manufacturing Unit 3)														
Equipment	Service	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 PTE (tpy)	HAP PTE (tpy)	CO PTE (tpy)	CO2e PTE (tpy)
Relief Valves	Gas/Vapor	Ethylene	0.2293	97	100	0	0	0	0	1	3.01E-02	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	Flare	0.2293	97	98.724	0	0.291	0	0	47	1.40E+00	0.00E+00	0.00E+00	1.03E-01
	Gas/Vapor	Hydrocarbon Gas	0.2293	97	93.79	0	1.45	0	0	4	1.13E-01	0.00E+00	0.00E+00	4.37E-02
	Gas/Vapor	Kill Gas	0.2293	0	0	0	0	10	10	4	0.00E+00	0.00E+00	4.02E-01	4.02E-01
	Gas/Vapor	Process Hydrocarbon	0.2293	97	93.79	0	1.45	0	0	2	5.65E-02	0.00E+00	0.00E+00	2.18E-02
	Gas/Vapor	Process Hydrocarbon Gas	0.2293	97	93.79	0	1.45	0	0	2	5.65E-02	0.00E+00	0.00E+00	2.18E-02
	Gas/Vapor	Tail Gas	0.2293	97	57.71	0.01	1.73	0	0	2	3.48E-02	6.03E-06	0.00E+00	2.61E-02
Pumps	Light Liquid	Process Hydrocarbon	0.0439	93	93.79	0	1.45	0	0	2	2.52E-02	0.00E+00	0.00E+00	9.76E-03
Compressor Seals	Gas/Vapor	Hydrocarbon Gas	0.5027	100	93.79	0	1.45	0	0	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total											5.97	0.00	3.12	16.78

Source ID = 501 Equipment Components (OSBL)															
Equipment	Service	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 PTE (tpy)	HAP PTE (tpy)	CO PTE (tpy)	CO2e PTE (tpy)	
Valves	Gas/Vapor	ECU Flare Gas	0.0132	97	1	0	69	0	0	24	4.16E-04	0.00E+00	0.00E+00	7.18E-01	
	Gas/Vapor	GN	0.0132	97	2.38	0	95.295	0	0	660	2.72E-02	0.00E+00	0.00E+00	2.73E+01	
	Gas/Vapor	OSBL Butene Vapor	0.0132	97	100	0	0	0	0	20	3.47E-02	0.00E+00	0.00E+00	0.00E+00	
	Gas/Vapor	OSBL C3 Fraction	0.0132	97	100	49.79	0	0	0	124	2.15E-01	1.07E-01	0.00E+00	0.00E+00	
	Gas/Vapor	OSBL C3 Refrigerant Vapor	0.0132	97	99.6	0	0	0	0	4	6.91E-03	0.00E+00	0.00E+00	0.00E+00	
	Gas/Vapor	OSBL C3+ Product RC Vapor	0.0132	97	100	49.79	0	0	0	55	9.54E-02	4.75E-02	0.00E+00	0.00E+00	
	Gas/Vapor	OSBL C3+ Vapor	0.0132	97	100	49.79	0	0	0	5	8.67E-03	4.32E-03	0.00E+00	0.00E+00	
	Gas/Vapor	OSBL Ethylene	0.0132	97	99.84	0	0.1	0	0	696	1.21E+00	0.00E+00	0.00E+00	3.02E-02	
	Gas/Vapor	OSBL Flare	0.0132	97	45.84	10.88	0.81	0	0	384	3.05E-01	7.25E-02	0.00E+00	1.35E-01	
	Gas/Vapor	OSBL Flare Gas	0.0132	97	45.84	10.88	0.81	0	0	4	3.18E-03	7.55E-04	0.00E+00	1.40E-03	
	Gas/Vapor	OSBL GN	0.0132	97	2.38	0	95.295	0	0	112	4.62E-03	0.00E+00	0.00E+00	4.63E+00	
	Gas/Vapor	OSBL Hydrocarbon Gas	0.0132	97	45.85	10.89	0.81	0	0	16	1.27E-02	3.02E-03	0.00E+00	5.62E-03	
	Gas/Vapor	OSBL Isoutane Vapor	0.0132	97	100	0	0	0	0	12	2.08E-02	0.00E+00	0.00E+00	0.00E+00	
	Gas/Vapor	OSBL Isopentane Vapor	0.0132	97	100	0	0	0	0	4	6.94E-03	0.00E+00	0.00E+00	0.00E+00	
	Gas/Vapor	OSBL Light Gasoline Vapor	0.0132	97	99	90.91	0	0	0	27	4.64E-02	4.26E-02	0.00E+00	0.00E+00	
	Gas/Vapor	OSBL Nitrogen Purge	0.0132	0	0	0	0	0	0	4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
	Gas/Vapor	OSBL Propane	0.0132	97	100	0	0	0	0	144	2.50E-01	0.00E+00	0.00E+00	0.00E+00	
	Gas/Vapor	OSBL Propane Refrigerant	0.0132	97	100	0	0	0	0	105	1.82E-01	0.00E+00	0.00E+00	0.00E+00	
	Gas/Vapor	OSBL Pyrolysis Fuel Oil VP	0.0132	97	100	44.4	0	0	0	19	3.30E-02	1.46E-02	0.00E+00	0.00E+00	
	Gas/Vapor	OSBL Waste Gas	0.0132	97	4.29	1.66	80.14	0	0	126	9.38E-03	3.63E-03	0.00E+00	4.38E+00	
	Heavy Liquid	OSBL Pyrolysis Oil	0.0005	97	100	44.4	0	0	0	57	3.74E-03	1.66E-03	0.00E+00	0.00E+00	
	Light Liquid	ECU Recovered Oil	0.0089	97	100	0	0	0	0	23	2.69E-02	0.00E+00	0.00E+00	0.00E+00	
	Light Liquid	ECU Spent Caustic	0.0089	0	0.21	0.21	0	0	0	42	3.44E-03	3.44E-03	0.00E+00	0.00E+00	
	Light Liquid	OSBL Butene	0.0089	97	100	0	0	0	0	88	1.03E-01	0.00E+00	0.00E+00	0.00E+00	
	Light Liquid	OSBL C3 Product	0.0089	97	100	49.79	0	0	0	139	1.63E-01	8.09E-02	0.00E+00	0.00E+00	
	Light Liquid	OSBL C3 Refrigerant	0.0089	97	99.6	0	0	0	0	29	3.38E-02	0.00E+00	0.00E+00	0.00E+00	
	Light Liquid	OSBL Chemical Drain	0.0089	0	0.2	0.2	0	0	0	18	1.40E-03	1.40E-03	0.00E+00	0.00E+00	
	Light Liquid	OSBL Ethylene	0.0089	97	99.84	0	0.1	0	0	25	2.92E-02	0.00E+00	0.00E+00	7.31E-04	
	Light Liquid	OSBL Hexene	0.0089	97	100	100	0	0	0	60	7.02E-02	7.02E-02	0.00E+00	0.00E+00	
	Light Liquid	OSBL Hexene Liquid	0.0089	97	100	100	0	0	0	108	1.26E-01	1.26E-01	0.00E+00	0.00E+00	
	Light Liquid	OSBL Isobutane	0.0089	97	100	0	0	0	0	44	5.15E-02	0.00E+00	0.00E+00	0.00E+00	
	Light Liquid	OSBL Isopentane	0.0089	97	100	0	0	0	0	132	1.54E-01	0.00E+00	0.00E+00	0.00E+00	
	Light Liquid	OSBL Light Gasoline	0.0089	97	99	90.91	0	0	0	51	5.90E-02	5.42E-02	0.00E+00	0.00E+00	
	Light Liquid	OSBL Light Gasoline L/L	0.0089	97	99	90.91	0	0	0	68	7.87E-02	7.23E-02	0.00E+00	0.00E+00	
	Light Liquid	OSBL Methanol	0.0089	97	100	100	0	0	0	63	7.37E-02	7.37E-02	0.00E+00	0.00E+00	
	Light Liquid	OSBL Spent Caustic	0.0089	0	0.21	0.21	0	0	0	150	1.23E-02	1.23E-02	0.00E+00	0.00E+00	
	Light Liquid	Spent Caustic	0.0089	0	0.21	0.21	0	0	0	22	1.80E-03	1.80E-03	0.00E+00	0.00E+00	
	Light Liquid	Waste Water	0.0089	0	4	3.5	0	0	0	38	5.93E-02	5.18E-02	0.00E+00	0.00E+00	

Source ID = 501 Equipment Components (OSBL)															
			SOCMI Average Emission Factor lb/hr/ component												
Equipment	Service	Stream ID		LAER Control Efficiency %	VOC wt%	HAP wt%	CH4 wt%	CO wt%	CO2 wt%	Component Count	VOC PTE (tpy)	HAP PTE (tpy)	CO PTE (tpy)	CO2e PTE (tpy)	
Connectors/Flanges	Gas/Vapor	Butene Vapor	0.0039	97	100	0	0	0	0	62	3.18E-02	0.00E+00	0.00E+00	0.00E+00	
	Gas/Vapor	C3 Fraction	0.0039	97	100	49.79	0	0	0	290	1.49E-01	7.40E-02	0.00E+00	0.00E+00	
	Gas/Vapor	C3 Refrigerant Vapor	0.0039	97	99.6	0	0	0	0	14	7.15E-03	0.00E+00	0.00E+00	0.00E+00	
	Gas/Vapor	C3+ Product RC Vapor	0.0039	97	100	49.79	0	0	0	197	1.01E-01	5.03E-02	0.00E+00	0.00E+00	
	Gas/Vapor	C3+ Vapor	0.0039	97	100	49.79	0	0	0	10	5.12E-03	2.55E-03	0.00E+00	0.00E+00	
	Gas/Vapor	Ethylene	0.0039	97	100	0	0	0	0	1,645	8.43E-01	0.00E+00	0.00E+00	0.00E+00	
	Gas/Vapor	OSBL Hydrocarbon Gas	0.0039	97	99.05	13.18	0.81	0	0	1	5.08E-04	6.75E-05	0.00E+00	1.04E-04	
	Gas/Vapor	Waste Gas	0.0039	97	2.98	1.66	80.14	1.55	1.55	180	2.75E-03	1.53E-03	1.43E-03	1.85E+00	
	Gas/Vapor	Propane Refrigerant	0.0039	97	100	0	0	0	0	213	1.09E-01	0.00E+00	0.00E+00	0.00E+00	
	Gas/Vapor	Propane	0.0039	97	100	0	0	0	0	278	1.42E-01	0.00E+00	0.00E+00	0.00E+00	
	Gas/Vapor	Pyrolysis Fuel Oil VP	0.0039	97	100	44.4	0	0	0	38	1.95E-02	8.65E-03	0.00E+00	0.00E+00	
	Gas/Vapor	PFO Vapor	0.0039	97	100	44.4	0	0	0	10	5.12E-03	2.28E-03	0.00E+00	0.00E+00	
	Gas/Vapor	OSBL Waste Gas	0.0039	97	4.29	1.66	80.14	0	0	1	2.20E-05	8.51E-06	0.00E+00	1.03E-02	
	Gas/Vapor	Flare	0.0039	97	98.724	0	0.291	0	0	966	4.89E-01	0.00E+00	0.00E+00	3.60E-02	
	Gas/Vapor	Flare Gas	0.0039	97	67.46	20.08	0.93	0	0	44	1.52E-02	4.53E-03	0.00E+00	5.24E-03	
	Gas/Vapor	GN	0.0039	97	2.38	0	95.295	0	0	1,873	2.28E-02	0.00E+00	0.00E+00	2.29E+01	
	Gas/Vapor	Hexene Vapor	0.0039	97	100	0	0	0	0	88	4.51E-02	0.00E+00	0.00E+00	0.00E+00	
	Gas/Vapor	Isobutane Vapor	0.0039	97	100	0	0	0	0	35	1.79E-02	0.00E+00	0.00E+00	0.00E+00	
	Gas/Vapor	Isopentane Vapor	0.0039	97	100	0	0	0	0	16	8.20E-03	0.00E+00	0.00E+00	0.00E+00	
	Gas/Vapor	LGO Vapor	0.0039	97	99	90.91	0	0	0	35	1.78E-02	1.63E-02	0.00E+00	0.00E+00	
	Gas/Vapor	Light Gasoline Vapor	0.0039	97	99	90.91	0	0	0	37	1.88E-02	1.72E-02	0.00E+00	0.00E+00	
	Gas/Vapor	Nitrogen Purge	0.0039	0	0	0	0	0	0	17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
	Gas/Vapor	OSBL Ethylene	0.0039	97	99.84	0	0.1	0	0	2	1.02E-03	0.00E+00	0.00E+00	2.56E-05	
	Gas/Vapor	OSBL Flare	0.0039	97	45.84	10.88	0.81	0	0	3	7.05E-04	1.67E-04	0.00E+00	3.11E-04	
	Gas/Vapor	OSBL GN	0.0039	97	2.38	0	95.295	0	0	1	1.22E-05	0.00E+00	0.00E+00	1.22E-02	
	Gas/Vapor	OSBL Isopentane	0.0039	97	100	0	0	0	0	1	5.12E-04	0.00E+00	0.00E+00	0.00E+00	
	Gas/Vapor	Hydrocarbon Gas	0.0039	97	93.79	0	1.45	0	0	4	1.92E-03	0.00E+00	0.00E+00	7.43E-04	
	Light Liquid	Butene	0.0005	97	100	0	0	0	0	179	1.18E-02	0.00E+00	0.00E+00	0.00E+00	
	Light Liquid	C3 Refrigerant	0.0005	97	99.6	0	0	0	0	110	7.20E-03	0.00E+00	0.00E+00	0.00E+00	
	Light Liquid	C3+ Product	0.0005	97	100	49.79	0	0	0	365	2.40E-02	1.19E-02	0.00E+00	0.00E+00	
	Light Liquid	Ethylene	0.0005	97	100	0	0	0	0	50	3.29E-03	0.00E+00	0.00E+00	0.00E+00	
	Light Liquid	Hexene	0.0005	97	100	0	0	0	0	163	1.07E-02	0.00E+00	0.00E+00	0.00E+00	
	Light Liquid	Hexene Liquid	0.0005	97	100	0	0	0	0	212	1.39E-02	0.00E+00	0.00E+00	0.00E+00	
	Light Liquid	Isobutane	0.0005	97	100	0	0	0	0	95	6.24E-03	0.00E+00	0.00E+00	0.00E+00	
	Light Liquid	Isopentane	0.0005	97	100	0	0	0	0	322	2.12E-02	0.00E+00	0.00E+00	0.00E+00	
	Light Liquid	LGO	0.0005	97	99	90.91	0	0	0	24	1.56E-03	1.43E-03	0.00E+00	0.00E+00	
	Light Liquid	Light Gasoline L/L	0.0005	97	99	90.91	0	0	0	182	1.18E-02	1.09E-02	0.00E+00	0.00E+00	
	Light Liquid	Methanol	0.0005	97	100	100	0	0	0	172	1.13E-02	1.13E-02	0.00E+00	0.00E+00	
	Light Liquid	OSBL Hexene	0.0005	97	100	100	0	0	0	44	2.89E-03	2.89E-03	0.00E+00	0.00E+00	
	Light Liquid	OSBL Spent Caustic	0.0005	0	0.21	0.21	0	0	0	1	4.60E-06	4.60E-06	0.00E+00	0.00E+00	
	Light Liquid	Pyrolysis Fuel Oil	0.0005	97	100	44.4	0	0	0	63	4.14E-03	1.84E-03	0.00E+00	0.00E+00	
	Light Liquid	Recovered Oil	0.0005	97	70	0	0	0	0	31	1.43E-03	0.00E+00	0.00E+00	0.00E+00	
	Light Liquid	Spent Caustic	0.0005	0	0.21	0.21	0	0	0	79	3.63E-04	3.63E-04	0.00E+00	0.00E+00	
	Light Liquid	Waste Water	0.0005	0	4	3.5	0	0	0	41	3.59E-03	3.14E-03	0.00E+00	0.00E+00	
	Light Liquid	ECU Worse Case	0.0005	97	90	47	5	0	0	605	3.58E-02	1.87E-02	0.00E+00	4.97E-02	
	LLG	ECU Worse Case	0.0005	97	90	47	5	0	0	121	7.15E-03	3.74E-03	0.00E+00	9.94E-03	

Source ID = 501 Equipment Components (OSBL)														
Equipment	Service	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 PTE (tpy)	HAP PTE (tpy)	CO PTE (tpy)	CO2e PTE (tpy)
Relief Valves	Gas/Vapor	GN	0.2293	97	2.38	0	95.295	0	0	26	1.86E-02	0.00E+00	0.00E+00	1.87E+01
	Gas/Vapor	GN	0.2293	100	2.38	0	95.295	0	0	4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	OSBL C3 Fraction	0.2293	97	100	49.79	0	0	0	9	2.71E-01	1.35E-01	0.00E+00	0.00E+00
	Gas/Vapor	OSBL Ethylene	0.2293	97	99.84	0	0.1	0	0	35	1.05E+00	0.00E+00	0.00E+00	2.64E-02
	Gas/Vapor	OSBL Flare	0.2293	97	45.84	10.88	0.81	0	0	21	2.90E-01	6.88E-02	0.00E+00	1.28E-01
	Gas/Vapor	OSBL Flare	0.2293	100	45.84	10.88	0.81	0	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	OSBL Flare Gas	0.2293	97	45.84	10.88	0.81	0	0	1	1.38E-02	3.28E-03	0.00E+00	6.10E-03
	Gas/Vapor	OSBL Hydrocarbon Gas	0.2293	97	45.85	10.89	0.81	0	0	1	1.38E-02	3.28E-03	0.00E+00	6.10E-03
	Gas/Vapor	OSBL Propane	0.2293	97	100	0	0	0	0	7	2.11E-01	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	OSBL Propane Refrigerant	0.2293	97	100	0	0	0	0	4	1.21E-01	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	OSBL Waste Gas	0.2293	97	4.29	1.66	80.14	0	0	8	1.03E-02	4.00E-03	0.00E+00	4.83E+00
	Gas/Vapor	OSBL Waste Gas	0.2293	100	4.29	1.66	80.14	0	0	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	ECU Spent Caustic	0.2293	100	0.21	0.21	0	0	0	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	OSBL Butene	0.2293	97	100	0	0	0	0	2	6.03E-02	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	OSBL C3 Product	0.2293	97	100	49.79	0	0	0	2	6.03E-02	3.00E-02	0.00E+00	0.00E+00
	Light Liquid	OSBL Hexene Liquid	0.2293	97	100	100	0	0	0	3	9.04E-02	9.04E-02	0.00E+00	0.00E+00
	Light Liquid	OSBL Isobutane	0.2293	97	100	0	0	0	0	2	6.03E-02	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	OSBL Isopentane	0.2293	97	100	0	0	0	0	4	1.21E-01	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	OSBL Light Gasoline	0.2293	97	99	90.91	0	0	0	1	2.98E-02	2.74E-02	0.00E+00	0.00E+00
	Light Liquid	OSBL Light Gasoline L/L	0.2293	97	99	90.91	0	0	0	2	5.97E-02	5.48E-02	0.00E+00	0.00E+00
	Light Liquid	OSBL Methanol	0.2293	97	100	100	0	0	0	2	6.03E-02	6.03E-02	0.00E+00	0.00E+00
Pumps	Light Liquid	Waste Water	0.2293	0	4	3.5	0	0	0	1	4.02E-02	3.52E-02	0.00E+00	0.00E+00
	Light Liquid	Waste Water	0.2293	100	4	3.5	0	0	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	OSBL Recovered Oil	0.0439	93	100	0	0	0	0	2	2.69E-02	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	ECU Spent Caustic	0.0439	0	0.21	0.21	0	0	0	2	8.08E-04	8.08E-04	0.00E+00	0.00E+00
	Light Liquid	OSBL Butene	0.0439	93	100	0	0	0	0	2	2.69E-02	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	OSBL C3 Product	0.0439	93	100	49.79	0	0	0	1	1.35E-02	6.70E-03	0.00E+00	0.00E+00
	Light Liquid	OSBL Ethylene	0.0439	93	99.84	0	0.1	0	0	3	4.03E-02	0.00E+00	0.00E+00	1.01E-03
	Light Liquid	OSBL Isobutane	0.0439	93	100	0	0	0	0	2	2.69E-02	0.00E+00	0.00E+00	0.00E+00
Compressor Seals	Light Liquid	OSBL Isopentane	0.0439	93	100	0	0	0	0	2	2.69E-02	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	OSBL Propane Refrigerant	0.0439	93	100	0	0	0	0	3	4.04E-02	0.00E+00	0.00E+00	0.00E+00
	Light Liquid	OSBL Spent Caustic	0.0439	0	0.21	0.21	0	0	0	4	1.62E-03	1.62E-03	0.00E+00	0.00E+00
	Gas/Vapor	ECU Propane Refrigerant	0.5027	100	100	0	0	0	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	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
Instrumentation Valve	Gas/Vapor	OSBL Flare	0.5027	100	45.84	10.88	0.81	0	0	3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gas/Vapor	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
	Gas/Vapor	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
Instrumentation Conn	Gas/Vapor	GN	0.0039	97	2.38	0	95.295	0	0	184	2.24E-03	0.00E+00	0.00E+00	2.25E+00
Total											8.55	1.61	1.4E-03	91.14

Source ID = 502 Wastewater Treatment Plant						
	Toxchem Output Emissions	Annualized Emissions			Calculation/ Estimation	Emission Factor Reference
Pollutant	lb/hr	lb/hr	hr/year	tpy		
VOC	0.048	0.048	8,760	0.21	Emissions model	Toxchem
Benzene	7.0E-03	7.0E-03	8,760	3.1E-02	Emissions model	Toxchem
Phenol	1.2E-07	1.2E-07	8,760	5.3E-07	Emissions model	Toxchem
Toluene	2.1E-02	2.1E-02	8,760	9.1E-02	Emissions model	Toxchem
Ethylbenzene	1.2E-03	1.2E-03	8,760	5.4E-03	Emissions model	Toxchem
Xylene	1.3E-03	1.3E-03	8,760	5.7E-03	Emissions model	Toxchem
Styrene	1.7E-02	1.7E-02	8,760	7.5E-02	Emissions model	Toxchem
Naphthalene	2.3E-04	2.3E-04	8,760	9.9E-04	Emissions model	Toxchem
Dibutylphthalate	1.6E-07	1.6E-07	8,760	7.2E-07	Emissions model	Toxchem
Chloroform (Trichloromethane)	1.7E-05	1.7E-05	8,760	7.4E-05	Emissions model	Toxchem
Acenaphthene	1.4E-05	1.4E-05	8,760	6.1E-05	Emissions model	Toxchem
Acenaphthylene	6.0E-06	6.0E-06	8,760	2.6E-05	Emissions model	Toxchem
Fluorene	5.6E-06	5.6E-06	8,760	2.5E-05	Emissions model	Toxchem
Anthracene	9.6E-07	9.6E-07	8,760	4.2E-06	Emissions model	Toxchem
Phenanthrene	5.4E-06	5.4E-06	8,760	2.4E-05	Emissions model	Toxchem
Fluoranthene	1.3E-07	1.3E-07	8,760	5.6E-07	Emissions model	Toxchem
Pyrene	2.5E-07	2.5E-07	8,760	1.1E-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, a Biosludge Holding Tank, a Biosludge Dewatering Tank, a Centrate Sump, a Sand Filter, and a Sand Filter Backwash Receiver. The WWTP Permanent Controls Project proposes the installation of Settlement Drum(s), 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 vent to the Spent Caustic Thermal Oxidizer (SCTO); therefore, their emissions are not included in the table above. Additionally, the new Settlement Drum(s), two DNF Units, Float/Sludge Drum, and Steam Stripper 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 or abnormal conditions.						
Example Calculations: 0.21 tpy VOC = (0.048 lb/hr) x (8,760 hr/year) / (2,000 lb/ton)						

<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.

<u>Source ID = 503 Plant Roadways (Talc Transport Truck Annual Particulate Emissions)</u>		
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)	SF6 GWP	CO2e (tpy)
138 kV GIS SWGR	555-ES-101	MIS Substation	-	-	0.1	-	22,800	-
GIS Breaker Bay 1	555-ES-101-E01	MIS Substation	7,872	65 - 81	0.1	7.87	22,800	89.74
GIS Breaker Bay 2	555-ES-101-E02	MIS Substation	7,746	65 - 81	0.1	7.75	22,800	88.30
GIS Breaker Bay 3	555-ES-101-E03	MIS Substation	6,022	65 - 81	0.1	6.02	22,800	68.65
GIS Breaker Bay 4	555-ES-101-E04	MIS Substation	5,266	65 - 81	0.1	5.27	22,800	60.03
GIS Breaker Bay 5	555-ES-101-E05	MIS Substation	5,346	65 - 81	0.1	5.35	22,800	60.94
GIS Breaker Bay 6	555-ES-101-E06	MIS Substation	5,266	65 - 81	0.1	5.27	22,800	60.03
GIS Breaker Bay 7	555-ES-101-E07	MIS Substation	8,485	65 - 81	0.1	8.49	22,800	96.73
GIS Breaker Bay 8	555-ES-101-E08	MIS Substation	5,346	65 - 81	0.1	5.35	22,800	60.94
GIS Breaker Bay 9	555-ES-101-E09	MIS Substation	5,266	65 - 81	0.1	5.27	22,800	60.03
GIS Breaker Bay 10	555-ES-101-E10	MIS Substation	6,022	65 - 81	0.1	6.02	22,800	68.65
GIS Breaker Bay 11	555-ES-101-E11	MIS Substation	5,266	65 - 81	0.1	5.27	22,800	60.03
GIS Breaker Bay 12	555-ES-101-E12	MIS Substation	5,312	65 - 81	0.1	5.31	22,800	60.56
35 kV GIS SWGR	556-ES-201	PDS Substation	-	-	0.1	-	22,800	-
35 kV GIS SWGR	556-ECB-201A	PDS Substation	-	-	0.1	-	22,800	-
35 kV GIS SWGR	Phase Bussing B11	PDS Substation	9.1	21 - 23	0.1	0.0091	22,800	0.104
35 kV GIS SWGR	Phase Bussing B12	PDS Substation	9.1	21 - 23	0.1	0.0091	22,800	0.104
35 kV GIS SWGR	Phase Bussing B13	PDS Substation	9.1	21 - 23	0.1	0.0091	22,800	0.104
35 kV GIS SWGR	556-ECB-201A H-1	PDS Substation	4.4	21 - 23	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-201A H-2	PDS Substation	4.4	21 - 23	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-201A H-3	PDS Substation	4.4	21 - 23	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-201A H-4	PDS Substation	4.4	21 - 23	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-201A H-5	PDS Substation	4.4	21 - 23	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-201A H-6	PDS Substation	4.4	21 - 23	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-201A H-7	PDS Substation	4.4	21 - 23	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-201A H-8	PDS Substation	4.4	21 - 23	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-201A H-10	PDS Substation	7.2	21 - 23	0.1	0.0072	22,800	0.082
35 kV GIS SWGR	556-ECB-201A H-11	PDS Substation	9.1	21 - 23	0.1	0.0091	22,800	0.104
35 kV GIS SWGR	556-ECB-201B	PDS Substation	-	-	0.1	-	22,800	-
35 kV GIS SWGR	Phase Bussing B11	PDS Substation	9.9	21 - 23	0.1	0.0099	22,800	0.113
35 kV GIS SWGR	Phase Bussing B12	PDS Substation	9.9	21 - 23	0.1	0.0099	22,800	0.113
35 kV GIS SWGR	Phase Bussing B13	PDS Substation	9.9	21 - 23	0.1	0.0099	22,800	0.113
35 kV GIS SWGR	556-ECB-201A H-13	PDS Substation	7.2	21 - 23	0.1	0.0072	22,800	0.082
35 kV GIS SWGR	556-ECB-201A H-15	PDS Substation	4.4	21 - 23	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-201A H-16	PDS Substation	4.4	21 - 23	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-201A H-17	PDS Substation	4.4	21 - 23	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-201A H-18	PDS Substation	4.4	21 - 23	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-201A H-19	PDS Substation	4.4	21 - 23	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-201A H-20	PDS Substation	4.4	21 - 23	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-201A H-21	PDS Substation	4.4	21 - 23	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-201A H-22	PDS Substation	4.4	21 - 23	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-201A H-23	PDS Substation	4.4	21 - 23	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ES-202	PDS Substation	-	-	0.1	-	22,800	-
35 kV GIS SWGR	5560ECB-202A	PDS Substation	-	-	0.1	-	22,800	-
35 kV GIS SWGR	Phase Bussing B11	PDS Substation	8.3	21	0.1	0.0083	22,800	0.094
35 kV GIS SWGR	Phase Bussing B12	PDS Substation	8.3	21	0.1	0.0083	22,800	0.094
35 kV GIS SWGR	Phase Bussing B13	PDS Substation	8.3	21	0.1	0.0083	22,800	0.094
35 kV GIS SWGR	556-ECB-202A H-1	PDS Substation	4.4	21	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-202A H-2	PDS Substation	5.7	21	0.1	0.0057	22,800	0.065
35 kV GIS SWGR	556-ECB-202A H-3	PDS Substation	4.4	21	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-202A H-4	PDS Substation	4.4	21	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-202A H-5	PDS Substation	4.4	21	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-202A H-6	PDS Substation	4.4	21	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-202A H-7	PDS Substation	4.4	21	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-202A H-9	PDS Substation	10.4	21	0.1	0.0104	22,800	0.119
35 kV GIS SWGR	556-ECB-202A H-10	PDS Substation	13.6	21	0.1	0.0136	22,800	0.155
35 kV GIS SWGR	556-ECB-202B	PDS Substation	-	-	0.1	-	22,800	-

Source ID = 504 Gas Insulated Switchgear (SF6)								
Equipment	Tag	Location	SF6 Quantity (lb)	Pressure (psi)	Leak Rate (%/yr)	SF6 Losses (lb)	SF6 GWP	CO2e (tpy)
35 kV GIS SWGR	Phase Bussing B11	PDS Substation	8.3	21	0.1	0.0083	22,800	0.094
35 kV GIS SWGR	Phase Bussing B12	PDS Substation	8.3	21	0.1	0.0083	22,800	0.094
35 kV GIS SWGR	Phase Bussing B13	PDS Substation	8.3	21	0.1	0.0083	22,800	0.094
35 kV GIS SWGR	556-ECB-202B H-12	PDS Substation	10.4	21	0.1	0.0104	22,800	0.119
35 kV GIS SWGR	556-ECB-202B H-14	PDS Substation	4.4	21	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-202B H-15	PDS Substation	4.4	21	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-202B H-16	PDS Substation	5.7	21	0.1	0.0057	22,800	0.065
35 kV GIS SWGR	556-ECB-202B H-17	PDS Substation	4.4	21	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-202B H-18	PDS Substation	4.4	21	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-202B H-19	PDS Substation	4.4	21	0.1	0.0044	22,800	0.050
35 kV GIS SWGR	556-ECB-202B H-20	PDS Substation	4.4	21	0.1	0.0044	22,800	0.050
MIS Transformer	556-ET-201A	Outside MIS	30	56.6	0.5	0.15	22,800	1.71
MIS Transformer	556-ET-201B	Outside MIS	30	56.6	0.5	0.15	22,800	1.71
MIS Transformer	556-ET-202A	Outside MIS	30	56.6	0.5	0.15	22,800	1.71
MIS Transformer	556-ET-202B	Outside MIS	30	56.6	0.5	0.15	22,800	1.71
GTG Step Up Transformer	555-ET-102	Cogen	30	56.6	0.5	0.15	22,800	1.71
GTG Step Up Transformer	555-ET-103	Cogen	30	56.6	0.5	0.15	22,800	1.71
GTG Step Up Transformer	555-ET-104	Cogen	30	56.6	0.5	0.15	22,800	1.71
STG Step Up Transformer	555-ET-101	Cogen	30	56.6	0.5	0.15	22,800	1.71
STG Step Up Transformer	555-ET-105	Cogen	30	56.6	0.5	0.15	22,800	1.71
Total						74.87		853.51

Process Flow Diagrams

Figure C-1. Post-WWTP Permanent Controls Project WWTP Process Flow Diagram

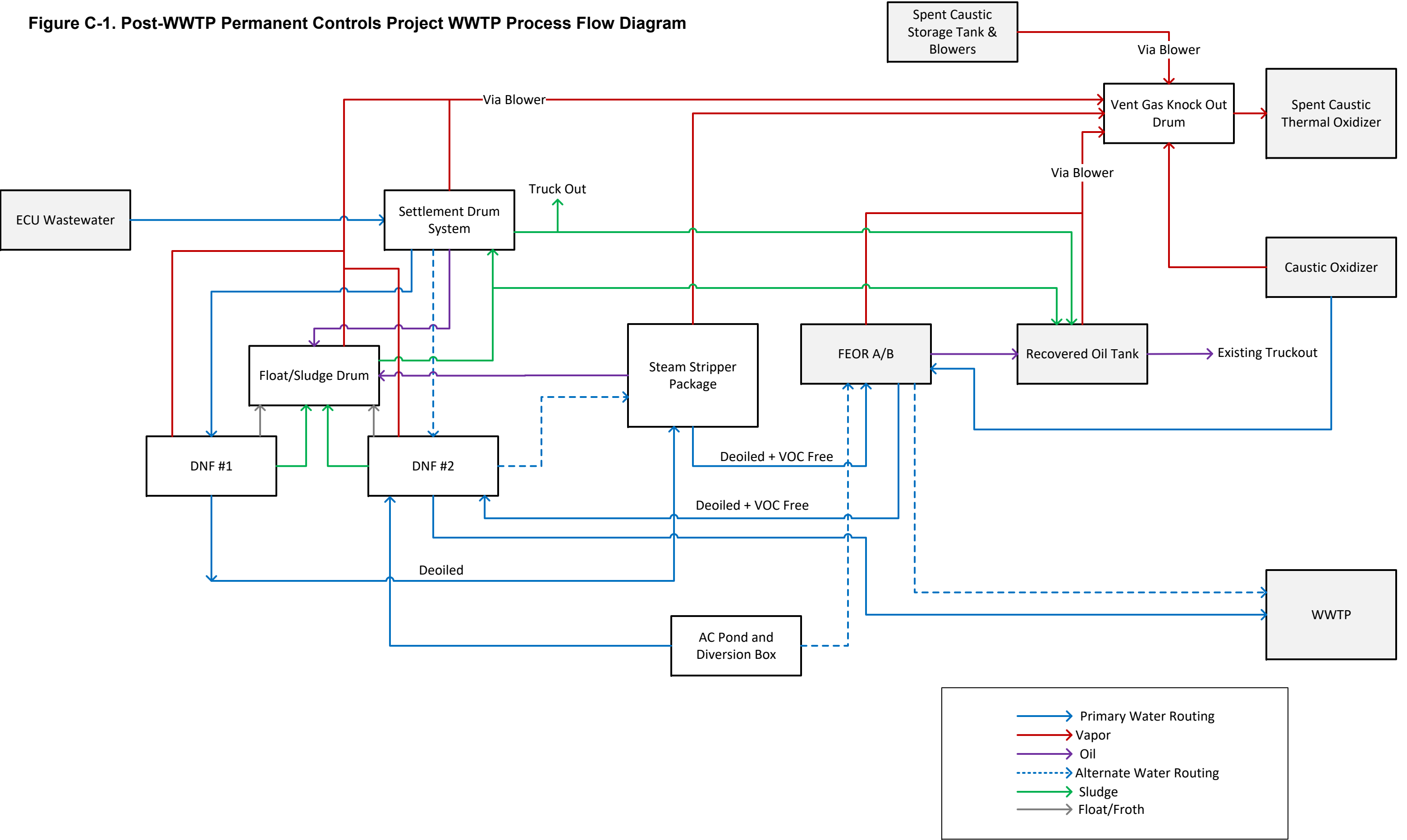


Figure C-2. Ethylene Manufacturing Process Flow Diagram

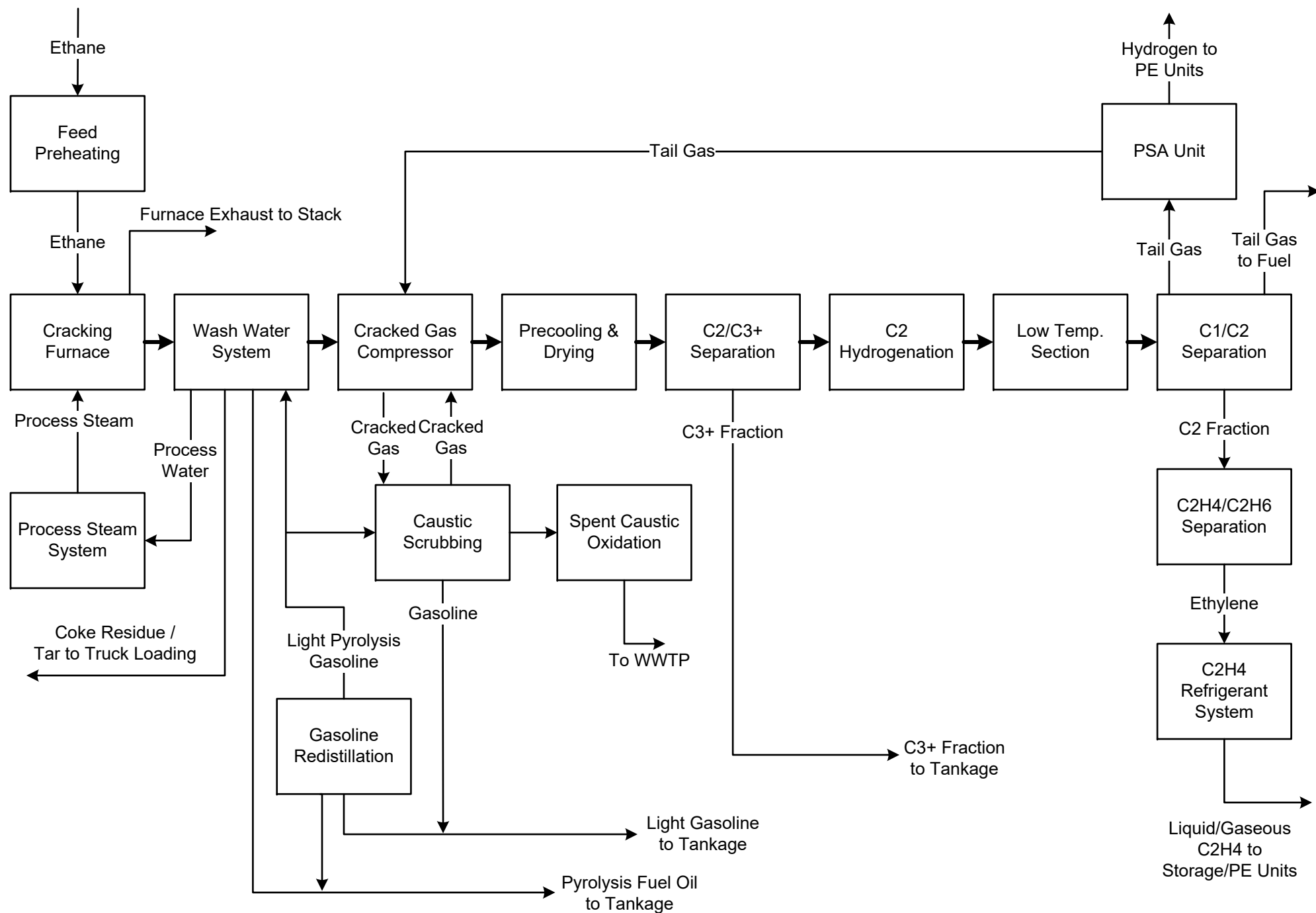


Figure C-3. Gas Phase Polyethylene Manufacturing Process Flow Diagram

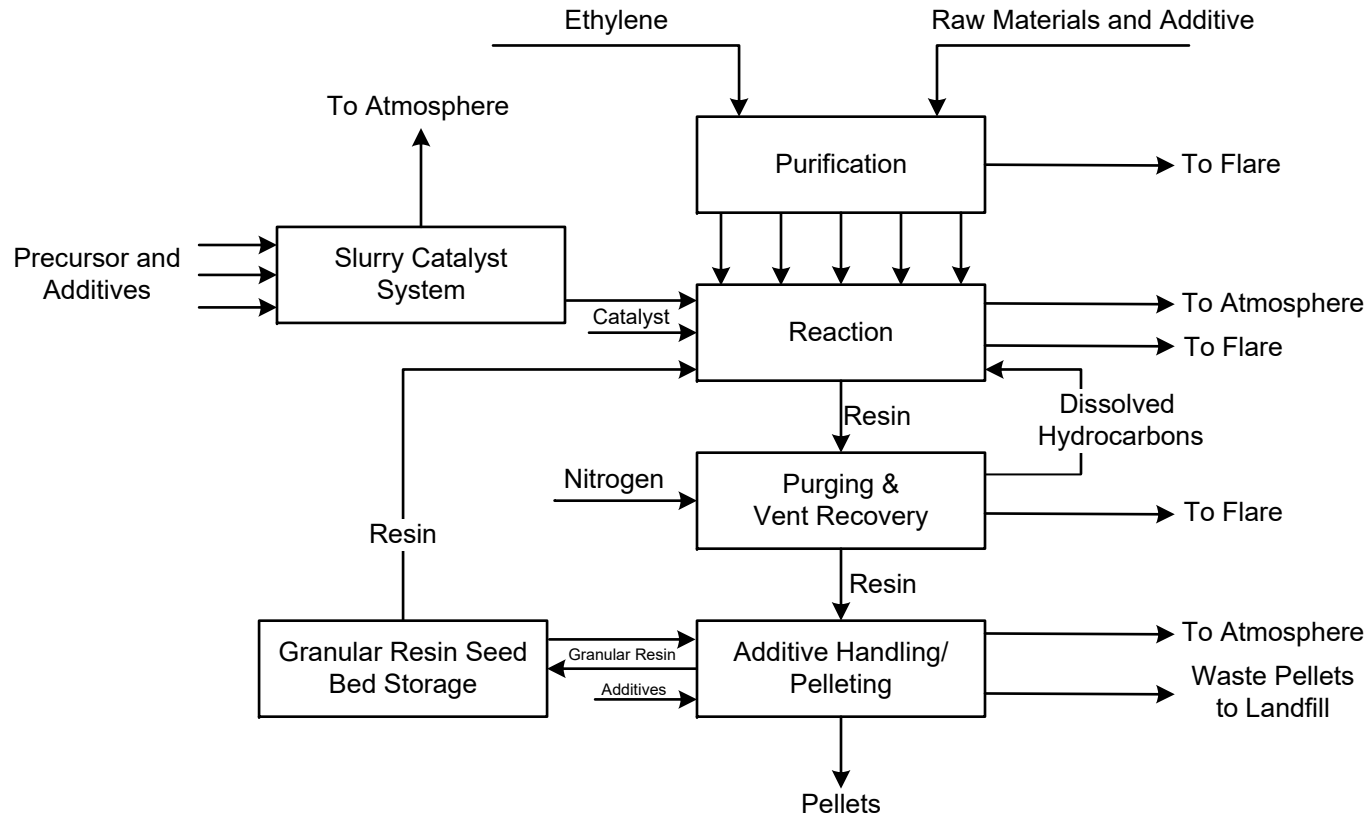


Figure C-4. Liquid Phase Slurry Polyethylene Manufacturing Process Flow Diagram

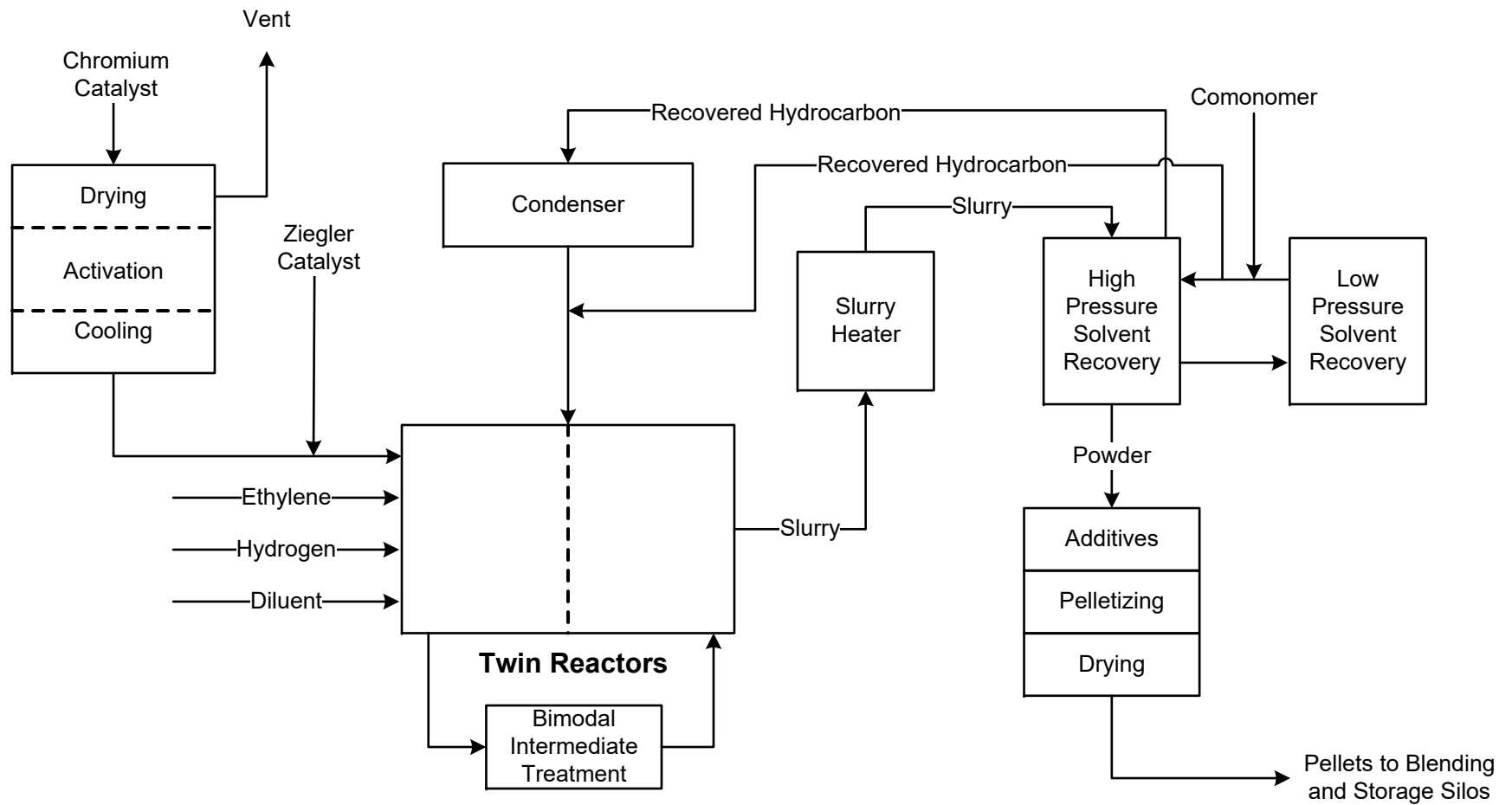
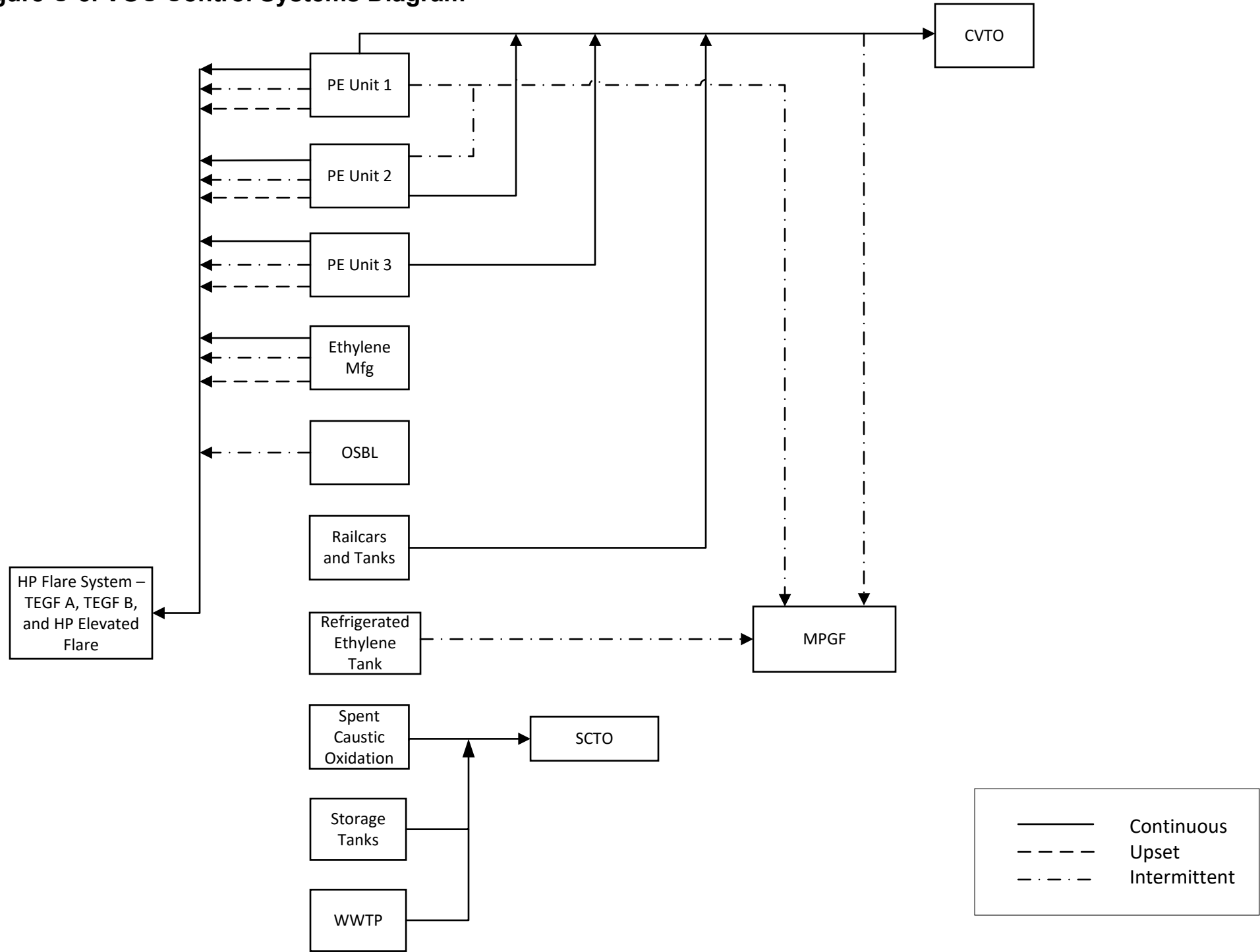


Figure C-5. VOC Control Systems Diagram



Air Quality Analysis

APPENDIX D-1

AIR DISPERSION MODELING AND CLASS II VISIBILITY ANALYSIS FOR SHELL POLYMERS MONACA IN BEAVER COUNTY PENNSYLVANIA



September 2024



Table of Contents

1.0 INTRODUCTION AND SUMMARY OF RESULTS	1-1
1.1 Modeling Revisions	1-3
2.0 FACILITY AND PROJECT DESCRIPTION	2-1
3.0 SITE DESCRIPTION	3-1
4.0 MODEL SELECTION AND MODEL INPUT	4-1
4.1 Model Selection	4-1
4.2 Model Control Options and Land Use	4-1
4.3 Source and Monitoring Data	4-2
4.4 Receptor Data	4-10
4.5 Meteorological Data	4-13
5.0 MODELING METHODOLOGY	5-1
5.1 Pollutants Modeled	5-1
5.2 Turbine Load/Operating Conditions	5-1
5.3 Furnace Modes and Worst-Case Operating Conditions	5-2
5.4 Significant Impact Analysis	5-3
5.5 Preconstruction Monitoring	5-5
5.6 Secondary PM _{2.5} Analyses	5-6
5.7 NO ₂ Analyses	5-8
5.8 NAAQS Analysis and Increment Analyses	5-11
6.0 RESULTS	6-1
6.1 Turbine Load Analysis Results	6-1
6.2 Furnace Mode and Worst-Case Operating Condition Results	6-1
6.3 Secondary PM _{2.5} Analysis Results	6-2
6.4 EMACT Project Significant Impact Analysis Results	6-6
6.5 Plan Approval Reconciliations and WWTP Permanent Controls Project Significant Impact Analysis Results	6-6
6.6 NAAQS Analysis Results	6-7
6.7 Class II Increment Analysis Results	6-8
7.0 CLASS II VISIBILITY ANALYSIS	7-1
8.0 CLASS I AREA IMPACTS	8-1
8.1 Class I AQRV Analysis	8-1
8.2 Class I Significant Impacts Analysis	8-2



List of Tables

Table 1. Existing Air Quality and Background Concentrations	4-9
Table 2. Beaver Falls 98% Hourly NO ₂ (ppb) By Season and Hour of Day.....	4-10
Table 3. Receptor Grid Spacing	4-11
Table 4. PSD Class II Significant Impact Levels	5-5
Table 5. PSD Preconstruction Monitoring Exemption Levels	5-6
Table 6. National Ambient Air Quality Standards	5-12
Table 7. PSD Increments	5-13
Table 8. Turbine Load Analysis Results	6-3
Table 9. Worst-Case Furnace Mode Analysis Results	6-4
Table 10. Worst-Case Furnace Analysis Results	6-5
Table 11. EMACT Project PM _{2.5} SIL MERP Calculation Results.....	6-5
Table 12. EMACT Project Class II Significant Impact Analysis Results	6-6
Table 13. Plan Approval Reconciliations and WWTP Permanent Controls Project Class II Significant Impact Analysis Results.....	6-7
Table 14. As-Built NAAQS Analysis Results	6-8
Table 15. Class II PSD Increment Analysis Results.....	6-8
Table 16. Level-1 Class II Maximum Visibility Impacts Inside Raccoon Creek State Park	7-4
Table 17. Level-2 Class II Maximum Visibility Impacts Inside Raccoon Creek State Park	7-7
Table 18. SPM Annual Emissions (Q).....	8-2
Table 19. SPM Class I Q/d Evaluation	8-2
Table 20. EMACT Project Class I Significant Impact Analysis Results	8-6
Table 21. Plan Approval Reconciliations and WWTP Permanent Controls Project Class I Significant Impact Analysis Results.....	8-6
Table 22. Calculation of 24-Hour PM ₁₀ Concentrations for Each of the Three Flagpole Heights	8-8

List of Figures

Figure 1. General Location of SPM	3-2
Figure 2. Specific Location of SPM	3-3
Figure 3. Land Use within Three Kilometers of SPM (Three Kilometer Radius Circle Shown in Blue)	4-1
Figure 4. SPM Three-Dimensional Plot Plan (View from SW).....	4-4
Figure 5. SPM Plot Plan	4-5
Figure 6. Ambient Air Quality Monitors in the Vicinity of SPM	4-8
Figure 7. SPM Near-field Receptor Grid.....	4-12
Figure 8. Vistra Meteorological Tower and Pittsburgh Surface and Upper Air Station Locations Relative to SPM	4-14
Figure 9. Beaver Valley Windrose 2018-2022.....	4-15
Figure 10. Albedo and Bowen Ratio Comparison Results.....	4-16
Figure 11. Surface Roughness Comparison Results.....	4-17



Figure 12. Comparison of Ozone Concentrations at the Four Sites	5-10
Figure 13. Location of Raccoon Creek State Park Relative to SPM.....	7-5
Figure 14. Level-2 Wind Sector Analysis Results.....	7-6
Figure 15. Class I Areas Located within Three Hundred Kilometers of SPM and Modeled Receptors	8-5
Figure 16. PM ₁₀ Impact Change Over Distance for Each Flagpole Height Category ..	8-7



1.0 INTRODUCTION AND SUMMARY OF RESULTS

This document presents the results of the air quality dispersion modeling analysis conducted for Shell Polymers Monaca (SPM), owned and operated by Shell Chemical Appalachia LLC (Shell) located in Beaver County, Pennsylvania. The initial analysis was submitted to the Pennsylvania Department of Environmental Protection (PADEP) in April of 2014, prior to construction of the facility. Subsequent revisions to the analysis have been necessitated by changes to the facility design configuration, associated emissions, as well as updates to the EPA-approved dispersion models, supporting software, off-site source information, meteorological data, background concentrations, and modeling procedures. Shell last provided PADEP with updates to the analysis in September of 2020.

This revised analysis serves two purposes. Firstly, it presents the results of the modeling analysis conducted for a proposed major modification to the existing facility, referred to as the “EMACT Project” in this report, as described in Section 2. The EMACT Project will result in a significant net emissions increase for nitrogen oxides (NO_x) and carbon monoxide (CO). Since the EMACT Project will be significant for NO_x, which is also regulated as a precursor to particulate matter (PM) with an aerodynamic diameter less than or equal to 2.5 microns (PM_{2.5}), Shell has also evaluated emissions of PM_{2.5}.

It's second purpose is to provide an updated air quality compliance demonstration for SPM, including a National Ambient Air Quality Standards (NAAQS) analysis, a Prevention of Significant Deterioration (PSD) increment analysis, and Class II visibility analysis to address the Plan Approval Reconciliations and WWTP Permanent Controls Project, which is described in more detail in Section 2 of this document. This analysis addresses only those pollutants that were required to be evaluated as part of the initial Plan Approval Application, including CO, NO₂ and PM with an aerodynamic diameter less than or equal to 10 microns (PM₁₀). This analysis includes a number of changes since the last modeling demonstration was provided in 2020. A list of the changes made to the model since the last update is provided in Section 1.1 below.



The air quality analyses performed for the EMACT Project and Plan Approval Reconciliations and WWTP Permanent Controls Project address the emissions of the criteria pollutants regulated under the PSD regulations of 40 CFR 52.21 as implemented under 25 Pa. Code Chapter 127, Subchapter D. The analyses were conducted to ensure that the EMACT Project and Plan Approval Reconciliations and WWTP Permanent Controls Project do not cause or contribute to air pollution in excess of a NAAQS or PSD increment. An updated analysis was also performed to address potential impacts on soils and vegetation; general commercial, residential, industrial and other growth; visibility; and Class I Air Quality Related Values (AQRVs) as required under 40 CFR 52.21(o) and (p), respectively. The additional impacts analysis, which includes the growth and soils and vegetation analyses, is included in Appendix D-2 of the plan approval application.

Only the emissions increases from project-impacted sources at SPM were initially evaluated to determine if either the EMACT Project or Plan Approval Reconciliations and WWTP Permanent Controls Project would significantly impact local air quality. Two separate significant impact analyses were conducted: one for the EMACT Project and one for the Plan Approval Reconciliations and WWTP Permanent Controls Project. The resultant modeled concentrations were compared to the ambient Significant Impact Levels (SILs) for Class I and Class II areas. Note, the emissions modeled in the significant impact analysis for the Plan Approval Reconciliations and WWTP Permanent Controls Project reflect the proposed total facility-wide potential emissions, excluding the emissions increases associated with the EMACT Project.

The results of the significant impacts analysis for the EMACT Project demonstrate that the project will not result in ambient impacts in excess of the Class II or Class I SILs for NO₂, CO, or PM_{2.5}. Therefore, a cumulative air quality analysis to calculate concentrations for comparison to the NAAQS for NO₂, CO, and PM_{2.5} and increments for NO₂ and PM_{2.5} was not required for the EMACT Project.

The significant impacts analysis conducted for the Plan Approval Reconciliations and WWTP Permanent Controls Project results in ambient impacts in excess of the Class II SILs for NO₂, CO, and PM₁₀. Therefore, a cumulative air quality analysis to calculate



concentrations for comparison to the NAAQS and Class II PSD increments was required for these pollutants.¹ The results of the cumulative impact analysis (also referred to as the “as-built analysis”), which includes emissions associated with the EMACT Project, demonstrate compliance with the NO₂, CO, and PM₁₀ NAAQS and Class II increment standards for NO₂ and PM₁₀. The analysis also demonstrates insignificant Class I impacts for NO₂ and PM₁₀ for the Plan Approval Reconciliations and WWTP Permanent Controls Project.

Class I AQRVs were also evaluated for SPM using the Federal Land Manager’s (FLM’s) Q/d screening and determined to be less than the screening threshold of 10. The total facility emissions used in the Q/d screening included the emissions increases from the EMACT Project and updates associated with the Plan Approval Reconciliations and WWTP Permanent Controls Project. In addition, visibility impacts were evaluated at the nearby Racoon Creek State Park and it was concluded that SPM is not expected to negatively impact visibility at the park.

The analysis conforms with the modeling procedures outlined in the Environmental Protection Agency’s Guideline on Air Quality Models (“Guideline”) and associated EPA modeling policy and guidance.² It also conforms with the modeling protocol submitted on June 5, 2024 and approved by the PADEP on June 6, 2024.

1.1 Modeling Revisions

- Included latest versions of AERMOD and AERMET (Versions 23132);
- Included most recent 1/3 arc second Three-Dimensional Elevation Program (3DEP) data obtained from the National Map from the U.S. Geological Survey (USGS);
- Updated the model with the most current meteorological data from 2018-2022;
- Updated the off-site emissions inventory;
- Updated background pollutant concentrations based on data from 2020-2022;

¹ There are no PSD increments for CO; therefore, modeling was only performed to demonstrate compliance with the CO NAAQS.

² *Guideline on Air Quality Models*, Appendix W to 40 CFR Part 51, U.S. Environmental Protection Agency, January 2017.



- Removed emergency generator nos. 5 and 6 which have been permanently removed from SPM; and,
- Updated emission rates for numerous sources (See Section 1.7 of the plan approval application for more details).



2.0 FACILITY AND PROJECT DESCRIPTION

SPM consists of an ethylene manufacturing unit, three polyethylene manufacturing units, three cogeneration units (Cogen Units), and a variety of ancillary equipment required to support its operations. The major sources of emissions include seven ethane cracking furnaces, a number of diesel engines to provide emergency power and power fire water pumps, flares, thermal oxidizers, cooling towers, catalyst activation heaters, and combustion turbines with heat recovery systems to provide steam and electric power to the facility and electric power for sale.

This modeling report has been prepared in support of the plan approval application submitted by Shell to PADEP in accordance with the Pennsylvania Air Pollution Control Act and 25 Pa. Code §127.12 for the following projects and plan approval reconciliations:

- Shell is proposing to implement the Wastewater Treatment Plant (WWTP) Permanent Controls Project at SPM to improve the oils, grease, and volatile organic compound (VOC) removal efficiency of the primary treatment section of SPM's WWTP. Shell is currently using temporary equipment to achieve improved removal efficiencies and is now proposing to install permanent equipment.
- Shell is proposing the EMACT Project to comply with the 40 Code of Federal Regulations (CFR) 63 Subpart YY pressure-assisted multi-point flare minimum net heating value of flare combustion zone gas (NHV_{CZ}) requirement that recently became applicable to the HP Ground Flare #1 and HP Ground Flare #2 (also referred to as "TEGF A" and "TEGF B"). Supplemental gas will be utilized as necessary in order to achieve compliance with the minimum net heating value for the totally enclosed ground flares (TEGFs).
- After a thorough review of SPM's as-built operations and plan approval source inventory, potential emissions calculations, and conditions, Shell is proposing to reconcile specific plan approval source descriptions, potential emissions calculations, and conditions. These proposed reconciliations are collectively



referred to by Shell as the “Plan Approval Reconciliations”. A detailed description of all proposed reconciliations is provided in the plan approval application.

Shell has retrospectively evaluated the Plan Approval Reconciliations and WWTP Permanent Controls Project together as part of the initial construction of SPM. These changes are related to the facility’s initial construction since they represent as-built changes to the facility’s initial construction plan approval and necessary improvements to the initial design and construction of the facility’s WWTP, respectively. Shell has evaluated the EMACT Project separately from the initial construction of SPM because the project is only being completed in order to comply with newly effective federal regulatory requirements that are applicable to ethylene production units across the country.

The attainment status designations for SPM’s location contemporaneous with PADEP’s issuance of PA-04-00740A, which authorized the initial construction and operation of SPM, are the relevant designations for the retrospective NSR applicability analysis performed for the Plan Approval Reconciliations and WWTP Permanent Controls Project. Although Beaver County is currently designated as attainment for PM_{2.5}, the county was designated as nonattainment for PM_{2.5} when PADEP issued PA-04-00740A to Shell. The remaining currently effective attainment status designations for SPM’s location are unchanged from the attainment status designations that were in effect when PADEP issued PA-04-00740A. Thus, Shell evaluated the Plan Approval Reconciliations and WWTP Permanent Controls Project in regard to PADEP’s Nonattainment NSR (NNSR) regulations (25 Pa. Code §§127.201 to 127.218) for ozone (NO_x and VOC), PM_{2.5}, SO₂, and lead, while Shell evaluated the same changes in regard to PADEP’s PSD regulations (25 Pa. Code §§127.81 to 127.83) for CO, NO₂ (NO_x), PM₁₀, and all other regulated PSD pollutants.

The Plan Approval Reconciliations and WWTP Permanent Controls Project will not retrospectively cause the initial construction of SPM to require PSD permitting under 25 Pa. Code §127.83 for any additional regulated PSD pollutants relative to the PSD applicability determinations that were made contemporaneous with PADEP’s



authorization of the initial construction of SPM. However, with this submittal Shell has updated the most recent air quality analysis that was completed for the initial construction of SPM due to the proposed changes to emissions unit-specific and facility-wide potential emissions of CO, NO_x, and PM₁₀ associated with the Plan Approval Reconciliations and WWTP Permanent Controls Project.

As mentioned previously, the EMACT Project is a separate, standalone project with respect to the NSR permitting programs. Because SPM is currently a PSD major stationary source, PSD permitting requirements are applicable to the EMACT Project because the project will result in significant net emissions increases of NO_x and CO. Additionally, although the EMACT Project will not result in a significant net emissions increase in direct emissions of PM_{2.5}, the project is subject to PSD review for PM_{2.5} because it will result in a significant net emissions increase in NO_x, which is regulated as a precursor to PM_{2.5} per 40 CFR 52.21 (b)(23)(i). Therefore, this analysis addresses the emissions increases of NO_x, CO, and PM_{2.5} associated with the EMACT Project.

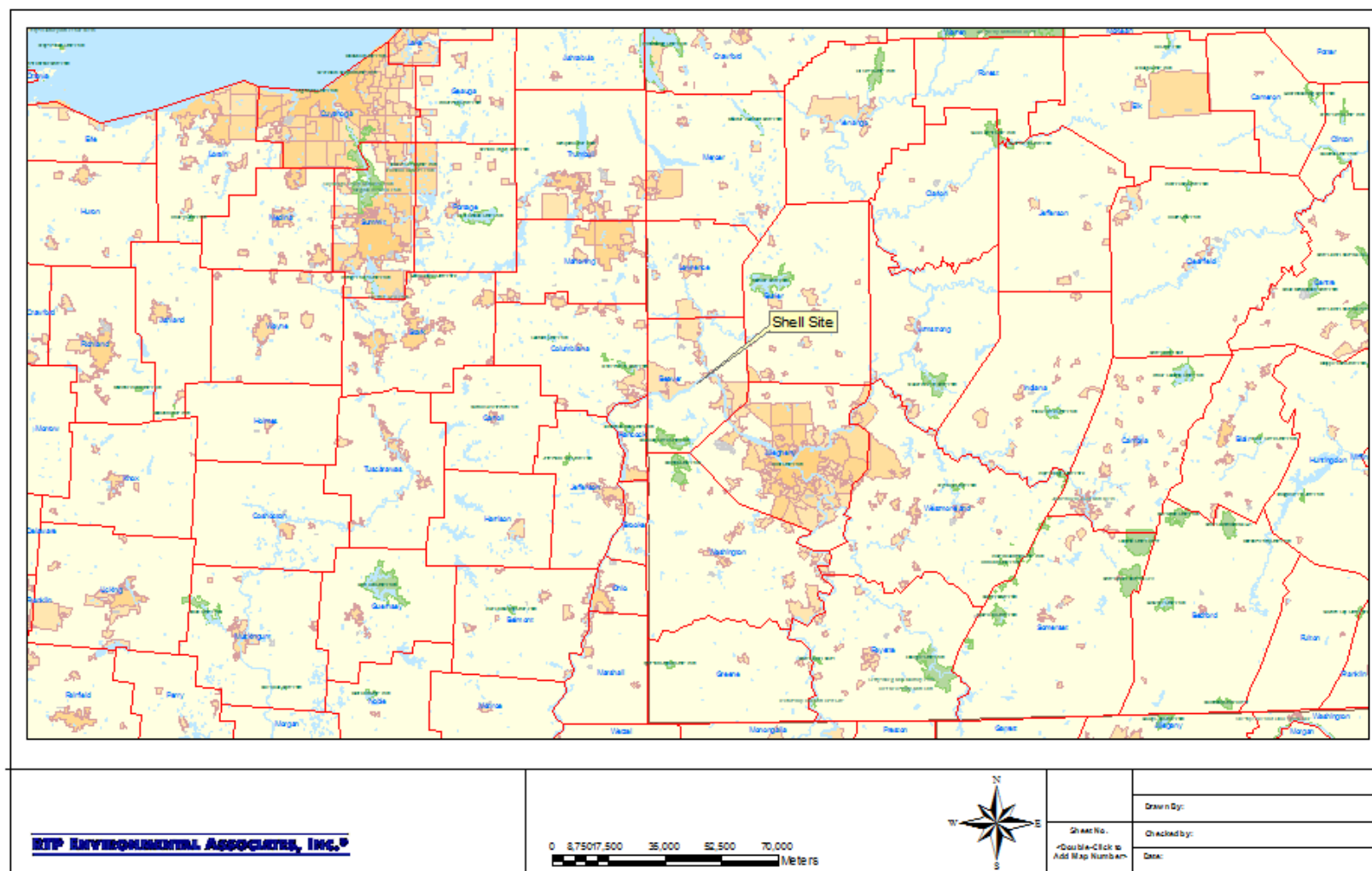


3.0 SITE DESCRIPTION

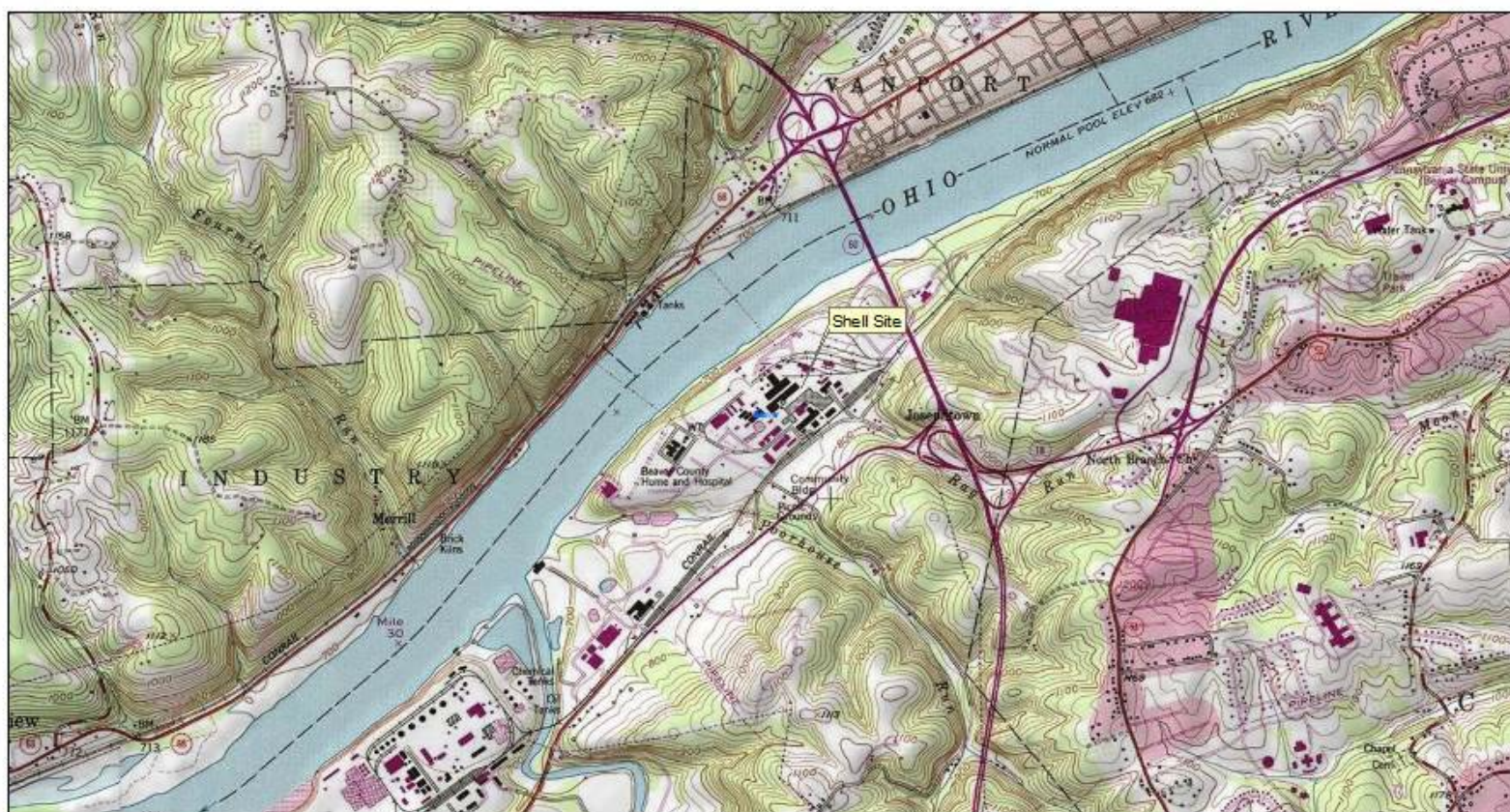
SPM occupies approximately 400 acres adjacent to the Ohio River in Center and Potter Townships, Pennsylvania in Beaver County. The approximate Universal Transverse Mercator (UTM) coordinates of the facility are 556,129 meters east and 4,502,450 meters north (UTM Zone 17, NAD 83). Figure 1 shows the general location of SPM. Figure 2 shows the location of SPM on a 7.5-minute USGS topographic map.

The facility is classified under the regulations governing PSD (40 CFR 52.21) and Title V (40 CFR 70.2) as a major source of air pollution. The portion of Beaver County where SPM is located is currently designated as attainment or unclassifiable for all regulated pollutants with the exception of ozone, sulfur dioxide (SO₂), and lead (Pb).³

³ A portion of Beaver County is designated non-attainment for the 2010 1-hr SO₂ standard and the 2008 lead (Pb) standard.



3-2



ETP Environmental Associates, Inc.

0 165 330 660 990 1,320
Meters



Sheet No.
Double-Click to
Add Map Number

Drawn By:

Checked by:

Date:

Figure 2. Specific Location of SPM



4.0 MODEL SELECTION AND MODEL INPUT

4.1 Model Selection

The latest version of the AMS/EPA Regulatory Model (AERMOD, Version 23132) was used to conduct the dispersion modeling analysis. AERMOD is a Gaussian plume dispersion model that is based on planetary boundary layer principles for characterizing atmospheric stability. The model evaluates the non-Gaussian vertical behavior of plumes during convective conditions with the probability density function and the superposition of several Gaussian plumes. AERMOD is a modeling system with three components: AERMAP is the terrain preprocessor program, AERMET is the meteorological data preprocessor and AERMOD includes the dispersion modeling algorithms.

AERMOD is the most appropriate model for calculating ambient concentrations near SPM based on the model's ability to incorporate multiple sources and source types. The model can also account for convective updrafts and downdrafts and meteorological data throughout the plume depth. The model also provides parameters required for use with up-to-date planetary boundary layer parameterization. The model also has the ability to incorporate building wake effects and to calculate concentrations within the cavity recirculation zone. All model options were selected as recommended in the EPA Guideline on Air Quality Models (Appendix W to 40 CFR 51).⁴ Model runs were completed using the EPA executable available for download from the Support Center for Regulatory Atmospheric Modeling (SCRAM).⁵

4.2 Model Control Options and Land Use

AERMOD was run in the regulatory default mode for all pollutants. The NO₂ significant impact modeling included the Tier 2 Ambient Ratio Method (ARM2) with the EPA recommended minimum and maximum ambient NO₂/NO_x ratios of 0.5 and 0.9, respectively. The Plume Volume Molar Ratio Method (PVMRM) was used in the NO₂

⁴ *Guideline on Air Quality Models*, Appendix W to 40 CFR Part 51, U.S. Environmental Protection Agency, January 2017.

⁵ <https://www.epa.gov/scram>



NAAQS analysis. This option is discussed in more detail in Section 5.7. The Class II increment modeling conservatively assumes 100% conversion of NO_x to NO₂.

The default rural dispersion coefficients in the model were used. This is supported by the Land Use Procedure consistent with subsection 7.2.1.1 of the Guideline and Section 5.1 of the AERMOD Implementation Guide.^{6,7} The USGS 2021 National Land Cover Database (NLCD) Land Cover Data within 3 km of the site were converted to Auer 1978 land use types. NLCD Categories 23 and 24, were considered as urban.⁸ It was determined that the land use in the vicinity of SPM is predominantly rural (22% of the area is classified as urban - Figure 3). A spreadsheet providing the results of the landuse analysis is provided with the modeling input and output files electronically. The potential for urban heat island effects, which are regional in character, was considered and determined not to be of concern.

⁶ *Guideline on Air Quality Models*, Appendix W to 40 CFR Part 51, U.S. Environmental Protection Agency, January 2017.

⁷ *AERMOD Implementation Guide*, EPA-454-B-23-009, October 12, 2023.

⁸ Auer, Jr., A.H. "Correlation of Land Use and Cover with Meteorological Anomalies." *Journal of Applied Meteorology*, 17:636-643, 1978.

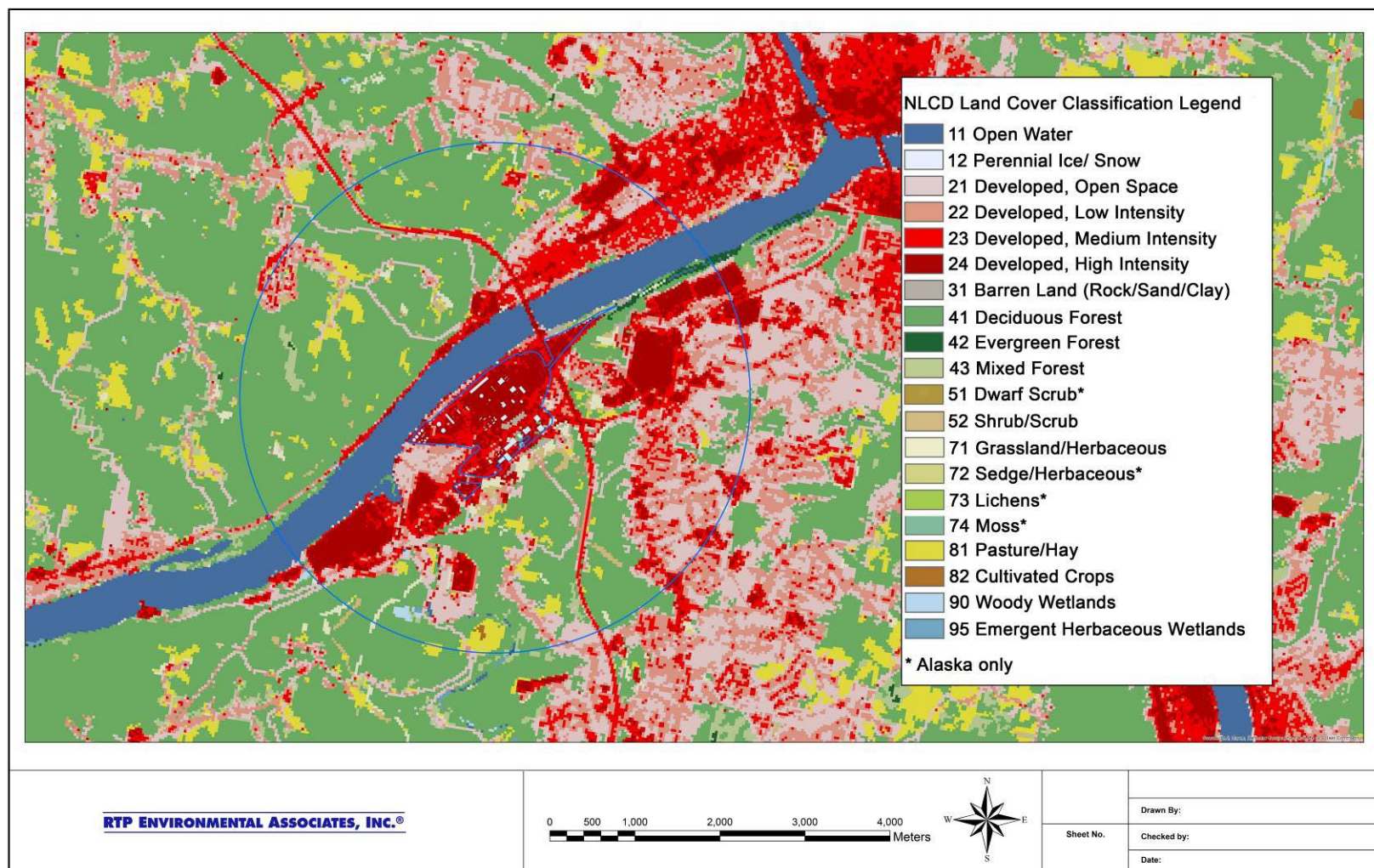


Figure 3. Land Use within Three Kilometers of SPM (Three Kilometer Radius Circle Shown in Blue)



4.3 Source and Monitoring Data

Point Sources and Flares

Most emission sources at SPM vent to stacks with a well defined opening. These sources were modeled as point sources in AERMOD. In addition, there are several flares at the facility: two totally enclosed ground flares (TEGFs), an elevated high pressure candlestick flare, and a multipoint ground flare (MPGF). Some flaring events will only occur during periods of malfunction. Malfunction emissions are not required to be modeled per Appendix W Section 8.2.2(d).⁹ The flares are also used for startup or shutdown (i.e., non-emergency flaring), which is considered in short-term modeled emission rates. The flares have been modeled using the procedures outlined below as presented in Section 2.1.2 of the AERSCREEN User's Guide.¹⁰

The effective flare diameter (D , in meters) and height (h_{eff} , in meters) for each flare were computed as a function of heat release rate according to the following equations, where HR is the heat release rate of the flare in calories per second, HL is the heat loss fraction, and H_s is the physical height of the flare in meters:

$$D = 9.88 \times 10^{-4} \times \sqrt{HR \times (1 - HL)}$$

$$h_{eff} = H_s + 4.56 \times 10^{-3} \times HR^{0.478}$$

The MPGF was represented by one flare stack. The effective flare diameter and height for an individual flare was used for the representative flare stack and was calculated using the equivalent individual heat release rate, which was estimated as the total heat release rate (99 MMBtu/hr) divided by the total number of flare heads (38).

An exit temperature of 1273 Kelvin (K) and velocity of 20 meters per second (m/s) were assumed for all flares, consistent with the AERSCREEN default values.¹¹

⁹ *Guideline on Air Quality Models*, Appendix W to 40 CFR Part 51, U.S. Environmental Protection Agency, January 2017.

¹⁰ *AERSCREEN User's Guide*, EPA-454/B-21-005, April 2021.

¹¹ *Ibid.*



Volume Sources

Haul roads were modeled pursuant to procedures adopted by the EPA Haul Road Workgroup as outlined in the six steps below:¹²

Step 1: The adjusted width of the “road” was calculated as the actual road width plus 6 meters. The additional width represents turbulence caused by the vehicle as it moves along the road.

Step 2: The number of volume sources was calculated by dividing the length of the road by the adjusted width. This was the maximum number of volume sources modeled.

Step 3: The height of the volume was set equal to 1.7 times the height of the vehicle generating the emissions.

Step 4: The initial horizontal sigma for each volume was calculated by dividing the adjusted width by 2.15.

Step 5: The initial vertical sigma was calculated by dividing the height of the volume determined in Step 3 by 2.15.

Step 6: The release point height was calculated as the height of the volume determined in Step 3 divided by two. This point is in the center of the volume.

All source locations were based upon a NAD83, UTM Zone 17 projection. Source elevations were determined from facility survey data, not using AERMAP.

Good Engineering Practice Stack Height Analysis

A Good Engineering Practice (GEP) stack height evaluation was conducted to determine the direction-specific building dimensions to include in the model. Since flares are not subject to the GEP regulations, there is no requirement to calculate the GEP formula stack height for flares. The formula height is used to justify stack height credit for stacks constructed in excess of 65 m. Procedures used were in accordance

¹² *Haul Road Workgroup Final Report*, EPA Region 5, December 6, 2011.



with those described in the EPA Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations-Revised).¹³ GEP formula stack height, as defined in 40 CFR 51, is expressed as $GEP = H_b + 1.5L$, where H_b is the building height and L is the lesser of the building height or maximum projected width. Point source and building/structure locations were determined from a facility plot plan. The locations and heights were input to the EPA's Building Profile Input Program (BPIP-PRIME) computer program to calculate the direction-specific building dimensions needed for AERMOD. A three dimensional rendering of the facility is shown in Figure 4 and a plot plan for SPM is shown in Figure 5. Downwash parameters for all point sources were included in the model runs.

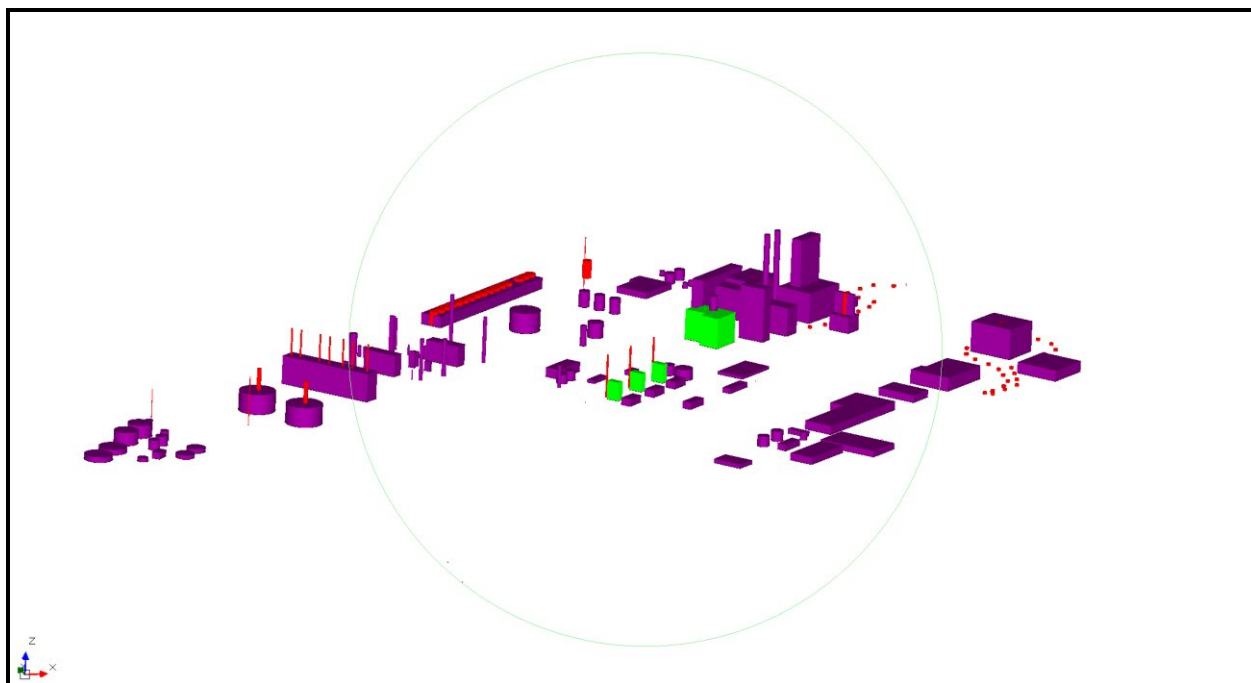


Figure 4. SPM Three-Dimensional Plot Plan (View from SW)

¹³ *Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document for Stack Height Regulations (Revised))*. EPA-450/4-80-023R, U.S. Environmental Protection Agency, June 1985.



RTP ENVIRONMENTAL ASSOCIATES, INC.®

0 160 320 640 960 1,280 Meters



Sheet No.

Drawn By:

Checked by:

Date:

Figure 5. SPM Plot Plan



Monitored Background Data

Ambient, background pollutant concentrations of PM_{2.5}, PM₁₀, NO₂, O₃, and CO are needed to establish a representative background concentration to fulfill the PSD pre-construction monitoring requirements and/or to establish background concentrations for use in the NAAQS analysis. In the NAAQS analysis, the O₃ background concentrations are used in the PVMRM analysis and the PM₁₀, NO₂, and CO background concentrations are added to the modeled concentrations to assess NAAQS compliance.

There are two ambient monitors in the vicinity (within 10 km) of SPM (Figure 6). The Brighton Township monitor, on Sebring Road (AQS #42-007-0005), is located across the river from SPM to the north. However, only SO₂ and O₃ are monitored at this location. The second monitor is located in Beaver Falls (AQS #42-007-0014). PM₁₀, PM_{2.5}, NO₂, O₃, and SO₂ are monitored at this location. There are no CO monitors in Beaver County (Please note that CO was historically monitored at the Beaver Falls site; however, the CO monitor was deactivated in 2008). The nearest CO monitor is the Lawrenceville monitor in Allegheny County (AQS# 42-003-0008).

The most recently available, quality assured data (2020-2022) from the Beaver Falls monitor provided by PADEP were used to establish representative PM₁₀ and NO₂ background concentrations for SPM and to satisfy the preconstruction monitoring requirements under 40 CFR 52.21(m)(1) for PM_{2.5}. The hourly data from 2018-2022 from the Brighton Township (a.k.a. Sebring) monitor was used for O₃, as hourly O₃ values are needed in the PVMRM analysis to allow for the model to convert NO_x to NO₂, as discussed in Section 5.7. The 2020-2022 CO data from the Lawrenceville monitor was used. The existing monitoring data satisfy the criteria provided in EPA's Ambient Monitoring Guidelines as being representative of the ambient air quality in the vicinity of SPM.¹⁴ PADEP has approved use of data from these monitors in previous PSD air dispersion modeling analyses conducted by Shell.

¹⁴ *Ambient Monitoring Guidelines for Prevention of Significant Deterioration*, EPA-450/4-87-007, USEPA, May 1987.



Monitor Location

The Beaver Falls and Brighton Township monitors are located less than 9 km from SPM. The Brighton monitor is located across the river from the site. These monitors best represent background concentrations in the modeling domain as they are the closest monitors with data for the pollutants of concern in the vicinity of SPM. The Beaver Falls monitor is also located in an adjacent river valley, absent the influence of any major, localized industry. These are the closest monitors to SPM that monitor the pollutants of concern (Figure 6). The Lawrenceville CO monitor is the closest CO monitor to the facility and, since it is located in a more urban setting, should provide a conservative over-estimate of CO concentrations near SPM.

Data Quality

The data were collected and quality assured by PADEP. PADEP has submitted a certification letter to EPA and EPA has no unresolved reservations about data quality after reviewing the letter. At the time of this writing, EPA has yet to respond to the certification letter regarding the PM_{2.5} data for 2020 and 2022; however the data has been certified by PADEP.

Currentness of Data

The data were collected during 2020-2022, which represents the most recent quality assured PADEP certified data available for use in assessing compliance with the NAAQS and preconstruction monitoring requirements.



RTP Environmental Associates, Inc.

0 250 1,100 2,200 3,300 4,400
Meters



Sheet No.
Double-Click to
Add Map Number

Drawn By:

Checked by:

Date:

Figure 6. Ambient Air Quality Monitors in the Vicinity of SPM



Monitor Data Usage

Except for the 1-hr NO₂ NAAQS assessment, and as suggested by PADEP, the maximum monitored value (from 2020-2022) for each averaging time was added to the modeled concentration to assess NAAQS compliance (See Table 1). Use of the maximum monitored value in lieu of the monitored design value is conservative. A range of monitored background NO₂ values that consider seasonal and diurnal variation was used to assess compliance with the 1-hr NO₂ NAAQS. These seasonal values are presented in Table 2 and reflect the three-year average (2020-2022) of the 98th percentile value by hour of day and by season. These seasonal NO₂ values were added to the modeled concentrations within AERMOD. All other monitored concentrations were added to the modeled concentrations external to the model prior to comparison to the NAAQS.

Table 1. Existing Air Quality and Background Concentrations

Pollutant	Averaging Time	Maximum Monitored Value (2020-2022) (µg/m ³)	Monitor Site Location
PM _{2.5}	24-hour	21.9	Beaver Falls
	Annual	8.6	
PM ₁₀	24-hour	66.0	
NO ₂	Annual	16.1	
CO	1-hour	2,648	Lawrenceville
	8-hour	1,602	

Note, modeled impacts from the EMACT project are less than the PM_{2.5} SILs. As such, a NAAQS analysis was not required.

**Table 2. Beaver Falls 98% Hourly NO₂ (ppb) By Season and Hour of Day**

Model Ending Hour	Winter	Spring	Summer	Fall
01	32.2	28.1	18.6	25.9
02	32.3	28.7	17.5	24.6
03	31.4	31.9	21.6	25.8
04	31.8	31.8	20.2	24.2
05	32.3	29.5	19.9	25.0
06	31.2	31.6	19.8	23.7
07	34.1	31.2	18.6	22.3
08	33.7	30.4	18.8	23.0
09	34.5	28.8	16.0	23.8
10	32.6	28.2	14.1	25.4
11	32.5	21.2	9.1	26.9
12	31.0	15.8	6.3	21.5
13	24.2	11.9	5.9	15.6
14	24.3	9.9	5.5	12.5
15	23.3	7.9	5.3	12.5
16	24.3	8.8	5.4	13.5
17	25.7	8.4	5.0	15.9
18	28.3	10.1	5.8	24.4
19	30.0	14.8	10.3	24.0
20	30.4	20.2	13.0	26.1
21	31.7	20.2	14.1	27.6
22	31.7	24.7	14.9	27.9
23	33.0	28.1	18.1	25.7
24	33.1	26.3	18.5	25.9

4.4 Receptor Data

Modeled receptors were placed in all areas considered "ambient air" pursuant to 40 CFR 50.1(e) and the EPA's December 2, 2019 "Revised Policy on Exclusions from Ambient Air".¹⁵ Ambient air is defined as that portion of the atmosphere, external to buildings, to which the general public has access. There is a fence which precludes public access to the entire SPM property. The fencing is placed around the entire facility perimeter as well as along each side of the railroad track that transects the facility. Entrances are secured by gate with cameras and remote-controlled access for

¹⁵ *Revised Policy on Exclusions from "Ambient Air"*, memorandum from Andrew Wheeler to Regional Administrators, EPA, December 2, 2019.



truck deliveries. Gate, guard shack, and cameras are used for contractor and personnel vehicle entrances. In addition, security maintains a 24/7 presence on-site to ensure that unauthorized public access is not permitted.

Approximately 25,000 receptors were used in the AERMOD significant impacts analyses. The receptor grid consists of four cartesian grids and receptors spaced at 25 m intervals along the facility fenceline and the railroad that transects the facility. The first cartesian grid extends to approximately 1 km from the fence in all directions. Receptors in this region were spaced at 50 m intervals. The second grid extends to 3 km. Receptor spacing in this region is 100 m. The third grid extends to 10 km with a spacing of 500 m. The fourth grid extends to 50 km with a receptor spacing of 1,000 m. Receptors with flagpole elevations were also placed along the Highway 376 bridge east of the facility. The receptor grid was designed such that maximum facility impacts fall within the 50 m spaced receptors. The receptor grid spacing is presented in Table 3.

Table 3. Receptor Grid Spacing

Receptor Spacing (m)	Distance from Facility Fence (m)
50	1,000
100	3,000
500	10,000
1,000	50,000

SPM is located in western Pennsylvania. Terrain within 10 km of the site is gently rolling; however, there is terrain in excess of stack top elevation. Receptor elevations and hill height scale factors were calculated with AERMAP (18081). The elevation data were obtained from the USGS 1/3 arc second Three-Dimensional Elevation Program (3DEP) data obtained from the National Map from the USGS. Locations were based upon a NAD83, UTM Zone 17 projection. The near-field receptor grid is presented in Figure 7. Note, only those receptors that exceeded the respective SILs were included in the NAAQS and increment runs.

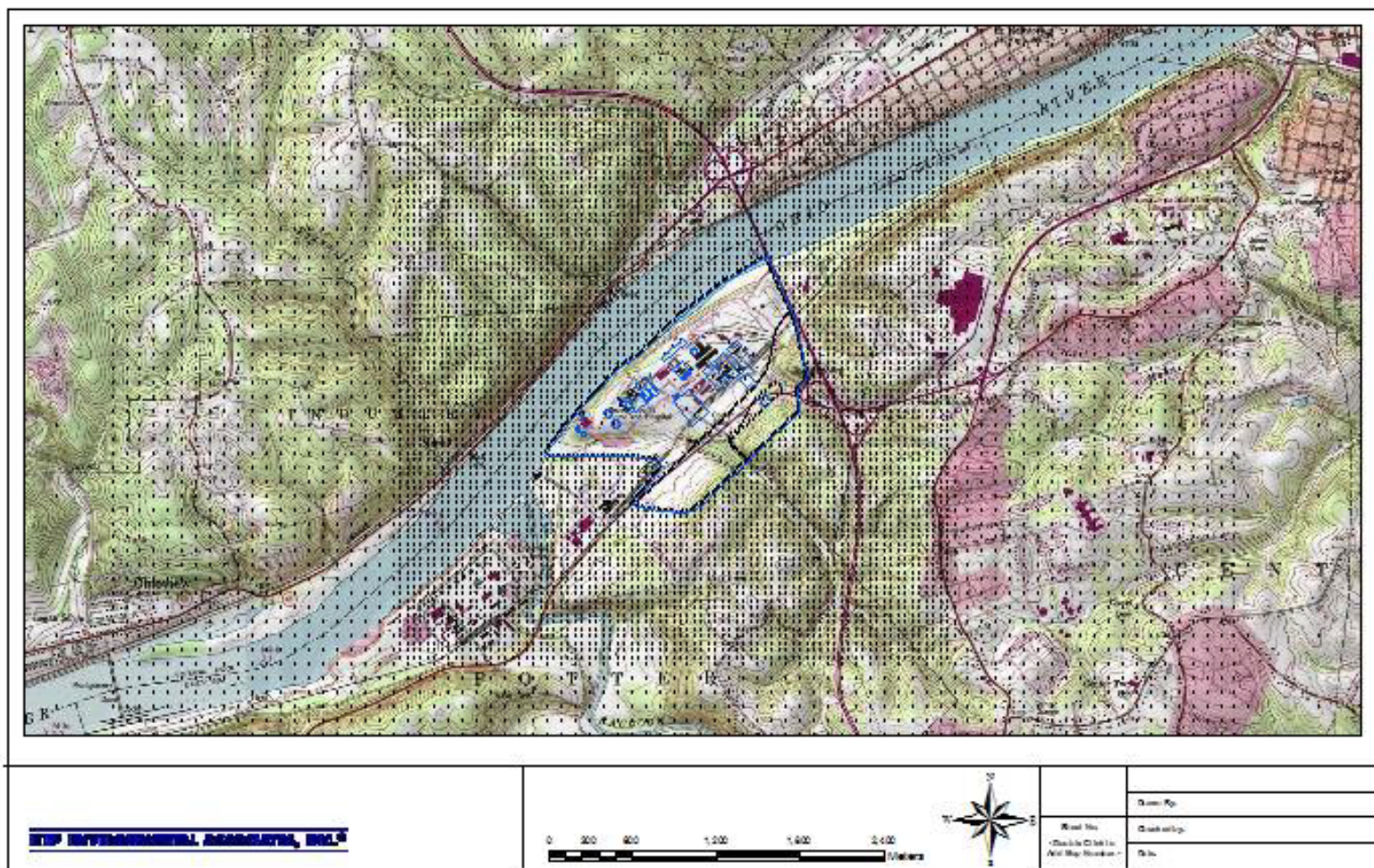


Figure 7. SPM Near-field Receptor Grid



4.5 Meteorological Data

Data Selection and Representativeness

The 2018-2022, 5-year sequential hourly primary surface meteorological data collected at the Vistra Beaver Valley Nuclear Generating Station (Beaver Valley) and supplemental surface and upper air data from the Pittsburgh International Airport (KPIT, WBAN 94823) were used in the analysis. The Vistra surface data were collected as part of a continuous data collection program required by the U.S. Nuclear Regulatory Commission (NRC). For reasons discussed below, the meteorological data adequately represent atmospheric boundary layer conditions within the SPM analysis domain for AERMOD to properly characterize the transport and dispersion of the plumes from SPM. A profile base elevation of 228.6 m (750 feet) was employed which corresponds to the base elevation of the Beaver Valley tower.

The Vistra station is located approximately 8 km downstream of SPM, also on the Ohio River. The Beaver Valley meteorological station and SPM site also share a similar orientation in relation to the Ohio River (Figure 8). The river flows from the northeast to southwest relative to both the SPM site and the Beaver Valley meteorological station. The topography is also similar at each location. The wind patterns are therefore expected to be similar at each location. Wind speed and direction are measured at three levels at the Beaver Valley station (10.7 m, 45.7 m, and 152.4 m) (See the wind roses for each level in Figure 9). Temperature is also measured at the 10.7 m level. These three levels provide adequate representation of plume behavior at the various release heights to be seen at SPM.

The Pittsburgh International Airport meteorological tower is located approximately 21 km southeast of the facility. Station pressure, cloud cover, and twice daily sounding data from Pittsburgh were used. These meteorological parameters are of synoptic scale and are adequately representative of the Beaver Valley area. Upper air data are also collected in Pittsburgh (Figure 8).



According to the EPA AERMOD Implementation Guide, the surface characteristics should be similar for the meteorological station and the study site.¹⁶ A comparison was made of the surface characteristics at the Vistra Energy station and SPM. The AERSURFACE program (20060) was run to determine the characteristics for comparison. The results of the albedo and Bowen ratio comparison by month are shown in Figure 10. The surface roughness comparison, by season, are shown in Figure 11. As can be seen, the surface characteristics values for the two sites, when compared on a monthly and seasonal and sector basis, are similar, especially considering the overall range in potential roughness values from 0 to 1.3 m.

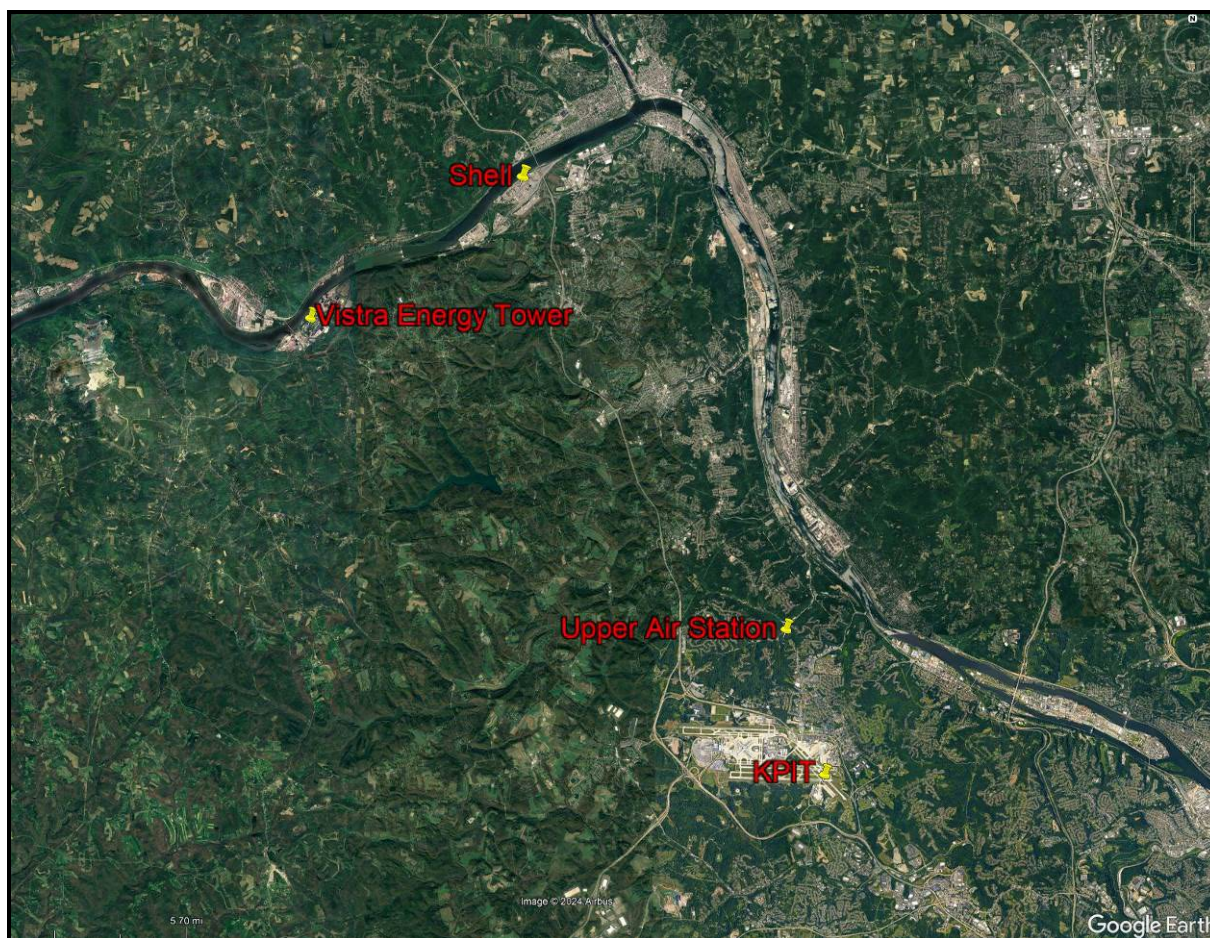


Figure 8. Vistra Meteorological Tower and Pittsburgh Surface and Upper Air Station Locations Relative to SPM

¹⁶ AERMOD Implementation Guide, EPA-454-B-23-009, October 12, 2023.

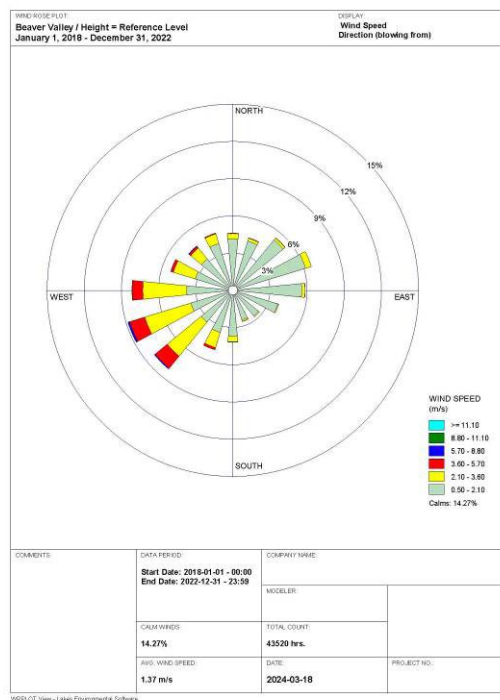
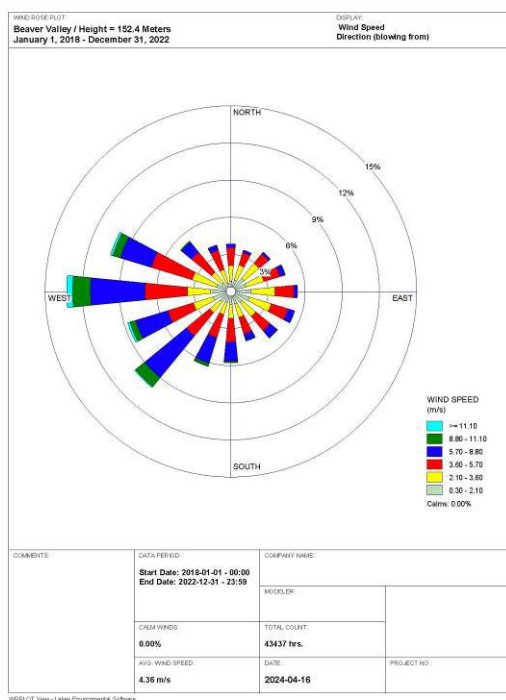
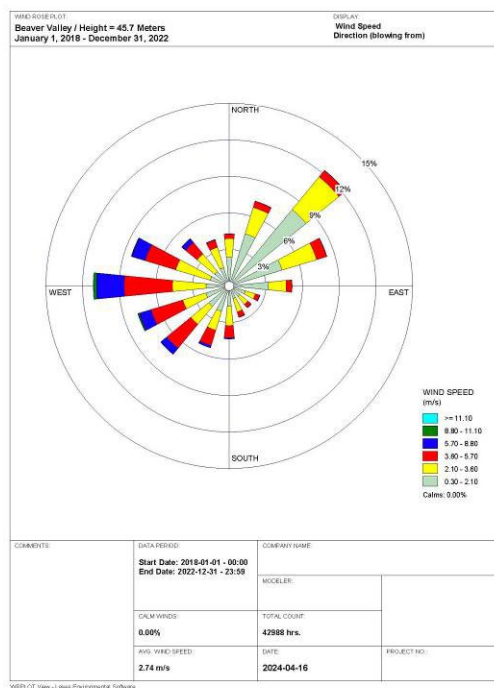
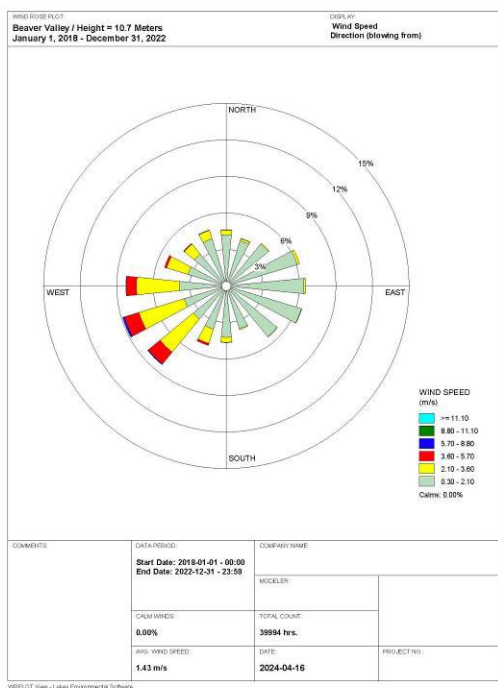


Figure 9. Beaver Valley Windrose 2018-2022

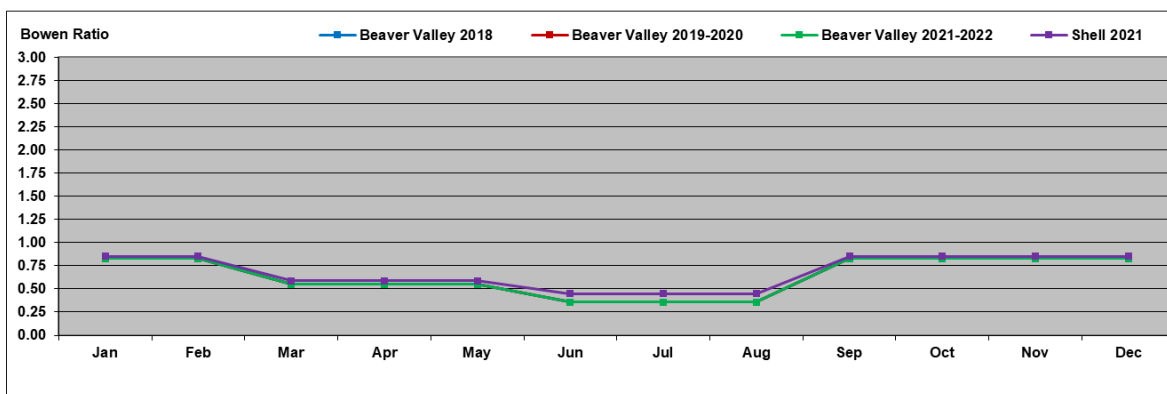
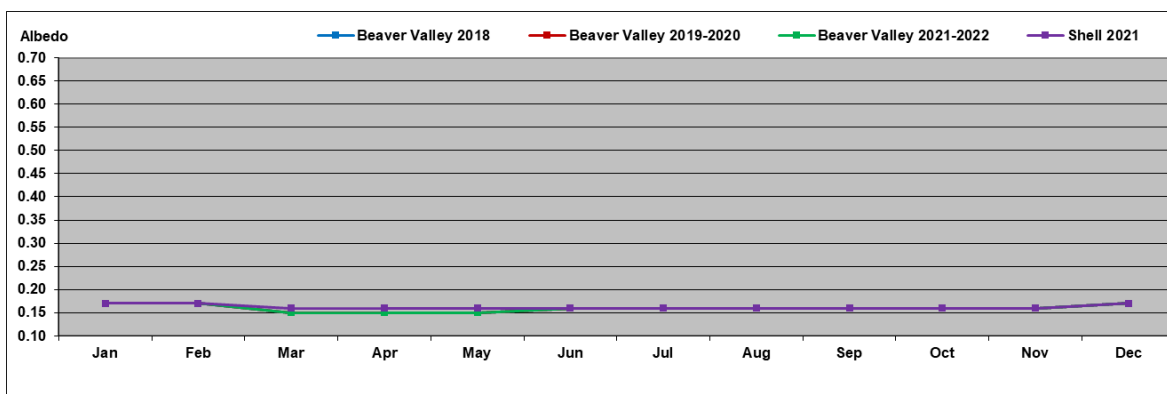


Figure 10. Albedo and Bowen Ratio Comparison Results

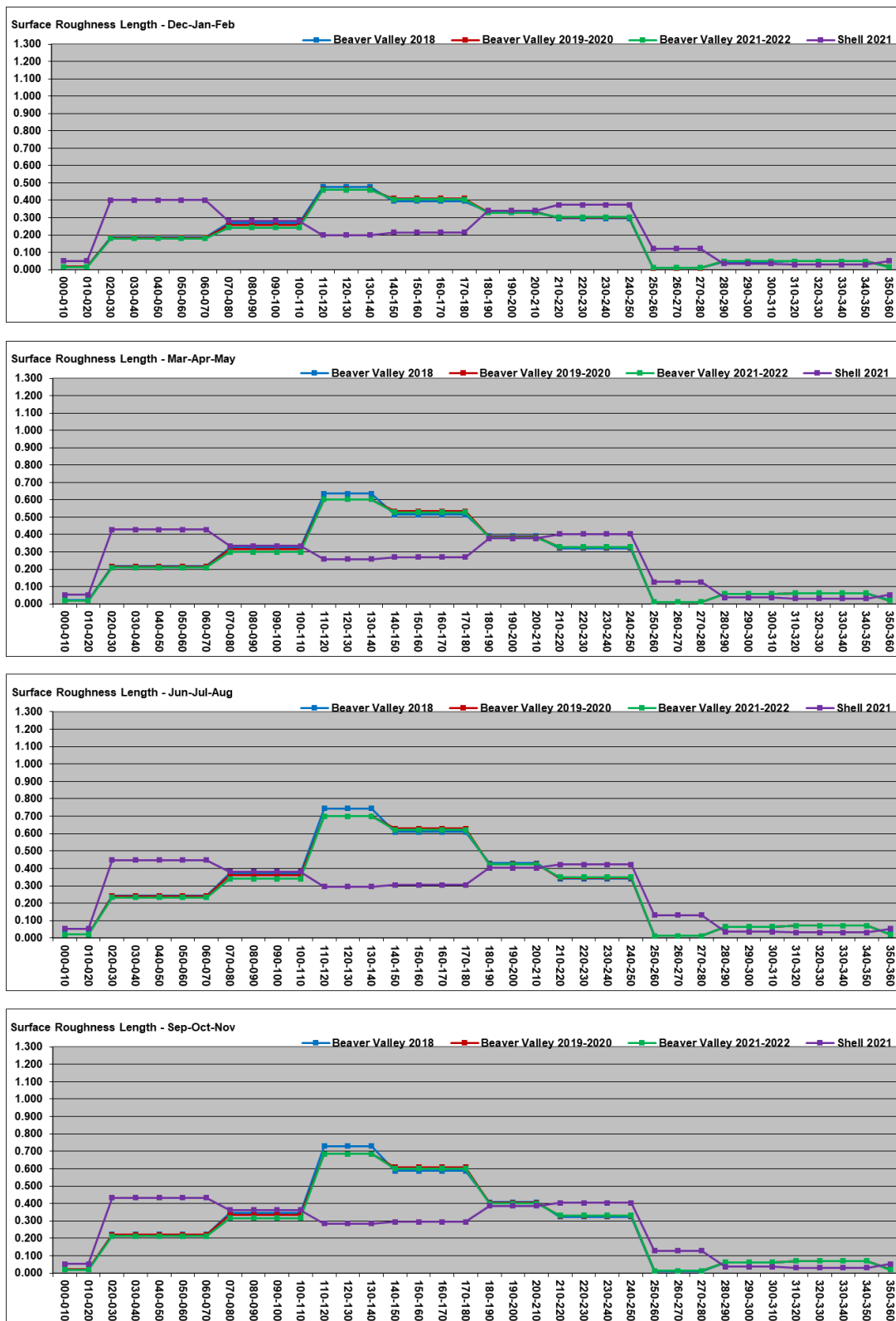


Figure 11. Surface Roughness Comparison Results



Data Processing

The meteorological data were provided to RTP Environmental by PADEP. PADEP processed the Beaver Valley surface data, Pittsburgh International Airport (KPIT) surface data, and KPIT upper air data using the meteorological preprocessor AERMET (Ver. 23132). In AERMET Stage 1, KPIT surface meteorological data in the Integrated Surface Data (ISD) format were extracted. KPIT upper air meteorological data in the Forecast Systems Laboratory (FSL) format were also extracted.

Also, the MODIFY keyword was entered to fill missing temperatures in the upper air data with interpolated values. In AERMET Stage 2, values of the surface characteristics (noon-time albedo, Bowen ratio, and surface roughness length) representative of the Beaver Valley surface meteorological site were entered. These surface characteristics values were calculated by AERSURFACE (Ver. 20060) using USGS National Land Cover Database (NLCD) land cover, impervious surface, tree canopy cover data for 2016, 2019 and 2021.¹⁷ The following options were selected in AERSURFACE: default 1-km radius and ten user-defined sectors defined as non-airport for the surface roughness length study area, the default method for determining surface roughness length (ZORAD), monthly temporal resolution with default season assignment, and non-arid region. AERSURFACE was executed for each surface moisture condition (average, dry, and wet), assuming both no continuous snow cover and continuous snow cover during the winter (i.e., AERSURFACE was executed six times). AERMET Stage 2 was then executed for each set of surface characteristics to produce six surface (.sfc) files. The final AERMET surface file was assembled by month based on actual estimates of surface moisture condition and snow cover during the meteorological data period. Estimates of surface moisture condition were based on precipitation data for Pennsylvania Climate Division 9. Snow cover was based on National Centers for Environmental Information (NCEI) Local Climatological Data from KPIT.

¹⁷ 2016 NLCD data was used for processing meteorological data from 2018, 2019 NLCD data was used for processing meteorological data from years 2019 and 2020, and 2021 NLCD data was used for processing meteorological data from years 2021 and 2022.



5.0 MODELING METHODOLOGY

5.1 Pollutants Modeled

As previously discussed, this air quality modeling analysis served two purposes. Firstly, it evaluated the air quality impacts of the NSR pollutants emitted in excess of the PSD significant emission rates (SER) due to the EMACT Project. These pollutants, which include NO_x and CO, are therefore subject to PSD review. Since NO_x emissions exceed the SER, Shell has also evaluated emissions of PM_{2.5} as required under 40 CFR 52.21. Only the two TEGFs are affected by the proposed EMACT Project. Therefore, these are the only two sources that were included in the EMACT significance modeling.

The second purpose of the analysis is to evaluate the air quality impacts associated with the Plan Approval Reconciliations and WWTP Permanent Controls Project. As previously discussed, Shell has retrospectively evaluated the Plan Approval Reconciliations and WWTP Permanent Controls Project together as part of the initial construction of SPM because these changes are related to the facility's initial construction since they represent as-built changes to the facility's initial construction plan approval and necessary improvements to the initial design and construction of the facility's WWTP, respectively. A separate SIL analysis was performed which addresses only these as-built changes (i.e., proposed facility-wide potential emissions minus the emissions increases associated with the EMACT Project); however, the as-built cumulative modeling also includes the emissions increases associated with the EMACT Project. As detailed in Section 2, the pollutants evaluated in this analysis are limited to those that triggered PSD review due to the initial construction of the facility including PM₁₀, NO_x, and CO. PM_{2.5} was not a regulated PSD pollutant at that time as the area was designated as PM_{2.5} nonattainment.

5.2 Turbine Load/Operating Conditions

The combustion turbines occasionally operate at a reduced load. Therefore, a range of load conditions and operating modes representing potential unit operation were evaluated to identify the condition which results in the worst-case impact for each



averaging period of concern. Three load conditions were evaluated for each turbine: 100%, 75%, and 45%. A unit (i.e., 1 lb/hr) emission rate was assumed to represent the 100% load condition for each turbine. The emissions and flows for the other loads and operating modes were scaled from the 100% load condition. The condition resulting in the worst-case impacts (i.e., 100% load) was carried forward in the SIL, NAAQS, and increment analyses. The results of the load analysis are presented in Section 6.1. Note, CO emissions are significantly higher during startup. As such, the maximum hourly emission rate, which occurs during startup, was conservatively modeled for all three turbines for 1-hour and 8-hour CO despite the fact that all three turbines are not started up simultaneously and startup does not last for 8 hours.

5.3 Furnace Modes and Worst-Case Operating Conditions

The furnaces also have different modes of operation. The modes of operation include: maximum normal, minimum normal, decoking, feed in/feed out, hot steam standby, and startup/shutdown. Normal furnace operation ranges from 100% of the furnace feed rate to 50% of the furnace feed rate. Both the maximum and minimum of the range of normal operation were evaluated. Furnace emissions are highest during normal operation for all pollutants except CO. Per Condition # 007 in Section E of PA-04-00740C, hourly NO_x emissions from the furnaces are limited to 6.2 lb/hr, except two furnaces are authorized by Condition # 009 to operate simultaneously at a higher rate. Note, the maximum non-startup/shutdown hourly emission rate for the furnaces is 9.3 lb/hr and occurs during normal operation (refer to the potential emissions calculations included in the plan approval application). Pursuant to the March 1, 2011 EPA guidance on treatment of intermittent emissions, start-up/shutdown was not modeled for 1-hour NO₂ as this mode is intermittent based on the frequency of occurrence and duration of events and will not contribute to an exceedance of the 1-hour NO₂ NAAQS.¹⁸

Since the furnace exhaust gas temperatures and velocities vary by mode, it was necessary to determine the mode of operation that results in worst-case impacts. Each

¹⁸ U.S. EPA, *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO₂ National Ambient Air Quality Standard*, March 1, 2011.



furnace operating mode was modeled for each pollutant/averaging period with corresponding emission rates and exhaust characteristics. The mode of operation with the worst-case modeled impacts for that pollutant/averaging period was then used in the SIL, NAAQS, and increment analyses. Note, all modes of operation, except for normal operation modes, occur infrequently (between 1 and 12 times per year) and only for short durations (between 2 to 60 hours per event). As such, all annual modeling analyses were based on maximum normal operation which, as shown in Table 9, is also worst-case for the annual averaging period for both NO₂ and PM₁₀.

CO emissions are significantly higher during decoking. In addition, as stated above, two furnaces are authorized to operate simultaneously at an elevated NO_x emission rate. It was therefore also necessary to identify furnaces with worst-case short-term impacts during decoking and elevated NO_x emissions. For this worst-case determination, each furnace was modeled with a unit emission rate. The two furnaces that generated the worst-case impacts were assigned the corresponding worst-case operating mode for the CO and 1-hour NO₂ runs. The results of the worst-case furnace operating mode analysis and worst-case furnace analysis are presented in Section 6.2.

5.4 Significant Impact Analysis

The criteria pollutant air quality analysis was conducted in two phases: an initial or significant impact analysis, and a cumulative impact analysis including both an increment and NAAQS analysis. As previously described, two separate significant impact analyses were conducted: one for the proposed EMACT Project and one for the Plan Approval Reconciliations and WWTP Permanent Controls Project. In the significant impacts analyses, the calculated maximum impacts resulting from the EMACT Project and the Plan Approval Reconciliations and WWTP Permanent Controls Project were determined. These impacts determined the net change in air quality resulting from each project. The maximum modeled concentration from across the five individual years of meteorological data were compared to the pollutant-specific significance levels for each pollutant and averaging time except for 1-hr NO₂. The maximum five-year average was used to assess significance for 1-hr NO₂ impacts.



Normally, for PM_{2.5}, the maximum five-year average concentration is used to assess significance for the NAAQS and the maximum concentration over all five years is used to assess significance for the increment. To avoid two separate PM_{2.5} SIL analyses, the maximum PM_{2.5} impacts from across the five individual years were used for comparison to the SILs.

The PM_{2.5} SILs were vacated on January 22, 2013; however, the court decision did not preclude the use of SILs for PM_{2.5} but required that EPA correct errors in the regulations for PM_{2.5}.¹⁹ EPA has advised that permitting authorities may continue to apply SILs for PM_{2.5} but must ensure their use is consistent with the requirements of Section 165(a)(3) of the Clean Air Act (CAA). In response to the promulgation of the revised annual PM_{2.5} NAAQS, on April 30, 2024, EPA released "Supplement to the Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program", which establishes a revised PM_{2.5} annual SIL of 0.13 µg/m³.²⁰ EPA did not recommend any changes to the 24-hour PM_{2.5} SIL. The most recent EPA recommended PM_{2.5} SILs were used for this analysis. In the 2018 SILs guidance and accompanying documents, EPA provides the necessary policy, technical, and legal analyses that permitting authorities may choose to adopt in supporting the use of the SILs.^{21,22,23}

Pollutants with impacts that exceed their respective SILs were included in both the NAAQS and increment analyses. In these latter analyses, the cumulative impacts from SPM and other nearby sources were assessed. For the NAAQS compliance demonstration, a regional background concentration was also added to the modeled concentrations to capture the impact of sources not explicitly modeled (e.g., mobile sources, natural background, etc.). The resultant total concentrations were compared

¹⁹ *Sierra Club v. EPA*, 705 F.3d 458, 463-66 (D.C. Cir. 2013).

²⁰ *Supplement to the Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program*, memorandum from Richard Wayland to Regional Air Directors, April 30, 2024.

²¹ *Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program*, Peter Tsirigotis, OAQPS. April 17, 2018.

²² *Technical Basis for the EPA's Development of the Significant Impact Thresholds for PM_{2.5} and Ozone*, EPA-454/R-18-001, April 2018.

²³ *Legal Memorandum: Application of Significant Impact Levels in the Air Quality Demonstration for Prevention of Significant Deterioration Permitting under the Clean Air Act*, April 2018.



to the NAAQS and increments to determine compliance. The PSD Class II SILs are listed in Table 4.

Five years of meteorological data were used in the significant impact analyses. The radius of the significant impact area (SIA), equal to the maximum distance from SPM at which a modeled concentration exceeds the SIL, was determined for each pollutant and averaging period. After the radius of the SIA is determined, the NAAQS and increment inventories were established using best professional judgment to identify and select nearby sources to explicitly model. As discussed further in Section 5.8, the off-site inventory was developed by PADEP and provided to RTP for use in these analyses.

Table 4. PSD Class II Significant Impact Levels

Pollutant	Averaging Time	PSD Class II Significant Impact Levels ($\mu\text{g}/\text{m}^3$)^a
PM _{2.5}	24-hour	1.2
	Annual	0.13
NO ₂	1-hour	7.5 ^b
	Annual	1.0
CO	1-hour	2,000
	8-hour	500

^a EPA recommends that the PM_{2.5} SIL values apply to the NAAQS everywhere, regardless of the class of the airshed.²⁴ The PADEP is following this guidance for PM_{2.5} as well as other pollutants. The difference between Beaver Falls background values and the NAAQS were evaluated and determined to be greater than the SILs (Please compare Tables 1 and 4).

^b Please note that there is no 1-hr NO₂ SIL promulgated at 40 CFR 51.165. Consistent with the June 28, 2010 EPA Policy Memorandum from Anna Marie Wood to the Regional Air Directors, an interim 1-hr NO₂ SIL of 4 ppb (7.5 $\mu\text{g}/\text{m}^3$) is suggested for use by the PADEP.

5.5 Preconstruction Monitoring

Pursuant to 40 CFR 52.21(i)(5), as adopted at 25 Pa. Code Chapter 127, Subchapter D, requirements for preconstruction ambient monitoring may be waived by the permitting authority if projected increases in ambient concentrations due to the project are less than the Significant Monitoring Concentrations (“SMC”) (Table 5). However, in light of the decision of the D.C. Circuit Court of Appeals *Sierra Club v. EPA* in 2013, Shell has

²⁴ *Supplement to the Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program*, memorandum from Richard Wayland to Regional Air Directors, April 30, 2024.



elected not to request such a waiver.²⁵ If an applicant can demonstrate that existing monitoring data is representative of the project site, this can be used in lieu of conducting preconstruction monitoring. Shell has elected to use existing ambient data in lieu of preconstruction monitoring data and this approach has previously been approved by PADEP for SPM. As discussed in detail in Section 4.3, existing monitors have previously been determined to be representative of the area surrounding SPM.

Table 5. PSD Preconstruction Monitoring Exemption Levels

Pollutant	Averaging Time	Significant Monitoring Concentrations (µg/m³)
CO	8-hour	575
NO ₂	Annual	14
PM ₁₀	24-hour	10
PM _{2.5}	24-hour, Annual	0

5.6 Secondary PM_{2.5} Analyses

On July 29, 2022, EPA issued its final guidance for ozone and fine particulate matter modeling.²⁶ An update was subsequently issued in April 2024 to address the updates to recommended PM_{2.5} SILs.²⁷ The guidance addresses both primary and secondary PM_{2.5} impacts. Primary PM_{2.5} impact refers to the impacts due to direct emissions of PM_{2.5}. Secondary impacts refer to the PM_{2.5} impacts attributable to nitrates and sulfates formed due to potential precursor NO_x and SO₂ emissions. EPA outlines their recommended approaches for conducting PM_{2.5} air quality analyses for two assessment cases. The appropriate approach to use in each case depends on the magnitude of direct PM_{2.5} and precursor NO_x and SO₂ emissions. Under Assessment Case 1, the emissions increases of both direct PM_{2.5} and all precursor (i.e., NO_x and SO₂) emissions are below their respective SERs. Under Assessment Case 2, either the

²⁵ *Sierra Club v. EPA*, 705 F.3d 458 (D.C. Cir. 2013).

²⁶ U.S. EPA, *Guidance for Ozone and Fine Particulate Matter Permit Modeling*, EPA-454-R-22-005, July 29, 2022.

²⁷ *Supplement to the Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program*, memorandum from Richard Wayland to Regional Air Directors, April 30, 2024.



direct PM_{2.5} emissions increase is greater than or equal to the SER or the NO_x and/or SO₂ emissions increase is greater than the respective SER.

The proposed EMACT Project falls under Assessment Case 2, as the direct PM_{2.5} emissions increases are less than the SER, but the NO_x emissions increases exceed the SER. In this case, a PM_{2.5} compliance demonstration is required for the direct PM_{2.5} emissions using approved dispersion modeling techniques. The potential impact of the precursor emissions, both NO_x and SO₂, also requires evaluation.

Consistent with EPA's recommended approach for Assessment Case 2, the EMACT Project's direct PM_{2.5} emissions were evaluated using AERMOD and secondary PM_{2.5} concentrations resulting from the precursor NO_x and SO₂ emissions were estimated in accordance with EPA's recently revised MERPs guidance.²⁸ The EPA's "MERPs VIEW Qlik" site was queried for all of the 500 tpy hypothetical sources located in the Northeast and Ohio Valley Climate Zones.²⁹ To estimate the secondary PM_{2.5} concentrations for use in the Class II SIL analysis for the EMACT Project, the highest modeled NO_x and SO₂ concentrations across all stack heights (i.e., 10 and 90 m) were then divided by the 500 tpy modeled hypothetical source emission rate and multiplied by the project-related precursor NO_x and SO₂ emissions increases. This total secondary PM_{2.5} contribution from the precursor NO_x and SO₂ was then added to the modeled primary PM_{2.5} concentrations to determine whether the project impacts exceed the Class II SILs.

The MERPs VIEW Qlik tool also provides illustrative hypothetical single source modeled impacts of maximum daily average PM_{2.5} concentrations by distance from the source for use in Class I PSD compliance demonstrations. Similar to the Class II analysis, the MERPs VIEW Qlik tool was queried for all 500 tpy hypothetical sources located in the Northeast and Ohio Valley Climate Zones. The closest Class I area to SPM, Otter Creek Wilderness, is located approximately 189 km away. As such, the maximum concentrations across all stack heights at a distance of 180 km from the hypothetical source were obtained from MERPs View Qlik for use in the Class I SIL analysis for the

²⁸ *Clarification on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM_{2.5} under the PSD Permitting Program*, EPA-454-R-19-003, April 2024.

²⁹ <https://www.epa.gov/scram/merps-view-qlik>



EMACT Project. The NO_x and SO_2 concentrations were divided by the hypothetical source emission rate of 500 tpy and then multiplied by the project-related emissions increases in tpy. Calculated secondary $\text{PM}_{2.5}$ concentrations are summarized in Table 11.

As previously stated, impacts from the EMACT Project are below the Class I and II $\text{PM}_{2.5}$ SILs, and $\text{PM}_{2.5}$ modeling is not required for the Plan Approval Reconciliations and WWTP Permanent Controls Project because these changes are related to the facility's initial construction and the area was designated nonattainment for $\text{PM}_{2.5}$ at the time of the original PSD permitting for the facility. As such, modeling is not required to assess compliance with the $\text{PM}_{2.5}$ NAAQS and increments for either project.

5.7 NO_2 Analyses

The SIL modeling employed the Tier 2 Ambient Ratio Method (ARM2) with the EPA recommended minimum and maximum ambient NO_2/NO_x ratios of 0.5 and 0.9, respectively. Tier 3 (discussed below) was used to assess 1-hr NO_2 NAAQS compliance. Tier 3 accounts for the chemical reactions that convert NO_x to NO_2 in the presence of ozone. 100% NO_x to NO_2 conversion was conservatively assumed in assessing compliance with the annual NAAQS and increment.

Tier 3 Option

There are two regulatory non-default Tier 3 methods currently available in AERMOD for simulating the conversion of NO_x to NO_2 : the Ozone Limiting Method (OLM) and the Plume Volume Molar Ratio Method (PVMRM). Shell employed PVMRM. The EPA's conservative, default NO_2/NO_x in-stack ratio of 0.50 was used for all sources located within 3 km of SPM. An in-stack ratio of 0.2 was used for more distant sources.

Use of the Tier 3 PVMRM modeling approach requires an understanding of ozone concentrations in the project area. The AERMOD model uses either a single representative background ozone value for all hours of simulation or varying hourly background ozone data as collected from representative ozone monitors.



Hourly background ozone data was obtained from the Brighton Township ozone monitor (AQS # 42-007-0005), located 1.6 miles to the northwest, for the years 2018-2022. This monitor operated year-round from 2018-2020. In 2021 it was operated from January through October. During 2022 it was only operated during the ozone season (March-October). Therefore, a suitable year-round monitor was needed to substitute data for the missing periods.

The closest year-round monitor that is at an elevation similar to Brighton is the South Fayette monitor (AQD # 42-003-0067), located 22 miles to the south-southeast. Three other nearby monitors, including Harrison Township, Beaver Falls, and Lawrenceville were also considered. The data from these four monitors were compared with the Brighton Township site. Figure 12 displays scatter plots of hourly ozone levels, paired in time, at Brighton Township versus those at the other sites. A simple linear regression was applied to each pair of sites to analyze their linear relationship. Among the four sites, the South Fayette site exhibited the best linear relationship with the Brighton Township site, showing the highest R^2 value of 0.81 and a slope of 0.8894. Consequently, the South Fayette site was selected to substitute for the missing data at the Brighton Township site.

A three-step process was used to fill in missing data from the Brighton Township monitor. In step 1, any single missing hour of data was filled in with the average of the ozone concentrations from the hour before and the hour after the missing hour. In step 2, a missing hour of data was filled in with the adjusted South Fayette concentrations for that day and hour. In step 3, any remaining missing hours of data were filled in with the average monthly/hourly concentrations from the Brighton Township monitor. This was accomplished by determining the average concentration for each hour for each month.

Intermittent Emissions

Emissions from sources that emit intermittently (i.e., emergency generators, firewater pumps, flares, certain furnace operating scenarios, and startups and shutdowns) required evaluation. These sources were modeled in the 1-hr NO_2 analysis pursuant to



the March 1, 2011 EPA guidance.³⁰ Pursuant to this guidance, any source with emissions that do not have the potential to contribute significantly to the annual distribution of the daily maximum concentrations was modeled with emissions based on an average hourly rate, rather than the maximum hourly rate. Sources that are not likely to contribute include those with emission duration of less than 24-hours and with operational frequency of less than seven occurrences per year.

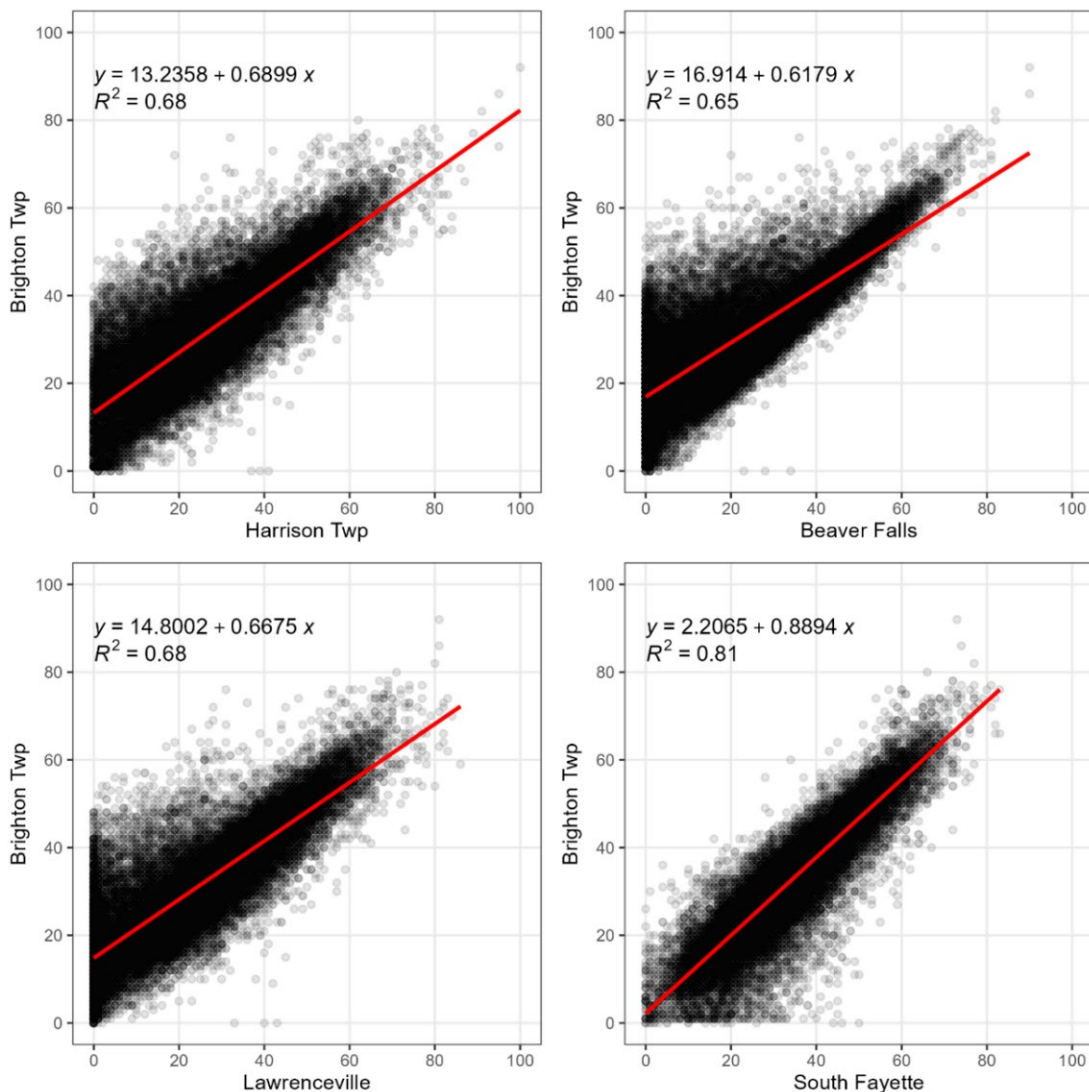


Figure 12. Comparison of Ozone Concentrations at the Four Sites

³⁰ U.S. EPA, *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO₂ National Ambient Air Quality Standard*, March 1, 2011.



5.8 NAAQS Analysis and Increment Analyses

Following the determination of significant impacts, a cumulative air quality analysis to determine compliance with the NAAQS was conducted. A cumulative analysis was conducted to determine compliance with the NAAQS and increments only for pollutants with modeled concentrations above the SILs in the significant impact analysis. The receptors modeled were limited to those showing a significant impact for each pollutant. Each source's potential emission rate was used. Five years of meteorological data was again used in this analysis.

Nearby Source Inventory

Off-site sources were included in the NAAQS and increment modeling. Pursuant to the Guideline and EPA's 2023 Draft Guidance on Developing Background Concentrations for Use in Modeling Demonstrations, the nearby sources under consideration will typically be within the first 10 to 20 km from the project source and the area where the project source's impacts equal or exceed the SIL.^{31,32}

The inventory of off-site sources was provided by PADEP and is based on a thorough review of facility permits. Although Appendix W (Table 8-2) allows for use of actual operations in developing the emissions inputs for nearby sources for the cumulative impacts analysis, potential emissions were conservatively modeled for all off-site sources. Model inputs for nearby sources were updated by PADEP to reflect current information obtained from each facility.

NAAQS Compliance Assessment

Appropriate ambient background concentrations (as discussed in more detail in Section 4.3) were then added to the modeled concentrations to demonstrate NAAQS compliance. As previously described, the maximum monitored concentrations were conservatively used in lieu of the actual design value for all pollutants/averaging periods except 1-hour NO₂. The high-second-high (H2H) modeled concentrations for CO were

³¹ *Guideline on Air Quality Models*, Appendix W of 40 CFR Part 51, U.S. Environmental Protection Agency, January 2017.

³² *Draft Guidance on Developing Background Concentrations for Use in Modeling Demonstrations*, EPA-454/P-23-001, October 2023.



added to the maximum monitored values to assess NAAQS compliance. The maximum modeled annual NO₂ impacts were added to the maximum monitored NO₂ concentration to assess compliance with the annual standard. The five-year average of the 98th percentile maximum daily 1-hr NO₂ modeled concentration was added to the three-year average of the 98th percentile NO₂ monitor value by season and hour of day within AERMOD. The resultant total concentration was compared to the 1-hr NO₂ NAAQS. The high-sixth-high (H6H) modeled PM₁₀ concentration from the five-years of meteorology was added to the maximum monitored PM₁₀ concentration. The NAAQS are shown in Table 6. Note that NAAQS modeling was not required for PM_{2.5} as impacts from the EACT Project were shown to be below the SILs, as will be discussed in the following section.

Table 6. National Ambient Air Quality Standards

Pollutant	Averaging Time	National Ambient Air Quality Standards (µg/m ³)	
		Primary	Secondary
PM ₁₀	24-hour	150	150
NO ₂	1-hour	188	--
	Annual	100	100
CO	1-hour	40,000	--
	8-hour	10,000	--

Increment Compliance Assessment

An increment compliance demonstration was also conducted. All sources, including the off-site sources, were conservatively assumed to consume increment at their potential to emit rates. Compliance with the PSD increments was based on the cumulative impacts of SPM and other off-site sources identified by PADEP in the nearby source emissions inventory. All off-site sources included in the NAAQS inventory were included in the increment inventory and assumed to be increment consuming.

The resultant modeled impacts were compared to the PSD Class II increment levels. The highest modeled annual averages were used for evaluating compliance with the annual increments and the high-second-high values were used for evaluating



compliance with the short-term PM₁₀ increment. The PSD Class II increments are shown in Table 7.

Table 7. PSD Increments

Pollutant	Averaging Time	PSD Class II Increments (µg/m³)
PM ₁₀	24-hour	30
	Annual	17
NO ₂	Annual	25

Note: There are no increments for CO or for 1-hr NO₂.



6.0 RESULTS

The following summarizes the results of the air quality modeling analyses. AERMOD input and output files, including the BPIP-PRIME files, will be provided electronically.

6.1 Turbine Load Analysis Results

The results of the load analysis are presented in Table 8. As shown, the 100% load scenario for each turbine was found to generate the highest impacts. The 100% load case was therefore used in the SIL, NAAQS, and increment analyses.

6.2 Furnace Mode and Worst-Case Operating Condition Results

The results of the worst-case furnace modeling and worst-case furnace operating mode analyses are presented in Tables 9 and 10, respectively. As shown, decoking results in the worst-case furnace impacts for CO. The maximum normal mode of operation results in the worst-case impacts for all other pollutants. This normal mode of furnace operation was therefore used to model all but two of the furnaces. The other two furnaces were modeled with elevated CO and NO_x emissions to represent decoking and the short-term reduced NO_x control efficiency. The higher NO_x emission rate was paired with stack parameters from normal operations because this results in worst-case impacts. Only the short-term CO emissions are elevated during decoking. Annual emissions were therefore not evaluated for this operating mode (i.e., decoking). Table 10 demonstrates that Furnace Nos. 1 and 2 were found to generate the highest short-term impacts. Furnace 6 had a slightly higher 24-hour impact (higher by 0.05 µg/m³) than either Furnace 1 or 2. However, since it typically takes less than 24 hours to decoke a furnace, Furnaces 1 and 2 are still considered as worst case for the 24-hour average. These two furnaces were therefore assigned the elevated emissions for 1-hour NO₂ and CO and 8-hour CO.

As previously discussed, all modes of operation, except for normal operation modes, occur infrequently (between 1 and 12 times per year) and only for short durations (between 2 to 60 hours per event). As such, all annual modeling analyses were based



on maximum normal operation which, as shown in Table 9, is also worst-case for the annual averaging period for both NO₂ and PM₁₀.

6.3 Secondary PM_{2.5} Analysis Results

The results of the MERPS analysis for secondary PM_{2.5} are presented in Table 11. The results were calculated from the highest modeled concentrations from the 500 tpy sources in the Northeast and Ohio Valley climate zones. As shown, the Class II secondary PM_{2.5} contributions due to the precursor NO_x and SO₂ emissions increases from the proposed EMACT Project are 0.046 and 0.0018 µg/m³ for the 24 hour and annual averaging periods, respectively. The Class I secondary PM_{2.5} impacts due to the NO_x and SO₂ emissions increases associated with the EMACT Project for the 24-hour and annual averaging periods are 0.0068 µg/m³ and 1.90E-04 µg/m³, respectively.



Table 8. Turbine Load Analysis Results

Averaging Period	Source Name	Modeled Concentration ($\mu\text{g}/\text{m}^3$)	Source Description
1-hr	CT1_100	1.36	Turbine 1, 100% load
	CT1_75	1.14	Turbine 1, 75% load
	CT1_45	0.82	Turbine 1, 45% load
	CT2_100	1.41	Turbine 2, 100% load
	CT2_75	1.18	Turbine 2, 75% load
	CT2_45	0.83	Turbine 2, 45% load
	CT3_100	1.42	Turbine 3, 100% load
	CT3_75	1.21	Turbine 3, 75% load
	CT3_45	0.88	Turbine 3, 45% load
8-hr	CT1_100	0.67	Turbine 1, 100% load
	CT1_75	0.59	Turbine 1, 75% load
	CT1_45	0.42	Turbine 1, 45% load
	CT2_100	0.64	Turbine 2, 100% load
	CT2_75	0.58	Turbine 2, 75% load
	CT2_45	0.42	Turbine 2, 45% load
	CT3_100	0.58	Turbine 3, 100% load
	CT3_75	0.53	Turbine 3, 75% load
	CT3_45	0.40	Turbine 3, 45% load
24-hr	CT1_100	0.22	Turbine 1, 100% load
	CT1_75	0.20	Turbine 1, 75% load
	CT1_45	0.14	Turbine 1, 45% load
	CT2_100	0.24	Turbine 2, 100% load
	CT2_75	0.20	Turbine 2, 75% load
	CT2_45	0.14	Turbine 2, 45% load
	CT3_100	0.24	Turbine 3, 100% load
	CT3_75	0.20	Turbine 3, 75% load
	CT3_45	0.14	Turbine 3, 45% load
Annual	CT1_100	0.013	Turbine 1, 100% load
	CT1_75	0.012	Turbine 1, 75% load
	CT1_45	0.009	Turbine 1, 45% load
	CT2_100	0.013	Turbine 2, 100% load
	CT2_75	0.012	Turbine 2, 75% load
	CT2_45	0.008	Turbine 2, 45% load
	CT3_100	0.013	Turbine 3, 100% load
	CT3_75	0.012	Turbine 3, 75% load
	CT3_45	0.008	Turbine 3, 45% load



Table 9. Worst-Case Furnace Mode Analysis Results

Pollutant	Average	Mode	Modeled Concentration (µg/m³)
CO	1-HR	Normal (Max Rate)	32.7
		Normal (Min Rate)	28.8
		Decoking	79.0
		Feed in/out	15.4
		Hot Standby	10.1
		Start up/Shutdown	54.0
	8-HR	Normal (Max Rate)	15.9
		Normal (Min Rate)	12.3
		Decoking	36.8
		Feed in/out	6.96
		Hot Standby	4.52
		Start up/Shutdown	22.7
NO ₂	1ST-HIGHEST MAX DAILY 1-HR	Normal (Max Rate)	11.5
		Normal (Min Rate)	8.46
		Decoking	3.31
		Feed in/out	5.23
		Hot Standby	5.77
		Start up/Shutdown	N/A
	ANNUAL	Normal (Max Rate)	0.13
		Normal (Min Rate)	0.12
		Decoking	N/A
		Feed in/out	2.80E-04
		Hot Standby	0.0095
		Start up/Shutdown	0.0014
PM10	24-HR	Normal (Max Rate)	1.14
		Normal (Min Rate)	0.74
		Decoking	0.70
		Feed in/out	0.53
		Hot Standby	0.35
		Start up/Shutdown	0.18
	ANNUAL	Normal (Max Rate)	0.071
		Normal (Min Rate)	0.054
		Decoking	N/A
		Feed in/out	1.00E-04
		Hot Standby	0.0021
		Start up/Shutdown	4.00E-05

N/A – Not applicable. Start-up/Shut-down mode not modeled for the 1-hr NO₂ average as this mode is considered intermittent and will not contribute to an exceedance of the 1-hr standard. Decoking only occurs up to 12 times per year (no more than 432 hours per year). This is not a long-term operating scenario and was thus not evaluated for annual averaging periods.



Table 10. Worst-Case Furnace Analysis Results

Averaging Period	Source Name	Modeled Concentration ($\mu\text{g}/\text{m}^3$)	Source Description
1-hr	EC#1	1.514	Ethane Cracking Furnace #1
	EC#2	1.502	Ethane Cracking Furnace #2
	EC#3	1.478	Ethane Cracking Furnace #3
	EC#4	1.467	Ethane Cracking Furnace #4
	EC#5	1.443	Ethane Cracking Furnace #5
	EC#6	1.419	Ethane Cracking Furnace #6
	EC#7	1.362	Ethane Cracking Furnace #7
8-hr	EC#1	0.706	Ethane Cracking Furnace #1
	EC#2	0.707	Ethane Cracking Furnace #2
	EC#3	0.662	Ethane Cracking Furnace #3
	EC#4	0.646	Ethane Cracking Furnace #4
	EC#5	0.628	Ethane Cracking Furnace #5
	EC#6	0.616	Ethane Cracking Furnace #6
	EC#7	0.607	Ethane Cracking Furnace #7
24-hr	EC#1	0.377	Ethane Cracking Furnace #1
	EC#2	0.359	Ethane Cracking Furnace #2
	EC#3	0.330	Ethane Cracking Furnace #3
	EC#4	0.313	Ethane Cracking Furnace #4
	EC#5	0.328	Ethane Cracking Furnace #5
	EC#6	0.381	Ethane Cracking Furnace #6
	EC#7	0.337	Ethane Cracking Furnace #7

Table 11. EMACT Project PM_{2.5} SIL MERP Calculation Results

Precursor	EMACT Project Emissions Increases ^a (tpy)	Class II					Class I	
		24-Hour Modeled Impact from Hypothetical Source ^b ($\mu\text{g}/\text{m}^3$)	Annual Modeled Impact from Hypothetical Source ^b ($\mu\text{g}/\text{m}^3$)	Modeled Emission Rate from Hypothetical Source ^b (tpy)	24-Hour Secondary PM _{2.5} from EMACT Project ($\mu\text{g}/\text{m}^3$)	Annual Secondary PM _{2.5} from EMACT Project ($\mu\text{g}/\text{m}^3$)	24-Hour Secondary PM _{2.5} from EMACT Project ^{b,c} ($\mu\text{g}/\text{m}^3$)	Annual Secondary PM _{2.5} from EMACT Project ^{b,c} ($\mu\text{g}/\text{m}^3$)
NO _x	75.3	0.27	0.012	500	0.041	1.73E-03	6.51E-03	1.86E-04
SO ₂	1.63	1.52	0.025	500	4.94E-03	8.16E-05	2.94E-04	4.71E-06
Total Secondary PM_{2.5} ($\mu\text{g}/\text{m}^3$):					0.046	1.82E-03	0.0068	1.90E-04

^a Emissions increases associated with the EMACT project.

^b Hypothetical source in Allegheny County, PA. Data obtained from EPA's MERPs View Qlik.

^c The closest Class I area, Otter Creek Wilderness, is located approximately 189 km from SPM. Concentration from MERPs View Qlik are based on a distance of 180 km from the hypothetical source.



6.4 EMACT Project Significant Impact Analysis Results

The EMACT Project is expected to result in insignificant impacts for all pollutants and averaging periods. The EMACT Class II significant impact analysis results are presented in Table 12.

Table 12. EMACT Project Class II Significant Impact Analysis Results

Pollutant	Avg Period	Maximum Modeled Impact ($\mu\text{g}/\text{m}^3$)	Secondary $\text{PM}_{2.5}$ Conc. ($\mu\text{g}/\text{m}^3$)	Total Concentration ($\mu\text{g}/\text{m}^3$)	PSD Significant Class II Impact Level ($\mu\text{g}/\text{m}^3$)
PM _{2.5}	24-hr	0.020	0.046	0.066	1.2
	Annual	5.20E-04	1.82E-03	2.34E-03	0.13
NO ₂ ^a	1-hr	0.93	N/A	0.93	7.5
	Annual	4.25E-03	N/A	4.25E-03	1.0
CO	1-hr	12.5	N/A	12.5	2,000
	8-hr	3.97	N/A	3.97	500

^a NO₂ impacts include ARM2 with minimum and maximum ambient ratios of 0.5 and 0.9, respectively.
N/A – not applicable.

Based on the results of the significant impacts analysis for the EMACT Project, a cumulative analysis for assessing NAAQS and increment compliance is not required.

6.5 Plan Approval Reconciliations and WWTP Permanent Controls Project Significant Impact Analysis Results

The significant impact analysis results for the Plan Approval Reconciliations and WWTP Permanent Controls Project are shown in Table 13. As shown, the project results in significant impacts for all modeled pollutants and averaging periods.



Table 13. Plan Approval Reconciliations and WWTP Permanent Controls Project Class II Significant Impact Analysis Results

Pollutant	Avg Period	Maximum Modeled Impact ($\mu\text{g}/\text{m}^3$)	PSD Class II Significant Impact Level ($\mu\text{g}/\text{m}^3$)	Maximum Distance to Significant Impact (km)
PM ₁₀	24-hr	27.6	5.0	2.7
	Annual	2.22	1.0	0.85
NO ₂ ^a	1-hr	117	7.5	36.5
	Annual	3.23	1.0	2.8
CO	1-hr	3,176	2,000	1.2
	8-hr	1,070	500	1.9

^a NO₂ impacts include ARM2 with minimum and maximum ambient ratios of 0.5 and 0.9, respectively.

6.6 NAAQS Analysis Results

Following the determination of significant impacts, an analysis was conducted to assess compliance with the PM₁₀, CO, and NO₂ NAAQS. As previously discussed, the cumulative impacts analysis (i.e., as-built analysis) reflects all as-built changes to the facility's initial construction plan approval and also includes emissions associated with the EMACT Project. All major and minor sources located within 20 km of SPM were conservatively modeled in conjunction with SPM in assessing compliance with the PM₁₀ and CO NAAQS. Sources of NO_x located within 37 km were modeled with SPM in assessing compliance with the 1-hr NO₂ NAAQS based on the radius of the 1-hr NO₂ SIA. Background concentrations were added to the model results to assess compliance. Evaluation of compliance with the 1-hour NO₂ NAAQS was based on the five-year average of the 98th percentile of the annual distribution of daily maximum 1-hour concentrations. Compliance with the CO short-term standards was based on the maximum of the H2H from the five-year meteorological dataset. Compliance with the 24-hour PM₁₀ NAAQS was based on the H6H as modeled over the full five-year meteorological dataset.



The results of the NAAQS analysis are presented in Table 14. As can be seen below, the modeling demonstrates compliance for all pollutants and averaging periods.

Table 14. As-Built NAAQS Analysis Results

Pollutant	Averaging Period	Modeled Concentration ($\mu\text{g}/\text{m}^3$)	Background Concentration ($\mu\text{g}/\text{m}^3$)	Total Concentration ($\mu\text{g}/\text{m}^3$)	Standard ($\mu\text{g}/\text{m}^3$)
NO ₂	1-hour	174 ^{a,b}	N/A	174	188
	Annual	4.76 ^b	16.1	20.9	100
CO	1-hour	3,039	2,648	5,687	40,000
	8-hour	794	1,602	2,396	10,000
PM ₁₀	24-hour	22.1	66.0	88.1	150

^a Based on the 98th percentile of the annual distribution of maximum daily 1-hour concentrations, averaged across the 5 years of meteorological data modeled.

^b PVMRM was employed.

N/A- Not applicable. Background NO₂ concentration is added within AERMOD run and therefore is included in the modeled concentration.

6.7 Class II Increment Analysis Results

Evaluation of compliance with the short-term Class II increments was based on the H2H value from the five years of meteorology. The maximum annual concentrations were used to assess compliance with the annual increments. All sources identified in the NAAQS inventory were conservatively assumed to consume increment at their potential to emit rates. The results of the Class II increment analysis are presented in Table 15. As shown below, the modeling demonstrates compliance for all pollutants and averaging periods.

Table 15. Class II PSD Increment Analysis Results

Pollutant	Averaging Period	Modeled Concentration ($\mu\text{g}/\text{m}^3$)	Standard ($\mu\text{g}/\text{m}^3$)
PM ₁₀	24-hour ^a	22.9	30
	Annual	3.43	17
NO ₂	Annual ^b	5.34	25

^a Based on the maximum H2H high value from the five years of meteorology.

^b 100% NO_x to NO₂ conversion conservatively assumed.



7.0 CLASS II VISIBILITY ANALYSIS

The CAA Amendments of 1977 require new and modified emission sources to assess potential impacts on visibility. In accordance with 40 CFR 52.21(o)(1), visibility impacts were assessed for nearby sensitive Class II areas. Emissions were evaluated as described in the EPA Workbook for Plume Visual Impact Screening and Analysis to determine potential contribution to atmospheric discoloration and visual range reduction.³³

Generally, atmospheric discoloration occurs when NO emissions from combustion sources react in the presence of atmospheric oxygen to form NO₂, a reddish-brown gas. Another form of atmospheric discoloration may be caused by particulate emissions and secondary aerosols formed by gaseous precursor emissions. The visual range reduction (increased haze) is caused primarily by particulate emissions and secondary aerosols such as sulfates and nitrates. Both secondary sulfate and primary particulate emissions are accounted for in the analysis. Emissions of other pollutants do not materially affect visibility.

EPA visibility impairment analysis guidelines were followed in conducting the analysis. The analysis was performed for the Raccoon Creek State Park, located a minimum of 16 km and a maximum of 23 km southwest of SPM.

This analysis requires inputs of emission rates (PM₁₀ and NO_x), regional background visual range, distance between the source and the object of study, and worst-case dispersion parameters (i.e., wind speed and stability). Outputs from the model include:

- Plume contrast against the sky and terrain; and,
- Perceptibility of the plume (Delta E criteria).

The facility-wide annualized maximum daily emissions of PM₁₀ and NO_x were input to

³³ *Workbook for Plume Visual Impact Screening and Analysis (Revised)*. EPA-454/R-92-023. RTP, NC. October 1992.



the VISCREEN model [i.e., 341 tpy and 695 tpy, respectively].³⁴ These rates include the increases associated with the EMACT Project. The background visual range was set to 20 km, which was determined from Figure 9 of the VISCREEN manual. The VISCREEN default screening values for Delta E (2.0) and contrast (0.05) were assumed.

As shown in Table 16, exceedances of the default delta E screening value occurs when using the conservative default meteorological conditions (F stability and 1 m/sec wind speed) and Level-1 procedures. Therefore, a more refined Level-2 VISCREEN analysis was performed based upon the procedures outlined in the visibility Workbook.³⁵

Raccoon Creek State Park is located in a 185-225 degree wind sector (wind blowing towards) relative to SPM (Figure 13). The frequency of occurrence of all meteorological conditions in these wind sectors were evaluated for a five-year meteorological dataset using the Iowa Department of Natural Resources "VISCREEN Screening Tool".³⁶ The screening tool was developed using the guidance, equations, and constants from the EPA visibility Workbook. As the VISCREEN procedures and screening tool requires a meteorological database with both wind speed and stability categories in the older Industrial Source Complex (ISC) model format, a five-year ISC meteorological dataset (1987-1991) was developed for the Pittsburgh airport.

There are significant data formatting and processing hurdles in preparing the meteorological data from the Beaver Valley meteorological tower for use with a much older model like VISCREEN. The five-year meteorological dataset from KPIT is adequate for the purpose of conducting a Level-2 screening analysis for visibility impairment because it represents the atmospheric conditions on a greater regional scale, including conditions at Raccoon Creek State Park. The 1987-1991 meteorological dataset from KPIT is the most recent, readily available five-year dataset in the correct format for use with VISCREEN.

³⁴ Annual emissions were calculated based on the 24-hour maximum allowable emissions in accordance with Federal Land Manager's (FLM's) AQRV Work Group (FLAG) 2010 guidance.

³⁵ *Workbook for Plume Visual Impact Screening and Analysis (Revised)*. EPA-454/R-92-023. RTP, NC. October 1992.

³⁶ Available at: <https://www.iowadnr.gov/Environmental-Protection/Air-Quality/Modeling/Dispersion-Modeling#249516-psd-modeling-guidance>



The results of this wind sector analysis are provided in Figure 14. Based on the results of the wind sector analysis, a wind speed of 2 m/s and F stability class were employed in the Level-2 VISCREEN analysis. This is the next worst stability class and wind speed combination to the combination employed in the Level-1 analysis (F,1).

The results of the Level-2 VISCREEN analysis are shown in Table 17. As shown below, the modeled visibility impacts inside Raccoon Creek State Park are below the screening thresholds. As such, it was determined SPM will not negatively impact visibility at Raccoon Creek State Park and no further analysis was performed. The VISCREEN modeling files are provided electronically.



Table 16. Level-1 Class II Maximum Visibility Impacts Inside Raccoon Creek State Park

Viewing Background	Theta (degrees)	Azimuth (degrees)	Distance (km)	Alpha (degrees)	Delta E		Green Contrast	
					Criterion	Plume	Criterion	Plume
SKY	10	84	16	84	2.0	3.588	0.05	0.020
SKY	140	84	16	84	2.0	1.109	0.05	-0.021
TERRAIN	10	84	16	84	2.0	2.492	0.05	0.031
TERRAIN	140	84	16	84	2.0	0.464	0.05	0.020

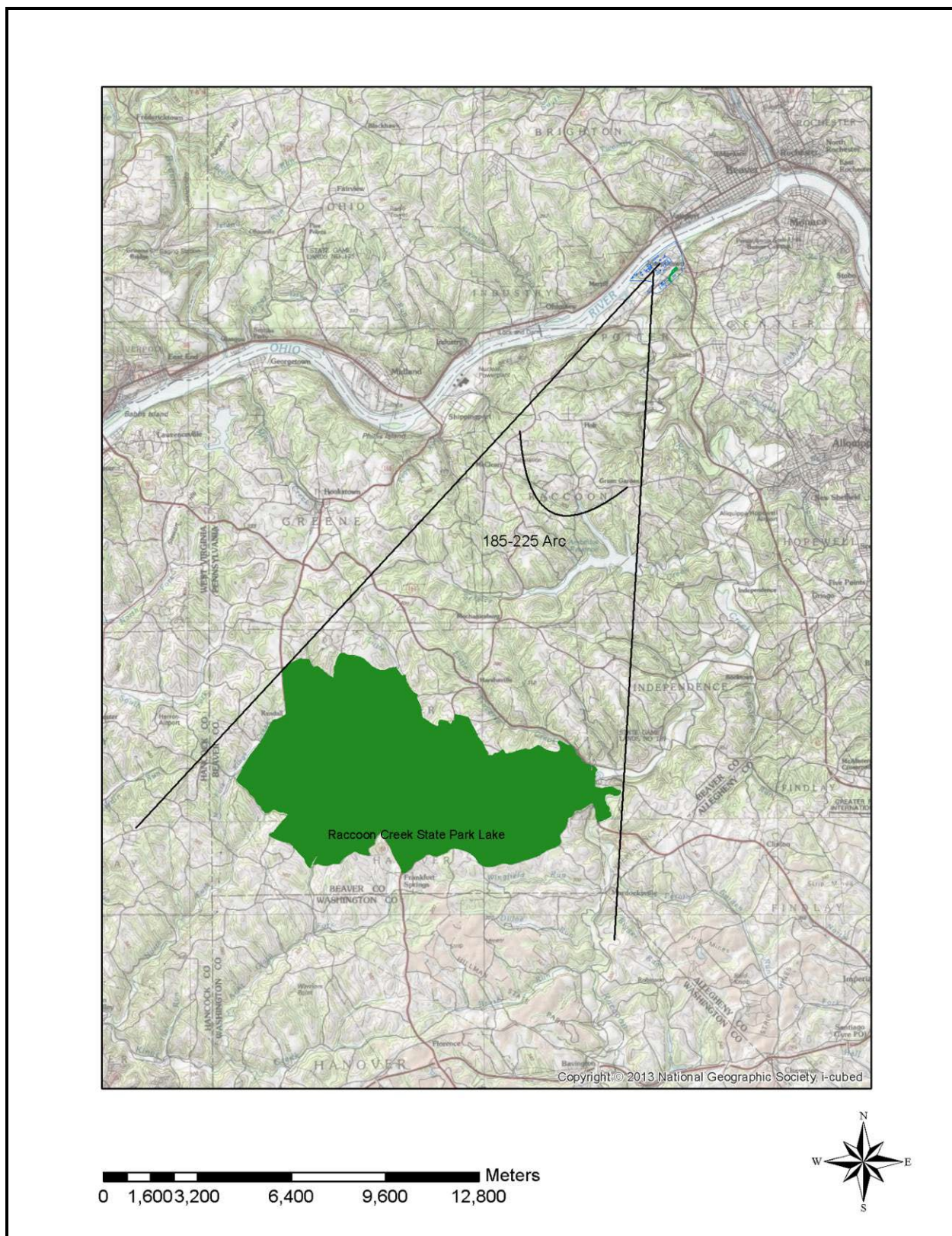


Figure 13. Location of Raccoon Creek State Park Relative to SPM



Iowa DNR Level-2 Visibility Screening Tool

Facility:

Sensitive Area Being Evaluated:

Project Number:

Minimum Source-Site Angle:

Maximum Source-Site Angle:

Source-Observer Distance (km):

Meteorological Data Set:

Time Period Being Evaluated:

Worst-Case Meteorological Conditions Summary

Dispersion Condition (stability, wind speed)	$\sigma_y \sigma_z u$ (m ³ /s)	Transport Time (hours)	Frequency (f) and Cumulative Frequency (cf) of occurrence of given dispersion condition associated with source-site wind directions for given time of day (%)							
			1 - 6		7 - 12		13 - 18		19 - 24	
			f	cf	f	cf	f	cf	f	cf
F,1	2.31E+04	8.9	2.13	2.13	0.09	0.09	0.00	0.00	0.91	0.91
F,2	4.61E+04	3.0	0.43	2.56	0.02	0.11	0.00	0.00	0.16	1.07
E,1	6.08E+04	8.9	0.14	2.70	0.15	0.26	0.00	0.00	0.03	1.10
F,3	6.92E+04	1.8	1.10	3.80	0.07	0.33	0.00	0.00	1.01	2.11
E,2	1.22E+05	3.0	0.03	3.83	0.05	0.38	0.00	0.00	0.04	2.15
D,1	1.45E+05	8.9	0.08	3.91	0.24	0.62	0.03	0.03	0.06	2.21
E,3	1.82E+05	1.8	0.55	4.46	0.13	0.75	0.03	0.06	0.42	2.63
E,4	2.43E+05	1.3	0.71	5.17	0.07	0.82	0.05	0.11	0.78	3.41
D,2	2.90E+05	3.0	0.06	5.23	0.10	0.92	0.01	0.12	0.02	3.43
E,5	3.04E+05	1.0	0.29	5.52	0.04	0.96	0.02	0.14	0.80	4.23
D,3	4.36E+05	1.8	0.40	5.92	0.50	1.46	0.49	0.63	0.27	4.50
D,4	5.81E+05	1.3	0.81	6.73	0.78	2.24	0.68	1.31	0.94	5.44
D,5	7.26E+05	1.0	0.69	7.42	0.68	2.92	0.59	1.90	0.87	6.31
D,6	8.71E+05	0.8	0.24	7.66	0.54	3.46	0.65	2.55	0.44	6.75
D,7	1.02E+06	0.7	0.13	7.79	0.28	3.74	0.31	2.86	0.16	6.91
D,8	1.16E+06	0.6	0.05	7.84	0.02	3.76	0.09	2.95	0.06	6.97

Figure 14. Level-2 Wind Sector Analysis Results



Table 17. Level-2 Class II Maximum Visibility Impacts Inside Raccoon Creek State Park

Viewing Background	Theta (degrees)	Azimuth (degrees)	Distance (km)	Alpha (degrees)	Delta E		Green Contrast	
					Criterion	Plume	Criterion	Plume
SKY	10	115	18	54	2.0	1.859	0.05	0.011
SKY	140	115	18	54	2.0	0.550	0.05	-0.011
TERRAIN	10	84	16	84	2.0	1.296	0.05	0.016
TERRAIN	140	84	16	84	2.0	0.236	0.05	0.010



8.0 CLASS I AREA IMPACTS

8.1 Class I AQRV Analysis

The Federal Land Managers (FLM) are responsible for protecting AQRV at Class I areas and have the authority to determine whether a proposed project is expected to have a negative impact on AQRV. In general, the primary concerns associated with air emissions include visibility impairment, ozone effects on vegetation, and the impact of pollutant deposition on soils and surface waters.

There are three Class I areas located within 300 km of SPM.³⁷ Each Class I area is located in excess of 50 km from SPM. A Q/d screening analysis was therefore conducted for each of the three Class I areas to evaluate SPM's potential impacts, consistent with the Federal Land Manager's (FLM's) AQRV Work Group (FLAG) 2010 guidance. The ratio of the sum of emissions of SO₂, NO_x, PM₁₀, and sulfuric acid mist (H₂SO₄) to the distance between SPM and each nearby Class I area was determined and compared to a threshold of 10. Per the FLAG guidance, if the Q/d is less than or equal to 10 the facility is presumed to have no adverse impact. Annual emissions for use in the Q/d screening analysis for SPM were calculated based on the 24-hour maximum allowable emissions in accordance with FLAG 2010 guidance and include the emissions increases associated with the EMACT Project and updates associated with the Plan Approval Reconciliations and WWTP Permanent Controls Project (Table 18).

³⁷ Class I areas are pristine areas (e.g., National Parks and Wilderness Areas) that have been designated by Congress and are afforded a greater degree of air quality protection. All other areas are designated as Class II areas.



As shown in Table 19 below, the maximum Q/d value calculated for SPM is 5.9 (Q= 1,116 tpy, D = 189 km for Otter Creek). As such, SPM is presumed to have no adverse impact on AQRVs at any Class I area. A Q/d evaluation for the 2015 Plan Approval Application was presented to the FLMs which had an emissions increase of 816 tpy and a resultant Q/d of 4.3. The FLMs reviewed the Q/d evaluation and stated that no Class I AQRV evaluation was required for SPM.^{38,39,40} This more recent Q/d analysis was submitted to the FLMs on September 6, 2024 and a copy of the submittal is included in Attachment B for reference.

Table 18. SPM Annual Emissions (Q)

Pollutant	Facility-wide Annual Emissions ^a (tpy)	SPM Annual Emissions (Q) (tpy)
SO ₂	76.1	1,116
NO _x	695	
PM ₁₀	341	
H ₂ SO ₄	3.69	

^a Annual emissions in tons per year, based on 24-hour maximum allowable emissions in accordance with FLAG 2010.

Table 19. SPM Class I Q/d Evaluation

Class I Area	FLM	Approx. Distance from SPM (km)	SPM Annual Emissions Q ^a (tpy)	Q/d	AQRV Required? (Y/N?)
Otter Creek	USFS	189	1,116	5.9	N
Dolly Sods	USFS	200		5.6	N
Shenandoah	NPS	269		4.1	N
James River Face	USFS	347		3.2	N

^a Q/d screening analysis is based on the total SO₂, NO_x, PM₁₀, and H₂SO₄ annual emissions in tons per year, based on 24-hour maximum allowable emissions in accordance with FLAG 2010.

8.2 Class I Significant Impacts Analysis

The air quality impacts at each Class I area within 300 km were determined using AERMOD. An arc of receptors spaced at 1 degree, located in the direction of the Class I areas, was placed at 50 km from SPM (Figure 15). To account for the variation in

³⁸ February 11, 2014, email from Melanie Pitrolo, US Forest Service, to David Keen, RTP Environmental.

³⁹ February 12, 2014, email from Don Shepard, National Parks Service, to David Keen, RTP Environmental.

⁴⁰ February 13, 2014, email from Claire O'Dea, US Forest Service, to David Keen, RTP Environmental.



receptor elevations within each Class I area, flagpole heights were modeled at each receptor. Three flagpole height categories were established by subtracting the actual receptor elevation at 50 km from the minimum, maximum and average receptor elevations for each Class I area obtained from the National Park Service (NPS) Air Resources Division.⁴¹

As with the Class II SIL analyses discussed above, two separate Class I SIL analyses were conducted: one for the proposed EMACT Project and one for the Plan Approval Reconciliations and WWTP Permanent Controls Project. Modeled emission rates and operating scenarios were consistent with the Class II SIL analyses. The model results were compared to the Class I significant impact levels (Tables 20 and 21).⁴² Secondary PM_{2.5} concentrations determined in accordance with EPA's recently revised MERPs guidance were added to the modeled primary PM_{2.5} concentrations prior to comparison to the Class I SILs.⁴³ As shown below, the impacts for both projects are less than the Class I SILs. SPM will not therefore cause or contribute to exceedance of a Class I increment.

In conducting the Class I SIL analysis for the Plan Approval Reconciliations and WWTP Permanent Controls Project, a single day (September 6, 2022) from the five years of meteorology showed a PM₁₀ 24-hour concentration that was approximately twice as high as any other day. This was discussed with the PADEP and, as a result, an additional AERMOD run was performed for 2022 with rings of receptors placed at distances of 10, 20, 30, 40, and 50 km from SPM. The maximum PM₁₀ 24-hour concentration at each distance and flagpole height category (e.g., average, minimum and maximum) was determined. Given that modeled concentrations decrease exponentially with increasing distance from the source, a logarithmic regression analysis was then performed to calculate the concentration change over distance for each flagpole height category (Figure 16). The concentration at each Class I Area was then calculated for each of the three flagpole heights based on the resulting equation

⁴¹ Available at: <https://irma.nps.gov/DataStore/Reference/Profile/2249830>

⁴² See 61 FR 38249 (July 23, 1996) for the proposed Class I SILs.

⁴³ *Supplement to the Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program*, memorandum from Richard Wayland to Regional Air Directors, April 30, 2024.



(Table 22). The maximum concentration across the three flagpole heights was then determined. The Class I area with the predicted maximum concentration (Otter Creek) was used to compare to the Class I SIL for 24-hour PM_{10} . All modeling files are provided electronically.

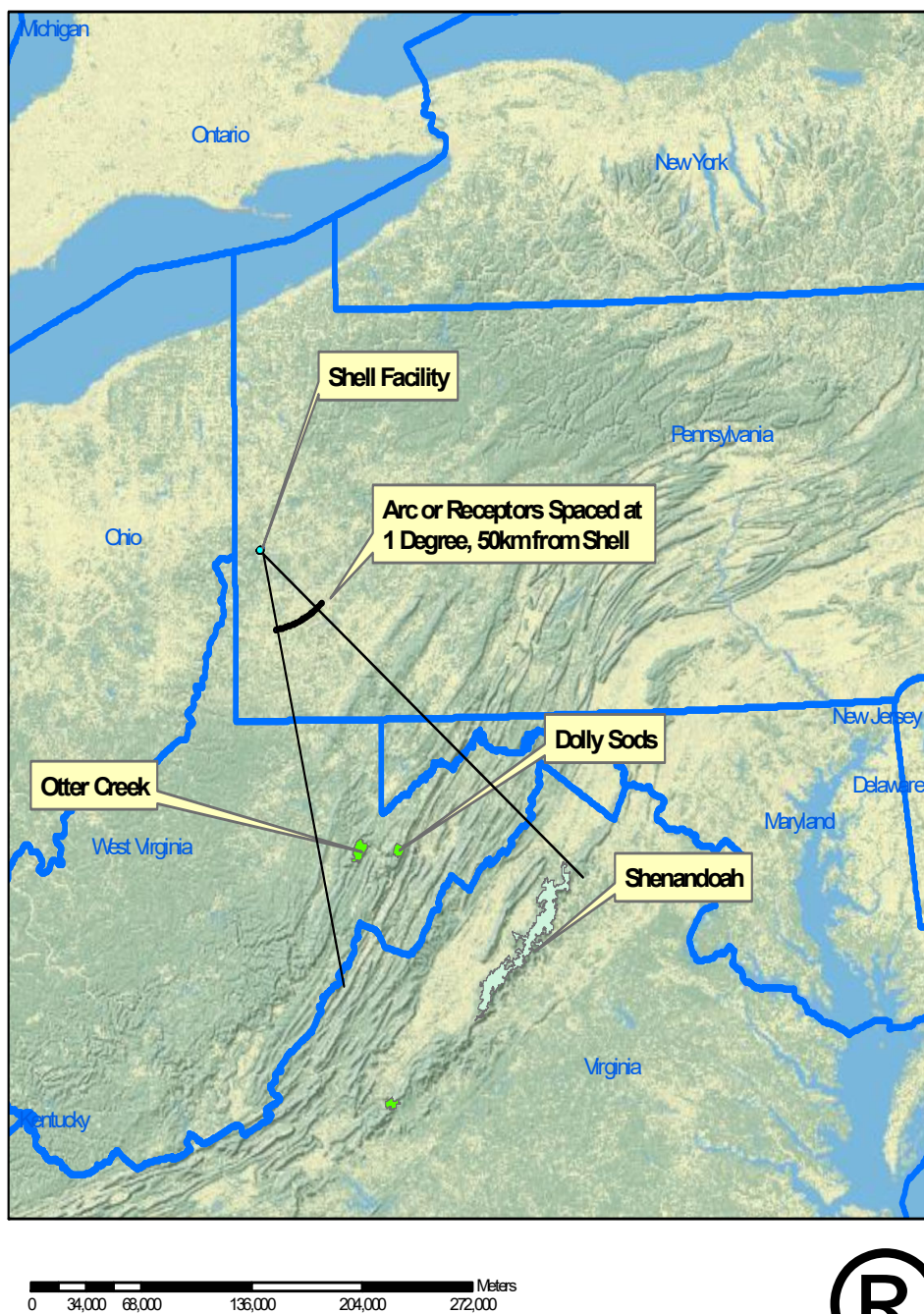


Figure 15. Class I Areas Located within Three Hundred Kilometers of SPM and Modeled Receptors



Table 20. EMACT Project Class I Significant Impact Analysis Results

Pollutant	Averaging Period	Maximum Modeled Conc. ($\mu\text{g}/\text{m}^3$)	Secondary $\text{PM}_{2.5}$ Conc. ($\mu\text{g}/\text{m}^3$)	Total Conc. ($\mu\text{g}/\text{m}^3$)	Class I Significant Impact Level ($\mu\text{g}/\text{m}^3$)
$\text{PM}_{2.5}$	24-hr	0.044	0.0068	0.050	0.27
	Annual	4.90E-04	1.90E-04	6.80E-04	0.03
NO_2	Annual	4.02E-03 ^a	N/A	4.02E-03	0.10

^a ARM2 was employed.

N/A – Not applicable.

Table 21. Plan Approval Reconciliations and WWTP Permanent Controls Project Class I Significant Impact Analysis Results

Pollutant	Averaging Period	Total Facility Maximum Modeled Conc. ^a ($\mu\text{g}/\text{m}^3$)	Proposed Class I Significant Impact Level ($\mu\text{g}/\text{m}^3$)
PM_{10}	24-hr	4.56E-03	0.30
	Annual	0.015	0.20
NO_2	Annual	0.025	0.10

^a ARM2 was employed.

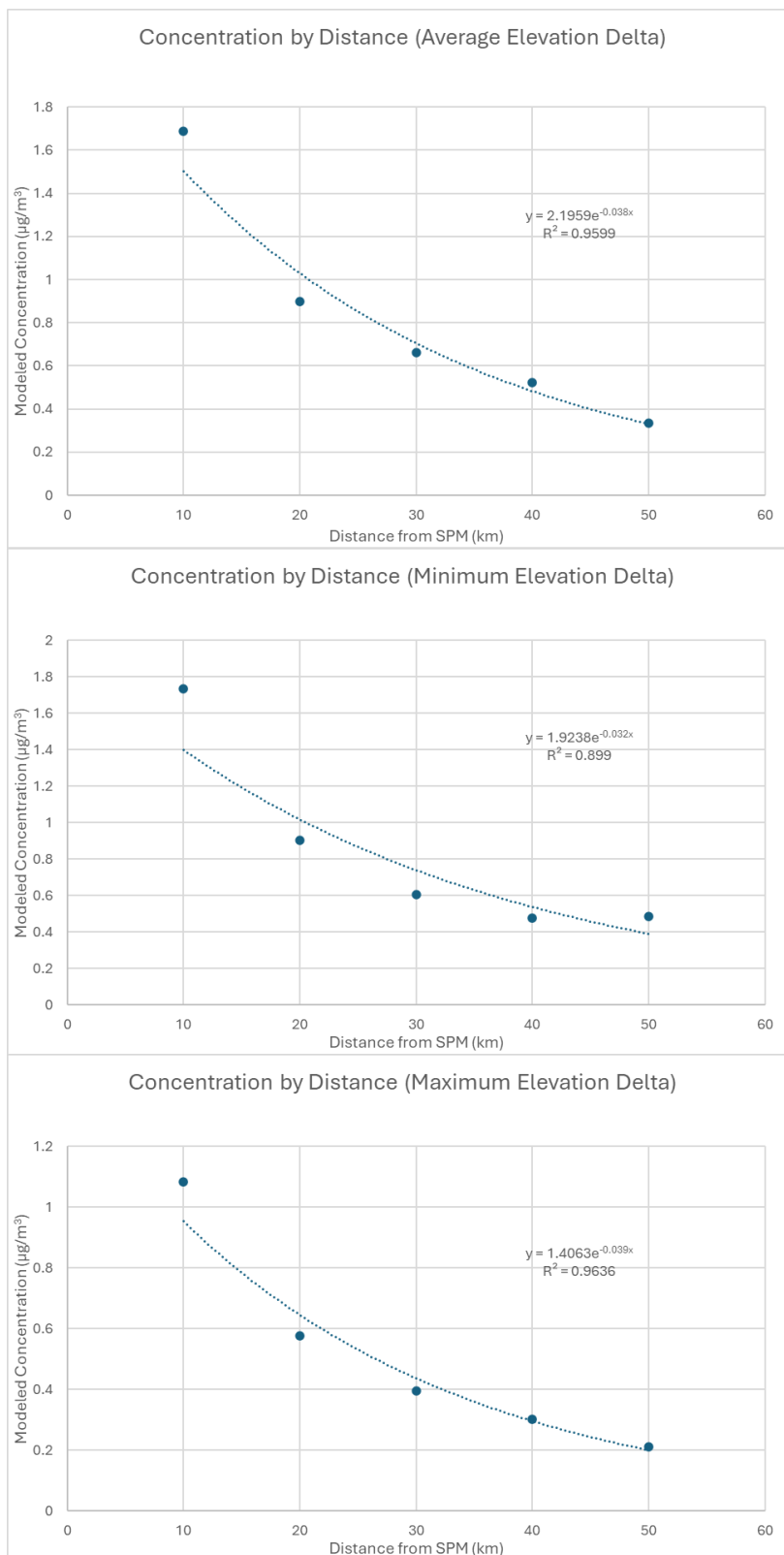


Figure 16. PM_{10} Impact Change Over Distance for Each Flagpole Height Category



Table 22. Calculation of 24-Hour PM₁₀ Concentrations for Each of the Three Flagpole Heights

Class I Area	Distance from SPM (km)	Calculated Concentration (µg/m ³)		
		Average Elevation	Minimum Elevation	Maximum Elevation
Otter Creek (USFS)	189	1.68E-03	4.56E-03	8.88E-04
Dolly Sods (USFS)	200	1.11E-03	3.23E-03	5.82E-04
Shenandoah (NPS)	269	8.11E-05	3.56E-04	3.97E-05
James River Face (USFS)	347	4.11E-06	2.89E-05	1.86E-06



ATTACHMENT A
MODELED SOURCE INPUT DATA



Modeled Point Source Parameters

AERMOD ID	Description	UTM Easting ¹ (m)	UTM Northing ¹ (m)	Elevation (m)	Stack Height (m)	Stack Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)
EC#1	Ethane Cracking Furnace #1	555502.11	4502199.00	242.32	83.82	396.26	12.25	2.59
EC#1	Ethane Cracking Furnace #1 - Decoking	555502.11	4502199.00	242.32	83.82	449.15	9.11	2.59
EC#2	Ethane Cracking Furnace #2	555512.76	4502186.65	242.32	83.82	396.26	12.25	2.59
EC#2	Ethane Cracking Furnace #2 - Decoking	555512.76	4502186.65	242.32	83.82	449.15	9.11	2.59
EC#3	Ethane Cracking Furnace #3	555534.48	4502160.24	242.32	83.82	396.26	12.25	2.59
EC#4	Ethane Cracking Furnace #4	555545.98	4502148.32	242.32	83.82	396.26	12.25	2.59
EC#5	Ethane Cracking Furnace #5	555561.73	4502131.29	242.32	83.82	396.26	12.25	2.59
EC#6	Ethane Cracking Furnace #6	555572.81	4502118.51	242.32	83.82	396.26	12.25	2.59
EC#7	Ethane Cracking Furnace #7	555590.27	4502098.92	242.32	83.82	396.26	12.25	2.59
CT1	Combustion Turbine/Duct Burner Unit #1	555945.76	4502058.51	242.32	64.92	428.15	24.08	3.05
CT2	Combustion Turbine/Duct Burner Unit #2	555991.73	4502098.68	242.32	64.92	428.15	24.08	3.05
CT3	Combustion Turbine/Duct Burner Unit #3	556038.01	4502138.02	242.32	64.92	428.15	24.08	3.05
GFLARE1	HP Ground Flare #1 (TEGF A)	555472.50	4502011.25	237.74	82.66	1273.15	20.00	10.96
GFLARE2	HP Ground Flare #2 (TEGF B)	555421.71	4502085.72	237.74	82.66	1273.15	20.00	10.96
HPFLARE	HP Elevated Flare	555385.33	4502007.13	237.74	151.24	1273.15	20.00	10.96
MPFLARE	Multipoint Ground Flare (MPGF)	556083.87	4502666.73	242.32	4.54	1273.15	20.00	0.28
INCIN	Continuous Vent Thermal Oxidizer (CVTO)	556066.31	4502619.14	242.32	76.20	1144.26	56.76	1.37
COI	Spent Caustic Vent Incinerator (SCTO)	555256.39	4502075.62	217.63	60.96	1144.26	13.71	0.61
FWP1	Fire Water Pump 1	556126.22	4501713.44	259.08	9.97	692.59	36.88	0.30
FWP2	Fire Water Pump 2	556118.30	4501706.53	259.08	9.97	692.59	36.88	0.30
GEN1	Diesel-Fired Emergency 1 - Parking Garage	556228.46	4501766.08	259.08	1.52	687.59	68.82	0.08
GEN2	Diesel-Fired Emergency Generator 2 - Telecom Hut	556275.53	4501732.18	259.08	1.83	763.15	42.62	0.06
GEN3	Natural Gas-Fired Emergency Generator 3 - Lift Station	556186.33	4502105.90	242.32	1.83	949.82	90.66	0.09
GEN4	Natural Gas-Fired Emergency Generator 4 - Lift Station	555907.33	4502035.53	242.32	1.83	960.93	37.26	0.06
TALC	Rail to Truck Talc Transfer	556541.50	4502557.60	242.32	3.66	0.00	0.01	0.18
COOLTWR1	Process Cooling Tower	555792.73	4502459.17	242.32	21.64	294.82	7.88	11.20
COOLTWR2	Process Cooling Tower	555804.58	4502468.80	242.32	21.64	294.82	7.88	11.20
COOLTWR3	Process Cooling Tower	555815.69	4502481.38	242.32	21.64	294.82	7.88	11.20
COOLTWR4	Process Cooling Tower	555828.28	4502492.49	242.32	21.64	294.82	7.88	11.20
COOLTWR5	Process Cooling Tower	555841.61	4502502.12	242.32	21.64	294.82	7.88	11.20
COOLTWR6	Process Cooling Tower	555853.33	4502512.89	242.32	21.64	294.82	7.88	11.20
COOLTWR7	Process Cooling Tower	555866.07	4502523.70	242.32	21.64	294.82	7.88	11.20
COOLTWR8	Process Cooling Tower	555878.57	4502535.24	242.32	21.64	294.82	7.88	11.20
COOLTWR9	Process Cooling Tower	555891.07	4502545.57	242.32	21.64	294.82	7.88	11.20
COLTWR10	Process Cooling Tower	555903.80	4502556.38	242.32	21.64	294.82	7.88	11.20
COLTWR11	Process Cooling Tower	555916.06	4502567.20	242.32	21.64	294.82	7.88	11.20
COLTWR12	Process Cooling Tower	555927.83	4502578.01	242.32	21.64	294.82	7.88	11.20
COLTWR13	Process Cooling Tower	555940.57	4502588.83	242.32	21.64	294.82	7.88	11.20



Modeled Point Source Parameters

AERMOD ID	Description	UTM Easting ¹ (m)	UTM Northing ¹ (m)	Elevation (m)	Stack Height (m)	Stack Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)
COLTWR14	Cogeneration Plant Cooling Tower	555964.12	4502609.50	242.32	21.64	294.82	6.86	11.20
COLTWR15	Cogeneration Plant Cooling Tower	555975.66	4502619.59	242.32	21.64	294.82	6.86	11.20
COLTWR16	Cogeneration Plant Cooling Tower	555986.47	4502629.68	242.32	21.64	294.82	6.86	11.20
CAH1	PE Unit 1 Catalyst Vent Filter Vent	556294.39	4502493.32	242.32	45.72	473.15	10.67	0.41
CAH2	PE Unit 2 Catalyst Vent Filter Vent	556289.38	4502488.95	242.32	45.72	473.15	10.67	0.41
CAA	PE Unit 3 Catalyst Activator A Filter (External) Vent	556151.35	4502347.38	242.32	23.87	473.15	7.20	0.20
CAB	PE Unit 3 Catalyst Activator B Filter (External) Vent	556158.56	4502339.12	242.32	23.87	473.15	7.20	0.20
AUSA	Additive Unloading Station A Filter Vent	556183.65	4502329.83	242.32	35.05	288.15	11.25	0.15
AUSB	Additive Unloading Station B Filter Vent	556183.42	4502329.63	242.32	35.05	288.15	11.25	0.15
AUSC	Additive Unloading Station C Filter Vent	556183.24	4502329.47	242.32	35.05	288.15	11.25	0.15
AUSD	Additive Unloading Station D Filter Vent	556183.01	4502329.27	242.32	35.05	288.15	11.25	0.15
FIBC	FIBC Compactor Filter Vent	556182.66	4502308.22	242.32	35.81	288.15	32.15	0.15
AFEEDA	Additive Feeder A Filter Vent	556192.58	4502325.85	242.32	17.53	288.15	1.21	0.15
AFEEDB	Additive Feeder B Filter Vent	556192.40	4502326.06	242.32	17.53	288.15	1.21	0.15
AFEEDC	Additive Feeder C Filter Vent	556192.24	4502326.25	242.32	17.53	288.15	1.21	0.15
AFEEDD	Additive Feeder D Filter Vent	556192.06	4502326.45	242.32	17.53	288.15	1.21	0.15
EXTRUD	Extruder Filter Vent	556194.85	4502323.26	242.32	25.60	288.15	33.27	0.10
PELTDRY	Pellet Dryer Vent	556189.76	4502305.88	242.32	42.67	353.15	19.46	0.76
VACLEAN	Vacuum Cleaning System Filter Vent	556210.64	4502312.58	242.32	23.77	288.15	24.52	0.10

¹ Coordinates reflect UTM NAD83, Zone 17.

Effective Release Heights and Diameters for Flares

Flare	Total Heat Release Rate (MMBtu/hr)	Effective Diameter ² (ft)	Actual Height (ft)	Effective Height ³ (ft)
HP Ground Flare 1 (TEGF A)	3,900	35.95	110	271.20
HP Ground Flare 2 (TEGF B)	3,900	35.95	110	271.20
HP Elevated Flare	3,900	35.95	335	496.20
Multipoint Ground Flare (MPGF) ⁴	2.61	0.93	10.0	14.9

¹Parameters calculated based on Section 2.1.2 of the AERSCREEN User's Guide.

²Effective diameter (ft) = $(0.1755 \times (\text{heat release (MMBtu/hr)}^{.5}) \times 3.28$

³Effective height (ft) = actual height + $(0.944 \times (\text{heat release (MMBtu/hr)})^{.478}) \times 3.28$

⁴The MPGF was represented by one flare stack. The effective flare diameter and height for an individual flare was used for the representative flare stack and was calculated using the equivalent individual heat release rate, which was estimated as the total heat release rate (99 MMBtu/hr) divided by the total number of flare heads (38).



Modeled Volume Source Parameters

AERMOD ID	Description	UTM Easting ¹ (m)	UTM Northing ¹ (m)	Elevation (m)	Release Height (m)	Initial Lat. Dim. (m)	Initial Vert. Dim. (m)
PEBLD	PE Blending Silos	556290.17	4502354.40	242.32	42.98	7.80	19.99
PERC	PE Railcar Handling and Storage Silos, Railcar Loading	556389.00	4502348.93	242.32	57.00	6.97	26.51
PETK	PE Truck Handling and Storage Silos, Truck Loading	556573.49	4502153.59	259.08	46.02	14.52	21.41
PEU1	PE Unit 1 Process Vents	556400.47	4502491.96	242.32	13.72	12.44	6.38
PEU2	PE Unit 2 Process Vents	556287.18	4502495.70	242.32	13.72	12.44	6.38
PERD_1	Plant Roadways (Transport Trucks)	556500.85	4501934.99	259.08	3.89	6.38	3.62
PERD_2	Plant Roadways (Transport Trucks)	556524.52	4501954.21	259.08	3.89	6.38	3.62
PERD_3	Plant Roadways (Transport Trucks)	556548.18	4501973.42	259.08	3.89	6.38	3.62
PERD_4	Plant Roadways (Transport Trucks)	556555.98	4502001.64	259.08	3.89	6.38	3.62
PERD_5	Plant Roadways (Transport Trucks)	556560.36	4502031.81	259.08	3.89	6.38	3.62
PERD_6	Plant Roadways (Transport Trucks)	556564.74	4502061.97	259.08	3.89	6.38	3.62
PERD_7	Plant Roadways (Transport Trucks)	556585.70	4502082.99	259.08	3.89	6.38	3.62
PERD_8	Plant Roadways (Transport Trucks)	556608.87	4502102.79	259.08	3.89	6.38	3.62
PERD_9	Plant Roadways (Transport Trucks)	556632.04	4502122.60	259.08	3.89	6.38	3.62
PERD_10	Plant Roadways (Transport Trucks)	556654.19	4502142.96	259.08	3.89	6.38	3.62
PERD_11	Plant Roadways (Transport Trucks)	556656.29	4502172.98	259.08	3.89	6.38	3.62
PERD_12	Plant Roadways (Transport Trucks)	556642.86	4502199.61	259.08	3.89	6.38	3.62
PERD_13	Plant Roadways (Transport Trucks)	556621.84	4502221.36	259.08	3.89	6.38	3.62
PERD_14	Plant Roadways (Transport Trucks)	556594.67	4502227.32	259.08	3.89	6.38	3.62
PERD_15	Plant Roadways (Transport Trucks)	556569.50	4502211.37	259.08	3.89	6.38	3.62
PERD_16	Plant Roadways (Transport Trucks)	556546.44	4502191.45	259.08	3.89	6.38	3.62
PERD_17	Plant Roadways (Transport Trucks)	556526.09	4502169.05	259.08	3.89	6.38	3.62
PERD_18	Plant Roadways (Transport Trucks)	556517.50	4502141.09	259.08	3.89	6.38	3.62
PERD_19	Plant Roadways (Transport Trucks)	556522.55	4502111.96	259.08	3.89	6.38	3.62
PERD_20	Plant Roadways (Transport Trucks)	556535.88	4502084.55	259.08	3.89	6.38	3.62
PERD_21	Plant Roadways (Transport Trucks)	556543.41	4502055.97	259.08	3.89	6.38	3.62
PERD_22	Plant Roadways (Transport Trucks)	556541.82	4502025.53	259.08	3.89	6.38	3.62
PERD_23	Plant Roadways (Transport Trucks)	556540.24	4501995.09	259.08	3.89	6.38	3.62
PERD_24	Plant Roadways (Transport Trucks)	556527.44	4501970.10	259.08	3.89	6.38	3.62
PERD_25	Plant Roadways (Transport Trucks)	556504.47	4501950.06	259.08	3.89	6.38	3.62
PERD_26	Plant Roadways (Transport Trucks)	556490.48	4501940.46	259.08	3.89	6.38	3.62
TLCRD_1	Plant Roadways (Talc Transport via Trucks)	556521.21	4502553.10	242.32	3.89	6.38	3.62
TLCRD_2	Plant Roadways (Talc Transport via Trucks)	556492.72	4502561.08	242.32	3.89	6.38	3.62
TLCRD_3	Plant Roadways (Talc Transport via Trucks)	556467.64	4502546.01	242.32	3.89	6.38	3.62
TLCRD_4	Plant Roadways (Talc Transport via Trucks)	556444.27	4502527.20	242.32	3.89	6.38	3.62
TLCRD_5	Plant Roadways (Talc Transport via Trucks)	556452.84	4502502.08	242.32	3.89	6.38	3.62
TLCRD_6	Plant Roadways (Talc Transport via Trucks)	556470.01	4502477.80	242.32	3.89	6.38	3.62
TLCRD_7	Plant Roadways (Talc Transport via Trucks)	556456.25	4502452.49	242.32	3.89	6.38	3.62



Modeled Volume Source Parameters

AERMOD ID	Description	UTM Easting ¹ (m)	UTM Northing ¹ (m)	Elevation (m)	Release Height (m)	Initial Lat. Dim. (m)	Initial Vert. Dim. (m)
TLCRD_8	Plant Roadways (Talc Transport via Trucks)	556433.83	4502432.57	242.32	3.89	6.38	3.62
TLCRD_9	Plant Roadways (Talc Transport via Trucks)	556411.40	4502412.64	242.32	3.89	6.38	3.62
TLCRD_10	Plant Roadways (Talc Transport via Trucks)	556388.97	4502392.72	242.32	3.89	6.38	3.62
TLCRD_11	Plant Roadways (Talc Transport via Trucks)	556366.54	4502372.79	242.32	3.89	6.38	3.62
TLCRD_12	Plant Roadways (Talc Transport via Trucks)	556341.02	4502363.86	242.32	3.89	6.38	3.62
TLCRD_13	Plant Roadways (Talc Transport via Trucks)	556320.87	4502386.02	242.32	3.89	6.38	3.62

¹ Coordinates reflect UTM NAD83, Zone 17.



Non-Road Volume Source Parameter Calculations

Model ID	Source Description	Source Dimensions			Structure Height/Vertical Dimension (ft)	Release Height (ft)	Initial Dispersion Coefficients		Footnote
		Length (ft)	Width (ft)	Square Root of Area (ft)			Initial Horizontal Dimension σ_y (ft)	Initial Vertical Dimension σ_z (ft)	
PEBLD	PE Blending Silos	147.6	82.0	110.0	141.0	141.0	25.58	65.6	1, 2, 3
PERC	PE Rail Loading Silos	98.4	98.4	98.4	187.0	187.0	22.88	87.0	1, 2, 3
PETK	PE Truck Loading Silos	213.2	196.8	204.8	151.0	151.0	47.64	70.2	1, 2, 3
PEU1	LDPE Vents	313.2	98.4	175.6	45.0	45.0	40.83	20.9	1, 2, 3
PEU2	LDPE Vents	213.2	164.0	187.0	145.0	145.0	43.49	67.4	1, 2, 3
PEU3	HDPE Vents	213.2	164.0	187.0	150.0	150.0	43.49	69.8	1, 2, 3

¹ Release height equal to top of structure as process is aspirated and emissions occur at the top of the structure.

² Sigma Y value calculated as the square root of the area divided by 4.3 (Table 3-1 of AERMOD User's Guide for single volume source).

³ Sigma Z values for elevated sources on or adjacent to a building calculated as the building height divided by 2.15 (Table 3-1 of AERMOD User's Guide for Elevated Source on or Adjacent to Building).

Truck Roadway Volume Source Parameter Calculation

Step 1: Adjusted Width of Road			
Two Lane Road Width (ft) of	$25 + 20 \text{ ft (6 m)}$	=	45 ft
Step 2: Height of Volume			
Vehicle height (ft) of	15	X 1.7 =	25.5 ft
Step 3: Initial Sigma Y (Horizontal Dimension)			
Adjusted road width (ft) of	45	/ 2.15 =	20.93 ft
Step 4: Initial Sigma Z (Vertical Dimension)			
Height of volume (ft) of	25.5	/ 2.15 =	11.86 ft
Step 5: Height of Release			
Height of volume (ft) of	25.5	/ 2 =	13 ft



Turbine Load Analysis

AERMOD ID	Description	UTM Easting ¹ (m)	UTM Northing ¹ (m)	Elevation (m)	Stack Height (m)	Stack Temperature (K)	Exit Velocity ² (m/s)	Stack Diameter (m)	Modeled Emission Rate ² (g/s)
CT1_100	Combustion Turbine 100% Load	555945.76	4502058.51	242.32	64.92	428.15	24.08	3.048	1.26E-01
CT1_75	Combustion Turbine 75% Load	555945.76	4502058.51	242.32	64.92	428.15	19.26	3.048	9.45E-02
CT1_45	Combustion Turbine 45% Load	555945.76	4502058.51	242.32	64.92	428.15	14.45	3.048	5.67E-02
CT2_100	Combustion Turbine 100% Load	555991.73	4502098.68	242.32	64.92	428.15	24.08	3.048	1.26E-01
CT2_75	Combustion Turbine 75% Load	555991.73	4502098.68	242.32	64.92	428.15	19.26	3.048	9.45E-02
CT2_45	Combustion Turbine 45% Load	555991.73	4502098.68	242.32	64.92	428.15	14.45	3.048	5.67E-02
CT3_100	Combustion Turbine 100% Load	556038.01	4502138.02	242.32	64.92	428.15	24.08	3.048	1.26E-01
CT3_75	Combustion Turbine 75% Load	556038.01	4502138.02	242.32	64.92	428.15	19.26	3.048	9.45E-02
CT3_45	Combustion Turbine 45% Load	556038.01	4502138.02	242.32	64.92	428.15	14.45	3.048	5.67E-02

¹ Coordinates reflect UTM NAD83, Zone 17.

² Emissions are approximately linear with load. Flow and velocity are not.



Furnace Operating Mode Analysis – Modeled Stack Parameters

AERMOD ID	Description	UTM Easting ¹ (m)	UTM Northing ¹ (m)	Elevation (m)	Stack Height (m)	Stack Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)	Event Duration (hr/event)	Frequency (events/yr)
MAX_NORM	Furnace Normal Mode (Max Ops)	555502.11	4502199.00	242.32	83.82	396.26	12.25	2.591	-	-
MIN_NORM	Furnace Normal Mode (Min Ops)	555502.11	4502199.00	242.32	83.82	383.15	6.55	2.591	-	-
DECOKE	Furnace Decoking Mode	555502.11	4502199.00	242.32	83.82	449.15	9.11	2.591	36	12
FEDINOUT	Furnace Feed in Feed out Mode	555502.11	4502199.00	242.32	83.82	417.65	9.81	2.591	2	12
HOTSTNBY	Furnace Hot Steam Standby	555502.11	4502199.00	242.32	83.82	439.15	7.50	2.591	60	12
SUSD ²	Furnace Startup Shutdown	555502.11	4502199.00	242.32	83.82	347.26	9.88	2.591	24	1

¹ Location of Furnace #1 was modeled for all scenarios. Coordinates reflect UTM NAD83, Zone 17.

² Start-up and shutdowns only occur once per year and typically last 24 hours. This mode was not evaluated for 1-hour NO₂ given the frequency and duration.

Furnace Operating Mode Analysis – Modeled Emission Rates

AERMOD ID	Description	CO (lb/hr)	CO (g/s)	Hourly NO ₂ ¹ (lb/hr)	Hourly NO ₂ ¹ (g/s)	Annual NO _x ¹ (lb/hr)	Annual NO _x ¹ (g/s)	24-Hour PM ₁₀ (lb/hr)	24-Hour PM ₁₀ (g/s)	Annual PM ₁₀ (lb/hr)	Annual PM ₁₀ (g/s)
MAX_NORM	Furnace Normal Mode (Max Ops)	21.70	2.73E+00	9.30	1.17E+00	5.91	7.45E-01	3.10	3.91E-01	2.83	3.57E-01
MIN_NORM	Furnace Normal Mode (Min Ops)	13.58	1.71E+00	5.16	6.50E-01	3.55	4.47E-01	1.65	2.08E-01	1.41	1.78E-01
DECOKE	Furnace Decoking Mode	52.20	6.58E+00	2.70	3.40E-01	0.13	1.68E-02	1.86	2.34E-01	0.09	1.16E-02
FEDINOUT	Furnace Feed in Feed out Mode	9.70	1.22E+00	4.16	5.24E-01	0.01	1.43E-03	1.39	1.75E-01	0.004	4.78E-04
HOTSTNBY	Furnace Hot Steam Standby	6.06	7.63E-01	4.33	5.45E-01	0.36	4.50E-02	0.87	1.09E-01	0.07	9.00E-03
SUSD ²	Furnace Startup Shutdown	25.09	3.16E+00	-	-	0.04	5.37E-03	0.43	5.45E-02	0.001	1.49E-04

¹ The pollutant "NO₂" represents worst-case short-term emissions. The pollutant "NO_x" represents annual emissions.

² Start-up and shutdowns only occur once per year and typically last 24 hours. This mode was not evaluated for 1-hour NO₂ given the frequency and duration.



Worst-Case Furnace Analysis

AERMOD ID	Description	UTM Easting ¹ (m)	UTM Northing ¹ (m)	Elevation (m)	Stack Height (m)	Stack Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)	Modeled Emission Rate (g/s)
EC#1	Ethane Cracking Furnace #1	555502.11	4502199.00	242.32	83.82	449.15	9.11	2.591	1.26E-01
EC#2	Ethane Cracking Furnace #2	555512.76	4502186.65	242.32	83.82	449.15	9.11	2.591	1.26E-01
EC#3	Ethane Cracking Furnace #3	555534.48	4502160.24	242.32	83.82	449.15	9.11	2.591	1.26E-01
EC#4	Ethane Cracking Furnace #4	555545.98	4502148.32	242.32	83.82	449.15	9.11	2.591	1.26E-01
EC#5	Ethane Cracking Furnace #5	555561.73	4502131.29	242.32	83.82	449.15	9.11	2.591	1.26E-01
EC#6	Ethane Cracking Furnace #6	555572.81	4502118.51	242.32	83.82	449.15	9.11	2.591	1.26E-01
EC#7	Ethane Cracking Furnace #7	555590.27	4502098.92	242.32	83.82	449.15	9.11	2.591	1.26E-01

¹ Coordinates reflect UTM NAD83, Zone 17.



Off-Site Inventory for NAAQS Analysis - CO

AERMOD ID	Description	Source Type	UTM Easting ¹ (m)	UTM Northing ¹ (m)	Elevation (m)	Stack Height (m)	Stack Temp. (K)	Exit Velocity (m/s)	Stack Diameter (m)	CO Emission Rate (g/s)
BASF_S01	BASF Thermal Oxidation Unit	POINT	555260.00	4501187.00	226.60	22.86	953.71	4.71	1.46	2.96E-01
BASF_S032	BASF Cleaver Brooks Boiler #2	POINT	555223.82	4501190.03	226.60	4.57	512.59	17.22	0.61	1.46E-01
BASF_S031	BASF Cleaver Brooks Boiler #1	POINT	555230.83	4501184.04	226.60	4.57	512.59	17.22	0.61	1.46E-01
BS_S031	BVPV BOILERS 1-6 STACK	POINT	554357.37	4500741.91	230.12	11.28	430.93	6.31	0.98	3.26E-01
BS_S037	BVPV BOILERS 7-12 STACK	POINT	554359.98	4500738.23	230.12	11.28	430.93	6.31	0.98	3.26E-01
BS_S112	BVPV DIRECT FIRED T/O BACKUP	POINTCAP	553885.07	4500511.25	230.12	19.81	1033.15	8.13	3.35	2.11E+00
SG_S13	Stoelzle FIRE SUPPRESSION BOILER STACK	POINT	560538.00	4504631.00	226.47	6.00	422.04	1.72	0.61	2.77E-02
SG_S103	Stoelzle MELT TANK CADF STACK	POINT	560668.00	4504653.00	224.64	15.24	521.48	17.00	1.13	3.15E-01
SG_OTH01	Stoelzle	POINT	560712.40	4504613.69	224.64	22.71	-0.18	10.33	1.31	1.13E-02
SG_OTH03	Stoelzle	POINT	560720.59	4504602.26	224.64	22.71	-0.18	10.33	1.31	1.13E-02
SG_OTH02	Stoelzle	POINT	560715.80	4504612.65	224.64	22.71	-0.18	10.33	1.31	1.13E-02
SG_OTH14	Stoelzle	POINT	560711.83	4504654.06	224.64	17.77	-0.18	10.48	1.74	1.89E-02
SG_OTH13	Stoelzle	POINT	560713.01	4504658.75	224.64	17.77	-0.18	10.48	1.74	1.89E-02
SG_OTH15	Stoelzle	POINT	560717.96	4504652.30	224.64	17.77	-0.18	10.48	1.74	1.89E-02
SG_OTH04	Stoelzle	POINT	560741.41	4504604.06	224.64	17.13	-0.18	10.33	1.31	1.13E-02
SG_OTH11	Stoelzle	POINT	560726.46	4504636.77	224.64	23.29	-0.18	10.33	1.31	1.13E-02
SG_OTH10	Stoelzle	POINT	560730.20	4504636.07	224.64	23.29	-0.18	10.33	1.31	1.13E-02
SG_OTH16	Stoelzle	POINT	560723.84	4504650.57	224.64	17.77	-0.18	10.48	1.74	1.89E-02
SG_OTH12	Stoelzle	POINT	560718.42	4504664.22	224.64	17.74	-0.18	10.33	1.31	1.13E-02
SG_OTH06	Stoelzle	POINT	560743.59	4504613.34	224.64	17.13	-0.18	10.33	1.31	1.13E-02
SG_OTH05	Stoelzle	POINT	560751.24	4504601.68	224.64	17.13	-0.18	10.33	1.31	1.13E-02
SG_OTH17	Stoelzle	POINT	560729.72	4504649.43	224.64	17.77	-0.18	10.48	1.74	1.89E-02
SG_OTH08	Stoelzle	POINT	560746.21	4504623.56	224.64	17.13	-0.18	10.33	1.31	1.13E-02
SG_OTH18	Stoelzle	POINT	560736.22	4504647.83	224.64	17.77	-0.18	10.48	1.74	1.89E-02
SG_OTH07	Stoelzle	POINT	560753.48	4504610.65	224.64	17.13	-0.18	10.33	1.31	1.13E-02
SG_OTH09	Stoelzle	POINT	560748.38	4504632.31	224.64	17.13	-0.18	10.33	1.31	1.13E-02
NGC_S09	Gold Bond Board Dryer	POINT	548962.00	4497373.00	235.33	9.14	370.37	15.52	2.38	1.35E+00



Off-Site Inventory for NAAQS Analysis - CO

AERMOD ID	Description	Source Type	UTM Easting ¹ (m)	UTM Northing ¹ (m)	Elevation (m)	Stack Height (m)	Stack Temp. (K)	Exit Velocity (m/s)	Stack Diameter (m)	CO Emission Rate (g/s)
NGC_S100	Gold Bond IMP Mill	POINT	548962.00	4497373.00	235.33	9.14	449.82	16.18	0.61	2.31E-01
NGC_S11	Gold Bond Cage Mill	POINT	548962.00	4497373.00	235.33	6.10	366.48	18.71	1.74	2.73E-01
FEBV_S01	Energy Harbor Beaver Valley Aux Boil A	POINT	548011.90	4497013.10	223.87	37.19	589.26	5.21	2.13	2.13E-01
FEBV_S02	Energy Harbor Beaver Valley Aux Boil B	POINT	548011.90	4497013.10	223.87	37.19	589.26	5.21	2.13	2.13E-01
FEBVS101	Energy Harbor Beaver Valley Emg Dies Eng	POINT	548011.90	4497013.10	223.87	6.10	608.15	0.01	0.30	4.24E+00
FEBVS102	Energy Harbor Beaver Valley Emg Dies Eng	POINT	548011.90	4497013.10	223.87	6.10	608.15	0.01	0.30	4.24E+00
FEBVS103	Energy Harbor Beaver Valley Emg Dies Eng	POINT	548011.90	4497013.10	223.87	6.10	755.37	0.01	0.30	4.70E+00
FEBVS104	Energy Harbor Beaver Valley Emg Dies Eng	POINT	548011.90	4497013.10	223.87	6.10	755.37	0.01	0.30	4.70E+00
FEBVS105	Energy Harbor Beaver Valley Emg Res Gen	POINT	548011.90	4497013.10	223.87	3.05	810.93	0.01	0.30	4.24E+00
USGYP_S1	US Gypsum S1	POINT	564090.67	4497863.46	225.77	16.46	368.15	15.30	2.59	2.77E+00
USGYP_S2	US Gypsum #1 Kettle	POINT	564090.67	4497863.46	225.77	29.57	588.71	42.37	0.43	2.72E-01
USGYP_S3	US Gypsum #2 Kettle	POINT	564090.67	4497863.46	225.77	29.87	588.71	42.37	0.43	2.72E-01
USGYP_S4	US Gypsum #1 Dryer Mill	POINT	564090.67	4497863.46	225.77	30.48	377.59	15.73	1.55	3.23E-01
USGYP_S5	US Gypsum #2 Dryer Mill	POINT	564090.67	4497863.46	225.77	30.48	377.59	15.73	1.55	3.23E-01
USGYP_S6	US Gypsum Gauging Water Heater	POINT	564090.67	4497863.46	225.77	7.62	588.71	15.97	0.27	5.17E-02
JEWLS206	Allegheny & Tsingshan Annealing	POINT	545579.00	4498791.00	236.22	3.05	422.04	0.01	0.30	7.26E-01
JEWLS209	Allegheny & Tsingshan Boiler 1	POINT	545579.00	4498791.00	236.22	3.05	449.82	0.01	0.30	3.04E-01
JEWLS210	Allegheny & Tsingshan Boiler 2	POINT	545579.00	4498791.00	236.22	3.05	310.37	0.01	0.30	3.46E-01
JEWLZ050	Allegheny & Tsingshan Heaters	POINT	545579.00	4498791.00	236.22	3.05	422.04	0.01	0.30	2.08E-01
PADEP7	IPSCO Koppel Rot Hearth	POINT	565068.00	4495454.00	228.74	38.10	699.98	0.17	3.29	1.91E+00
PADEP8	IPSCO Koppel Quench	POINT	565068.00	4495454.00	228.74	16.46	754.98	0.04	1.22	3.94E-01
PADEP9	IPSCO Koppel Temper Furnace	POINT	565068.00	4495454.00	228.74	16.46	754.98	0.04	1.22	4.36E-01
PADEP10	IPSCO Koppel Reheat	POINT	565068.00	4495454.00	228.74	16.46	918.98	0.04	1.22	3.11E-01
PADEP11	IPSCO Koppel Misc Heaters	POINT	565068.00	4495454.00	228.74	16.46	754.98	4.29	1.22	8.32E-02
PADEP12	BEAVER FALLS TUBULAR PRODLLC/BEAVER FALLS	POINT	556288.00	4514679.00	281.26	1.01	-0.02	0.00	0.00	4.78E-01
DOM_S01	Eastern Gas Transmission Eng 1	POINT	558671.00	4518753.00	373.29	15.85	644.26	7.19	0.91	2.31E+00
DOM_S02	Eastern Gas Transmission Eng 2	POINT	558671.00	4518753.00	373.29	15.85	644.26	7.19	0.91	2.31E+00
DOM_S03	Eastern Gas Transmission Eng 3	POINT	558671.00	4518753.00	373.29	15.85	644.26	7.19	0.91	2.31E+00



Off-Site Inventory for NAAQS Analysis - CO

AERMOD ID	Description	Source Type	UTM Easting ¹ (m)	UTM Northing ¹ (m)	Elevation (m)	Stack Height (m)	Stack Temp. (K)	Exit Velocity (m/s)	Stack Diameter (m)	CO Emission Rate (g/s)
DOM_S04	Eastern Gas Transmission Eng 4	POINT	558671.00	4518753.00	373.29	15.85	644.26	7.19	0.91	2.31E+00
PADEP23	EASTERN GAS TRANSMISSION & STORAGE	POINT	558671.00	4518753.00	375.66	1.01	-0.18	0.00	0.00	1.64E-02
IPSC_S05A	IPSCO Koppel Melt Shop	POINT	557297.50	4520629.10	271.09	30.48	338.71	17.43	3.05	6.30E+00
IPSC_S05B	IPSCO Koppel Melt Shop	POINT	557303.60	4520629.42	271.09	30.48	338.71	17.43	3.05	6.30E+00
IPSC_S05C	IPSCO Koppel Melt Shop	POINT	557309.70	4520629.74	271.09	30.48	338.71	17.43	3.05	6.30E+00
IPSC_S05D	IPSCO Koppel Melt Shop	POINT	557315.80	4520630.07	271.09	30.48	338.71	17.43	3.05	6.30E+00
IPSC_S05E	IPSCO Koppel Melt Shop	POINT	557321.90	4520630.39	271.09	30.48	338.71	17.43	3.05	6.30E+00
IPSC_S05F	IPSCO Koppel Melt Shop	POINT	557328.00	4520630.71	271.09	30.48	338.71	17.43	3.05	6.30E+00
IPSC_S05G	IPSCO Koppel Melt Shop	POINT	557334.10	4520631.03	271.09	30.48	338.71	17.43	3.05	6.30E+00
IPSC_S05H	IPSCO Koppel Melt Shop	POINT	557340.20	4520631.36	271.09	30.48	338.71	17.43	3.05	6.30E+00
IPSC_S05I	IPSCO Koppel Melt Shop	POINT	557346.30	4520631.68	271.09	30.48	338.71	17.43	3.05	6.30E+00
IPSC_S05J	IPSCO Koppel Melt Shop	POINT	557352.40	4520632.00	271.09	30.48	338.71	17.43	3.05	6.30E+00
IPSC_S02	IPSCO Koppel Aus Furnace	POINT	557468.00	4520732.00	270.64	16.46	755.37	3.10	1.22	1.26E-02
IPSC_S03	IPSCO Koppel Var Heaters	POINT	557468.00	4520732.00	270.64	16.46	755.37	4.29	1.22	2.70E-01
IPSC_S04	IPSCO Koppel Temper Furnace	POINT	557468.00	4520732.00	270.64	16.46	755.37	4.29	1.22	2.77E-02

¹ Coordinates reflect UTM NAD83, Zone 17.



Off-Site Inventory for NAAQS and Class II PSD Increment Analyses – PM₁₀

AERMOD ID	Description	Source Type	UTM Easting ¹ (m)	UTM Northing ¹ (m)	Elevation (m)	Stack Height (m)	Stack Temp. (K)	Exit Velocity (m/s)	Stack Diameter (m)	PM ₁₀ Emission Rate (g/s)
BASF_S01	BASF Thermal Oxidation Unit	POINT	555260.00	4501187.00	226.60	22.86	953.71	4.71	1.46	2.65E-02
BASF_S032	BASF Cleaver Brooks Boiler #2	POINT	555223.82	4501190.03	226.60	4.57	512.59	17.22	0.61	5.17E-02
BASF_S031	BASF Cleaver Brooks Boiler #1	POINT	555230.83	4501184.04	226.60	4.57	512.59	17.22	0.61	5.17E-02
BS_S031	BVPV BOILERS 1-6 STACK	POINT	554357.37	4500741.91	230.12	11.28	430.93	6.31	0.98	6.55E-02
BS_S037	BVPV BOILERS 7-12 STACK	POINT	554359.98	4500738.23	230.12	11.28	430.93	6.31	0.98	6.55E-02
BS_S112	BVPV DIRECT FIRED T/O BACKUP	POINTCAP	553885.07	4500511.25	230.12	19.81	1033.15	8.13	3.35	7.43E-02
SG_S13	Stoelzle FIRE SUPPRESSION BOILER STACK	POINT	560538.00	4504631.00	226.47	6.00	422.04	1.72	0.61	5.72E-04
SG_S103	Stoelzle MELT TANK CADF STACK	POINT	560668.00	4504653.00	224.64	15.24	521.48	17.00	1.13	7.41E-01
SG_OTH01	Stoelzle	POINT	560712.40	4504613.69	224.64	22.71	-0.18	10.33	1.31	2.44E-04
SG_OTH03	Stoelzle	POINT	560720.59	4504602.26	224.64	22.71	-0.18	10.33	1.31	2.44E-04
SG_OTH02	Stoelzle	POINT	560715.80	4504612.65	224.64	22.71	-0.18	10.33	1.31	2.44E-04
SG_OTH14	Stoelzle	POINT	560711.83	4504654.06	224.64	17.77	-0.18	10.48	1.74	4.23E-04
SG_OTH13	Stoelzle	POINT	560713.01	4504658.75	224.64	17.77	-0.18	10.48	1.74	4.23E-04
SG_OTH15	Stoelzle	POINT	560717.96	4504652.30	224.64	17.77	-0.18	10.48	1.74	4.23E-04
SG_OTH04	Stoelzle	POINT	560741.41	4504604.06	224.64	17.13	-0.18	10.33	1.31	2.44E-04
SG_OTH11	Stoelzle	POINT	560726.46	4504636.77	224.64	23.29	-0.18	10.33	1.31	2.44E-04
SG_OTH10	Stoelzle	POINT	560730.20	4504636.07	224.64	23.29	-0.18	10.33	1.31	2.44E-04
SG_OTH16	Stoelzle	POINT	560723.84	4504650.57	224.64	17.77	-0.18	10.48	1.74	4.23E-04
SG_OTH12	Stoelzle	POINT	560718.42	4504664.22	224.64	17.74	-0.18	10.33	1.31	2.44E-04
SG_OTH06	Stoelzle	POINT	560743.59	4504613.34	224.64	17.13	-0.18	10.33	1.31	2.44E-04
SG_OTH05	Stoelzle	POINT	560751.24	4504601.68	224.64	17.13	-0.18	10.33	1.31	2.44E-04
SG_OTH17	Stoelzle	POINT	560729.72	4504649.43	224.64	17.77	-0.18	10.48	1.74	4.23E-04
SG_OTH08	Stoelzle	POINT	560746.21	4504623.56	224.64	17.13	-0.18	10.33	1.31	2.44E-04
SG_OTH18	Stoelzle	POINT	560736.22	4504647.83	224.64	17.77	-0.18	10.48	1.74	4.23E-04
SG_OTH07	Stoelzle	POINT	560753.48	4504610.65	224.64	17.13	-0.18	10.33	1.31	2.44E-04
SG_OTH09	Stoelzle	POINT	560748.38	4504632.31	224.64	17.13	-0.18	10.33	1.31	2.44E-04
PADEP1	SHERWIN WILLIAMS CO/ROCHESTER	POINT	560136.00	4506973.00	277.00	1.01	343.98	0.00	0.00	2.33E-01
PADEP2	SHERWIN WILLIAMS CO/ROCHESTER	POINT	560136.00	4506973.00	359.55	9.14	449.98	0.29	0.46	3.52E-02
NGC_S09	Gold Bond Board Dryer	POINT	548962.00	4497373.00	235.33	9.14	370.37	15.52	2.38	2.90E-01
NGC_S100	Gold Bond IMP Mill	POINT	548962.00	4497373.00	235.33	9.14	449.82	16.18	0.61	4.79E-01
NGC_S11	Gold Bond Cage Mill	POINT	548962.00	4497373.00	235.33	6.10	366.48	18.71	1.74	6.31E-01
NGC_S201	Gold Bond Board Trim	POINT	548962.00	4497373.00	235.33	17.98	294.26	11.87	0.52	1.65E-01
NGC_S202	Gold Bond Riser Maker	POINT	548962.00	4497373.00	235.33	17.98	294.26	3.96	0.52	2.77E-02
NGC_S203	Gold Bond Catenary	POINT	548962.00	4497373.00	235.33	17.98	294.26	14.09	0.46	2.77E-02



Off-Site Inventory for NAAQS and Class II PSD Increment Analyses – PM₁₀

AERMOD ID	Description	Source Type	UTM Easting ¹ (m)	UTM Northing ¹ (m)	Elevation (m)	Stack Height (m)	Stack Temp. (K)	Exit Velocity (m/s)	Stack Diameter (m)	PM ₁₀ Emission Rate (g/s)
NGC_S204	Gold Bond Board Plant	POINT	548962.00	4497373.00	235.33	13.72	294.26	18.97	0.46	3.65E-02
NGC_S205	Gold Bond Starch Storage	POINT	548962.00	4497373.00	235.33	18.29	294.26	5.17	0.30	3.78E-03
NGC_SZ01	Gold Bond Raw Material Storage	POINT	548962.00	4497373.00	235.33	3.05	297.04	0.01	0.30	2.39E-01
NGC_SZ10	Gold Bond Roads	POINT	548962.00	4497373.00	235.33	3.05	294.26	0.01	0.30	3.94E-01
NGCSZ206	Gold Bond Mat Hand Fugitives	POINT	548962.00	4497373.00	235.33	0.30	294.26	0.01	0.30	2.55E-01
FEBV_S01	Energy Harbor Beaver Valley Aux Boil A	POINT	548011.90	4497013.10	223.87	37.19	589.26	5.21	2.13	8.44E-02
FEBV_S02	Energy Harbor Beaver Valley Aux Boil B	POINT	548011.90	4497013.10	223.87	37.19	589.26	5.21	2.13	8.44E-02
FEBVS101	Energy Harbor Beaver Valley Emg Dies Eng	POINT	548011.90	4497013.10	223.87	6.10	608.15	0.01	0.30	1.38E+00
FEBVS102	Energy Harbor Beaver Valley Emg Dies Eng	POINT	548011.90	4497013.10	223.87	6.10	608.15	0.01	0.30	1.38E+00
FEBVS103	Energy Harbor Beaver Valley Emg Dies Eng	POINT	548011.90	4497013.10	223.87	6.10	755.37	0.01	0.30	1.53E+00
FEBVS104	Energy Harbor Beaver Valley Emg Dies Eng	POINT	548011.90	4497013.10	223.87	6.10	755.37	0.01	0.30	1.53E+00
FEBVS105	Energy Harbor Beaver Valley Emg Res Gen	POINT	548011.90	4497013.10	223.87	3.05	810.93	0.01	0.30	1.38E+00
FEBVS106	Energy Harbor Beaver Valley Shot Blast	POINT	548011.90	4497013.10	223.87	3.05	294.26	0.01	0.30	7.70E-01
USGYP_S1	US Gypsum S1	POINT	564090.67	4497863.46	225.77	16.46	368.15	15.30	2.59	3.57E+00
USGYP_S2	US Gypsum #1 Kettle	POINT	564090.67	4497863.46	225.77	29.57	588.71	42.37	0.43	1.01E-01
USGYPS20	US Gypsum End Saw	POINT	564090.67	4497863.46	225.77	20.73	294.26	28.75	0.46	4.32E-01
USGYS200	US Gypsum #1 DC Balance	POINT	564090.67	4497863.46	225.77	30.18	333.15	0.01	0.61	1.21E+00
USGYPS21	US Gypsum #1 Dunnage	POINT	564090.67	4497863.46	225.77	20.73	294.26	28.75	0.46	4.32E-01
USGYP_S3	US Gypsum #2 Kettle	POINT	564090.67	4497863.46	225.77	29.87	588.71	42.37	0.43	1.01E-01
USGYP_S4	US Gypsum #1 Dryer Mill	POINT	564090.67	4497863.46	225.77	30.48	377.59	15.73	1.55	6.94E-01
USGYP_S5	US Gypsum #2 Dryer Mill	POINT	564090.67	4497863.46	225.77	30.48	377.59	15.73	1.55	6.94E-01
USGYP_S6	US Gypsum Gauging Water Heater	POINT	564090.67	4497863.46	225.77	7.62	588.71	15.97	0.27	2.52E-01
USGYP_Z01	US Gypsum Paved Road Fug Emissions	POINT	564090.67	4497863.46	225.77	3.05	294.26	0.01	0.30	1.26E-02
JEWLS202	Allegheny & Tsingshan Shot Blaster	POINT	545579.00	4498791.00	236.22	3.05	297.04	0.01	0.30	1.51E-02
JEWLS205	Allegheny & Tsingshan Cold Reduction	POINT	545579.00	4498791.00	236.22	3.05	366.48	0.01	0.30	2.65E-01
JEWLS206	Allegheny & Tsingshan Annealing	POINT	545579.00	4498791.00	236.22	3.05	422.04	0.01	0.30	1.39E-01
JEWLS209	Allegheny & Tsingshan Boiler 1	POINT	545579.00	4498791.00	236.22	3.05	449.82	0.01	0.30	2.77E-02
JEWLS210	Allegheny & Tsingshan Boiler 2	POINT	545579.00	4498791.00	236.22	3.05	310.37	0.01	0.30	3.15E-02
JEWLZ050	Allegheny & Tsingshan Heaters	POINT	545579.00	4498791.00	236.22	3.05	422.04	0.01	0.30	1.89E-02
JEWLZ182	Allegheny & Tsingshan Roads	POINT	545579.00	4498791.00	236.22	3.05	293.15	0.01	0.30	6.39E-01
PADEP7	IPSCO Koppel Rot Hearth	POINT	565068.00	4495454.00	228.74	38.10	699.98	0.17	3.29	1.73E-01
PADEP8	IPSCO Koppel Quench	POINT	565068.00	4495454.00	228.74	16.46	754.98	0.04	1.22	3.53E-02
PADEP9	IPSCO Koppel Temper Furnace	POINT	565068.00	4495454.00	228.74	16.46	754.98	0.04	1.22	3.91E-02



Off-Site Inventory for NAAQS and Class II PSD Increment Analyses – PM₁₀

AERMOD ID	Description	Source Type	UTM Easting ¹ (m)	UTM Northing ¹ (m)	Elevation (m)	Stack Height (m)	Stack Temp. (K)	Exit Velocity (m/s)	Stack Diameter (m)	PM ₁₀ Emission Rate (g/s)
PADEP10	IPSCO Koppel Reheat	POINT	565068.00	4495454.00	228.74	16.46	918.98	0.04	1.22	2.77E-02
PADEP11	IPSCO Koppel Misc Heaters	POINT	565068.00	4495454.00	228.74	16.46	754.98	4.29	1.22	7.56E-03
PADEP12	BEAVER FALLS TUBULAR PRODLLC/BEAVER FALLS	POINT	556288.00	4514679.00	281.26	1.01	-0.02	0.00	0.00	4.28E-02
PADEP15	BEAVER FALLS TUBULAR PRODLLC/BEAVER FALLS	POINT	556288.00	4514679.00	281.26	1.01	365.98	0.00	0.00	9.58E-03
PADEP16	BEAVER FALLS TUBULAR PRODLLC/BEAVER FALLS	POINT	556288.00	4514679.00	281.26	1.01	365.98	0.00	0.00	9.58E-03
PADEP17	BEAVER FALLS TUBULAR PRODLLC/BEAVER FALLS	POINT	556288.00	4514679.00	281.26	1.01	365.98	0.00	0.00	2.67E-01
DOM_S01	Eastern Gas Transmission Eng 1	POINT	558671.00	4518753.00	373.29	15.85	644.26	7.19	0.91	1.44E-01
DOM_S02	Eastern Gas Transmission Eng 2	POINT	558671.00	4518753.00	373.29	15.85	644.26	7.19	0.91	1.44E-01
DOM_S03	Eastern Gas Transmission Eng 3	POINT	558671.00	4518753.00	373.29	15.85	644.26	7.19	0.91	1.44E-01
DOM_S04	Eastern Gas Transmission Eng 4	POINT	558671.00	4518753.00	373.29	15.85	644.26	7.19	0.91	1.44E-01
PADEP23	EASTERN GAS TRANSMISSION & STORAGE	POINT	558671.00	4518753.00	375.66	1.01	-0.18	0.00	0.00	7.56E-03
IPSC_S05A	IPSCO Koppel Melt Shop	POINT	557297.50	4520629.10	271.09	30.48	338.71	17.43	3.05	2.17E-01
IPSC_S05B	IPSCO Koppel Melt Shop	POINT	557303.60	4520629.42	271.09	30.48	338.71	17.43	3.05	2.17E-01
IPSC_S05C	IPSCO Koppel Melt Shop	POINT	557309.70	4520629.74	271.09	30.48	338.71	17.43	3.05	2.17E-01
IPSC_S05D	IPSCO Koppel Melt Shop	POINT	557315.80	4520630.07	271.09	30.48	338.71	17.43	3.05	2.17E-01
IPSC_S05E	IPSCO Koppel Melt Shop	POINT	557321.90	4520630.39	271.09	30.48	338.71	17.43	3.05	2.17E-01
IPSC_S05F	IPSCO Koppel Melt Shop	POINT	557328.00	4520630.71	271.09	30.48	338.71	17.43	3.05	2.17E-01
IPSC_S05G	IPSCO Koppel Melt Shop	POINT	557334.10	4520631.03	271.09	30.48	338.71	17.43	3.05	2.17E-01
IPSC_S05H	IPSCO Koppel Melt Shop	POINT	557340.20	4520631.36	271.09	30.48	338.71	17.43	3.05	2.17E-01
IPSC_S05I	IPSCO Koppel Melt Shop	POINT	557346.30	4520631.68	271.09	30.48	338.71	17.43	3.05	2.17E-01
IPSC_S05J	IPSCO Koppel Melt Shop	POINT	557352.40	4520632.00	271.09	30.48	338.71	17.43	3.05	2.17E-01
IPSC_S02	IPSCO Koppel Aus Furnace	POINT	557468.00	4520732.00	270.64	16.46	755.37	3.10	1.22	1.51E+00
IPSC_S03	IPSCO Koppel Var Heaters	POINT	557468.00	4520732.00	270.64	16.46	755.37	4.29	1.22	2.52E-02
IPSC_S04	IPSCO Koppel Temper Furnace	POINT	557468.00	4520732.00	270.64	16.46	755.37	4.29	1.22	8.57E-01
IPSCS09B	IPSCO Koppel Mill Piercing	POINT	557458.00	4520772.00	270.42	3.05	533.15	0.01	0.30	2.47E+00
PADEP34	Lindy Paving Inc/Koppel	POINT	553473.00	4521245.00	366.13	12.19	435.98	20.12	1.22	1.32E+00
PADEP35	Lindy Paving Inc/Koppel	POINT	553473.00	4521245.00	366.13	1.01	-0.02	0.00	0.00	1.21E-01
PADEP36	Lindy Paving Inc/Koppel	POINT	553473.00	4521245.00	366.13	1.01	-0.02	0.00	0.00	7.43E-03
PADEP37	Lindy Paving Inc/Koppel	POINT	553473.00	4521245.00	366.13	1.01	-0.02	0.00	0.00	7.43E-03
PADEP38	Lindy Paving Inc/Koppel	POINT	553473.00	4521245.00	366.13	1.01	-0.02	0.00	0.00	7.43E-03
PADEP39	Lindy Paving Inc/Koppel	POINT	553473.00	4521245.00	366.13	1.01	-0.02	0.00	0.00	7.43E-03
PADEP40	Lindy Paving Inc/Koppel	POINT	553473.00	4521245.00	366.13	1.01	-0.02	0.00	0.00	1.89E-03



Off-Site Inventory for NAAQS and Class II PSD Increment Analyses – PM₁₀

AERMOD ID	Description	Source Type	UTM Easting ¹ (m)	UTM Northing ¹ (m)	Elevation (m)	Stack Height (m)	Stack Temp. (K)	Exit Velocity (m/s)	Stack Diameter (m)	PM ₁₀ Emission Rate (g/s)
PADEP41	COLUMBIA GAS TRANS CORP/ELLWOOD CITY	POINT	562988.00	4520462.00	262.53	1.01	-0.02	0.00	0.00	2.39E-03
PADEP42	COLUMBIA GAS TRANS CORP/ELLWOOD CITY	POINT	562988.00	4520462.00	262.53	12.19	532.98	34.75	0.61	4.66E-03
PADEP43	COLUMBIA GAS TRANS CORP/ELLWOOD CITY	POINT	562988.00	4520462.00	262.53	12.19	532.98	34.75	0.61	4.66E-03
PADEP44	COLUMBIA GAS TRANS CORP/ELLWOOD CITY	POINT	562988.00	4520462.00	262.53	1.01	365.98	0.00	0.00	1.26E-04
PADEP46	COLUMBIA GAS TRANS CORP/ELLWOOD CITY	POINT	562988.00	4520462.00	262.53	0.30	292.98	0.01	0.30	1.01E-03

¹Coordinates reflect UTM NAD83, Zone 17.



Off-Site Inventory for NAAQS Analysis – 1-hour NO₂

AERMOD ID	Description	Source Type	UTM Easting ¹ (m)	UTM Northing ¹ (m)	Elevation (m)	Stack Height (m)	Stack Temp. (K)	Exit Velocity (m/s)	Stack Diameter (m)	1-hour NO ₂ Emission Rate (g/s)
BASF_S01	BASF Thermal Oxidation Unit	POINT	555260.00	4501187.00	226.60	22.86	953.71	4.71	1.46	9.45E-01
BASF_S032	BASF Cleaver Brooks Boiler #2	POINT	555223.82	4501190.03	226.60	4.57	512.59	17.22	0.61	1.27E-01
BASF_S031	BASF Cleaver Brooks Boiler #1	POINT	555230.83	4501184.04	226.60	4.57	512.59	17.22	0.61	1.27E-01
BS_S031	BVPV BOILERS 1-6 STACK	POINT	554357.37	4500741.91	230.12	11.28	430.93	6.31	0.98	1.29E-01
BS_S037	BVPV BOILERS 7-12 STACK	POINT	554359.98	4500738.23	230.12	11.28	430.93	6.31	0.98	1.29E-01
BS_S112	BVPV DIRECT FIRED T/O BACKUP	POINTCAP	553885.07	4500511.25	230.12	19.81	1033.15	8.13	3.35	7.56E-01
SG_S13	Stoelzle FIRE SUPPRESSION BOILER STACK	POINT	560538.00	4504631.00	226.47	6.00	422.04	1.72	0.61	3.28E-02
SG_S103	Stoelzle MELT TANK CADF STACK	POINT	560668.00	4504653.00	224.64	15.24	521.48	17.00	1.13	2.14E+00
SG_OTH01	Stoelzle	POINT	560712.40	4504613.69	224.64	22.71	-0.18	10.33	1.31	1.39E-02
SG_OTH03	Stoelzle	POINT	560720.59	4504602.26	224.64	22.71	-0.18	10.33	1.31	1.39E-02
SG_OTH02	Stoelzle	POINT	560715.80	4504612.65	224.64	22.71	-0.18	10.33	1.31	1.39E-02
SG_OTH14	Stoelzle	POINT	560711.83	4504654.06	224.64	17.77	-0.18	10.48	1.74	2.27E-02
SG_OTH13	Stoelzle	POINT	560713.01	4504658.75	224.64	17.77	-0.18	10.48	1.74	2.27E-02
SG_OTH15	Stoelzle	POINT	560717.96	4504652.30	224.64	17.77	-0.18	10.48	1.74	2.27E-02
SG_OTH04	Stoelzle	POINT	560741.41	4504604.06	224.64	17.13	-0.18	10.33	1.31	1.39E-02
SG_OTH11	Stoelzle	POINT	560726.46	4504636.77	224.64	23.29	-0.18	10.33	1.31	1.39E-02
SG_OTH10	Stoelzle	POINT	560730.20	4504636.07	224.64	23.29	-0.18	10.33	1.31	1.39E-02
SG_OTH16	Stoelzle	POINT	560723.84	4504650.57	224.64	17.77	-0.18	10.48	1.74	2.27E-02
SG_OTH12	Stoelzle	POINT	560718.42	4504664.22	224.64	17.74	-0.18	10.33	1.31	1.39E-02
SG_OTH06	Stoelzle	POINT	560743.59	4504613.34	224.64	17.13	-0.18	10.33	1.31	1.39E-02
SG_OTH05	Stoelzle	POINT	560751.24	4504601.68	224.64	17.13	-0.18	10.33	1.31	1.39E-02
SG_OTH17	Stoelzle	POINT	560729.72	4504649.43	224.64	17.77	-0.18	10.48	1.74	2.27E-02
SG_OTH08	Stoelzle	POINT	560746.21	4504623.56	224.64	17.13	-0.18	10.33	1.31	1.39E-02
SG_OTH18	Stoelzle	POINT	560736.22	4504647.83	224.64	17.77	-0.18	10.48	1.74	2.27E-02
SG_OTH07	Stoelzle	POINT	560753.48	4504610.65	224.64	17.13	-0.18	10.33	1.31	1.39E-02
SG_OTH09	Stoelzle	POINT	560748.38	4504632.31	224.64	17.13	-0.18	10.33	1.31	1.39E-02
PADEP2	SHERWIN WILLIAMS CO/ROCHESTER	POINT	560136.00	4506973.00	359.55	9.14	449.98	0.29	0.46	4.64E-01
NGC_S09	Gold Bond Board Dryer	POINT	548962.00	4497373.00	235.33	9.14	370.37	15.52	2.38	2.58E+00
NGC_S100	Gold Bond IMP Mill	POINT	548962.00	4497373.00	235.33	9.14	449.82	16.18	0.61	4.79E-01
NGC_S11	Gold Bond Cage Mill	POINT	548962.00	4497373.00	235.33	6.10	366.48	18.71	1.74	1.52E+00
FEBV_S01	Energy Harbor Beaver Valley Aux Boil A	POINT	548011.90	4497013.10	223.87	37.19	589.26	5.21	2.13	8.49E-01
FEBV_S02	Energy Harbor Beaver Valley Aux Boil B	POINT	548011.90	4497013.10	223.87	37.19	589.26	5.21	2.13	8.49E-01
USGYP_S1	US Gypsum S1	POINT	564090.67	4497863.46	225.77	16.46	368.15	15.30	2.59	9.40E-01
USGYP_S2	US Gypsum #1 Kettle	POINT	564090.67	4497863.46	225.77	29.57	588.71	42.37	0.43	5.30E-01



Off-Site Inventory for NAAQS Analysis – 1-hour NO₂

AERMOD ID	Description	Source Type	UTM Easting ¹ (m)	UTM Northing ¹ (m)	Elevation (m)	Stack Height (m)	Stack Temp. (K)	Exit Velocity (m/s)	Stack Diameter (m)	1-hour NO ₂ Emission Rate (g/s)
USGYP_S3	US Gypsum #2 Kettle	POINT	564090.67	4497863.46	225.77	29.87	588.71	42.37	0.43	5.30E-01
USGYP_S4	US Gypsum #1 Dryer Mill	POINT	564090.67	4497863.46	225.77	30.48	377.59	15.73	1.55	2.18E-01
USGYP_S5	US Gypsum #2 Dryer Mill	POINT	564090.67	4497863.46	225.77	30.48	377.59	15.73	1.55	2.18E-01
USGYP_S6	US Gypsum Gauging Water Heater	POINT	564090.67	4497863.46	225.77	7.62	588.71	15.97	0.27	6.17E-02
JEWLS209	Allegheny & Tsingshan Boiler 1	POINT	545579.00	4498791.00	236.22	3.05	449.82	0.01	0.30	3.69E-01
JEWLS210	Allegheny & Tsingshan Boiler 2	POINT	545579.00	4498791.00	236.22	3.05	310.37	0.01	0.30	4.22E-01
JEWLZ050	Allegheny & Tsingshan Heaters	POINT	545579.00	4498791.00	236.22	3.05	422.04	0.01	0.30	2.39E-01
PADEP7	IPSCO Koppel Rot Hearth	POINT	565068.00	4495454.00	228.74	38.10	699.98	0.17	3.29	3.97E+00
PADEP8	IPSCO Koppel Quench	POINT	565068.00	4495454.00	228.74	16.46	754.98	0.04	1.22	4.37E-01
PADEP9	IPSCO Koppel Temper Furnace	POINT	565068.00	4495454.00	228.74	16.46	754.98	0.04	1.22	4.37E-01
PADEP10	IPSCO Koppel Reheat	POINT	565068.00	4495454.00	228.74	16.46	918.98	0.04	1.22	4.37E-01
PADEP11	IPSCO Koppel Misc Heaters	POINT	565068.00	4495454.00	228.74	16.46	754.98	4.29	1.22	5.41E-01
PADEP12	BEAVER FALLS TUBULAR PRODLLC/BEAVER FALLS	POINT	556288.00	4514679.00	281.26	1.01	-0.02	0.00	0.00	2.52E-01
PADEP15	BEAVER FALLS TUBULAR PRODLLC/BEAVER FALLS	POINT	556288.00	4514679.00	281.26	1.01	365.98	0.00	0.00	1.26E-01
PADEP16	BEAVER FALLS TUBULAR PRODLLC/BEAVER FALLS	POINT	556288.00	4514679.00	281.26	1.01	365.98	0.00	0.00	1.26E-01
PADEP17	BEAVER FALLS TUBULAR PRODLLC/BEAVER FALLS	POINT	556288.00	4514679.00	281.26	1.01	365.98	0.00	0.00	2.52E-01
PADEP18	BEAVER FALLS TUBULAR PRODLLC/BEAVER FALLS	POINT	556288.00	4514679.00	281.26	1.01	-0.02	0.00	0.00	2.52E-01
DOM_S01	Eastern Gas Transmission Eng 1	POINT	558671.00	4518753.00	373.29	15.85	644.26	7.19	0.91	1.78E+00
DOM_S02	Eastern Gas Transmission Eng 2	POINT	558671.00	4518753.00	373.29	15.85	644.26	7.19	0.91	1.78E+00
DOM_S03	Eastern Gas Transmission Eng 3	POINT	558671.00	4518753.00	373.29	15.85	644.26	7.19	0.91	1.78E+00
DOM_S04	Eastern Gas Transmission Eng 4	POINT	558671.00	4518753.00	373.29	15.85	644.26	7.19	0.91	1.78E+00
PADEP23	EASTERN GAS TRANSMISSION & STORAGE INC/BEAVER	POINT	558671.00	4518753.00	375.66	1.01	-0.18	0.00	0.00	1.89E-01
PADEP24	EASTERN GAS TRANSMISSION & STORAGE INC/BEAVER	POINT	558671.00	4518753.00	375.66	1.01	-0.18	0.00	0.00	3.78E-02
PADEP25	EASTERN GAS TRANSMISSION & STORAGE INC/BEAVER	POINT	558671.00	4518753.00	375.66	1.01	-0.18	0.00	0.00	1.89E-02
PADEP26	EASTERN GAS TRANSMISSION & STORAGE INC/BEAVER	POINT	558671.00	4518753.00	375.66	1.01	-0.18	0.00	0.00	5.04E-04
PADEP27	HERITAGE THERMAL SERVICE	POINT	538346.17	4497947.28	213.57	1.01	-0.18	0.00	0.00	3.89E-01
PADEP28	HERITAGE THERMAL SERVICE	POINT	538346.17	4497947.28	213.57	1.01	-0.18	0.00	0.00	3.57E+00
PADEP29	IPSCO KOPPEL TUBULARS LLC/KOPPEL	POINT	557468.00	4520732.00	269.89	30.48	338.98	17.43	3.05	7.56E+00



Off-Site Inventory for NAAQS Analysis – 1-hour NO₂

AERMOD ID	Description	Source Type	UTM Easting ¹ (m)	UTM Northing ¹ (m)	Elevation (m)	Stack Height (m)	Stack Temp. (K)	Exit Velocity (m/s)	Stack Diameter (m)	1-hour NO ₂ Emission Rate (g/s)
PADEP30	IPSCO KOPPEL TUBULARS LLC/KOPPEL	POINT	557468.00	4520732.00	269.89	16.46	754.98	4.29	1.22	3.28E-01
PADEP31	IPSCO KOPPEL TUBULARS LLC/KOPPEL	POINT	557468.00	4520732.00	269.89	16.46	754.98	3.10	1.22	3.78E-01
PADEP32	IPSCO KOPPEL TUBULARS LLC/KOPPEL	POINT	557468.00	4520732.00	269.89	16.46	754.98	4.29	1.22	2.14E-01
PADEP33	IPSCO KOPPEL TUBULARS LLC/KOPPEL	POINT	557468.00	4520732.00	269.89	16.46	365.98	4.29	0.61	3.28E-01
PADEP34	Lindy Paving Inc/Koppel	POINT	553473.00	4521245.00	366.13	12.19	435.98	20.12	1.22	3.78E+00
PADEP40	Lindy Paving Inc/Koppel	POINT	553473.00	4521245.00	366.13	1.01	-0.02	0.00	0.00	2.52E-02
PADEP41	COLUMBIA GAS TRANS CORP/ELLWOOD CITY	POINT	562988.00	4520462.00	262.53	1.01	-0.02	0.00	0.00	3.15E-02
PADEP42	COLUMBIA GAS TRANS CORP/ELLWOOD CITY	POINT	562988.00	4520462.00	262.53	12.19	532.98	34.75	0.61	4.56E+00
PADEP43	COLUMBIA GAS TRANS CORP/ELLWOOD CITY	POINT	562988.00	4520462.00	262.53	12.19	532.98	34.75	0.61	4.56E+00
PADEP45	COLUMBIA GAS TRANS CORP/ELLWOOD CITY	POINT	562988.00	4520462.00	262.53	0.30	292.98	0.01	0.30	1.26E-02
PADEP47	NALCO Co. North/South	POINT	561169.00	4521433.00	268.51	7.62	365.98	13.00	0.21	1.61E-01
PADEP48	NALCO Co. North/South	POINT	561169.00	4521433.00	268.51	7.62	365.98	13.00	0.21	1.23E-01
PADEP49	NALCO Co. North/South	POINT	561169.00	4521433.00	268.51	7.62	365.98	13.00	0.21	1.23E-01
PADEP51	KAWNEER CO INC/CRANBERRY	POINT	575169.00	4506646.00	315.20	1.01	446.98	0.00	0.00	1.10E-01
PADEP52	KAWNEER CO INC/CRANBERRY TWP	POINT	575169.00	4506646.00	315.20	1.01	475.98	0.00	0.00	6.55E-02
PADEP53	KAWNEER CO INC/CRANBERRY	POINT	575169.00	4506646.00	315.20	1.01	419.98	0.00	0.00	9.07E-02
PADEP54	KAWNEER CO INC/CRANBERRY TWP	POINT	575169.00	4506646.00	315.20	1.01	293.98	0.00	0.00	6.30E-02
PADEP55	KAWNEER CO INC/CRANBERRY	POINT	575169.00	4506646.00	315.20	1.52	321.98	0.00	0.00	9.95E-01
PADEP56	KAWNEER CO INC/CRANBERRY TWP	POINT	575169.00	4506646.00	315.20	10.36	699.98	15.67	0.24	3.53E-02
PADEP57	KAWNEER CO INC/CRANBERRY	POINT	575169.00	4506646.00	315.20	1.83	321.98	0.00	0.00	6.30E-01
PADEP60	NALCO Co. North/South	POINT	561165.00	4522487.00	265.69	7.62	365.98	13.00	0.21	2.43E-01
PADEP61	NALCO Co. North/South	POINT	561165.00	4522487.00	265.69	1.01	365.98	0.00	0.00	1.21E-02
PADEP62	NALCO Co. North/South	POINT	561165.00	4522487.00	265.69	1.01	365.98	0.00	0.00	1.21E-02
PADEP63	BUCKEYE PIPELINE/CORAOPOLIS	POINT	569590.00	4486476.00	215.82	10.67	294.98	6.55	0.43	8.06E-03
PADEP64	BUCKEYE PIPELINE/CORAOPOLIS	POINT	569590.00	4486476.00	215.82	13.72	1271.98	21.08	0.21	6.01E-01
BNZ_21	BNZ Materials	POINT	571798.00	4516012.00	274.90	8.53	338.71	45.28	0.30	2.72E-01
BNZ_29	BNZ Materials	POINT	571798.00	4516012.00	274.90	10.06	463.71	6.47	0.30	3.35E-01
BNZ_31	BNZ Materials	POINT	571798.00	4516012.00	274.90	21.34	463.71	10.74	0.98	8.69E-02
BNZ_33	BNZ Materials	POINT	571798.00	4516012.00	274.90	10.67	463.71	6.21	0.76	1.26E-02
BNZ_34	BNZ Materials	POINT	571798.00	4516012.00	274.90	9.14	477.59	2.24	0.52	3.65E-02
PADEP65	BNZ MATERIALS INC/ZELIENOPLE	POINT	571798.00	4516012.00	273.07	1.52	477.98	0.00	0.00	2.65E-02
PADEP66	BNZ MATERIALS INC/ZELIENOPLE	POINT	571798.00	4516012.00	273.07	1.52	463.98	0.00	0.00	1.29E-01



Off-Site Inventory for NAAQS Analysis – 1-hour NO₂

AERMOD ID	Description	Source Type	UTM Easting ¹ (m)	UTM Northing ¹ (m)	Elevation (m)	Stack Height (m)	Stack Temp. (K)	Exit Velocity (m/s)	Stack Diameter (m)	1-hour NO ₂ Emission Rate (g/s)
PADEP67	BNZ MATERIALS INC/ZELIENOPLE	POINT	571798.00	4516012.00	273.07	10.06	463.98	6.47	0.30	8.82E-02
PADEP68	ELLWOOD CITY FORGE/ELLWOOD CITY	POINT	559518.00	4523532.00	271.60	7.62	365.98	13.00	0.21	7.77E-02
PADEP69	ELLWOOD CITY FORGE/ELLWOOD CITY	POINT	559518.00	4523532.00	271.60	12.19	310.98	12.80	0.61	1.26E-02
PADEP70	ELLWOOD CITY FORGE/ELLWOOD CITY	POINT	559518.00	4523532.00	271.60	53.34	921.98	70.71	1.16	3.06E-01
PADEP71	ELLWOOD CITY FORGE/ELLWOOD CITY	POINT	559518.00	4523532.00	271.60	25.30	421.98	2.44	0.79	2.35E-01
PADEP72	ELLWOOD CITY FORGE/ELLWOOD CITY	POINT	559518.00	4523532.00	271.60	11.58	477.98	5.17	0.91	4.19E-01
PADEP73	ELLWOOD CITY FORGE/ELLWOOD CITY	POINT	559518.00	4523532.00	271.60	11.58	1032.98	52.96	0.61	7.43E-01
INME_03	INMETCO Ellwood City	POINT	560998.00	4523212.00	277.36	21.03	330.37	19.34	1.01	1.25E+01
INME_04	INMETCO Ellwood City	POINT	560998.00	4523212.00	277.36	21.03	330.37	19.34	1.01	1.59E-01
INME_05	INMETCO Ellwood City	POINT	560998.00	4523212.00	277.36	22.25	347.04	21.90	1.46	5.67E+00
INME_10	INMETCO Ellwood City	POINT	560998.00	4523212.00	277.36	9.14	322.04	65.70	0.24	5.29E-02
INME_12	INMETCO Ellwood City	POINT	560998.00	4523212.00	277.36	3.05	310.93	0.01	0.30	2.90E-02
INME_13	INMETCO Ellwood City	POINT	560998.00	4523212.00	277.36	3.05	294.26	0.01	0.30	5.67E-02
PADEP74	INMETCO ELLWOOD CITY	POINT	560998.00	4523212.00	275.86	12.19	310.98	12.80	0.61	5.70E-02
PADEP75	INMETCO ELLWOOD CITY	POINT	560998.00	4523212.00	275.86	21.03	329.98	19.34	1.01	4.24E-01
PADEP76	INMETCO ELLWOOD CITY	POINT	560998.00	4523212.00	275.86	22.25	346.98	21.88	1.46	2.77E-01
PADEP77	INMETCO ELLWOOD CITY	POINT	560998.00	4523212.00	275.86	21.95	402.98	11.00	3.05	2.77E-01
PADEP78	INMETCO ELLWOOD CITY	POINT	560998.00	4523212.00	275.86	12.19	310.98	12.80	0.61	2.90E-02
PADEP79	INMETCO ELLWOOD CITY	POINT	560998.00	4523212.00	275.86	21.03	329.98	19.34	1.01	5.67E-02
PADEP80	WAMPUM CEMENT	POINT	556907.10	4525518.70	259.10	105.19	513.98	18.70	3.99	2.46E+01
PADEP81	GEOPETRO LLC/PATTERSON COM	POINT	549729.00	4526823.00	338.68	0.30	292.98	0.01	0.30	9.58E-02
PADEP82	GEOPETRO LLC/PATTERSON COM	POINT	549729.00	4526823.00	338.68	0.30	292.98	0.01	0.30	1.26E-02
PADEP83	SENECA LANDFILL/SENECA	POINT	577711.00	4518290.00	295.40	0.91	504.98	0.00	0.00	4.79E-02
PADEP84	SENECA LANDFILL/SENECA	POINT	577711.00	4518290.00	295.40	0.30	310.98	0.00	0.00	3.15E-02
PADEP85	SENECA LANDFILL/SENECA	POINT	577711.00	4518290.00	295.40	6.10	365.98	34.75	0.46	1.26E+01
PADEP86	SENECA LANDFILL/SENECA	POINT	577711.00	4518290.00	295.40	1.01	-0.02	0.00	0.00	1.72E+00
PADEP87	SENECA LANDFILL/SENECA	POINT	577711.00	4518290.00	295.40	1.01	-0.02	0.00	0.00	1.91E+00
PADEP88	SENECA LANDFILL/SENECA	POINT	577711.00	4518290.00	295.40	1.01	-0.02	0.00	0.00	1.37E+00
PADEP89	SENECA LANDFILL/SENECA	POINT	577711.00	4518290.00	295.40	1.52	-0.02	169.16	0.00	7.03E-01
PADEP90	SENECA LANDFILL/SENECA	POINT	577711.00	4518290.00	295.40	1.01	563.98	0.00	0.00	7.03E-01
PADEP91	NEW CASTLE POWER LLC/NEW CASTLE GENERATING STATION	POINT	553209.00	4532062.00	244.51	228.60	422.04	46.68	5.82	1.30E+01
PADEP92	NEW CASTLE POWER LLC/NEW CASTLE GENERATING STATION	POINT	553209.00	4532062.00	244.51	228.60	422.04	46.68	5.82	1.30E+01
PADEP93	NEW CASTLE POWER LLC/NEW CASTLE GENERATING STATION	POINT	553209.00	4532062.00	244.51	228.60	422.04	46.68	5.82	1.97E+01



Off-Site Inventory for NAAQS Analysis – 1-hour NO₂

AERMOD ID	Description	Source Type	UTM Easting ¹ (m)	UTM Northing ¹ (m)	Elevation (m)	Stack Height (m)	Stack Temp. (K)	Exit Velocity (m/s)	Stack Diameter (m)	1-hour NO ₂ Emission Rate (g/s)
PADEP94	NEW CASTLE POWER LLC/NEW CASTLE GENERATING STATION	POINT	553209.00	4532062.00	244.51	5.79	669.98	30.80	1.07	1.24E+00
PADEP95	NEW CASTLE POWER LLC/NEW CASTLE GENERATING STATION	POINT	553209.00	4532062.00	244.51	16.46	477.98	5.24	0.55	1.50E-01
PADEP96	NEW CASTLE POWER LLC/NEW CASTLE GENERATING STATION	POINT	553209.00	4532062.00	244.51	5.79	477.98	5.24	0.55	9.20E-02
PADEP97	EAST FAIRFIELD COAL COMPANY	POINT	540080.83	4530324.90	329.44	1.01	-0.02	0.00	0.00	4.86E+00
PADEP98	MAHONING LANDFILL, INC.	POINT	535165.00	4529756.31	345.57	1.01	-0.02	0.00	0.00	1.13E+00
PADEP99	MAHONING LANDFILL, INC.	POINT	535165.00	4529756.31	345.57	1.01	-0.02	0.00	0.00	4.62E-01
WVA_66	ARCELORMITTAL WEIRTON INC.	POINT	533700.00	4474500.00	220.49	76.20	885.93	10.67	3.66	2.92E+01
WVA_80	ARCELORMITTAL WEIRTON INC.	POINT	533700.00	4474500.00	220.49	52.43	487.59	15.85	3.05	1.26E+01
WVA_81	ARCELORMITTAL WEIRTON INC.	POINT	533700.00	4474500.00	220.49	63.09	313.15	8.23	4.88	1.26E+01
WVA_82	ARCELORMITTAL WEIRTON INC.	POINT	533700.00	4474500.00	220.49	54.86	455.37	17.98	3.35	1.40E+01
PADEP100	ELLWOOD QUALITY STEEL CO./NEW CASTLE	POINT	554606.00	4538045.00	236.56	23.47	338.98	25.50	2.74	9.58E-01
PADEP101	ELLWOOD QUALITY STEEL CO./NEW CASTLE	POINT	554606.00	4538045.00	236.56	30.48	324.98	14.68	2.44	1.08E+00
PADEP102	ELLWOOD QUALITY STEEL CO./NEW CASTLE	POINT	554606.00	4538045.00	236.56	1.52	547.98	0.00	0.00	1.39E-01
PADEP103	ELLWOOD QUALITY STEEL CO./NEW CASTLE	POINT	554606.00	4538045.00	236.56	10.97	527.98	4.06	0.70	2.52E-01
PADEP104	ELLWOOD QUALITY STEEL CO./NEW CASTLE	POINT	554606.00	4538045.00	236.56	1.01	-0.02	0.00	0.00	1.31E-01
PADEP105	ELLWOOD QUALITY STEEL CO./NEW CASTLE	POINT	554606.00	4538045.00	236.56	1.01	-0.02	0.00	0.00	1.26E-02
PADEP106	ELLWOOD QUALITY STEEL CO./NEW CASTLE	POINT	554606.00	4538045.00	236.56	1.01	-0.02	0.00	0.00	1.26E-02
PADEP107	ELLWOOD QUALITY STEEL CO./NEW CASTLE	POINT	554606.00	4538045.00	236.56	23.47	338.98	25.50	2.74	7.56E-02
PADEP108	ELLWOOD MILL PROD	POINT	554922.00	4538219.00	239.68	1.01	-0.02	0.00	0.00	1.25E-01
PADEP109	ELLWOOD MILL PROD	POINT	554922.00	4538219.00	239.68	12.19	365.98	12.80	0.61	3.77E+00
PADEP110	ELLWOOD MILL PROD	POINT	554922.00	4538219.00	239.68	1.01	-0.02	0.00	0.00	1.25E-01
PADEP111	ELLWOOD MILL PROD	POINT	554922.00	4538219.00	239.68	1.01	-0.02	0.00	0.00	2.42E-01

¹Coordinates reflect UTM NAD83, Zone 17.



Off-Site Inventory for NAAQS and Class II PSD Increment Analyses – Annual NO₂

AERMOD ID	Description	Source Type	UTM Easting ¹ (m)	UTM Northing ¹ (m)	Elevation (m)	Stack Height (m)	Stack Temp. (K)	Exit Velocity (m/s)	Stack Diameter (m)	NO _x Annual Emission Rate (g/s)
BASF_S01	BASF Thermal Oxidation Unit	POINT	555260.00	4501187.00	226.60	22.86	953.71	4.71	1.46	9.45E-01
BASF_S032	BASF Cleaver Brooks Boiler #2	POINT	555223.82	4501190.03	226.60	4.57	512.59	17.22	0.61	1.27E-01
BASF_S031	BASF Cleaver Brooks Boiler #1	POINT	555230.83	4501184.04	226.60	4.57	512.59	17.22	0.61	1.27E-01
BS_S031	BVPV BOILERS 1-6 STACK	POINT	554357.37	4500741.91	230.12	11.28	430.93	6.31	0.98	1.29E-01
BS_S037	BVPV BOILERS 7-12 STACK	POINT	554359.98	4500738.23	230.12	11.28	430.93	6.31	0.98	1.29E-01
BS_S112	BVPV DIRECT FIRED T/O BACKUP	POINTCAP	553885.07	4500511.25	230.12	19.81	1033.15	8.13	3.35	7.56E-01
SG_S13	Stoelzle FIRE SUPPRESSION BOILER STACK	POINT	560538.00	4504631.00	226.47	6.00	422.04	1.72	0.61	3.28E-02
SG_S103	Stoelzle MELT TANK CADF STACK	POINT	560668.00	4504653.00	224.64	15.24	521.48	17.00	1.13	2.14E+00
SG_OTH01	Stoelzle	POINT	560712.40	4504613.69	224.64	22.71	-0.18	10.33	1.31	1.39E-02
SG_OTH03	Stoelzle	POINT	560720.59	4504602.26	224.64	22.71	-0.18	10.33	1.31	1.39E-02
SG_OTH02	Stoelzle	POINT	560715.80	4504612.65	224.64	22.71	-0.18	10.33	1.31	1.39E-02
SG_OTH14	Stoelzle	POINT	560711.83	4504654.06	224.64	17.77	-0.18	10.48	1.74	2.27E-02
SG_OTH13	Stoelzle	POINT	560713.01	4504658.75	224.64	17.77	-0.18	10.48	1.74	2.27E-02
SG_OTH15	Stoelzle	POINT	560717.96	4504652.30	224.64	17.77	-0.18	10.48	1.74	2.27E-02
SG_OTH04	Stoelzle	POINT	560741.41	4504604.06	224.64	17.13	-0.18	10.33	1.31	1.39E-02
SG_OTH11	Stoelzle	POINT	560726.46	4504636.77	224.64	23.29	-0.18	10.33	1.31	1.39E-02
SG_OTH10	Stoelzle	POINT	560730.20	4504636.07	224.64	23.29	-0.18	10.33	1.31	1.39E-02
SG_OTH16	Stoelzle	POINT	560723.84	4504650.57	224.64	17.77	-0.18	10.48	1.74	2.27E-02
SG_OTH12	Stoelzle	POINT	560718.42	4504664.22	224.64	17.74	-0.18	10.33	1.31	1.39E-02
SG_OTH06	Stoelzle	POINT	560743.59	4504613.34	224.64	17.13	-0.18	10.33	1.31	1.39E-02
SG_OTH05	Stoelzle	POINT	560751.24	4504601.68	224.64	17.13	-0.18	10.33	1.31	1.39E-02
SG_OTH17	Stoelzle	POINT	560729.72	4504649.43	224.64	17.77	-0.18	10.48	1.74	2.27E-02
SG_OTH08	Stoelzle	POINT	560746.21	4504623.56	224.64	17.13	-0.18	10.33	1.31	1.39E-02
SG_OTH18	Stoelzle	POINT	560736.22	4504647.83	224.64	17.77	-0.18	10.48	1.74	2.27E-02
SG_OTH07	Stoelzle	POINT	560753.48	4504610.65	224.64	17.13	-0.18	10.33	1.31	1.39E-02
SG_OTH09	Stoelzle	POINT	560748.38	4504632.31	224.64	17.13	-0.18	10.33	1.31	1.39E-02
PADEP2	SHERWIN WILLIAMS CO/ROCHESTER	POINT	560136.00	4506973.00	359.55	9.14	449.98	0.29	0.46	4.64E-01



Off-Site Inventory for NAAQS and Class II PSD Increment Analyses – Annual NO₂

AERMOD ID	Description	Source Type	UTM Easting ¹ (m)	UTM Northing ¹ (m)	Elevation (m)	Stack Height (m)	Stack Temp. (K)	Exit Velocity (m/s)	Stack Diameter (m)	NO _x Annual Emission Rate (g/s)
PADEP3	SHERWIN WILLIAMS CO/ROCHESTER	POINT	560136.00	4506973.00	359.55	1.01	365.98	0.00	0.00	3.02E-01
NGC_S09	Gold Bond Board Dryer	POINT	548962.00	4497373.00	235.33	9.14	370.37	15.52	2.38	1.84E-01
NGC_S100	Gold Bond IMP Mill	POINT	548962.00	4497373.00	235.33	9.14	449.82	16.18	0.61	4.75E-01
NGC_S11	Gold Bond Cage Mill	POINT	548962.00	4497373.00	235.33	6.10	366.48	18.71	1.74	3.46E-01
FEBV_S01	Energy Harbor Beaver Valley Aux Boil A	POINT	548011.90	4497013.10	223.87	37.19	589.26	5.21	2.13	8.49E-01
FEBV_S02	Energy Harbor Beaver Valley Aux Boil B	POINT	548011.90	4497013.10	223.87	37.19	589.26	5.21	2.13	8.49E-01
FEBVS101	Energy Harbor Beaver Valley Emg Dies Eng	POINT	548011.90	4497013.10	223.87	6.10	608.15	0.01	0.30	6.07E-01
FEBVS102	Energy Harbor Beaver Valley Emg Dies Eng	POINT	548011.90	4497013.10	223.87	6.10	608.15	0.01	0.30	6.07E-01
FEBVS103	Energy Harbor Beaver Valley Emg Dies Eng	POINT	548011.90	4497013.10	223.87	6.10	755.37	0.01	0.30	6.77E-01
FEBVS104	Energy Harbor Beaver Valley Emg Dies Eng	POINT	548011.90	4497013.10	223.87	6.10	755.37	0.01	0.30	6.77E-01
FEBVS105	Energy Harbor Beaver Valley Emg Res Gen	POINT	548011.90	4497013.10	223.87	3.05	810.93	0.01	0.30	6.07E-01
USGYP_S1	US Gypsum S1	POINT	564090.67	4497863.46	225.77	16.46	368.15	15.30	2.59	9.40E-01
USGYP_S2	US Gypsum #1 Kettle	POINT	564090.67	4497863.46	225.77	29.57	588.71	42.37	0.43	5.30E-01
USGYP_S3	US Gypsum #2 Kettle	POINT	564090.67	4497863.46	225.77	29.87	588.71	42.37	0.43	5.30E-01
USGYP_S4	US Gypsum #1 Dryer Mill	POINT	564090.67	4497863.46	225.77	30.48	377.59	15.73	1.55	2.18E-01
USGYP_S5	US Gypsum #2 Dryer Mill	POINT	564090.67	4497863.46	225.77	30.48	377.59	15.73	1.55	2.18E-01
USGYP_S6	US Gypsum Gauging Water Heater	POINT	564090.67	4497863.46	225.77	7.62	588.71	15.97	0.27	6.17E-02
JEWLS206	Allegheny & Tsingshan Annealing	POINT	545579.00	4498791.00	236.22	3.05	422.04	0.01	0.30	6.43E-01
JEWLS208	Allegheny & Tsingshan Pickle	POINT	545579.00	4498791.00	236.22	3.05	422.04	0.01	0.30	5.42E-01
JEWLS209	Allegheny & Tsingshan Boiler 1	POINT	545579.00	4498791.00	236.22	3.05	449.82	0.01	0.30	3.62E-01
JEWLS210	Allegheny & Tsingshan Boiler 2	POINT	545579.00	4498791.00	236.22	3.05	310.37	0.01	0.30	4.13E-01
JEWLZ050	Allegheny & Tsingshan Heaters	POINT	545579.00	4498791.00	236.22	3.05	422.04	0.01	0.30	2.47E-01
PADEP7	IPSCO Koppel Rot Hearth	POINT	565068.00	4495454.00	228.74	38.10	699.98	0.17	3.29	3.97E+00
PADEP8	IPSCO Koppel Quench	POINT	565068.00	4495454.00	228.74	16.46	754.98	0.04	1.22	4.69E-01
PADEP9	IPSCO Koppel Temper Furnace	POINT	565068.00	4495454.00	228.74	16.46	754.98	0.04	1.22	5.18E-01
PADEP10	IPSCO Koppel Reheat	POINT	565068.00	4495454.00	228.74	16.46	918.98	0.04	1.22	3.70E-01



Off-Site Inventory for NAAQS and Class II PSD Increment Analyses – Annual NO₂

AERMOD ID	Description	Source Type	UTM Easting ¹ (m)	UTM Northing ¹ (m)	Elevation (m)	Stack Height (m)	Stack Temp. (K)	Exit Velocity (m/s)	Stack Diameter (m)	NO _x Annual Emission Rate (g/s)
PADEP11	IPSCO Koppel Misc Heaters	POINT	565068.00	4495454.00	228.74	16.46	754.98	4.29	1.22	9.83E-02
PADEP12	BEAVER FALLS TUBULAR PRODLLC/BEAVER FALLS	POINT	556288.00	4514679.00	281.26	1.01	-0.02	0.00	0.00	5.68E-01
PADEP15	BEAVER FALLS TUBULAR PRODLLC/BEAVER FALLS	POINT	556288.00	4514679.00	281.26	1.01	365.98	0.00	0.00	1.26E-01
PADEP16	BEAVER FALLS TUBULAR PRODLLC/BEAVER FALLS	POINT	556288.00	4514679.00	281.26	1.01	365.98	0.00	0.00	1.26E-01
PADEP17	BEAVER FALLS TUBULAR PRODLLC/BEAVER FALLS	POINT	556288.00	4514679.00	281.26	1.01	365.98	0.00	0.00	2.52E-01
PADEP18	BEAVER FALLS TUBULAR PRODLLC/BEAVER FALLS	POINT	556288.00	4514679.00	281.26	1.01	-0.02	0.00	0.00	2.52E-01
DOM_S01	Eastern Gas Transmission Eng 1	POINT	558671.00	4518753.00	373.29	15.85	644.26	7.19	0.91	1.78E+00
DOM_S02	Eastern Gas Transmission Eng 2	POINT	558671.00	4518753.00	373.29	15.85	644.26	7.19	0.91	1.78E+00
DOM_S03	Eastern Gas Transmission Eng 3	POINT	558671.00	4518753.00	373.29	15.85	644.26	7.19	0.91	1.78E+00
DOM_S04	Eastern Gas Transmission Eng 4	POINT	558671.00	4518753.00	373.29	15.85	644.26	7.19	0.91	1.78E+00
PADEP23	EASTERN GAS TRANSMISSION & STORAGE	POINT	558671.00	4518753.00	375.66	1.01	-0.18	0.00	0.00	1.89E-01
IPSC_S05A	IPSCO Koppel Melt Shop	POINT	557297.50	4520629.10	271.09	30.48	338.71	17.43	3.05	7.56E-01
IPSC_S05B	IPSCO Koppel Melt Shop	POINT	557303.60	4520629.42	271.09	30.48	338.71	17.43	3.05	7.56E-01
IPSC_S05C	IPSCO Koppel Melt Shop	POINT	557309.70	4520629.74	271.09	30.48	338.71	17.43	3.05	7.56E-01
IPSC_S05D	IPSCO Koppel Melt Shop	POINT	557315.80	4520630.07	271.09	30.48	338.71	17.43	3.05	7.56E-01
IPSC_S05E	IPSCO Koppel Melt Shop	POINT	557321.90	4520630.39	271.09	30.48	338.71	17.43	3.05	7.56E-01
IPSC_S05F	IPSCO Koppel Melt Shop	POINT	557328.00	4520630.71	271.09	30.48	338.71	17.43	3.05	7.56E-01
IPSC_S05G	IPSCO Koppel Melt Shop	POINT	557334.10	4520631.03	271.09	30.48	338.71	17.43	3.05	7.56E-01
IPSC_S05H	IPSCO Koppel Melt Shop	POINT	557340.20	4520631.36	271.09	30.48	338.71	17.43	3.05	7.56E-01
IPSC_S05I	IPSCO Koppel Melt Shop	POINT	557346.30	4520631.68	271.09	30.48	338.71	17.43	3.05	7.56E-01
IPSC_S05J	IPSCO Koppel Melt Shop	POINT	557352.40	4520632.00	271.09	30.48	338.71	17.43	3.05	7.56E-01
IPSC_S02	IPSCO Koppel Aus Furnace	POINT	557468.00	4520732.00	270.64	16.46	755.37	3.10	1.22	2.46E-01
IPSC_S03	IPSCO Koppel Var Heaters	POINT	557468.00	4520732.00	270.64	16.46	755.37	4.29	1.22	3.21E-01
IPSC_S04	IPSCO Koppel Temper Furnace	POINT	557468.00	4520732.00	270.64	16.46	755.37	4.29	1.22	9.70E-02

¹Coordinates reflect UTM NAD83, Zone 17.

11-14 Vanport Bridge Receptors

	x (m)	y (m)	elev (m)	terr max (m)	flagpole (m)	flagpole height above pool (ft)
1	556613.057	4503089.098	227.75	342.68	5.60	83
2	556592.472	4503134.664	212.00	354.30	21.35	
3	556571.886	4503180.230	208.13	354.30	25.22	
4	556551.301	4503225.796	208.05	354.30	25.30	
5	556530.716	4503271.362	208.05	355.09	25.30	
6	556510.130	4503316.927	208.05	355.56	25.30	
7	556489.545	4503362.493	208.05	355.56	25.30	
8	556468.959	4503408.059	208.05	355.56	25.30	
9	556448.374	4503453.625	208.05	355.56	25.30	
10	556427.789	4503499.191	208.12	355.56	25.23	
11	556407.203	4503544.756	215.15	355.56	18.20	
12	556386.618	4503590.322	232.83	354.30	0.52	

Vanport Bridge Clearance Height above pool elevation of 208ft or 63.43m

Light List corrected through LNM week: 09/14						
(1) No.	(2) Name and Location	(3) Mile	(4) Bank	(5) Characteristic	(6) Structure / Dayboard Up Down	(7) Remarks
OHIO RIVER						
23045	Vanport Bridge	28.0				CLEARANCES: Horizontal, 700.0 feet; vertical, 68.0 feet above pool for center 640.0 feet of span.

From: US Coast Guard - Light List: Mississippi River System of the United States, 2014

Bridge Deck is at least 15' from the lowest clearance height of 68ft, so total height of flagpole is 68+15 or 83ft above pool elevation.



Flagpole receptor locations in model (every 50m along span)





ATTACHMENT B
FLM NOTIFICATION

Request for Applicability of Class I Area Modeling Analysis

<i>Facility Name (Company Name)</i>	Shell Polymers Monaca (“SPM”) owned and operated by Shell Chemical Appalachia LLC (“Shell”)
<i>New Facility or Modification?</i>	Modification
<i>Source Type/BART Applicability</i>	Major Modification to Existing Major Source
<i>Project Location (County/State/ Lat. & Long. in decimal degrees)</i>	Beaver County, Pennsylvania, 40.671, -80.336

Application Contacts

<i>Applicant</i>		<i>Consultant</i>		<i>Air Agency Permit Engineer</i>	
Company	Shell Chemical Appalachia	Company	Landau Associates, Inc.	Agency	PADEP
Contact	Laura Sabolyk	Contact	Aubrey Jones, CCM	Contact	Andrew Fleck
Address	Shell Chemical Appalachia LLC 300 Frankfort Rd Monaca, PA 15061	Address	Landau Associates, Inc. 8280 YMCA Plaza Drive Building 10, Ste B Baton Rouge, LA 70810	Address	Department of Environmental Protection Rachel Carson State Office Building 400 Market Street Harrisburg PA 17101
Phone #	(504) 465-6480	Phone #	(813) 761-9959	Phone #	(717) 783-9243
Email	laura.l.sabolyk@shell.com	Email	ajones@landauinc.com	Email	afleck@pa.gov

Briefly Describe the Proposed Project

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. Shell is in the process of preparing a plan approval application for submittal to the Pennsylvania Department of Environmental Protection (DEP) in accordance with the Pennsylvania Air Pollution Control Act and 25 Pa. Code §127.12 to propose the following projects and plan approval reconciliations:

- Shell is proposing to implement the Wastewater Treatment Plant (WWTP) Permanent Controls Project at SPM to improve the oils, grease, and volatile organic compound (VOC) removal efficiency of the primary treatment section of SPM’s WWTP. Shell is currently using temporary equipment to achieve improved removal efficiencies and is now proposing to install permanent equipment.
- Shell is proposing the Ethylene Maximum Achievable Control Technology (EMACT) Project at SPM to comply with the 40 Code of Federal Regulations (CFR) 63 Subpart YY pressure-assisted multi-point flare minimum net heating value of flare combustion zone gas (NHV_{cz}) requirement that recently became applicable to the HP Ground Flare #1 and HP Ground Flare #2 (also referred to as “TEGF A” and “TEGF B”). Supplemental gas will be utilized as necessary in order to achieve compliance with the minimum net heating value for the totally enclosed ground flares (TEGFs).
- After a thorough review of SPM’s as-built operations and plan approval source inventory, potential emissions calculations, and conditions, Shell is proposing to reconcile specific plan approval source descriptions, potential emissions calculations, and conditions. These proposed reconciliations are collectively referred to by Shell as the “Plan Approval Reconciliations.” A detailed description of all

proposed reconciliations will be provided in the plan approval application which Shell anticipates will be submitted to DEP in September 2024.

Shell has retrospectively evaluated the Plan Approval Reconciliations and WWTP Permanent Controls Project together as part of the initial construction of SPM because these changes are related to the facility's initial construction since they represent as-built changes to the facility's initial construction plan approval and necessary improvements to the initial design and construction of the facility's WWTP, respectively. Shell has evaluated the EMACT Project separately from the initial construction of SPM because the project is only required to comply with newly effective federal regulatory requirements that are applicable to ethylene production units across the country.

The Plan Approval Reconciliations and WWTP Permanent Controls Project will not retrospectively cause the initial construction of SPM to require Prevention of Significant Deterioration (PSD) permitting under 25 Pa. Code §127.83 for any additional regulated PSD pollutants relative to the PSD applicability determinations that were made contemporaneous with DEP's authorization of the initial construction of SPM. However, Shell will be updating the most recent air quality analysis that was completed for the initial construction of SPM due to proposed changes to emissions unit-specific and facility-wide potential emissions of carbon monoxide (CO), nitrogen oxide (NO_x), and particulate matter (PM) with an aerodynamic diameter less than or equal to 10 micrometers (PM₁₀) associated with the Plan Approval Reconciliations and WWTP Permanent Controls Project.

As discussed above, the EMACT Project is a separate, standalone project with respect to the NSR permitting programs. Because SPM is currently a PSD major stationary source, PSD permitting requirements will be applicable to the EMACT Project because the project will result in significant net emissions increases of NO_x and CO. Additionally, although the EMACT Project will not result in a significant net emissions increase in direct emissions of PM with an aerodynamic diameter less than or equal to 2.5 micrometers (PM_{2.5}), the project is subject to PSD review for PM_{2.5} because it will result in a significant net emissions increase in NO_x, which is regulated as a precursor to PM_{2.5}.

SPM is located adjacent to the Ohio River in the Borough of Monaca. The approximate Universal Transverse Mercator (UTM) coordinates of the facility are 556,129 meters east and 4,502,450 meters north (UTM Zone 17, NAD 83).

The proposed emissions below represent the total facility-wide emissions, including the emissions increases associated with the EMACT Project and updates associated with the Plan Approval Reconciliations and WWTP Permanent Controls Project.

Proposed Emissions and BACT

<i>Criteria Pollutant</i>	<i>Emissions</i>		<i>Emission Factor (AP-42, Stack Test, Other?)</i>	<i>Proposed BACT</i>
	<i>Maximum hourly (lb/hr)</i>	<i>Proposed Annual (tons/yr)</i>		
Nitrogen Oxides	159	695	Various	Various
Sulfur Dioxide	17.4	76.1	NA	NA
Particulate Matter	77.9	341	Various	Various
Sulfuric Acid Mist	0.84	3.69	NA	NA

Proximity to Class I Areas			
Class I Area	See table below.		
Distance from Facility (km)	See table below.		

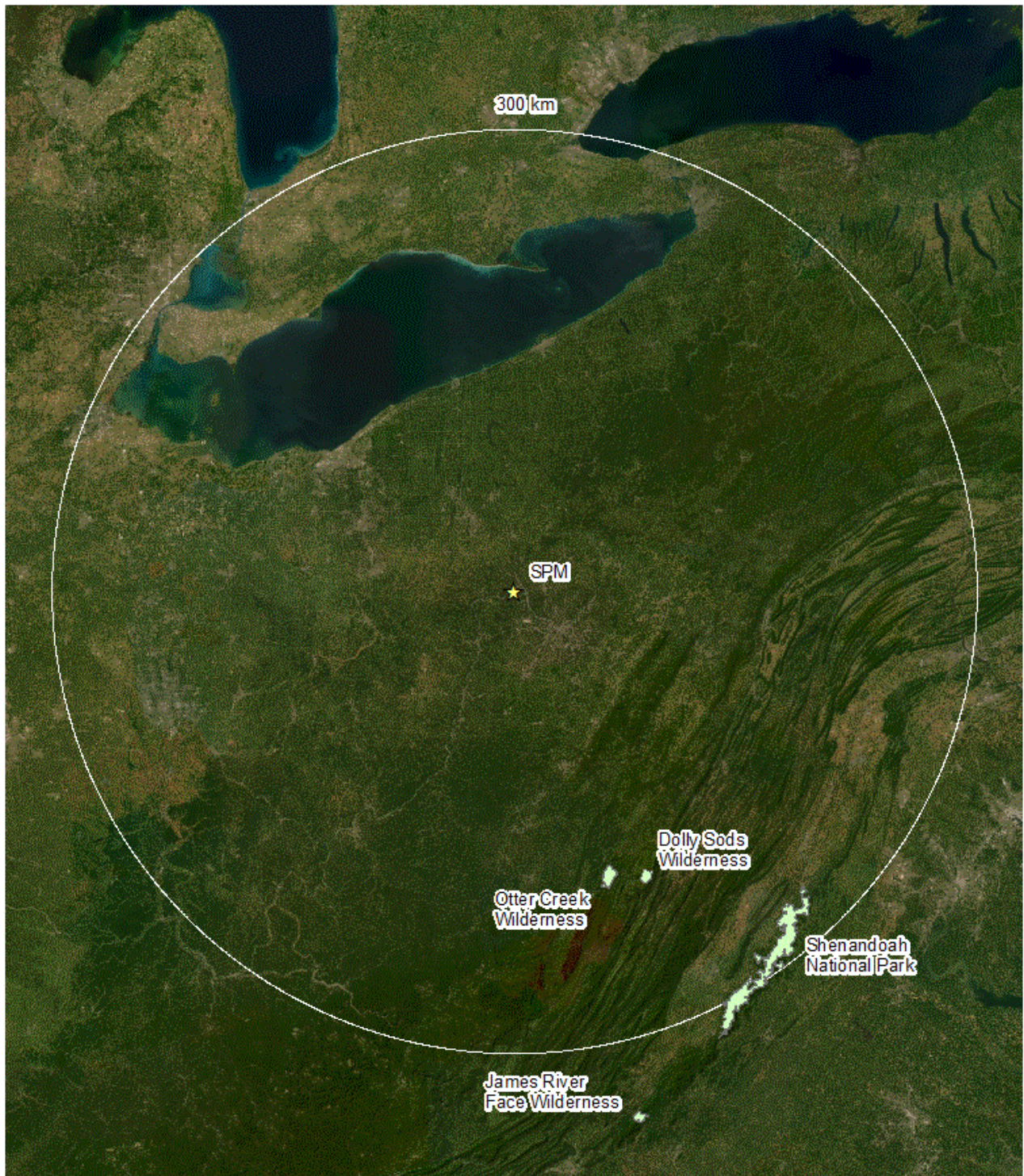
Pollutant	Facility-wide Annual Emissions (tpy)	SPM Annual Emissions Q (tpy)
SO ₂	76.1	1,116
NO _x	695	
PM ₁₀	341	
H ₂ SO ₄	3.69	

Class I Area	FLM	Approx. Distance from SPM (km)	SPM Annual Emissions Q ¹ (tpy)	Q/D	AQRV Required? (Y/N?)
Otter Creek	USFS	189	1,116	5.9	N
Dolly Sods	USFS	200		5.6	N
Shenandoah	NPS	269		4.1	N
James River Face	USFS	347		3.2	N

1. Q/D screening analysis is based on the total SO₂, NO_x, PM₁₀, and H₂SO₄ annual emissions in tons per year, calculated based on 24-hour maximum allowable emissions in accordance with FLAG 2010 guidance.

A Q/D screening analysis was conducted to evaluate SPM's potential impacts on federally protected Class I areas, consistent with the Federal Land Manager's (FLM's) Air Quality Related Value (AQRV) Work Group (FLAG) 2010 guidance. The ratio of the sum of emissions of sulfur dioxide (SO₂), NO_x, PM₁₀, and sulfuric acid mist (H₂SO₄) to the distance between SPM and each nearby Class I area was determined and compared to a threshold of 10. Annual emissions were calculated based on the 24-hour maximum allowable emissions in accordance with FLAG 2010 guidance. Per the guidance, if Q/D is less than or equal to 10, the facility is presumed not to have an adverse impact. As shown in the table above, the ratio of Q/D is less than 10 for each Class I area within 300 km of SPM. As such, SPM is not expected to have a significant impact on any AQRV at the above Class I areas. Shell does not plan to conduct an AQRV analysis for SPM and requests that the FLM provide written concurrence of the finding of no impact based on the results of the Q/D screening presented above.

As detailed in the modeling protocol dated June 5, 2024 and approved by DEP on June 6, 2024, Class I significance will be evaluated using an arc of receptors spaced at 1 degree intervals located 50 km from SPM. The receptors will be placed between the three Class I areas that are located within 300 km of SPM. AERMOD will be run to derive a conservative estimate of impacts. If impacts are insignificant when compared to the Class I significant impact levels, no additional evaluation will be conducted. Preliminary modeling indicates insignificant Class I impacts for both the EMACT Project and Plan Approval Reconciliations and WWTP Permanent Controls Project.



LANDAU
ASSOCIATES

Location of SPM and Nearby Class I Areas

Figure
1

APPENDIX D-2

ADDITIONAL IMPACTS ANALYSIS:

**POTENTIAL GROWTH IMPACTS
AND
POTENTIAL IMPAIRMENT TO SOILS AND VEGETATION
FROM
THE PROPOSED EMAX PROJECT AND PLAN APPROVAL
RECONCILIATIONS AND WWTP PERMANENT CONTROLS
PROJECT
AT
SHELL POLYMERS MONACA
IN BEAVER COUNTY, PENNSYLVANIA**



September 2024

Table of Contents

Executive Summary	1
1.0 Potential Impacts Due to Growth	5
1.1 Overview	5
1.2 Growth in Commuter Population	5
1.3 Growth in Air Pollutant Emissions	7
A. Stationary Source Emissions.....	7
B. Other Area Source Emissions	11
C. Total Emissions Growth.....	12
2.0 Potential Impacts to Soils and Vegetation	14
2.1 Overview	14
2.2 Potential Acidification of Soils.....	14
2.3 Potential Impairment of Vegetation	19
A. Identification of Vegetation with Significant Commercial Value	19
B. Identification of Vegetation with Potential Recreational Value.....	22
C. Identification of Pollutants of Concern	25
D. Determination of Effects Concentrations	26
E. Potential Phytotoxic NOx Effects	28
2.4 Potential Impairment to Soil, Vegetation, and Animals from Toxic Metals Deposition	31
2.5 Conclusion.....	37

List of Tables

Table 1. Commuter Flow of Beaver County Workers	7
Table 2. Tank Truck Exhaust Emissions Increase	9
Table 3. Motor Vehicle Emissions Increase Related to Employment Growth in Beaver County, PA by Vehicle Type	11
Table 4. Comparison of 2014 and 2024 Revised Estimates of Project-Related Motor Vehicle Emissions from Indirect Employment Growth (2014 vs. 2024)	11
Table 5. Other Area Source Emissions Increases Compared to Current Inventory	12
Table 6. Emissions Increases from Residential and Commercial Growth Due to SPM ₁₀	13
Table 7. Commercially Significant Vegetation (Acres) in Ten-County Study Area	21
Table 8. Beaver County Vegetation of Interest.....	22
Table 9. Pennsylvania-Listed Plant Species with Potential to Occur in Vicinity of Beaver Valley Nuclear (BVN) Plant (~7-mile distance from SPM).....	25
Table 10. Trace Metal Deposition Concentrations from SPM Calculated from Ambient Air Modeling Concentrations	33
Table 11. Trace Metal Deposition Concentrations from SPM Compared to Screening Values	33
Table 12. Trace Metal Average Percent Increase in Endogenous Soil Concentration ..	34
Table 13. Estimated Vegetation Trace Metal Tissue Concentration.....	35
Table 14. Estimated Vegetation Trace Metal Tissue Concentrations Compared to Screening Concentrations	36
Table 15. Trace Metals Vegetative Tissue Concentrations Compared to Animal Toxicity Screening Concentrations.....	37

Executive Summary

This document presents the results of the additional impacts analysis conducted for Shell Polymers Monaca (“SPM”) in Beaver County, Pennsylvania. This analysis is required by 25 Pa. Code §127.83, which incorporates by reference the “Additional Impacts Analyses” requirements found in the federal Prevention of Significant Deterioration (PSD) program at 40 CFR §52.21(o).

Shell Chemical Appalachia LLC (“Shell”) submitted RTP’s initial analysis to the Pennsylvania Department of Environmental Protection (PADEP) in April of 2014, as part of its preconstruction Plan Approval application for SPM. This project involved construction of a new major stationary source for the purposes of manufacturing ethylene.

The 2014 analysis included those pollutants that were required to be evaluated as part of the initial Plan Approval Application, including carbon monoxide (CO), nitrogen oxides (NO_x), and particulate matter (PM) with an aerodynamic diameter less than or equal to 10 microns (PM₁₀). A revised additional impact analysis is now necessitated by submission of a Plan Approval Application for the following projects and plan approval reconciliations:

- Shell is proposing to implement the Wastewater Treatment Plant (WWTP) Permanent Controls Project at SPM to improve the oils, grease, and volatile organic compound (VOC) removal efficiency of the primary treatment section of SPM’s WWTP. Shell is currently using temporary equipment to achieve improved removal efficiencies and is now proposing to install permanent equipment.
- Shell is proposing the EMACT Project to comply with the 40 Code of Federal Regulations (CFR) 63 Subpart YY pressure-assisted multi-point flare minimum net heating value of flare combustion zone gas (NHV_{CZ}) requirement that recently became applicable to the HP Ground Flare #1 and HP Ground Flare #2 (also

referred to as “TEGF A” and “TEGF B”). Supplemental gas will be utilized as necessary in order to achieve compliance with the minimum net heating value for the totally enclosed ground flares (TEGFs).

- After a thorough review of SPM’s as-built operations and plan approval source inventory, potential emissions calculations, and conditions, Shell is proposing to reconcile specific plan approval source descriptions, potential emissions calculations, and conditions. These proposed reconciliations are collectively referred to by Shell as the “Plan Approval Reconciliations”. A detailed description of all proposed reconciliations is provided in the plan approval application.

Shell has retrospectively evaluated the Plan Approval Reconciliations and WWTP Permanent Controls Project together as part of the initial construction of SPM because these changes are related to the facility’s initial construction since they represent as-built changes to the facility’s initial construction plan approval and necessary improvements to the initial design and construction of the facility’s WWTP, respectively. Shell has evaluated the EMACT Project separately from the initial construction of SPM because the project is only being completed in order to comply with newly effective federal regulatory requirements that are applicable to ethylene production units across the country.

The attainment status designations for SPM’s location contemporaneous with PADEP’s issuance of PA-04-00740A, which authorized the initial construction and operation of SPM, are the relevant designations for the retrospective New Source Review (NSR) applicability analysis performed for the Plan Approval Reconciliations and WWTP Permanent Controls Project. Although Beaver County is currently designated as attainment for PM_{2.5}, the county was designated as nonattainment for PM_{2.5} when PADEP issued PA-04-00740A to Shell. The remaining currently effective attainment status designations for SPM’s location are unchanged from the attainment status designations that were in effect when PADEP issued PA-04-00740A. Thus, Shell evaluated the Plan Approval Reconciliations and WWTP Permanent Controls Project in regard to PADEP’s Nonattainment NSR (NNSR) regulations (25 Pa. Code §§127.201 to

127.218) for ozone (NO_x and VOC), PM with an aerodynamic diameter less than or equal to 2.5 micrometers (PM_{2.5}), sulfur dioxide (SO₂), and lead, while Shell evaluated the same changes in regard to PADEP's PSD regulations (25 Pa. Code §§127.81 to 127.83) for CO, nitrogen dioxide (NO₂) (NO_x), PM₁₀, and all other regulated PSD pollutants.

The Plan Approval Reconciliations and WWTP Permanent Controls Project will not retrospectively cause the initial construction of SPM to require PSD permitting under 25 Pa. Code §127.83 for any additional regulated PSD pollutants relative to the PSD applicability determinations that were made contemporaneous with PADEP's authorization of the initial construction of SPM. However, with this submittal Shell has updated the most recent additional impacts analysis that was completed for the initial construction of SPM due to the proposed changes to emissions unit-specific and facility-wide potential emissions of CO, NO_x, and PM₁₀ associated with the Plan Approval Reconciliations and WWTP Permanent Controls Project.

As mentioned previously, the EMACT Project is a separate, standalone project with respect to the NSR permitting programs. Because SPM is currently a PSD major stationary source, PSD permitting requirements are applicable to the EMACT Project because the project will result in significant net emissions increases of NO_x and CO. Additionally, although the EMACT Project will not result in a significant net emissions increase in direct emissions of PM_{2.5}, the project is subject to PSD review for PM_{2.5} because it will result in a significant net emissions increase in NO_x, which is regulated as a precursor to PM_{2.5} per 40 CFR 52.21 (b)(23)(i). As such, PM_{2.5} has been added to this revised additional impacts analysis.

This revised additional impact analysis considers total facility-wide emissions from SPM and reflects both the Plan Approval Reconciliations and WWTP Permanent Controls Project as well as the EMACT Project. The results of this revised additional impact analysis show that SPM remains unlikely to cause adverse impacts due to growth, or impairment of soils or vegetation. Because the total emissions from SPM, which include the EMACT Project, show no adverse impact or impairment, the EMACT Project was

not separately evaluated. Because the EMACT Project's emissions increases are small in comparison to SPM as a whole, the EMACT Project's smaller emissions increase would individually show no adverse impact or impairment.

1.0 Potential Impacts Due to Growth

1.1 Overview

SPM is a major stationary source (major source) subject to PSD program requirements, including the requirement to analyze general commercial, residential, industrial, and other growth associated with the major source in accordance with 40 CFR 52.21(o). Permit applicants use the growth analysis, in conjunction with the analysis of air quality impacts, to assess the impacts of activities that are not a part of the major source but can reasonably be expected to occur because of the major source.

The growth analysis focuses on the permanent impacts during the operational phase of a project. Aggregate air quality impacts during the construction phase of the project are small in relation to the impacts during the operational phase, and permit applicants are not required to consider these emissions in the growth analysis.¹ Furthermore, the proposed Plan Approval Reconciliations and WWTP Permanent Controls Project and EMACT Project will only require minimal on-site construction activities.

For SPM, quantifiable growth includes commercial and residential growth related to growth in the workforce. Shell expects no industrial growth in the immediate area because existing markets for SPM's products already exist within the area. Moreover, SPM does not produce the primary raw material (ethane), but instead receives ethane by pipeline from remote locations. No further processing of SPM's products is required; therefore, no quantifiable industrial growth is expected to occur in the area because of the projects. This conclusion remains unchanged since the 2014 application.

1.2 Growth in Commuter Population

SPM is located in Beaver County, Potter Township, Pennsylvania, approximately 35 miles northwest of Pittsburgh. The County is bordered on five sides by Allegheny,

¹ U.S. EPA interpretive policy expressly calls for consideration of only "permanent residential, commercial, and industrial growth," excluding "temporary sources," in the growth analysis under 40 CFR § 52.21(o). See, e.g., *Prevention of Significant Deterioration Workshop Manual* (EPA-450/2-80-081), Oct. 1980, at page I-D-5.

Butler, Lawrence, and Washington Counties in PA; Hancock County in WV; and Columbiana County in OH. A 24-mile radius (the largest impact area) from the site also includes Brooke County in WV, and Jefferson and Mahoning County in OH. The study area is comprised of this ten-county area, consistent with the 2014 analysis.

Shell originally estimated that upon completion of construction, SPM would employ approximately 400-600 skilled workers to maintain operations. This estimate proved accurate; after completion of construction, Shell employs approximately 600 skilled workers.² Shell filled most of these permanent jobs from the local population.³ As the plant converted from zinc smelting to cracker operations, no net change in the permanent workforce occurred, because Horsehead Corporation formerly employed approximately 600 workers at the site. Thus, no residential growth was expected due to direct job growth in Potter Township. The US Census Bureau confirms that the total number of housing units in Potter Township has not significantly increased since 2010.⁴

When considering indirect and induced job growth, Shell estimated that SPM would increase local employment by as much as 2,000-8,000. A recent study, completed by Robert Morris University, revised that estimate to 10,127 jobs in the Southwestern Pennsylvania area with a large majority occurring in Beaver County.⁵

In 2014, RTP used commuter flow patterns from the U.S. Census Bureau to estimate motor vehicle emissions related to indirect job growth. With this submittal, the 2014 analysis was updated for the 10 surrounding counties, and also consider other parts of Southwestern Pennsylvania noted in the Robert Morris University study, assuming all workers commute to Beaver County.⁶

² Francis, Thomas, "Pennsylvania Plant Brings Jobs, Skills and Opportunity," Shell News and Insights, Oct. 12, 2022. (available at: <https://www.shell.com/news-and-insights/inside-energy-stories/western-pennsylvania-plant-brings-jobs-skills-and-opportunity.html>; last accessed May 15, 2024).

³ Minutolo, Marcel C., et.al, "Updated Economic Impact Analysis: Petrochemical Facility in Beaver County, Pennsylvania," Robert Morris University, April 2021.

⁴ US Census Bureau, Occupancy Status (available at <https://data.census.gov/table/DECENNIALPL2020.H1?q=060XX00US4200762352>; last accessed May 15, 2024).

⁵ *Id.* at 3.

⁶ The 10 counties addressed in the original 2014 analysis include Allegheny, Beaver, Butler, Lawrence, and Washington Counties in Pennsylvania; Columbiana and Mahoning Counties in Ohio; and Brooke, Jefferson, and Hancock Counties in West Virginia.

According to census data from 2016-2020, of the people who worked in Beaver County, approximately 70% of the commuters also live in Beaver County.⁷ The remaining 30% of commuters primarily come from Allegheny, Butler, and Lawrence Counties in PA, and Columbiana County in OH. See Table 1. Consistent with the methodology used in the 2014 analysis, counties with one percent or less commuting to Beaver County were excluded from further consideration in this growth analysis.⁸

Table 1. Commuter Flow of Beaver County Workers⁹

County and State of Residence	Number Commuting to Beaver County	Margin of Error (+ or -)	Percent from County
Allegheny, PA	5,783	485	10%
Beaver, PA	41,285	1,164	71%
Butler, PA	1,883	373	3%
Columbiana, OH	2,612	331	4%
Lawrence, PA	3,818	377	6%

1.3 Growth in Air Pollutant Emissions

Based on job growth of 10,127 individuals, SPM's operations are not expected to cause significant indirect pollution growth in Beaver County or surrounding counties. The following updates our previous growth projections in the 2014 application.

A. Stationary Source Emissions

In 2014, RTP predicted that no quantifiable industrial growth would occur as a direct result of SPM; no increase in air pollutant emissions from stationary sources would occur within the area; and that even if significant growth occurred, emissions offsets would mitigate any impact for criteria air pollutants of particular concern. To re-confirm these conclusions, a comparison of the 2014 and 2020 National Emission Inventory (NEI) was completed and no new stationary sources attributable to SPM were identified.

⁷ Counties with a margin of error greater than the estimated number of commuters were excluded.

⁸ See Table 2 Residence County to Workplace County Flows for the United States and Puerto Rico Sorted by Workplace Geography: 2006-2010. Available at: <https://www.census.gov/data/tables/2020/demo/metro-micro/commuting-flows-2020.html>

⁹Data from U.S. Census Bureau; American Community Survey Data 2016-2020 5- Year ACS Commuting Flows, Table DP03(available at: Source: 2016-2020 5-Year ACS Commuting Flows <https://www.census.gov/data/tables/2020/demo/metro-micro/commuting-flows-2020.html>; last accessed May 15, 2024.)

In fact, there is a substantial decline in emissions in Beaver County due to a shutdown of the Bruce Mansfield and AES Beaver Valley Electrical Generation Stations.

According to U.S. EPA interpretive policy relating to the recommended elements of the growth analysis required by 40 CFR § 52.21(o), mobile source tailpipe emissions may be excluded from consideration.¹⁰ RTP, nonetheless, included motor vehicle exhaust emissions in its 2014 growth analysis to ensure a conservative analysis, because mobile source emissions were predicted to be the single largest cause of area source emissions growth associated with the project. The previous mobile source emissions impact projections have been revised and show lower impacts from indirect job growth than originally estimated. This is consistent with an overall decline in mobile source emissions nationally due to more stringent motor vehicle emission standards and resulting mobile source emissions controls.

i. Tank Trucks

SPM uses tank trucks to transport a portion of the facility's product output and incoming supplies. RTP originally estimated these emissions using the following methodology and conservative assumptions; and there are no changes to these assumptions, or the emissions calculated for this revised analysis:

- Approximately 22,000 roundtrips are anticipated annually.¹¹
- Truck roundtrips are expected to include an average of approximately 100 miles each, with an expected total travel of 2.2 million miles per year. Most of these miles occur outside the impact area, but RTP included the total mileage within the analysis as a conservative approach.
- Using EPA's average ratio of 3.031 brake horsepower-hour per mile for heavy duty diesel vehicles,¹² the total annual energy output of tanker trucks in the affected area is 6.7 million brake horsepower hours.

¹⁰ See, e.g., *Prevention of Significant Deterioration Workshop Manual* (EPA-450/2-80-081), Oct. 1980, at page I-D-5.

¹¹ Based on an estimated 120 total trips per day and 60 roundtrips per day.

¹² *Update Heavy-Duty Engine Emission Conversion Factors for MOBILE6: Analysis of BSFCs and Calculation of Heavy-Duty Engine Emission Conversion Factors* (EPA-420/R-02-005), Jan. 2002, at p. 16. The factor provided is for Class 8B trucks, which are those with a gross vehicle weight in excess of 60,000 lbs.

- RTP used the exhaust emission standards for model 2007 and later diesel heavy-duty engines at 40 CFR § 86.007-11 to calculate emissions of each pollutant.

Table 2 shows the estimated emissions from tank truck exhaust.

Table 2. Tank Truck Exhaust Emissions Increase

Pollutant	Emission Factor (g/bhp-hr)	Emissions (tons/yr)
CO	15.5	115
NO _x	0.2	1.5
PM ₁₀ , PM _{2.5}	0.01	0.7
VOC (NMHC)	0.14	1.0

ii. Passenger Vehicles

Job growth in the impact area would lead to increased commuter motor vehicle use. In the 2014 analysis, RTP reported that the U.S. Census bureau estimated a 25.5 minute average commute time for American workers, but that no information on the average distance commuters travel was readily available.¹³ RTP estimated emissions increases using 2008 US EPA emissions factors for heavy duty gasoline vehicles and light duty gasoline vehicles by proportionally growing the population and mobile emissions inventory in the nine counties (excluding Jefferson County, WV) in proportion to the estimated increase in jobs.

Enhanced data availability now allows for a more refined analysis of mobile source impacts from job growth. Data available through the Federal Highway Administration reports that an average person drives 6,256 miles per year to work and an additional 2,078 miles for work-related travel.¹⁴ The U.S. Census Bureau includes county-level

¹³See “Megacommuters: 600,000 in U.S. Travel in 90 Minutes and 50 miles to Work, and 10.8 Million travel an hour each way, Census Bureau Reports,” U.S. Census Newsroom, Mar. 5, 2013.

¹⁴ “Average Annual Person-Trips, Person-Miles, and Trip Length per Household by Purpose,” U.S. Dept. of Transportation, Bureau of Transportation and Statistics, Sept. 7, 2016 (reporting on information from the Federal Highway Administration.) Available at: https://www.bts.gov/archive/publications/passenger_travel_2016/tables/fig2_3; last accessed May 17, 2024.)

data on the mode of transportation to work¹⁵, and both Pennsylvania Dept. of Transportation (PennDOT) and Ohio Dept. of Public Safety report vehicle registration data by type of vehicle.¹⁶ Using an average emission factor (grams per mile) by type of vehicle, RTP estimated mobile source emissions using total annual mileage estimates and emissions factors developed based on EPA's MOVES4.0 mobile emissions simulator model, for each vehicle type (gasoline and diesel passenger, light duty trucks, and heavy duty trucks, and electric vehicles).¹⁷ The following assumptions were used:

- Each additional job resulted in 8,334 miles per year if traveling alone to work; 4,167 miles per year if carpooling; and 2,778 if using public transportation.
- Workers who work at home; use other means of transport; or walk were treated as traveling alone to work to assure conservatism in the estimate.¹⁸
- Statewide percent of electric vehicle registrations were used for all counties (2.68% PA, 2.0% Ohio).¹⁹ Note, vehicles are assumed to be hybrid vehicles rather than full electric vehicles.
- After considering electric vehicles, the remaining vehicle use was split between diesel and gasoline use in proportion to the 2020 NEI: light duty passenger cars and trucks (gasoline 84%; diesel 16%), and heavy duty trucks (gasoline 8%; diesel 92%).²⁰

Table 3 shows emissions growth from indirect commuter traffic by vehicle type over the five counties with greater than 1% of the population commuting to Beaver County (Allegheny, Beaver, Butler, Lawrence, Columbiana) and Table 4 displays the change in

¹⁵ U.S. Census Bureau; American Community Survey 2016-2020, data sheet DP0; available at: <https://data.census.gov/table/ACSDP1Y2014.DP03?g=050XX00US42007>; last accessed May 15, 2024.

¹⁶ "Annual Report of Registrations," PennDOT Driver and Vehicle Services, 2023; available at: <https://www.dot.state.pa.us/public/DVSPubsForms/BMV/Registration%20Reports/ReportofRegistration2023.pdf>; last accessed May 14, 2024; and "Tax Distribution – Detailed State of Motor Vehicle Registrations for year 2023, OH Dept of Public Safety, 2023; available at: <https://bmv.ohio.gov/links/2023-Taxing-District-Breakdown-by-Vehicle-Type.pdf>; last accessed May 15, 2024.

¹⁷ "Estimated National Average Vehicle Emissions Rates per Vehicle by Vehicle Type Using Gasoline and Diesel (grams per mile)," U.S. Dept. of Transportation, Bureau of Transportation Statistics, undated; available for download at: [Estimated U.S. Average Vehicle Emissions Rates per Vehicle by Vehicle Type Using Gasoline and Diesel | Bureau of Transportation Statistics \(bts.gov\)](https://www.bts.gov/publications/data-explorer/vehicle-emissions-rates); last accessed May 17, 2024.

¹⁸ U.S. Census Bureau; American Community Survey 2016-2020, data sheet DP0; available at: <https://data.census.gov/table/ACSDP1Y2014.DP03?g=050XX00US42007>; last accessed May 15, 2024.

¹⁹ "Vehicle Registration Counts by State," Alternate Fuels Data Center, U.S. Dept. of Energy, 2022; available at <https://afdc.energy.gov/vehicle-registration>; last accessed May 17, 2025.

²⁰ Available at: <https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data>

total emissions between the 2014 and 2024 estimates. This revised analysis shows a smaller increase in mobile source emissions (with the exception of PM_{2.5}) which is attributable to the refined analysis applying current emissions factors based on vehicle type, and improved emissions controls on mobile sources.

Table 3. Motor Vehicle Emissions Increase Related to Employment Growth in Beaver County, PA by Vehicle Type

Emission Type	Gasoline (tpy)					Diesel (tpy)		Electric Hybrid (tpy)	Emissions Total (tpy)
	Light Duty Car	Light Duty Truck	Buses	Heavy Duty Vehicle	Motorcycle	Light Duty Car	Light Duty Truck	Light Duty Car	
Total VOC	13.9	2.23	0.44	0.30	0.82	1.03	0.43	0.43	19.6
Exhaust CO	169	28.3	10.2	2.13	3.75	4.79	3.06	5.22	226
Exhaust NO _x	7.20	1.68	0.13	0.11	0.18	0.59	2.34	0.22	12.5
Exhaust PM _{2.5}	0.091	0.023	0.0063	0.0042	0.0059	0.0012	0.10	0.0028	0.24
Brake Wear PM _{2.5}	0.14	0.023	0.0021	0.0015	0.0006	3.54E-06	0.0044	0.0013	0.17
Tire Wear PM _{2.5}	0.045	0.0076	0.0007	0.0006	0.0003	3.50E-09	0.0029	0.0013	0.058

Table 4. Comparison of 2014 and 2024 Revised Estimates of Project-Related Motor Vehicle Emissions from Indirect Employment Growth (2014 vs. 2024)

Pollutant	2014 Estimated Emissions Increases (tpy)	2024 Revised Estimated Emissions Increases (tpy)
CO	1,243	390
NO _x	85	19
PM ₁₀	0.58	0.58*
PM _{2.5}	0.54	0.55
VOC	137	33

*Revised emission factors for PM₁₀ are unavailable; therefore, PM₁₀ is conservatively assumed equal to the estimated increase in 2014.

B. Other Area Source Emissions

Residential and commercial growth in an area can cause increased emissions from various categories of area sources. These categories include residential and commercial fuel combustion, solvent usage, and waste disposal, commercial cooking, commercial marine vessels, and gas stations. RTP originally projected emissions increases in these categories by applying an estimated population growth rate (0.04%) to the existing inventory for the nine counties in proportion to each county's expected

contribution to growth (as represented by the commuter patterns).²¹ Table 5 reflects our original 2014 estimate.

Table 5. Other Area Source Emissions Increases Compared to Current Inventory

Pollutant	2011 Emissions from Other Area Sources (tpy)	Emissions Increases (tpy)
CO	30,046	133
NO _x	8,535	46
PM ₁₀	5,802	28
PM _{2.5}	4,365	23
VOC	19,000	80

Since the 2014 analysis, Beaver County has experienced a 2% decline in population (2014-2024), and each of the ten counties included in the study area are expected to experience continued population decline over the coming decades.²² Accordingly, the original estimates have been revised to include no emissions growth from other area source emissions, as existing resources are likely able to meet population demands.

C. Total Emissions Growth

Table 6 summarizes the anticipated increases in emissions due to residential and commercial growth associated with SPM. With refinements in the analysis, the revised emissions estimates across the five counties with greater than 1% of the population commuting to Beaver County (Allegheny, Beaver, Butler, Lawrence, and Columbiana) remain small in comparison to the total emissions inventory for these areas. No changes to these estimates are predicted for the EMACT project because the project is not expected to directly or indirectly affect job growth.

²¹ “Beaver County, Pennsylvania Population 2024 165,525,” World Population Review, undated; available at: [Beaver County, Pennsylvania Population 2024 \(worldpopulationreview.com\)](https://worldpopulationreview.com/us/population/beaver-county-pennsylvania/); last accessed May 17, 2024.

²² “Pennsylvania Population Projections 2050: A First Look,” Center for Rural Pennsylvania, October 2023; available at https://www.rural.pa.gov/getfile.cfm?file=Resources/PDFs/Access%20PASS%20Final%20Population%20Projections%20Fact%20Sheet_.pdf&view=true; last accessed May 17, 2024.

Table 6. Emissions Increases from Residential and Commercial Growth Due to SPM

Pollutant	Previous Estimate (2014) Total Emissions Increase (tpy)	Revised Estimate (2024) Total Emissions Increase (tpy)
CO	1,490	505
NO _x	133	20.5
PM ₁₀	29	1.28
PM _{2.5}	24	1.25
VOC	218	1.33

Residential and commercial growth associated with SPM may result in slight increases in air pollutant emissions in the surrounding area. Because the anticipated emissions increases are very small in relation to the existing emissions inventory and direct Project emissions, the impact on ambient air pollutant concentrations will not be significant and no adverse impacts are anticipated.

2.0 Potential Impacts to Soils and Vegetation

2.1 Overview

SPM is a major source subject to PSD program requirements, including an analysis of impairment to soils and vegetation that might occur because of the emissions from the proposed projects per 40 CFR 52.21(o)(1). In 2014, Shell estimated that operation of SPM would result in significant emissions increases of NO_x, CO, and PM₁₀. The EMACT Project will result in a significant net emissions increase for NO_x and CO. Because NO_x is now regulated as a precursor to PM_{2.5} under 40 CFR 52.21, and Beaver County was redesignated as a PM_{2.5} maintenance area in October 2015, PM_{2.5} was also included in this revised analysis. NO_x is also a precursor to the formation of ozone, but Pennsylvania is in the ozone transport region and must comply with nonattainment requirements for ozone rather than PSD. Ozone (O₃), therefore, is not addressed in this analysis.

The results of the soils and vegetation impact analyses show that no significant impairment will occur because of the as-built facility, including the Plan Approval Reconciliations and WWTP Permanent Controls Project and EMACT Project. Specific findings are documented in the following subsections.

2.2 Potential Acidification of Soils

For purposes of the soil analysis, information related to soils in the Beaver County area was reviewed. The Natural Resources Conservation Service (“NRCS”) has published soil survey data collectively covering Beaver and Lawrence counties.²³ The total land area in Beaver County covered by this analysis is approximately 447 square miles. This

²³ “Soil Survey of Beaver and Lawrence Counties, Pennsylvania,” U.S. Dept. of Agric. Soil Conservation Service in cooperation with Penn. State Univ., Issued April 192. Available at <https://archive.org/details/BeaverLawrencePA1982/mode/2up> (last accessed May 14, 2024).

exceeds the scope suggested by U.S. EPA guidance, which is limited to the area within approximately 10 kilometers of the facility.²⁴

The assessment of potential impacts on soil shows no likelihood of impairment from SPM. The basis for this conclusion is summarized below. This conclusion is likely representative of the lack of impairment throughout the larger 10-county area. This is because greater levels of deposition to soil and a higher potential for impairment occur closer to the source. Having found no likelihood of impairment within Beaver County, there is no likelihood of impairment further from SPM.

At least 10 different soil types exist in the Beaver County area.²⁵ Some of these soils are moderate to well-drained, while others exhibit poor drainage characteristics. Most of the soils in the NRCS maps units are classified as various varieties of silt loam, with the surface soil pH ranging from 4.6 to 7.0.

Deposition of NO_x and other nitrogen compounds into soils in the impact area could result from facility emissions. In the 2014 analysis, RTP considered whether some marginal acidification of the soils might occur because of SPM and concluded that no impairment to soil was likely to result. Current information shows a decrease in local acidification indicators.

Changes in soil acidity caused by nitrogen deposition can affect tree growth and lake and stream acidification through nitrate (NO₃-) leaching. In 2007, the U.S. Department of Agriculture (USDA) Forest Service undertook an assessment to estimate critical acid loads (CAL) and exceedances for forest soils in the United States.²⁶ A critical load ("CL") is an estimate of ecosystem exposure to a pollutant below which harmful ecosystem effects do not occur, and above which there is an increased risk of adverse effects. A soil's acid neutralizing capacity (ANC) will affect an area's CL. The ANC is

²⁴ See, e.g., *Prevention of Significant Deterioration Workshop Manual* (EPA-450/2-80-081), Oct. 1980, at page I-D-6, expressly limiting the soils and vegetation impairment analysis to the "impact area." See, also, the same document at page I-C-12, defining the impact area as "a circular area whose radius is equal to the greatest distance from the source to which approved dispersion modeling shows the proposed emissions will have a significant impact."

²⁵ Beaver River Conservation and Management Plan, Penn. Environmental Council, August 2008.

²⁶ "Estimates of critical acid loads and exceedances for forest soils across the conterminous United States," Steven G. McNulty, *et. al.*, *Environmental Pollution* 149 (2007) 281-292.

the ability of the soil to buffer acids. Critical loads are typically expressed in terms of kilograms per hectare per year (kg/ha/yr) of wet or total (wet + dry) deposition and consider the soil's ANC. For acidification, CAL is a function of both nitrogen and sulfur deposition. The 2007 assessment reported areas in Western Pennsylvania as having a CAL between 1000-2000 eq/ha/yr, with exceedances in the area between 250-500 eq/ha/yr based on 1994-2000 data.

Importantly, however, the study concluded that these findings were preliminary, and that additional research was needed before a CAL exceedance should be used as a tool for identifying areas of potential concern. There is "no simple dose-response relationship between acid loads and soil or water chemistry."²⁷ Target loads (a policy decision on the level of acceptable load) have not been defined for Western Pennsylvania, nor were any updated CAL values specific to the area location.

The CAL exceedance estimates in the 2007 study were based on 1994-2000 data which occurred before NO_x and SO₂ emissions reductions occurred due to the Acid Rain Program, the Clean Air Interstate Rule (CAIR), the Cross-State Air Pollution Rule (CSAPR), the NO_x SIP call, and other 1990 Clean Air Act Amendment emissions reductions programs. In fact, the U.S. EPA reports a 65% decline in national average NO₂ ambient air concentrations (based on annual 98th percentile of daily maximum 1-hour average values) and a 94% decline in national average SO₂ ambient air concentrations (based on the annual 99th percentile of daily maximum 1-hour averages) between the years 1980-2022.²⁸ Beaver County, specifically, has seen large decreases in NO_x and SO_x due to closure of two coal-fired power plants.

It is, however, generally recognized that broad areas of the entire eastern US are likely exceeding empirical CL estimates for nitrogen for some vegetative species. Studies for the broad Northeastern US region have shown that nitrogen leaching begins to increase in some forest soils at atmospheric nitrogen deposition rates greater than 8-12 kg

²⁷ "Critical Loads for Air Pollution: Measuring the Risks to Ecosystems," New York State Energy Research and Development Authority (NYSERDA), Report Number 14-24, May 2014.

²⁸ See U.S. EPA emissions trends reports available at <http://www.epa.gov/airtrends/>.

N/ha/yr,²⁹ Leaching, however, does not directly equate to an adverse effect, as the effect is related to the CAL/ANC, and can be both positive or negative, depending on the species affected (e.g. stunted growth of an invasive species would be a positive effect.)

EPA reported recommended CL values in its “Integrated Science Assessment for Oxides of Nitrogen, Oxides of Sulfur and Particulate Matter” for eastern temperate forests ranging between less than 3 kg N/ha/yr (for lichens) to 21 kg N/ha/yr (for herbaceous plants).³⁰ (Notably, the lichen CL was developed in the Western U.S. and extrapolated nationwide and may not be representative of Western PA.) The U.K. recommended critical load levels for broadleaved, deciduous woodlands, like those found in Beaver County, are 10-20 kg N/ha/yr; for coniferous woodland is 5-15 kg N/ha/yr; and for mountain hay, and low and medium hay meadows are 10-20 kg N/ha/yr and 20-30 kg N/ha/yr, respectively. Although these are recommended values, EPA also acknowledges that there is no “‘definitive’ CL for an ecological effect”; considerable uncertainty continues to remain with respect to CL science and establishing a target load for acceptable levels of deposition.³¹

Improvements (decreases) in acid loading in Western Pennsylvania can be seen in monitoring data from the National Atmospheric Deposition Program (NADP).³² The NADP collects pollutant deposition data from several national monitoring networks. Data collected at the Allegheny Portage Monitoring Station, located 115 miles east of Beaver County, show measured improvements in the 3-year average pH from 4.85 to 5.34 occurring between 2012 and 2022. Similarly, there is a marked decrease in nitrogen deposition between 2012 and 2022 from 15.67 kg/ha to 7.735 kg/ha.

Four additional monitoring sites located in Western Pennsylvania show improvements in nitrogen deposition loading since the 2014 analysis. The sites include the New Site

²⁹ “Setting Limits: Using Air Pollution Thresholds to Protect and Restore U.S. Ecosystems,” Issues in Ecology, Report No. 14, Fall 2011. Available at: <http://www.esa.org/esa/wp-content/uploads/2013/03/issuesinecology14.pdf>.

³⁰ “Integrated Science Assessment for Oxides of Nitrogen, Oxides of Sulfur and Particulate Matter,” EPA/600R-20/278, p. ES-17, September 2020.

³¹ *Id.*

³² <https://nadp.slh.wisc.edu/networks/national-trends-network/>

Piney Reservoir (approximately 95 miles southeast), Goddard State Park (approximately 62 miles, north), Laurel Hill State Park (approximately 87 miles, southeast), Crooked Creek Lake (approximately 55 miles, east). The 2012 monitoring data from these sites recorded annual NO₃ deposition rates of 7.23 kg/ha, 12.49 kg/ha, 15.57 kg/ha, and 10.67 kg/ha, respectively. The 2022 annual weighted mean NO₃ measured from Piney Reservoir declined to 5.15 kg/ha. The other monitors shut down in 2017 but showed similar declines in nitrogen deposition through 2016. This downward trend is consistent with earlier trends reported by Penn State Associate Professor Dr. Elizabeth Boyner that indicated there was a significant downward trend in nitrate concentration in stream and lakes in Western Pennsylvania.³³

Additionally, since the 2014 assessment, the EPA has undertaken soil analysis within SPM's potential impact area related to the February 3, 2023 train derailment in East Palestine, OH, which occurred approximately 20 miles from the facility. In March and April 2023, EPA conducted sampling at 146 locations, taking both surface and core samples, to assess the effects of a vent and burn event on nearby soils. EPA found that, "the vast majority of results fell within typical background ranges for rural and urban/suburban soil."³⁴ These samples were taken after the facility began operating, with samples showing no immediate signs of adverse effects from operations.

After reviewing this information and recognizing that "[t]here is no single 'definitive' critical load for a natural resource," it was concluded that SPM will not cause additional impairment of soils in this area.³⁵ This finding is based on the decreasing levels of acid deposition and nitrogen deposition in the area. And, to the extent that any of the identified acid and nitrogen CL values have meaning for the Beaver County area, it should be noted that the 2022 NADP monitored values are just below the point at which

³³"Atmospheric Deposition in Pennsylvania & Impacts on Watersheds," Penn State Water Resources Extension Webinar Series, Sept. 4, 2013.

³⁴ "Phase One Residential, Commercial, and Agricultural Soil Sampling Results," U.S. EPA, April 19, 2024; available at: <https://www.epa.gov/east-palestine-oh-train-derailment/phase-one-residential-commercial-and-agricultural-soil-sampling>; last accessed May 17, 2024.

³⁵ "Integrated Science Assessment" at p 250.

leaching (but not necessarily adverse effects) begin to occur, and they are close to or well below levels of recommended CLs for many species.

Finally, the original project provided approximately 534 tons of NO_x emissions reductions from offsets, and an additional 86.56 tons of NO_x are provided for the Plan Approval Reconciliations and WWTP Permanent Controls Project and EMACT Project. These emissions reductions further contribute to the likelihood that SPM will not cause impairment to soil.

2.3 Potential Impairment of Vegetation

The assessment of potential impacts on vegetation shows no likelihood of impairment from SPM. The basis for this conclusion is summarized below.

A. Identification of Vegetation with Significant Commercial Value

This analysis of impacts to commercial vegetation covers the entire ten-county area. This exceeds the scope suggested by U.S. EPA guidance, which is limited to the area within the impact area of the proposed facility (10 km).³⁶ As explained below, since the 2014 analysis, corn, soybean, and forage remain the top commercial crops in Beaver and surrounding counties. In this analysis, Northern Red Oak (*Quercus rubra*), White Oak (*Quercus alba*), Black Cherry (*Prunus serotina*), and White Ash (*Fraxinus americana*) have also been identified as commercially significant vegetation.

The 2014 analysis used 2007 U.S. Dept. of Agriculture Census data to identify the following as the principal crops for study in the analysis:

- Corn for grain (*Zea mays*)
- Corn for silage or greenchop
- Oats for grain (*Avena sativa*)

³⁶ See, e.g., *Prevention of Significant Deterioration Workshop Manual* (EPA-450/2-80-081), Oct. 1980, at page I-D-6, expressly limiting the soils and vegetation impairment analysis to the “impact area.” See, also, the same document at page I-C-12, defining the impact area as “a circular area whose radius is equal to the greatest distance from the source to which approved dispersion modeling shows the proposed emissions will have a significant impact.”

- Vegetables for harvest
- Other forage (other hay, etc.)
- Soybean for beans

The revised 2022 Census of Agriculture shows some shifts in production with wheat for grain outpacing production of oats for grain, and a decline in the acres of vegetables for harvest. Production in forage was also lower, but it remains the principal crop by acreage for the region. Soybeans and corn both saw increases in production volume between the 2007 and 2022 Agriculture Census. Table 7 lists the commercially significant vegetation in the ten-county study area by county.

In 2007, approximately 14% of the land area in the ten-county study area was used for harvested crops; this remains unchanged in the 2022 Census with some counties losing harvested acreage, while others gained. In 2007, approximately 92% of this farmland was used for corn as grain, corn as silage, other forage (e.g. hay), and soybeans. This percentage dropped to 90% in 2022, but these crops remain the three principal crops by acreage.

In addition to vegetative crops, timber harvest in southwest Pennsylvania includes Northern Red Oak, White Oak, Black Cherry, and to a lesser extent White Ash.³⁷

³⁷ "Pennsylvania Timber Market Report, First Quarter, 2024," PennState Extension, May 20, 2024; available at: [Pennsylvania Timber Market Report, First Quarter, 2024 \(psu.edu\)](https://www.psu.edu/news/2024/05/20/pennsylvania-timber-market-report-first-quarter-2024); last accessed May 29, 2024.

Table 7. Commercially Significant Vegetation (Acres) in Ten-County Study Area

Pennsylvania Counties						
Category	Beaver	Allegheny	Butler	Lawrence	Washington	Total
Total land area	278,214	467,251	504,704	229,235	548,473	2,027,877
Harvested cropland	20,995	7,838	72,543	53,290	63,214	217,8808
Corn for grain	4,410	273	22,176	17,100	4,410	48,369
Corn for silage or greenchop	235	30	2,524	1,412	1,227	5,428
Wheat for grain (all)	195	78	3,455	2,961	71	6,760
Oats for grain	720	87	3,262	1,227	363	5,659
Barley for grain	92	W	296	W	87	475
Vegetables harvested for sale	81	547	786	253	401	2,068
Cut Christmas trees	1,157	172	285	30	447	2,091
Other forage (other hay, haylage, grass silage, and greenchop)	11,121	6,378	28,077	13,851	54,259	113,686
Soybean for beans	2,603	60	12,569	16,369	1,407	33,008
Blueberries, Raspberries, Strawberries	17	18	47	13	15	110
Land in Orchards	184	134	132	209	117	776
Ohio and West Virginia Counties						
Category	Columbiana	Mahoning	Brooke	Jefferson	Hancock	Total
Total Land Area	339,840	263,040	56,960	134,169	52,870	846,879
Harvested cropland	93,585	46,635	2,813	36,405	2,105	181,543
Corn for grain	27,424	13,475	106	-	W	41,005
Corn for silage or greenchop	4,469	2,124	112	905	-	7,610
Wheat for grain (all)	6,071	2,538	-	1,772	-	10,381
Oats for grain	709	265	W	-	-	974
Barley for grain	483	113	-	W	-	569
Vegetables harvested for sale	723	422	9	75	W	1,229
Cut Christmas trees	223	223	W	48	-	494
Other forage (other hay, haylage, grass silage, and greenchop)	22,906	9,713	2,515	12,587	2,003	49,724
Soybean for beans	31,284	17,786	W	10,372	-	59,442
Blueberries, Raspberries, Strawberries	120	50	2	4	W	176
Land in Orchards	403	205	W	730	-	1,338

Source: 2022 Census of Agriculture, USDA, National Agricultural Statistic Service.

W – Withheld in the 2022 Census of Agriculture to avoid disclosing data for individual farms.

B. Identification of Vegetation with Potential Recreational Value

In the 2014 analysis, RTP reviewed the 1993 Beaver County Natural Heritage Inventory (NHI) produced by the Pennsylvania Natural Heritage Program (PNHP) to identify vegetation with potential recreational value. The NHI identified areas within the county of importance for the biological diversity and ecological integrity of the County that included the Raccoon Creek State Park and Wildflower Reserve, (located approximately 17 miles northwest of SPM).

After the original 2014 assessment, PNHP updated the Beaver County NHI, using new techniques, and identified 37 natural heritage areas (NHAs) in Beaver County. These areas contain species of concern at a state or federal level, important communities, or areas of “exceptional native biological diversity.”³⁸ Of these NHA’s, 16 contain plant species of interest because the state has designated the species as threatened, endangered, rare, vulnerable, a population of special concern, tentatively undetermined, or the PNHP designated the species for further study.³⁹ Table 8 lists the identified plant species and the State listing status. No federally threatened or endangered plant species were identified by PNHP within Beaver County.

Table 8. Beaver County Vegetation of Interest

Vegetation	Location	State Status
Bog Goldenrod (<i>Solidago uliginosa</i>)	North Fork Little Beaver Creek	Threatened
Crepis Rattlesnake-root (<i>Prenanthes crepidinea</i>)	Raccoon Creek Valley Raccoon Creek Wildflower Reserve	Not listed
Grass-leaved Rush (<i>Juncus biflorus</i>)	Painter Run	Rare
Great St. John’s-wort (<i>Hypericum pyramidatum</i>)	Monaca Bluffs	Not Listed
Harbinger-of-spring (<i>Erigenia bulbosa</i>)	Raccoon Creek Valley Raccoon Creek Wildflower Reserve	Threatened
Hartford Fern (<i>Lycogodium palatum</i>)	Patterson Road	Rare
Heartleaf Meehania (<i>Meehania cordata</i>)	Brady’s Run County Park	Not Listed
Purple Rocket (<i>Iodanthus pinnatifidus</i>)	Beaver River Connoquenessing Creek North Fork Little Beaver Creek Raccoon Creek Valley	Endangered
Rock Skullcap (<i>Scutellaria saxatilis</i>)	Monaca Bluffs	Tentatively Undetermined
Short-awn Foxtail (<i>Alopecurus aequalis</i>)	Little Beaver Creek at New Galilee	Not listed

³⁸ “Beaver County Natural Heritage Inventory,” Johnson, Anna and Christopher Tracey, editors, Pennsylvania Natural Heritage Program, 2021.

³⁹ See state listings at 17 Pa. Code §45.11-21.

Vegetation	Location	State Status
Spring Blue-eyed Mary (<i>Collinsia verna</i>)	Noarth Fork Little Beaver Creek	Not listed
Stalked Bulrush (<i>Scirpus pedicellatus</i>)	Little Beaver Creek at New Galilee	Threatened
Torrey's Bulrush (<i>Schoenoplectus torreyi</i>)	Big Beaver Borough Wetlands Darlington Swamp and North Fork Little Beaver Creek	Endangered
Vase-vine Leather-flower (<i>Clematis viorna</i>)	Cottage Road Raccoon Creek Wildflower Reserve	Endangered
White Trout-lily (<i>Erythronium albidum</i>)	Lower Raccoon Creek North Fork Little Beaver Raccoon Creek Wildflower Reserve Raccoon Creek Valley	Rare
Wild Kidney Bean (<i>Phaseolus polystachios</i>)	North Branch Brady Run	Not listed
Yellow Water-crowfoot (<i>Ranunculus flabellaris</i>)	Darlington Swamp and North Fork Little Beaver Creek Raccoon Creek Wildflower Reserve	Not listed
Declined Trillium (<i>Trillium flexipes</i>)	Not identified*	Tentatively Undetermined
Snow Trillium (<i>Trillium nivale</i>)	Not identified*	Rare

Source: "Beaver County Natural Heritage Inventory," Johnson, Anna and Christopher Tracey, editors, Pennsylvania Natural Heritage Program, 2021.

* Sensitive species, not identified at the site level.

PNHP described the principal threats to these species of concern as overgrazing, landscape fragmentation through development, and invasive plant species. A few species were at risk from loss of forest canopy, but pollutant effects were not identified as a principal concern.

In the surrounding counties, two federally listed species are known to occur 1) Eastern prairie fringe orchid (threatened) in Columbiana and Mahoning counties, and 2) Northern wild monkshood (threatened) in Mahoning County.⁴⁰

Also of interest, the Rocky Bend Nature Preserve is located approximately one mile from SPM. This preserve was formed through a collaborative partnership between Potter Township and local conservation groups to provide a protected area of green space for recreational and educational uses. The land was part of the Horsehead Corporation and was bought by Potter Township during the Horsehead Corporation bankruptcy proceedings.

⁴⁰ "Map:U.S. Threatened and Endangered Species by County," Center for Biological Diversity search tool; available at https://www.biologicaldiversity.org/programs/population_and_sustainability/T_and_E_map/; last accessed may 24, 2024.

Historically, butadiene and styrene production occurred on the land as part of a covert World War II operation. The Township plans to use the land for canoeing, fishing, weddings, reunions, graduations, and other special events.⁴¹ The area includes a forested bend of Raccoon Creek impacted by erosion.⁴² The land, however, is not identified as including threatened or endangered vegetation.

In the 2014 analysis, RTP reviewed the 2009 Environmental report produced by the Nuclear Regulatory Commission (NRC) to support approval of the license renewal for the Beaver Valley Nuclear Plant (BVNP).⁴³ There has been no updated report since this time.

BVNP is located 7 miles west of SPM. The NRC identified 11 Pennsylvania-listed plant species that have the potential to occur within the vicinity (50 mile radius) of BVNP, but no federally listed species. The NRC noted that none of the state-listed plants were found during a 2002 survey of the area.

The NRC concluded that tall larkspur (*Delphinium exaltatum*) was the only species of plant that had the potential to occur in the impact area in the future. No records exist that document tall larkspur historical occurrence in the Beaver County area, however, there is a record of occurrence before 1980 in Allegheny and Butler Counties, and after 1980 in Washington County.⁴⁴ Table 9 shows the identified plant species and state listing status.

⁴¹ “Rocky Bend Nature Preserve: A Community Partnership Project of Potter Township and Independence Conservancy,” undated; available at: <https://pottertwp-pa.gov/rocky-bend-nature-preserve/>.

⁴² “Independence Conservancy,” undated; available at <https://pottertwp-pa.gov/wp-content/uploads/2023/04/IC-Brochure-2019-w-QR-Code.pdf>.

⁴³ “Generic Environmental Impact Statement for License Renewal of Nuclear Plants,” NUREG-1437, Supplement 36, Nuclear Regulatory Commission, p 81, May 2009.

⁴⁴ *Id.* and Tall Larkspur (*Delphinium exaltatum*) Fact Sheet, Pennsylvania Natural Heritage Program.

Table 9. Pennsylvania-Listed Plant Species with Potential to Occur in Vicinity of Beaver Valley Nuclear (BVN) Plant (~7-mile distance from SPM)

Species	Common Name	State Listing Status
<i>Carex typhina</i>	Cattail sedge	Endangered
<i>Clematis viorna</i>	Leather flower	Endangered
<i>Delphinium exaltatum</i>	tall larkspur	Endangered*
<i>Helianthemum bicknellii</i>	Bicknell's Hoary Rockrose	Endangered
<i>Juncus torreyi</i>	Torrey's rush	Threatened
<i>Lithospermum latifolium</i>	American Grumwell	Endangered
<i>Matelea obliqua</i>	Climbing milkvine	Endangered
<i>Myriophyllum sibiricum</i>	Northern water-milfoil	Endangered
<i>Potamogeton tennesseensis</i>	Tennessee pondweed	Endangered
<i>Cypripedium calceolus</i> <i>var. parviflorum</i>	Lesser yellow lady's slipper	Not listed

*Only species determined by NRC with potential to occur within vicinity of BVN plant.

C. Identification of Pollutants of Concern

As discussed below, there is substantial scientific data characterizing the effects of air pollutant emissions on certain crops (e.g., common wheat), whereas there is limited data available for other crops. Air pollutants can affect crops through two principal means:

- Direct phytotoxic effects from air concentrations of pollutants; and
- Indirect phytotoxic effects due to deposition of pollutants in soils in which the crops are growing.

Of the gaseous air pollutants covered by this analysis, only NO_x (i.e., NO and NO₂) is known to be toxic to some plants at moderate to high concentrations in the ambient air. Although carbon monoxide is not phytotoxic, modeled ambient concentrations were

conservatively compared against EPA screening thresholds and found to be well below; therefore, this pollutant was not considered further in this analysis.^{45,46,47,48,49,50}

NO_x can also serve as a precursor to PM_{2.5} formation and cause direct effects on biota through deposition on plant surfaces, or indirect effects through uptake by roots of trace metals bound in the particulate matter or by altering soil biogeochemistry and microbiology.⁵¹ This analysis considers deposition of PM and trace metals as part of the toxic pollutant assessment.

D. Determination of Effects Concentrations

i. Direct Phytotoxic Effects

As is customary for this type of analysis, the assessment relied on the screening criteria in the U.S. EPA report, *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals* (“Screening Procedure”).⁵² This document establishes the air pollutant concentrations that are generally viewed by U.S. EPA to be protective of soils and vegetation having significant commercial or recreational value, including agricultural crops, based on a broad review of pertinent scientific literature. This analysis also relies on the secondary National Ambient Air Quality Standards (NAAQS)⁵³ which are established by U.S. EPA at levels that are protective of the public welfare, including agriculture. For most types of soils and vegetation, ambient

⁴⁵ Smith, A.E., and J.B. Levenson. *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals (EPA-450/2-81-078)*. U.S. EPA, Office of Air Quality Planning and Standards. Research Triangle Park, NC. December 1980. p. 11.

⁴⁶ *Air Quality Criteria for Carbon Monoxide*. U.S. Department of Health, Education, and Welfare, Public Health Service, National Air Pollution Control Administration. Washington, DC. March 1970. pp. 7-1 through 7-3.

⁴⁷ *Air Quality Criteria for Hydrocarbons*. U.S. Department of Health, Education, and Welfare, Public Health Service, National Air Pollution Control Administration. Washington, DC. March 1970. pp. 6-1 through 6-9.

⁴⁸ E.M. Hulzebos et al. “Phytotoxicity Studies with *Lactuca Sativa* in Soil and Nutrient Solutions.” *Environmental Toxicology and Chemistry*. Volume 12. 1993. pp. 1079-1094.

⁴⁹ Smith, A.E., and J.B. Levenson. *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals (EPA-450/2-81-078)*. U.S. EPA, Office of Air Quality Planning and Standards. Research Triangle Park, NC. December 1980.

⁵⁰ The maximum 1-hour CO concentration from the NAAQS analysis, which reflects cumulative impacts from SPM, nearby off-site sources, and regional background, is 5,687 µg/m³. This is well below the screening threshold of 1,800,000 µg/m³ (weekly average) from EPA’s *Screening Procedure*.

⁵¹ 2020 ISA at 15-2.

⁵² Smith, A.E., and J.B. Levenson. *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals (EPA-450/2-81-078)*. U.S. EPA, Office of Air Quality Planning and Standards. Research Triangle Park, NC. December 1980.

⁵³ See, 40 CFR part 50.

concentrations of criteria pollutants below the secondary NAAQS will not result in harmful effects.⁵⁴

Studies linking gaseous species of nitrogen (N) to plant foliar damage have been conducted well above concentration levels occurring in the United States. Thus, there is little evidence to show that current U.S. concentrations of gaseous phase N cause phytotoxic effects.⁵⁵ In the 2020 review of the secondary NO₂ NAAQS, EPA confirmed this finding when it concluded that while agricultural ecosystems are sensitive to high levels of N concentrations, these levels are above the ambient air concentrations found in the U.S.⁵⁶

ii. Indirect Deposition Effects

Two general approaches have been used in establishing deposition rate limits and soil concentration limits: a) preventing accumulation of pollutants in soils; and b) maximizing the capacity of soils to assimilate, attenuate, and detoxify pollutants. The first approach is based on the premise that soil can be used without any undue restriction if it is maintained free of contamination. If pollutants are artificially introduced and are allowed to accumulate in the soil, then over the long term the potential uses of the soil may become limited. The second approach is based on the premise that soils have a capacity to detoxify pollutants. This approach has been applied by the U.S. EPA and by the World Health Organization (WHO).⁵⁷ Section 2.2 considered thresholds for soil acidification while the remainder of this chapter looks at the secondary NAAQS and screening concentrations from the *Screening Procedures*.

⁵⁴ “New Source Review Workshop Manual, Draft”. U.S. EPA, October 1990. EPA never finalized this document but often refers to the document for an explanation of policy and procedures.

⁵⁵ “Integrated Science Assessment for Oxides of Nitrogen, Oxides of Sulfur and Particulate Matter- Ecological Criteria,” U.S. EPA, EPA/600/R-20/278, September 2020; and “Executive Summary Integrated Science Assessment Oxides of Nitrogen and Sulfur Ecological Criteria.” EPA/600/R-08/082F, Dec. 2008.

⁵⁶ 2020 ISA at 3-11.

⁵⁷ A.C. Chang, et al. *Developing Human Health-related Chemical Guidelines for Reclaimed Water and Sewage Sludge Applications in Agriculture*. World Health Organization. Copenhagen, Denmark. May 2002. pp. 19-41.

E. Potential Phytotoxic NO_x Effects

This section presents the results of NO_x dispersion modeling for each air pollutant and assesses modeled concentrations with respect to effects levels. NO_x includes both nitric oxide (NO) and nitrogen dioxide (NO₂), and much of the scientific literature treats these two gases separately.

Based on the results of the air quality impacts analysis, the maximum predicted ambient NO_x concentration due to emissions from SPM is 3.59 µg/m³ (annual average). This value represents total NO_x, including both NO and NO₂. This impact is orders of magnitude below the secondary NAAQS for NO₂ of 100 µg/m³ (annual average)⁵⁸ and the minimum U.S. EPA screening value of 94 µg/m³ (annual average).⁵⁹ Both the secondary NAAQS and the screening value are expressed in terms of NO₂; there are no NAAQS or screening values for NO.⁶⁰ Thus, even assuming all NO_x is NO₂, the ambient air concentrations are well-below the secondary NAAQS. Furthermore, the maximum annual concentration from the NAAQS analysis, which reflects cumulative impacts from SPM, nearby off-site sources, and regional background, is only 21% of the annual NAAQS (20.9 µg/m³).

The agricultural crops for which the minimum U.S. EPA screening value is listed as being protective include barley, corn, oats, and vegetables (carrot, lettuce, leek, broccoli, radish, peas). The principal crops identified in Section A that are not specifically listed in the Screening Procedures report are soybean and forage (e.g. hay).⁶¹

The literature was reviewed to ascertain whether there is any basis in the scientific literature for concluding that: a) the secondary NAAQS and the minimum U.S. EPA screening value are not protective of any of the identified crops; or b) the facility's NO_x

⁵⁸ 40 CFR § 50.11(c).

⁵⁹ Smith, A.E., and J.B. Levenson. *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals (EPA-450/2-81-078)*. U.S. EPA, Office of Air Quality Planning and Standards. Research Triangle Park, NC. December 1980. p. 11.

⁶⁰ *Ibid.*

⁶¹ *Ibid* at p. 68.

emissions will have an unacceptable, adverse impact on agricultural crops in the study area. A summary of our findings follows.

In April 2012, U.S. EPA issued a final rule retaining and affirming the secondary NO₂ NAAQS of 100 µg/m³ (annual average) and has not revised the secondary NAAQS since.⁶² This action reflected both the U.S. EPA Administrator's finding that this standard is "adequate to protect against direct phytotoxic effects on vegetation"⁶³ and her judgment that an alternative standard to protect against deposition-related effects is not supported by currently available data.⁶⁴ The data relied upon by U.S. EPA with respect to direct phytotoxic effects are summarized in the 2008 *Integrated Science Assessment*,⁶⁵ including the following observations:

- An analysis of over 50 peer-reviewed reports on the effects of NO₂ on foliar injury indicated that plants are relatively resistant to NO₂. With few exceptions, visible injury was not reported at concentrations below 377 µg/m³, and these occurred when the cumulative duration of exposures extended to 100 hours or longer.
- Soybean, peas (*Pisum sativum* L.), and radish (*Raphanus sativus* L.) are among numerous plant species for which no phytotoxic effects were documented based on exposure to NO₂ at 189 µg/m³.⁶⁶

In 2000, the WHO instituted a NO_x guideline concentration value of 30 µg/m³ on an annual average (including both NO and NO₂, expressed as NO_x). The maximum modeled concentration of NO_x is below this level. The WHO declined to institute a short-term value, saying "[t]here are insufficient data to provide these levels with confidence at present," but indicated that current evidence would suggest a guideline NO_x concentration value of about 75 µg/m³ on a daily average. The annual guideline

⁶² See, generally, 77 *Fed. Reg.* 20218. April 3, 2012.

⁶³ *Ibid* at p. 20241.

⁶⁴ *Ibid* at pp. 20262-63.

⁶⁵ *Integrated Science Assessment for Oxides of Nitrogen and Sulfur – Ecological Criteria (EPA-600/R-08-082F)*. U.S. EPA, Office of Research and Development. Research Triangle Park, NC. December 2008.

⁶⁶ *Ibid* at pp. 3-200 through 3-201.

concentration value is intended to be protective of all classes of vegetation under all environmental conditions.⁶⁷

In 2020, EPA revised the Integrated Science Assessment and indicated that, “[n]o clear dose-response relationship for exposure to NO₂ and reduction in growth and/or yield of plants emerged from experiments and explained that few additional studies have occurred since the 2008 Integrated Science Assessment.”⁶⁸

With respect to soybean exposure, EPA noted that, “soybeans (*Glycine max*) exposed 7 hours/day for 5 days showed an increase in photosynthesis at a concentration of 0.2 ppm but a decrease in net photosynthesis at a concentration of 0.5 ppm. Short-term exposures of soybean to 0.6 ppm NO₂ for 2 to 3 hours also had no effect on net photosynthesis.” Also, soybean plants grown in Australia had decreased NO₃ uptake by roots and reduced growth of plants exposed to 1.1 ppm of NO₂ for 7 days.” Additionally, “no effects of NO₂ were observed on soybeans grown in field plots subjected to a series of 10 episodic exposures averaging 0.4 ppm for 2.5 or 3 hours.”⁶⁹

Similarly, negative effects to forestry at existing ambient air concentrations and deposition rates are not expected. EPA reports that N deposition broadly stimulates tree growth forest productivity, with northern red oak showing increased growth even at a 50 kg N/ha/yr deposition rate.⁷⁰ With respect to trees of commercial value in Beaver County, researchers reported positive growth of northern red and white oak, white ash, and black cherry at increasing nitrogen deposition rates.⁷¹ Research into potential causes of northern red oak mortality in Southwestern Pennsylvania concluded that soil

⁶⁷ *Air Quality Guidelines for Europe*, 2nd Ed. World Health Organization, Regional Office for Europe. Copenhagen, Denmark. 2000. pp. 230-233.

⁶⁸ 2020 ISA at 3-10 through 3-11.

⁶⁹ *Id.*

⁷⁰ 2020 ISA at 6-17.

⁷¹ Thomas, Quinn *et. al.*, “Increased tree carbon storage in response to nitrogen deposition in the U.S.,” *Nature Geoscience*, Vol. 3, January 2010.

nutrient deficiency in combination with aluminum toxicity, rather than soil acidity was the likely cause of the northern red oak mortality.⁷²

Tall Larkspur is the only federally endangered plant species NRC identified with potential to occur within the vicinity of the BVN plant. It grows in meadows, at high elevations, and is poisonous to cattle. Efforts to develop an effective herbicide program to protect against harm during grazing has led to experiments with a high rate of N application on the plant. A variety of these studies demonstrate that Tall Larkspur is generally resistant to high concentration N application, and that herbicide mortality is linked to salt concentrations, not N concentrations.⁷³

In summary, the scientific literature affirms that the secondary NAAQS and the minimum annual U.S. EPA screening value are protective of the crops and vegetation identified herein. The maximum predicted NO_x concentration is well below the secondary NAAQS, the minimum U.S. EPA screening value, guideline concentration values established by foreign governmental agencies, and concentrations that are identified in the literature as being harmful to commercially significant vegetation in the ten-county study area. As such, no adverse phytotoxic effects are expected to result from the SPM facility.

2.4 Potential Impairment to Soil, Vegetation, and Animals from Toxic Metals Deposition

A six-step process following the guidance provided in EPA's *Screening Procedure*, was used to evaluate effects of trace metal deposition using modeled concentrations from the inhalation health risk assessment (HRA), where available.⁷⁴ A detailed discussion

⁷² "The effect of soil nutrition, soil acidity, and drought on northern red oak (*Quercus rubra* L.) growth and nutrition on Pennsylvania sites with high and low red oak mortality," Forest Ecology and Management, Volume 136, Issues 1–3, 1 October 2000, Pages 199-207.

⁷³ "Mechanism by which ammonium fertilizer kill tall larkspur," Woolsey, *et.al.*, Journal of Range Management, 56, 524-528, Sept 2003. (citing results of various historical studies).

⁷⁴ Smith, A.E., and J.B. Levenson. *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals (EPA-450/2-81-078)*. U.S. EPA, Office of Air Quality Planning and Standards. Research Triangle Park, NC. December 1980. p. 26-27.

of the modeling conducted in support of the inhalation HRA is provided in Appendix D-3 of the plan approval application.

Steps for Evaluating Trace Metal Effects based on Modeled Ambient Air Concentrations

- 1. Calculate the deposited concentration (DC) using the following equation assuming that all deposited metals are soluble.**

Equation 1: Computation of Deposited Concentration

$$DC \text{ (ppmw)} = 21.5 * \left(\frac{N}{d}\right) X$$

Where:

DC = deposited concentration (ppmw)

N = expected lifetime of source (yr)

d = depth of soil through which deposited material is distributed (cm); and

X = maximum annual average ambient concentration from the source ($\mu\text{g}/\text{m}^3$)

For purposes of this analysis, the EPA recommended value of 40 years for the expected source lifetime and 3 centimeters for the depth of soil through which deposited material is distributed were used.⁷⁵ The deposited concentrations calculated based on results from air dispersion modeling performed using AERMOD are summarized in Table 10 below. Concentrations are based on the total facility-wide emissions from SPM, including the updates associated with the Plan Approval Reconciliations and WWTP Permanent Controls Project and EMAX Project.⁷⁶

⁷⁵ Ibid. p. 35

⁷⁶ Refer to the Inhalation Risk Assessment submitted under separate cover for details on the AERMOD modeling analysis.

**Table 10. Trace Metal Deposition Concentrations from SPM
Calculated from Ambient Air Modeling Concentrations**

Pollutant	Modeled Maximum Annual Ambient Air Concentration ($\mu\text{g}/\text{m}^3$)	Deposited Concentration (DC) (ppmw)
Arsenic	1.00E-05	2.87E-03
Cadmium	5.51E-05	1.58E-02
Chromium	7.79E-05	2.23E-02
Cobalt	4.21E-06	1.21E-03
Manganese	1.91E-05	5.46E-03
Mercury	1.30E-05	3.74E-03
Nickel	1.05E-04	3.02E-02
Selenium	1.20E-06	3.45E-04
Lead	2.50E-05	7.17E-03
Vanadium	1.15E-04	3.31E-02
Zinc	1.45E-03	4.17E-01

2. Compare the DC to Soil Screening Concentrations (SCC)

The calculated deposited concentrations of trace metals from Table 10 were then compared against the soil screening concentrations from Table 3.4 of the *Screening Procedure*, as summarized in Table 11 below.

**Table 11. Trace Metal Deposition Concentrations from SPM
Compared to Screening Values**

Pollutant	Deposited Concentration (DC) (ppmw)	Soil Screening Concentration (SCC) (ppmw)	DC Below SCC?
Arsenic	2.87E-03	3	Yes
Cadmium	1.58E-02	2.5	Yes
Chromium	2.23E-02	8.4	Yes
Cobalt	1.21E-03	Not Available	-
Manganese	5.46E-03	2.5	Yes
Mercury	3.74E-03	455	Yes
Nickel	3.02E-02	500	Yes
Selenium	3.45E-04	13	Yes
Lead	7.17E-03	1,000	Yes
Vanadium	3.31E-02	2.5	Yes
Zinc	4.17E-01	Not Available	-

3. **Compare the DC to the endogenous soil concentration (EC) to determine whether the DC represents less than a 10 percent increase.**

Per the *Screening Procedure*, an increase over the soil's endogenous (i.e., background) concentration of more than 10 percent over the lifetime of the source could be a possible cause for concern. Per the guidance, this is intended to be used as a supporting indicator and not a primary decision parameter. The percent increase was calculated using the following equation from the *Screening Procedure*:

Equation 2. Percent Increase from Existing Soil Concentration

$$\% \text{ Increase} = \frac{DC \text{ (ppmw)}}{EC} * 100$$

Where:

DC = deposited concentration (ppmw)

EC = average soil endogenous concentration (ppmw)

To determine soil endogenous concentrations, data for Beaver County were used where available, or Table 3.5 of the *Screening Procedure* in the absence of Beaver County-specific data. The estimated percent increases are summarized in Table 12 below.

Table 12. Trace Metal Average Percent Increase in Endogenous Soil Concentration

Pollutant	Deposited Concentration (DC) (ppmw)	Average Endogenous Soil Concentration (EC) (ppmw)	Percent Increase (%)	Below 10%?	EC Source*
Arsenic	2.87E-03	6	0.05	Yes	Table 3.5
Cadmium	1.58E-02	4.61	0.34	Yes	Metal Data for Pennsylvania Soils
Chromium	2.23E-02	17.8	0.13	Yes	Metal Data for Pennsylvania Soils
Cobalt	1.21E-03	8	0.015	Yes	Table 3.5
Manganese	5.46E-03	850	0.0006	Yes	Table 3.5
Mercury	3.74E-03	0.05	7.47	Yes	Metal Data for Pennsylvania Soils
Nickel	3.02E-02	22.76	0.13	Yes	Metal Data for Pennsylvania Soils
Selenium	3.45E-04	0.5	0.069	Yes	Table 3.5
Lead	7.17E-03	103.24	0.0069	Yes	Metal Data for Pennsylvania Soils
Vanadium	3.31E-02	100	0.033	Yes	Table 3.5
Zinc	4.17E-01	274.18	0.15	Yes	Metal Data for Pennsylvania Soils

* Average EC based on data for Beaver County from the Penn State Environmental Chemistry Laboratory; Ciolkosz, Edward J., *et al.*, "Metal Data for Pennsylvania Soils," Pennsylvania State University Agronomy Department, June 1998, or Table 3.5 of the *Screening Procedure* in the absence of Beaver County specific data.

4. Calculate the potential vegetation tissue concentrations (TC) based on potential plant uptake from soil assuming all DC is soluble and available for uptake

The concentration in plant tissue was estimated using the following equation from the *Screening Procedure*:

Equation 3. Potential Tissue Concentration (ppmw)

$$TC \text{ (ppmw)} = DC \text{ (ppmw)} * \text{Default Soil Concentration Ratio}$$

Default soil concentration ratios were obtained from Table 3.6 of the *Screening Procedure*. This equation conservatively assumes that all deposited material is soluble and available for uptake by plants. In reality, a significant portion may be unavailable for uptake by plants depending on a number of factors, including but not limited to, the chemical form of the trace metal, temperature, presence of other elements, selective uptake by plants, soil pH, soil moisture content, and composition of the soil. Table 13 below summarizes the estimated vegetation tissue concentrations of trace metals resulting from SPM emissions.

Table 13. Estimated Vegetation Trace Metal Tissue Concentration

Pollutant	Deposited Concentration (DC) (ppmw)	Soil Concentration Ratio	Vegetation Tissue Concentration (TC) (ppmw)
Arsenic	2.87E-03	0.14	4.02E-04
Cadmium	1.58E-02	10.7	1.69E-01
Chromium	2.23E-02	0.02	4.47E-04
Cobalt	1.21E-03	0.11	1.33E-04
Manganese	5.46E-03	0.066	3.60E-04
Mercury	3.74E-03	0.5	1.87E-03
Nickel	3.02E-02	0.045	1.36E-03
Selenium	3.45E-04	1.0	3.45E-04
Lead	7.17E-03	0.45	3.23E-03
Vanadium	3.31E-02	0.01	3.31E-04
Zinc	4.17E-01	0.64	2.67E-01

5. Compare the TC to vegetation screening concentrations (VSC).

The estimated vegetation tissue concentrations were then compared to the vegetation screening concentrations from Table 3.4 of the *Screening Procedure*. The results of this comparison are summarized in Table 14 below:

Table 14. Estimated Vegetation Trace Metal Tissue Concentrations Compared to Screening Concentrations

Pollutant	Vegetation Tissue Concentration (ppmw)	Vegetation Tissue Screening Concentration (VSC) (ppmw)	TC Below VSC?
Arsenic	4.02E-04	0.25	Yes
Cadmium	1.69E-01	3	Yes
Chromium	4.47E-04	1	Yes
Cobalt	1.33E-04	19	Yes
Manganese	3.60E-04	400	Yes
Mercury	1.87E-03	Not Available	-
Nickel	1.36E-03	60	Yes
Selenium	3.45E-04	100	Yes
Lead	3.23E-03	126	Yes
Vanadium	3.31E-04	Not Available	-
Zinc	2.67E-01	300	Yes

6. Compare the TC to animal toxicity screen concentrations (Screening Procedure, Table 3.7) assuming animals feed only on vegetation in maximum deposition area.

The estimated vegetation tissue concentrations were also compared against animal toxicity screening concentrations obtained from Table 3.7 of the *Screening Procedure* to assess the potential for negative impacts on animals. Where a range is specified in Table 3.7, the minimum value was used for the comparison. This analysis conservatively assumes that the animals would feed only on vegetation in the area where maximum deposition occurs. The results of the comparison are summarized in Table 15 below.

Table 15. Trace Metals Vegetative Tissue Concentrations Compared to Animal Toxicity Screening Concentrations

Pollutant	Vegetation Tissue Concentration (TC) (ppmw)	Animal Toxicity Screening Concentration (ATC) (ppmw)	TC Below ATC?
Arsenic	4.02E-04	3	Yes
Cadmium	1.69E-01	15	Yes
Chromium	4.47E-04	Not available	-
Cobalt	1.33E-04	1	Yes
Manganese	3.60E-04	500	Yes
Mercury	1.87E-03	Not Available	-
Nickel	1.36E-03	1,000	Yes
Selenium	3.45E-04	5	Yes
Lead	3.23E-03	80	Yes
Vanadium	3.31E-04	10	Yes
Zinc	2.67E-01	500	Yes

As shown in Tables 10 through 15, all SPM-related concentrations are well below the *Screening Procedure's* screening values. The screening values provide a conservative estimate of potential impacts. Values resulting from SPM are orders of magnitude below the screening values. Based on this, SPM is unlikely to result in adverse effects from toxic metal deposition.

2.5 Conclusion

Based on the effects analysis, SPM's emissions are unlikely to adversely affect soil or vegetation with significant commercial value or potential recreational value, plant species of concern within the vicinity of the project site, nor animals. For each pollutant of concern, the predicted ambient concentration or the predicted deposition rate is well below the secondary NAAQS and the minimum screening values established by U.S. EPA. Nothing in the scientific literature identified during this review indicates that the secondary NAAQS and the minimum U.S. EPA screening values are not protective of the identified vegetation. Finally, the only federally identified plant species of concern, tall larkspur, is resistant to nitrogen application in experimental studies, and thus is unlikely to be affected by NO_x or PM deposition.

APPENDIX D-3A

EMISSION ESTIMATES FOR THE INHALATION RISK ASSESSMENT FOR SHELL POLYMERS MONACA SHELL CHEMICAL APPALACHIA LLC BEAVER COUNTY, PENNSYLVANIA



September 2024

Table of Contents

1.0 GENERAL DISCUSSION.....	1
1.1 Combustion Sources	1
1.2 Polyethylene Units	2
1.3 Storage Tanks	2
1.4 Process Cooling Water Tower	2
1.5 Wastewater Treatment Plant	3
1.6 Fugitive Emissions from Equipment Leaks	3

List of Tables

Table 1. Identified Compounds of Potential Concern	4
Table 2. Annual Average COPC Emission Rates	5
Table 3. Maximum Hourly COPC Emission Rates.....	7

Emission Estimates for Shell Polymers Monaca (SPM) Inhalation Risk Assessment

1.0 General Discussion

The methodologies used in this updated analysis to estimate emissions rates for the compounds of potential concern (COPC) are consistent with the methodologies previously used.¹ To identify the COPC from the project's combustion sources, EPA's compilation of Air Pollutant Emission Factors (*i.e.*, AP-42) was used. The COPC emissions for the remaining points of emission were determined based on process knowledge. A summary of the previously identified COPCs is presented in Table 1. Detailed emissions calculations are provided in Appendix B of the plan approval application.

A summary of the one-hour emissions rate estimates used in the chronic and acute exposure analyses are presented in Table 2 and Table 3, respectively. The following subsections provide more specific discussion of the calculation methodologies used for each type of emissions unit. References to hazardous air pollutants (HAP) are for Plan Approval purposes and should be considered synonymous with COPC for this analysis.

1.1 Combustion Sources

As previously noted, COPC emission rates from the combustion sources at SPM (*i.e.*, cracking furnaces, combustion turbines, emergency engines, flares, and incinerators) are based on the application of the appropriate AP-42, or other publicly available, factors, stack test data, and the fuel firing rate of the unit. Emissions from waste gas combustion by the flares and incinerators are based on actual process data and engineering judgement. Refer to Appendix B of the plan approval application for detailed calculations.

¹ See the February 2015 Application for Plan Approval submitted to the Pennsylvania Department of Environmental Protection (PaDEP) and the September 23, 2014, Technical Supplement.

1.2 Polyethylene Units

The COPCs emitted from the polyethylene manufacturing units are hexavalent chromium (CrVI) from the catalyst heaters and hexane from equipment leaks. Hexavalent chromium emissions result from the catalyst activation process. To activate the catalyst, hot air produced via electrical heaters is passed through the catalyst heater where it contacts with the catalyst. After passing through the heater, the air exhausts through a filter-controlled stack to the atmosphere. Catalyst particulate entrained in the hot exhaust contains trace amounts of CrVI.

1.3 Storage Tanks

Uncontrolled COPC emission rates from certain fixed roof atmospheric storage tanks are presented in Appendix B of the plan approval application. These emission rates are estimated using the methodology outlined in AP-42, Chapter 7, Section 1. No routine emissions, other than fugitive emissions from equipment components, are estimated from pressurized storage tanks (*i.e.*, the C3+ storage spheres).² These tanks are sealed and pressurized so working and breathing losses do not occur. Emissions from storage tanks with vents routed to the thermal oxidizer headers are accounted for in the estimated emissions rates from the Continuous Vent Thermal Oxidizer (CVTO) and Spent Caustic Thermal Oxidizer (SCTO).

1.4 Process Cooling Water Tower

COPC emissions from the process cooling water tower are estimated by speciating the potential volatile organic compound (VOC) emissions based on sampling data and engineering judgement. The VOC emissions are based on the VOC Lowest Achievable Emission Rate (LAER) limit and the design cooling water circulation rate. The process cooling water tower VOC emission rate estimate is presented in Appendix B of the plan approval application.

² In Tables 2 and 3 below, fugitive emissions from storage tanks are included in the “outside the boundary limits” (OSBL) fugitives.

1.5 Wastewater Treatment Plant

The WWTP's potential emissions calculation model was revised from WATER9 to Toxchem, which is a widely recognized calculation tool used for estimating emissions from wastewater collection, preliminary/primary/secondary treatment, and disposal facilities.³ Controlled emissions are accounted for in the emissions rate estimates from the SCTO. The WWTP emissions rate estimates are presented in Appendix B of the plan approval application.

1.6 Fugitive Emissions from Equipment Leaks

EPA's 1995 Protocol for Equipment Leak Emission Estimates (EPA-453-R-95-017) is used to estimate emissions from equipment leaks. SPM LDAR Program actual average leak rates for component types and the correlation emission factor approach for the synthetic organic chemical manufacturing industry (SOCMI) are used to estimate fugitive emissions. To determine the emissions rate for an individual COPC, process knowledge of the chemical composition of the lines is applied to the VOC emissions rate. Refer to Appendix B of the plan approval application for detailed calculations.

³ WATER9 is a wastewater collection, storage, separation, and treatment system emissions estimation model that is provided free by EPA, but it was developed by EPA using a freeware Windows software that is now outdated. As a result, WATER9 is not reliably functional on computers using newer Windows operating systems, and EPA is no longer providing updates to WATER9 or assistance to users experiencing model operating errors. For these reasons, SPM has revised the WWTP's potential to emit calculation so that it is now performed using Toxchem rather than WATER9. Like WATER9, Toxchem is a wastewater collection, storage, separation, and treatment system emissions estimation model that uses fundamental mass transfer equations and mass balances to perform wastewater emission calculations. Toxchem was developed in the early 1990s as an alternative to WATER8/WATER9 to overcome some of the limitations of those models, including improved mass transfer processes, sorption of contaminants to solids, and a compound database containing critically reviewed physical, chemical, and biological properties. Also, Toxchem is recognized as a more user-friendly alternative to WATER9. As documented in 40 CFR Part 63, Appendix C, EPA approved Toxchem as an alternative to WATER7/WATER8/WATER9 during the development of 40 CFR 63 Subpart G. Moreover, EPA and state agencies have recently been suggesting Toxchem as an available alternative to WATER9 due to the growing outdated status of WATER9 for its users.

Table 1. Identified Compounds of Potential Concern

1,3-Butadiene	Dichlorobenzene
2-Methylnaphthalene	Ethylbenzene
3-Methylchloranthrene	Fluoranthene
7,12-Dimethylbenz(a)anthracene	Fluorene
Acenaphthene	Formaldehyde
Acenaphthylene	Heptane
Acetaldehyde	Hexane
Acrolein	Indeno(1,2,3-cd)pyrene
Ammonia	Lead
Anthracene	Manganese
Arsenic	Mercury
Barium	Methanol
Benzene	Molybdenum
Benzo(a)anthracene	Naphthalene
Benzo(a)pyrene	Nickel
Benzo(b)fluoranthene	Polycyclic Aromatic Hydrocarbons (PAH)
Benzo(g,h,i)perylene	Pentane
Benzo(g,h,l)perylene	Phenanthrene
Benzo(k)fluoranthene	Phenol
Beryllium	Propane
Biphenyl	Propylene
Cadmium	Propylene Oxide
Chloroform	Pyrene
Chromium VI	Selenium
Chromium III ²	Styrene
Chrysene	Toluene
Cobalt	Vanadium
Copper	Xylenes
Dibenzo(a,h)anthracene	Zinc
Dibutylphthalate	

¹ Compounds of Potential Concern were identified from EPA's Compilation of AP-42 Emission Factors for combustion of natural gas and from process knowledge.

² For purposes of this analysis, all chromium emissions were conservatively assumed to be in the form of Chromium VI.

Table 2. Annual Average COPC Emission Rates

Pollutant	Cracking Furnaces (per furnace) (lb/hr)	Combined Cycle Units (per CT) (lb/hr)	HPGF1 (TEGF A) (lb/hr)	HPGF2 (TEGF B) (lb/hr)	HP Elevated Flare (lb/hr)	CVTO (lb/hr)	MPGF (lb/hr)	SCTO (lb/hr)	PE Blending Silos (lb/hr)	Total EC Fugitives (lb/hr)	Total OSBL Fugitives (lb/hr)	Emergency Engines (Total) (lb/hr)	Firewater Pump Engine (per engine) (lb/hr)	WWTP (lb/hr)	Process Cooling Tower ³ (lb/hr)	PE1 and PE2 (lb/hr)	PE3 (lb/hr)	Total ⁴
1,3-Butadiene	--	2.15E-04	4.50E-01	4.50E-01	4.50E-01	--	--	1.50E-03	--	5.94E-02	2.82E-02	5.99E-06	1.53E-06	--	1.37E-02	--	--	1.45E+00
2-Methylnaphthalene	7.91E-06	--	4.27E-06	4.27E-06	1.30E-06	4.23E-06	2.24E-06	2.60E-07	--	--	--	6.78E-07	--	--	--	--	--	2.52E-05
3-Methylchloranthrene	5.93E-07	--	3.20E-07	3.20E-07	9.73E-08	3.17E-07	1.68E-07	1.95E-08	--	--	--	--	--	--	--	--	--	1.84E-06
7,12-Dimethylbenz(a)anthracene	5.27E-06	--	2.85E-06	2.85E-06	8.65E-07	2.82E-06	1.49E-06	1.74E-07	--	--	--	--	--	--	--	--	--	1.63E-05
Acenaphthene	5.93E-07	--	3.20E-07	3.20E-07	9.73E-08	3.17E-07	1.68E-07	3.35E-05	--	--	--	1.93E-08	5.54E-08	1.39E-05	--	--	--	4.94E-05
Acenaphthylene	--	--	--	--	--	--	--	2.56E-05	--	--	--	6.87E-08	1.97E-07	5.97E-06	--	--	--	3.18E-05
Acetaldehyde	--	2.00E-02	--	--	--	--	--	--	--	--	--	1.81E-04	2.99E-05	--	--	--	--	2.02E-02
Acrolein	--	3.20E-03	--	--	--	--	--	--	--	--	--	1.06E-04	3.61E-06	--	--	--	--	3.31E-03
Ammonia	2.39E+00	4.88E+00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7.26E+00
Anthracene	7.91E-07	--	4.27E-07	4.27E-07	1.30E-07	4.23E-07	2.24E-07	7.35E-06	--	--	--	2.54E-08	7.29E-08	9.56E-07	--	--	--	1.08E-05
Arsenic	6.59E-05	--	3.56E-05	3.56E-05	1.08E-05	3.52E-05	1.87E-05	2.17E-06	--	--	--	--	--	--	--	--	--	2.04E-04
Barium	1.45E-03	--	7.83E-04	7.83E-04	2.38E-04	7.75E-04	4.11E-04	4.77E-05	--	--	--	--	--	--	--	--	--	4.49E-03
Benzene	6.92E-04	1.12E-03	7.81E-02	7.81E-02	7.78E-02	1.21E-03	8.38E-04	1.42E-02	--	3.93E-02	2.04E-02	2.17E-05	3.64E-05	7.05E-03	3.20E-03	--	--	3.22E-01
Benzo(a)anthracene	5.93E-07	--	3.20E-07	3.20E-07	9.73E-08	3.17E-07	1.68E-07	1.95E-08	--	--	--	2.28E-08	6.55E-08	--	--	--	--	1.92E-06
Benzo(a)pyrene	3.96E-07	--	2.14E-07	2.14E-07	6.49E-08	2.11E-07	1.12E-07	1.30E-08	--	--	--	2.55E-09	7.33E-09	--	--	--	--	1.23E-06
Benzo(b)fluoranthene	5.93E-07	--	3.20E-07	3.20E-07	9.73E-08	3.17E-07	1.68E-07	1.95E-08	--	--	--	1.35E-09	3.86E-09	--	--	--	--	1.84E-06
Benzo(g,h,i)perylene	3.96E-07	--	2.14E-07	2.14E-07	6.49E-08	2.11E-07	1.12E-07	1.30E-08	--	--	--	--	--	--	--	--	--	1.22E-06
Benzo(g,h,l)perylene	--	--	--	--	--	--	--	--	--	--	--	6.64E-09	1.91E-08	--	--	--	--	2.57E-08
Benzo(k)fluoranthene	5.93E-07	--	3.20E-07	3.20E-07	9.73E-08	3.17E-07	1.68E-07	1.95E-08	--	--	--	2.11E-09	6.04E-09	--	--	--	--	1.84E-06
Beryllium	3.96E-06	--	2.14E-06	2.14E-06	6.49E-07	2.11E-06	1.12E-06	1.30E-07	--	--	--	--	--	--	--	--	--	1.22E-05
Biphenyl	--	--	--	--	--	--	--	--	--	--	4.24E-08	4.33E-06	--	--	--	--	--	4.37E-06
Cadmium	3.63E-04	--	1.96E-04	1.96E-04	5.95E-05	1.94E-04	1.03E-04	1.19E-05	--	--	--	--	--	--	--	--	--	1.12E-03
Chloroform	--	--	--	--	--	--	--	6.61E-07	--	--	--	5.82E-07	--	1.68E-05	--	--	--	1.81E-05
Chromium	4.61E-04	--	2.49E-04	2.49E-04	7.57E-05	2.47E-04	1.31E-04	1.52E-05	--	--	--	--	--	--	--	8.20E-07	3.03E-05	1.46E-03
Chrysene	5.93E-07	--	3.20E-07	3.20E-07	9.73E-08	3.17E-07	1.68E-07	1.95E-08	--	--	--	4.80E-09	1.38E-08	--	--	--	--	1.85E-06
Cobalt	2.77E-05	--	1.49E-05	1.49E-05	4.54E-06	1.48E-05	7.85E-06	9.11E-07	--	--	--	--	--	--	--	--	--	8.57E-05
Copper	2.80E-04	--	1.51E-04	1.51E-04	4.60E-05	1.50E-04	7.94E-05	9.22E-06	--	--	--	--	--	--	--	--	--	8.67E-04
Dibenzo(a,h)anthracene	3.96E-07	--	2.14E-07	2.14E-07	6.49E-08	2.11E-07	1.12E-07	1.30E-08	--	--	--	7.92E-09	2.27E-08	--	--	--	--	1.25E-06
Dibutylphthalate	--	--	--	--	--	--	--	9.70E-05	--	--	--	--	--	1.63E-07	--	--	--	9.72E-05
Dichlorobenzene	3.96E-04	--	2.14E-04	2.14E-04	6.49E-05	2.11E-04	1.12E-04	1.30E-05	--	--	--	--	--	--	--	--	--	1.22E-03
Ethylbenzene	--	1.60E-02	2.01E-04	2.01E-04	2.01E-04	--	--	8.11E-04	--	9.36E-04	7.25E-04	8.11E-07	--	1.23E-03	8.30E-06	--	--	2.03E-02
Fluoranthene	9.89E-07	--	5.34E-07	5.34E-07	1.62E-07	5.28E-07	2.80E-07	1.15E-05	--	--	--	1.03E-07	2.97E-07	1.29E-07	--	--	--	1.51E-05
Fluorene	9.23E-07	--	4.98E-07	4.98E-07	1.51E-07	4.93E-07	2.62E-07	2.91E-05	--	--	--	3.97E-07	1.14E-06	5.61E-06	--	--	--	3.91E-05
Formaldehyde	2.47E-02	1.65E-01	1.33E-02	1.33E-02	4.06E-03	1.32E-02	7.01E-03	8.14E-04	--	--	--	1.09E-03	4.60E-05	--	--	--	--	2.42E-01
Heptane	--	--	--	--	--	--	--	--	--	2.76E-04	--	--	--	--	--	--	--	2.76E-04
Hexane	1.37E-01	--	6.86E-02	6.86E-02	6.50E-02	5.40E-03	2.94E-03	3.15E-04	1.31E-02	--	5.01E-02	2.27E-05	--	--	--	--	--	4.11E-01

Table 2. Annual Average COPC Emission Rates

Pollutant	Cracking Furnaces (per furnace) (lb/hr)	Combined Cycle Units (per CT) (lb/hr)	HPGF1 (TEGF A) (lb/hr)	HPGF2 (TEGF B) (lb/hr)	HP Elevated Flare (lb/hr)	CVTO (lb/hr)	MPGF (lb/hr)	SCTO (lb/hr)	PE Blending Silos (lb/hr)	Total EC Fugitives (lb/hr)	Total OSBL Fugitives (lb/hr)	Emergency Engines (Total) (lb/hr)	Firewater Pump Engine (per engine) (lb/hr)	WWTP (lb/hr)	Process Cooling Tower ³ (lb/hr)	PE1 and PE2 (lb/hr)	PE3 (lb/hr)	Total ⁴
Indeno(1,2,3-cd)pyrene	5.93E-07	--	3.20E-07	3.20E-07	9.73E-08	3.17E-07	1.68E-07	1.95E-08	--	--	--	5.09E-09	1.46E-08	--	--	--	--	1.86E-06
Lead	1.65E-04	--	8.90E-05	8.90E-05	2.70E-05	8.80E-05	4.67E-05	--	--	--	--	--	--	--	--	--	--	5.05E-04
Manganese	1.25E-04	--	6.76E-05	6.76E-05	2.05E-05	6.69E-05	3.55E-05	4.12E-06	--	--	--	--	--	--	--	--	--	3.88E-04
Mercury	8.57E-05	--	4.63E-05	4.63E-05	1.41E-05	4.58E-05	2.43E-05	2.82E-06	--	--	--	--	--	--	--	--	--	2.65E-04
Methanol	--	--	--	--	--	--	--	--	--	1.41E-02	7.42E-03	5.11E-05	--	--	--	--	--	2.16E-02
Molybdenum	3.63E-04	--	1.96E-04	1.96E-04	5.95E-05	1.94E-04	1.03E-04	1.19E-05	--	--	--	--	--	--	--	--	--	1.12E-03
Naphthalene	2.01E-04	6.50E-04	1.09E-04	1.09E-04	3.30E-05	1.07E-04	5.70E-05	9.77E-04	--	4.92E-03	5.82E-03	2.67E-06	3.31E-06	2.26E-04	--	--	--	1.32E-02
Nickel	6.92E-04	--	3.74E-04	3.74E-04	1.14E-04	3.70E-04	1.96E-04	2.28E-05	--	--	--	--	--	--	--	--	--	2.14E-03
PAH ²	--	1.10E-03	--	--	--	--	--	--	--	--	--	2.83E-06	6.55E-06	--	--	--	--	1.11E-03
Pentane	8.57E-01	--	4.63E-01	4.63E-01	1.41E-01	4.58E-01	2.43E-01	2.82E-02	--	--	--	5.31E-05	--	--	--	--	--	2.65E+00
Phenanthrene	5.60E-06	--	3.03E-06	3.03E-06	9.19E-07	2.99E-06	1.59E-06	3.72E-05	--	--	--	3.99E-07	1.15E-06	5.41E-06	--	--	--	6.13E-05
Phenol	--	--	--	--	--	--	--	2.29E-04	--	--	--	4.90E-07	--	1.20E-07	--	--	--	2.30E-04
Propane	5.27E-01	--	2.85E-01	2.85E-01	8.65E-02	2.82E-01	1.49E-01	1.74E-02	--	9.67E-02	4.36E-02	8.56E-04	--	--	--	--	--	1.77E+00
Propylene	--	--	--	--	--	--	--	--	--	2.57E-02	1.96E-02	3.50E-05	1.01E-04	--	--	--	--	4.55E-02
Propylene Oxide	--	1.45E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.45E-02
Pyrene	1.65E-06	--	8.90E-07	8.90E-07	2.70E-07	8.80E-07	4.67E-07	1.15E-05	--	--	--	9.27E-08	1.86E-07	2.50E-07	--	--	--	1.71E-05
Selenium	7.91E-06	--	4.27E-06	4.27E-06	1.30E-06	4.23E-06	2.24E-06	2.60E-07	--	--	--	--	--	--	--	--	--	2.45E-05
Styrene	--	--	--	--	--	--	--	1.32E-03	--	1.24E-03	2.36E-03	4.82E-07	--	1.72E-02	--	--	--	2.21E-02
Toluene	1.12E-03	1.75E-01	4.84E-03	4.84E-03	4.42E-03	5.99E-04	3.18E-04	7.36E-03	--	1.28E-02	9.69E-03	1.39E-05	1.59E-05	2.07E-02	1.75E-04	--	--	2.41E-01
Vanadium	7.58E-04	--	4.09E-04	4.09E-04	1.24E-04	4.05E-04	2.15E-04	2.50E-05	--	--	--	--	--	--	--	--	--	2.35E-03
Xylenes	--	3.20E-02	--	--	--	--	--	7.76E-04	--	2.25E-03	2.47E-04	7.63E-06	1.11E-05	1.30E-03	--	--	--	3.66E-02
Zinc	9.56E-03	--	5.16E-03	5.16E-03	1.57E-03	5.11E-03	2.71E-03	3.15E-04	--	--	--	--	--	--	--	--	--	2.96E-02

¹All emission rates are provided in lb/hr.

²AP-42 factors for stationary combustion turbines are not available for individual PAH compounds. For the purposes of the risk assessment, the PAH emissions were assumed to be that of the individual PAH COPC with the highest cancer and non-cancer impact.

³ The Process Cooling Tower emissions were modeled as 13 individual point sources (cooling tower is comprised of 26 cells). Values presented are per source.

⁴ Total emissions for each COPC are based on 7 cracking furnaces, 2 PE catalyst heaters, 3 combustion turbines, 4 emergency engines, 2 firewater pumps, and 13 modeled cooling water tower point sources (cooling tower is comprised of 26 cells).

Table 3. Maximum Hourly COPC Emission Rates

Pollutant	Cracking Furnaces (per furnace) (lb/hr)	Combined Cycle Units (per CT) (lb/hr)	HPGF1 (TEGF A) (lb/hr)	HPGF2 (TEGF B) (lb/hr)	HP Elevated Flare (lb/hr)	CVTO (lb/hr)	MPGF (lb/hr)	SCTO (lb/hr)	PE Blending Silos (lb/hr)	Total EC Fugitives (lb/hr)	Total OSBL Fugitives (lb/hr)	Emergency Engines (Total) (lb/hr)	Firewater Pump Engine (per engine) (lb/hr)	WWTP (lb/hr)	Process Cooling Tower ³ (lb/hr)	PE1 and PE2 (lb/hr)	PE3 (lb/hr)	Total ⁴
1,3-Butadiene	--	2.15E-04	2.05E+01	2.05E+01	2.05E+01	--	--	1.50E-03	--	5.94E-02	2.82E-02	5.25E-04	1.34E-04	--	1.37E-02	--	--	6.15E+01
2-Methylnaphthalene	7.91E-06	--	9.18E-05	9.18E-05	9.18E-05	4.65E-06	9.11E-06	2.60E-07	--	--	--	5.94E-05	--	--	--	--	--	3.57E-04
3-Methylchloranthrene	5.93E-07	--	6.88E-06	6.88E-06	6.88E-06	3.49E-07	6.83E-07	1.95E-08	--	--	--	--	--	--	--	--	--	2.23E-05
7,12-Dimethylbenz(a)anthracene	5.27E-06	--	6.12E-05	6.12E-05	6.12E-05	3.10E-06	6.07E-06	1.74E-07	--	--	--	--	--	--	--	--	--	1.98E-04
Acenaphthene	5.93E-07	--	6.88E-06	6.88E-06	6.88E-06	3.49E-07	6.83E-07	3.35E-05	--	--	--	1.69E-06	4.85E-06	1.39E-05	--	--	--	7.63E-05
Acenaphthylene	--	--	--	--	--	--	--	2.56E-05	--	--	--	6.02E-06	1.73E-05	5.97E-06	--	--	--	5.49E-05
Acetaldehyde	--	2.00E-02	--	--	--	--	--	--	--	--	--	1.59E-02	2.62E-03	--	--	--	--	3.85E-02
Acrolein	--	3.20E-03	--	--	--	--	--	--	--	--	--	9.31E-03	3.16E-04	--	--	--	--	1.28E-02
Ammonia	2.39E+00	4.88E+00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7.26E+00
Anthracene	7.91E-07	--	9.18E-06	9.18E-06	9.18E-06	4.65E-07	9.11E-07	7.35E-06	--	--	--	2.23E-06	6.39E-06	9.56E-07	--	--	--	4.66E-05
Arsenic	6.59E-05	--	7.65E-04	7.65E-04	7.65E-04	3.87E-05	7.59E-05	2.17E-06	--	--	--	--	--	--	--	--	--	2.48E-03
Barium	1.45E-03	--	1.68E-02	1.68E-02	1.68E-02	8.52E-04	1.67E-03	4.77E-05	--	--	--	--	--	--	--	--	--	5.45E-02
Benzene	6.92E-04	1.12E-03	3.68E+00	3.68E+00	3.68E+00	1.25E-03	1.32E-02	1.42E-02	--	3.93E-02	2.04E-02	1.90E-03	3.19E-03	7.05E-03	3.20E-03	--	--	1.12E+01
Benzo(a)anthracene	5.93E-07	--	6.88E-06	6.88E-06	6.88E-06	3.49E-07	6.83E-07	1.95E-08	--	--	--	2.00E-06	5.74E-06	--	--	--	--	3.00E-05
Benzo(a)pyrene	3.96E-07	--	4.59E-06	4.59E-06	4.59E-06	2.32E-07	4.56E-07	1.30E-08	--	--	--	2.24E-07	6.42E-07	--	--	--	--	1.57E-05
Benzo(b)fluoranthene	5.93E-07	--	6.88E-06	6.88E-06	6.88E-06	3.49E-07	6.83E-07	1.95E-08	--	--	--	1.18E-07	3.39E-07	--	--	--	--	2.27E-05
Benzo(g,h,i)perylene	3.96E-07	--	4.59E-06	4.59E-06	4.59E-06	2.32E-07	4.56E-07	1.30E-08	--	--	--	--	--	--	--	--	--	1.49E-05
Benzo(g,h,l)perylene	--	--	--	--	--	--	--	--	--	--	--	5.82E-07	1.67E-06	--	--	--	--	2.25E-06
Benzo(k)fluoranthene	5.93E-07	--	6.88E-06	6.88E-06	6.88E-06	3.49E-07	6.83E-07	1.95E-08	--	--	--	1.84E-07	5.29E-07	--	--	--	--	2.30E-05
Beryllium	3.96E-06	--	4.59E-05	4.59E-05	4.59E-05	2.32E-06	4.56E-06	1.30E-07	--	--	--	--	--	--	--	--	--	1.49E-04
Biphenyl	--	--	--	--	--	--	--	--	--	--	4.24E-08	3.80E-04	--	--	--	--	--	3.80E-04
Cadmium	3.63E-04	--	4.21E-03	4.21E-03	4.21E-03	2.13E-04	4.18E-04	1.19E-05	--	--	--	--	--	--	--	--	--	1.36E-02
Chloroform	--	--	--	--	--	--	--	6.61E-07	--	--	--	5.10E-05	--	1.68E-05	--	--	--	6.85E-05
Chromium	4.61E-04	--	5.35E-03	5.35E-03	5.35E-03	2.71E-04	5.31E-04	1.52E-05	--	--	--	--	--	--	--	1.05E-04	1.05E-04	1.75E-02
Chrysene	5.93E-07	--	6.88E-06	6.88E-06	6.88E-06	3.49E-07	6.83E-07	1.95E-08	--	--	--	4.20E-07	1.21E-06	--	--	--	--	2.39E-05
Cobalt	2.77E-05	--	3.21E-04	3.21E-04	3.21E-04	1.63E-05	3.19E-05	9.11E-07	--	--	--	--	--	--	--	--	--	1.04E-03
Copper	2.80E-04	--	3.25E-03	3.25E-03	3.25E-03	1.65E-04	3.23E-04	9.22E-06	--	--	--	--	--	--	--	--	--	1.05E-02
Dibenzo(a,h)anthracene	3.96E-07	--	4.59E-06	4.59E-06	4.59E-06	2.32E-07	4.56E-07	1.30E-08	--	--	--	6.94E-07	1.99E-06	--	--	--	--	1.75E-05
Dibutylphthalate	--	--	--	--	--	--	--	9.70E-05	--	--	--	--	--	1.63E-07	--	--	--	9.72E-05
Dichlorobenzene	3.96E-04	--	4.59E-03	4.59E-03	4.59E-03	2.32E-04	4.56E-04	1.30E-05	--	--	--	--	--	--	--	--	--	1.49E-02
Ethylbenzene	--	1.60E-02	1.91E-02	1.91E-02	1.91E-02	--	--	8.11E-04	--	9.36E-04	7.25E-04	7.11E-05	--	1.23E-03	8.30E-06	--	--	7.70E-02
Fluoranthene	9.89E-07	--	1.15E-05	1.15E-05	1.15E-05	5.81E-07	1.14E-06	1.15E-05	--	--	--	9.06E-06	2.60E-05	1.29E-07	--	--	--	8.38E-05
Fluorene	9.23E-07	--	1.07E-05	1.07E-05	1.07E-05	5.42E-07	1.06E-06	2.91E-05	--	--	--	3.47E-05	9.97E-05	5.61E-06	--	--	--	2.04E-04
Formaldehyde	2.47E-02	1.65E-01	2.87E-01	2.87E-01	2.87E-01	1.45E-02	2.85E-02	8.14E-04	--	--	--	9.59E-02	4.03E-03	--	--	--	--	1.19E+00
Heptane	--	--	--	--	--	--	--	--	--	2.76E-04	--	--	--	--	--	--	--	2.76E-04
Hexane	1.37E-01	--	8.46E-01	8.46E-01	8.46E-01	5.91E-03	1.54E-02	3.15E-04	1.31E-02	--	5.01E-02	1.99E-03	--	--	--	--	--	2.76E+00

Table 3. Maximum Hourly COPC Emission Rates

Pollutant	Cracking Furnaces (per furnace) (lb/hr)	Combined Cycle Units (per CT) (lb/hr)	HPGF1 (TEGF A) (lb/hr)	HPGF2 (TEGF B) (lb/hr)	HP Elevated Flare (lb/hr)	CVTO (lb/hr)	MPGF (lb/hr)	SCTO (lb/hr)	PE Blending Silos (lb/hr)	Total EC Fugitives (lb/hr)	Total OSBL Fugitives (lb/hr)	Emergency Engines (Total) (lb/hr)	Firewater Pump Engine (per engine) (lb/hr)	WWTP (lb/hr)	Process Cooling Tower ³ (lb/hr)	PE1 and PE2 (lb/hr)	PE3 (lb/hr)	Total ⁴
Indeno(1,2,3-cd)pyrene	5.93E-07	--	6.88E-06	6.88E-06	6.88E-06	3.49E-07	6.83E-07	1.95E-08	--	--	--	4.46E-07	1.28E-06	--	--	--	--	2.40E-05
Lead	1.65E-04	--	1.91E-03	1.91E-03	1.91E-03	9.68E-05	1.90E-04	--	--	--	--	--	--	--	--	--	--	6.19E-03
Manganese	1.25E-04	--	1.45E-03	1.45E-03	1.45E-03	7.36E-05	1.44E-04	4.12E-06	--	--	--	--	--	--	--	--	--	4.71E-03
Mercury	8.57E-05	--	9.94E-04	9.94E-04	9.94E-04	5.04E-05	9.87E-05	2.82E-06	--	--	--	--	--	--	--	--	--	3.22E-03
Methanol	--	--	--	--	--	--	--	--	--	1.41E-02	7.42E-03	4.48E-03	--	--	--	--	--	2.60E-02
Molybdenum	3.63E-04	--	4.21E-03	4.21E-03	4.21E-03	2.13E-04	4.18E-04	1.19E-05	--	--	--	--	--	--	--	--	--	1.36E-02
Naphthalene	2.01E-04	6.50E-04	2.33E-03	2.33E-03	2.33E-03	1.18E-04	2.32E-04	9.77E-04	--	4.92E-03	5.82E-03	2.34E-04	2.90E-04	2.26E-04	--	--	--	2.07E-02
Nickel	6.92E-04	--	8.03E-03	8.03E-03	8.03E-03	4.07E-04	7.97E-04	2.28E-05	--	--	--	--	--	--	--	--	--	2.60E-02
PAH ²	--	1.10E-03	--	--	--	--	--	--	--	--	--	2.48E-04	5.74E-04	--	--	--	--	1.92E-03
Pentane	8.57E-01	--	9.94E+00	9.94E+00	9.94E+00	5.04E-01	9.87E-01	2.82E-02	--	--	--	4.65E-03	--	--	--	--	--	3.22E+01
Phenanthrene	5.60E-06	--	6.50E-05	6.50E-05	6.50E-05	3.29E-06	6.45E-06	3.72E-05	--	--	--	3.50E-05	1.00E-04	5.41E-06	--	--	--	3.88E-04
Phenol	--	--	--	--	--	--	--	2.29E-04	--	--	--	4.30E-05	--	1.20E-07	--	--	--	2.72E-04
Propane	5.27E-01	--	6.12E+00	6.12E+00	6.12E+00	3.10E-01	6.07E-01	1.74E-02	--	9.67E-02	4.36E-02	7.50E-02	--	--	--	--	--	2.00E+01
Propylene	--	--	--	--	--	--	--	--	--	2.57E-02	1.96E-02	3.07E-03	8.81E-03	--	--	--	--	5.72E-02
Propylene Oxide	--	1.45E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.45E-02
Pyrene	1.65E-06	--	1.91E-05	1.91E-05	1.91E-05	9.68E-07	1.90E-06	1.15E-05	--	--	--	8.12E-06	1.63E-05	2.50E-07	--	--	--	9.81E-05
Selenium	7.91E-06	--	9.18E-05	9.18E-05	9.18E-05	4.65E-06	9.11E-06	2.60E-07	--	--	--	--	--	--	--	--	--	2.97E-04
Styrene	--	--	--	--	--	--	--	1.32E-03	--	1.24E-03	2.36E-03	4.22E-05	--	1.72E-02	--	--	--	2.22E-02
Toluene	1.12E-03	1.75E-01	4.15E-01	4.15E-01	4.15E-01	6.59E-04	1.29E-03	7.36E-03	--	1.28E-02	9.69E-03	1.22E-03	1.40E-03	2.07E-02	1.75E-04	--	--	1.48E+00
Vanadium	7.58E-04	--	8.79E-03	8.79E-03	8.79E-03	4.45E-04	8.73E-04	2.50E-05	--	--	--	--	--	--	--	--	--	2.85E-02
Xylenes	--	3.20E-02	--	--	--	--	--	7.76E-04	--	2.25E-03	2.47E-04	6.69E-04	9.74E-04	1.30E-03	--	--	--	3.82E-02
Zinc	9.56E-03	--	1.11E-01	1.11E-01	1.11E-01	5.62E-03	1.10E-02	3.15E-04	--	--	--	--	--	--	--	--	--	3.59E-01

¹ All emission rates are provided in lb/hr.

² AP-42 factors for stationary combustion turbines are not available for individual PAH compounds. For the purposes of the risk assessment, the PAH emissions were assumed to be that of the individual PAH COPC with the highest cancer and non-cancer impact.

³ The Process Cooling Tower emissions were modeled as 13 individual point sources (cooling tower is comprised of 26 cells). Values presented are per source.

⁴ Total emissions for each COPC are based on 7 cracking furnaces, 2 PE catalyst heaters, 3 combustion turbines, 4 emergency engines, 2 firewater pumps, and 13 modeled cooling water tower point sources (cooling tower is comprised of 26 cells)

APPENDIX D-3B

DISPERSION MODELING ANALYSIS FOR THE INHALATION RISK ASSESSMENT FOR SHELL POLYMERS MONACA BEAVER COUNTY, PENNSYLVANIA



September 2024

Table of Contents

1.0 INTRODUCTION	1
2.0 FACILITY AND PROJECT DESCRIPTION	2
3.0 SITE DESCRIPTION	4
4.0 MODEL SELECTION AND MODEL INPUT	7
4.1 Model Selection	7
4.2 Model Control Options and Land Use	7
4.3 Source Data	8
4.4 Receptor Data	19
4.5 Meteorological Data	23
4.6 Output Options	29
5.0 RESULTS	30
5.1 Turbine Load Analysis Results	30
5.2 Acute Pollutant Results	30
5.3 Chronic Pollutant Results	31

List of Tables

Table 1. Point Source Input Parameters	10
Table 2. SPM Non-Road Volume Source Parameter Calculations	14
Table 3. Receptor Grid Spacing	20
Table 4. Turbine Load Analysis Results	30

List of Figures

Figure 1. General Location of SPM	5
Figure 2. Specific Location of SPM	6
Figure 3. Land Use within Three Kilometers of SPM	9
Figure 4. Modeled Point Source Locations	11
Figure 5. Modeled Volume Source Locations	16
Figure 6. SPM Plot Plan	18
Figure 7. SPM Three-Dimensional Plot Plan (View from SW)	19
Figure 8. SPM Acute Analysis Receptor Grid	21
Figure 9. SPM Chronic Analysis Receptor Grid	22
Figure 10. Vistra Meteorological Tower and Pittsburgh Surface and Upper Air Station Locations Relative to SPM	24
Figure 11. Beaver Valley Windrose 2018-2022	25
Figure 12. Albedo and Bowen Ratio Comparison Results	26
Figure 13. Surface Roughness Comparison Results	27

1.0 INTRODUCTION

This document presents the procedures used in the dispersion modeling analysis conducted to calculate the ground-level concentrations that were employed in the inhalation risk assessment for Shell Polymers Monaca (SPM), owned and operated by Shell Chemical Appalachia LLC (“Shell”) located in Beaver County, Pennsylvania. An initial analysis was submitted to the Pennsylvania Department of Environmental Protection (“PADEP”) in January of 2015. At PADEP’s request, revisions to the 2015 analysis were made to account for updates to the facility configuration and emissions, as well as updates to the EPA-approved dispersion model, supporting software, and modeling procedures. The first update was submitted in February of 2020. The second update, submitted in September 2020, incorporated corrections to the modeled hexane emission rate, exit diameters for the facility cooling towers, and included removal of a diesel fired emergency generator. This update addresses the Plan Approval Reconciliations and WWTP Permanent Controls Project and the EMACT Project that are proposed in the September 2024 plan approval application for SPM. The assessment evaluates the potential cancer and non- cancer inhalation risks from the compounds of potential concern (“COPC”) emitted from SPM. The air quality dispersion modeling conforms with the modeling procedures outlined in Appendix W to 40 Code of Federal Regulations (CFR) 51, also referred to as the Environmental Protection Agency’s (EPA’s) Guideline on Air Quality Models (Guideline), and associated EPA modeling policy and guidance.^a

^a *Guidelines on Air Quality Models*, Appendix W to 40 CFR Part 51, U.S. Environmental Protection Agency, January 2017.

2.0 FACILITY AND PROJECT DESCRIPTION

SPM consists of an ethylene manufacturing unit, three polyethylene manufacturing units, three cogeneration units (Cogen Units), and a variety of ancillary equipment required to support its operations. The major sources of emissions include seven ethane cracking furnaces, a number of diesel engines to provide emergency power and power fire water pumps, flares, thermal oxidizers, cooling towers, catalyst activation heaters, and combustion turbines with heat recovery systems to provide steam and electric power to the facility and electric power for sale.

This inhalation risk assessment has been prepared in support of the plan approval application submitted by Shell to PADEP in accordance with the Pennsylvania Air Pollution Control Act and 25 Pa. Code §127.12 for the following projects and plan approval reconciliations:

- Shell is proposing to implement the Wastewater Treatment Plant (WWTP) Permanent Controls Project at SPM to improve the oils, grease, and volatile organic compound (VOC) removal efficiency of the primary treatment section of SPM's WWTP. Shell is currently using temporary equipment to achieve improved removal efficiencies and is now proposing to install permanent equipment.
- Shell is proposing the EMACT Project to comply with the 40 Code of Federal Regulations (CFR) 63 Subpart YY pressure-assisted multi-point flare minimum net heating value of flare combustion zone gas (NHV_{CZ}) requirement that recently became applicable to the HP Ground Flare #1 and HP Ground Flare #2 (also referred to as "TEGF A" and "TEGF B"). Supplemental gas will be utilized as necessary in order to achieve compliance with the minimum net heating value for the totally enclosed ground flares (TEGFs).
- After a thorough review of SPM's as-built operations and plan approval source inventory, potential emissions calculations, and conditions, Shell is proposing to reconcile specific plan approval source descriptions, potential emissions calculations, and conditions. These proposed reconciliations are collectively

referred to by Shell as the “Plan Approval Reconciliations”. A detailed description of all proposed reconciliations is provided in the plan approval application.

Shell has retrospectively evaluated the Plan Approval Reconciliations and WWTP Permanent Controls Project together as part of the initial construction of SPM because these changes are related to the facility’s initial construction since they represent as-built changes to the facility’s initial construction plan approval and necessary improvements to the initial design and construction of the facility’s WWTP, respectively. Shell has evaluated the EMACT Project separately from the initial construction of SPM because the project is only being completed in order to comply with newly effective federal regulatory requirements that are applicable to ethylene production units across the country.

For purposes of this inhalation risk assessment, the proposed facility-wide emissions are evaluated, including the revisions associated with the Plan Approval Reconciliations and WWTP Permanent Controls Project and emissions increases associated with the EMACT Project.

3.0 SITE DESCRIPTION

SPM occupies approximately 400 acres adjacent to the Ohio River in the Center and Potter Townships, Pennsylvania in Beaver County. The approximate Universal Transverse Mercator ("UTM") coordinates of the facility are 556,129 meters east and 4,502,450 meters north (UTM Zone 17, NAD 83). Figure 1 shows the general location of the facility. Figure 2 shows the location of SPM on a 7.5-minute U.S. Geological Survey (USGS) topographic map.

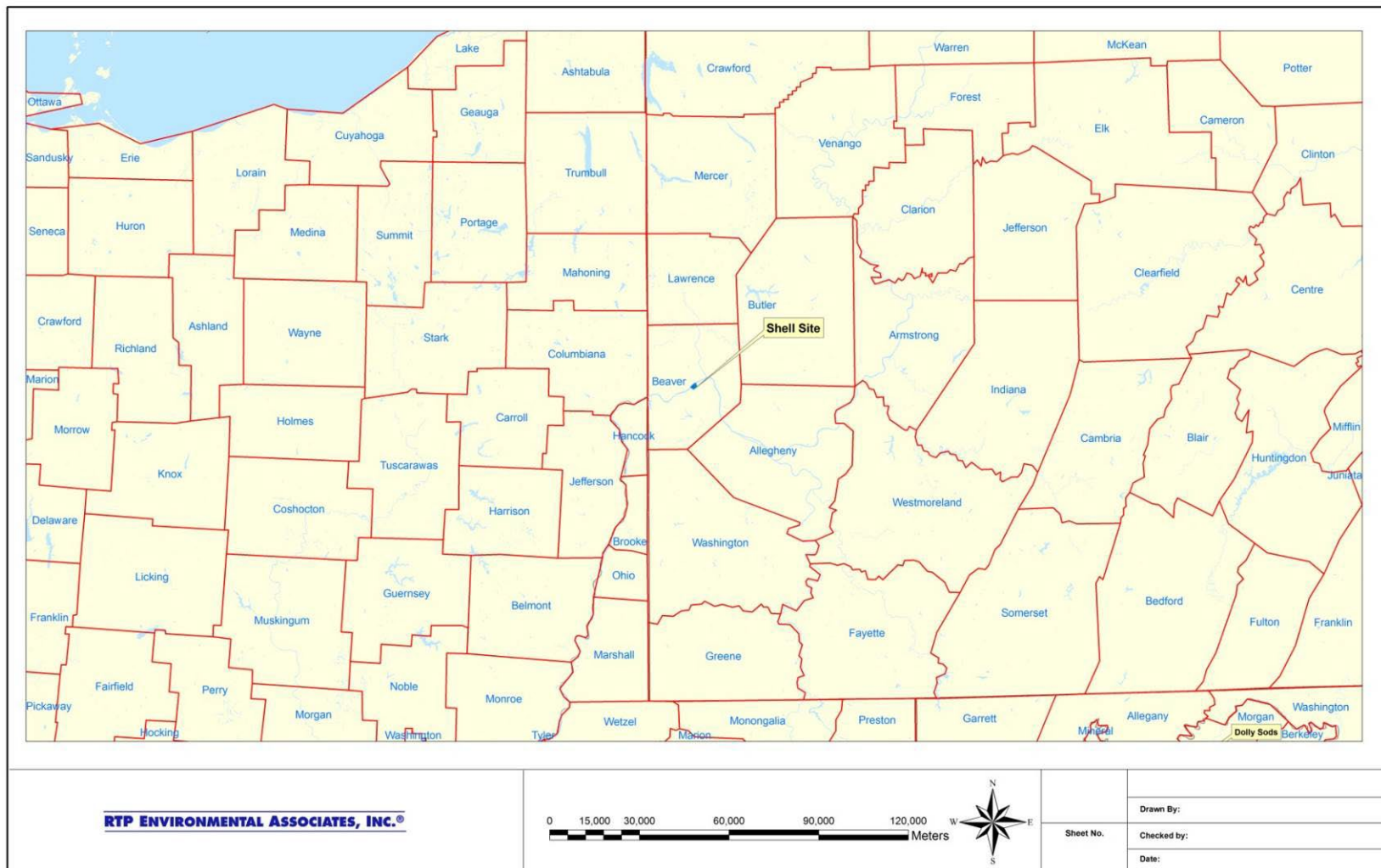
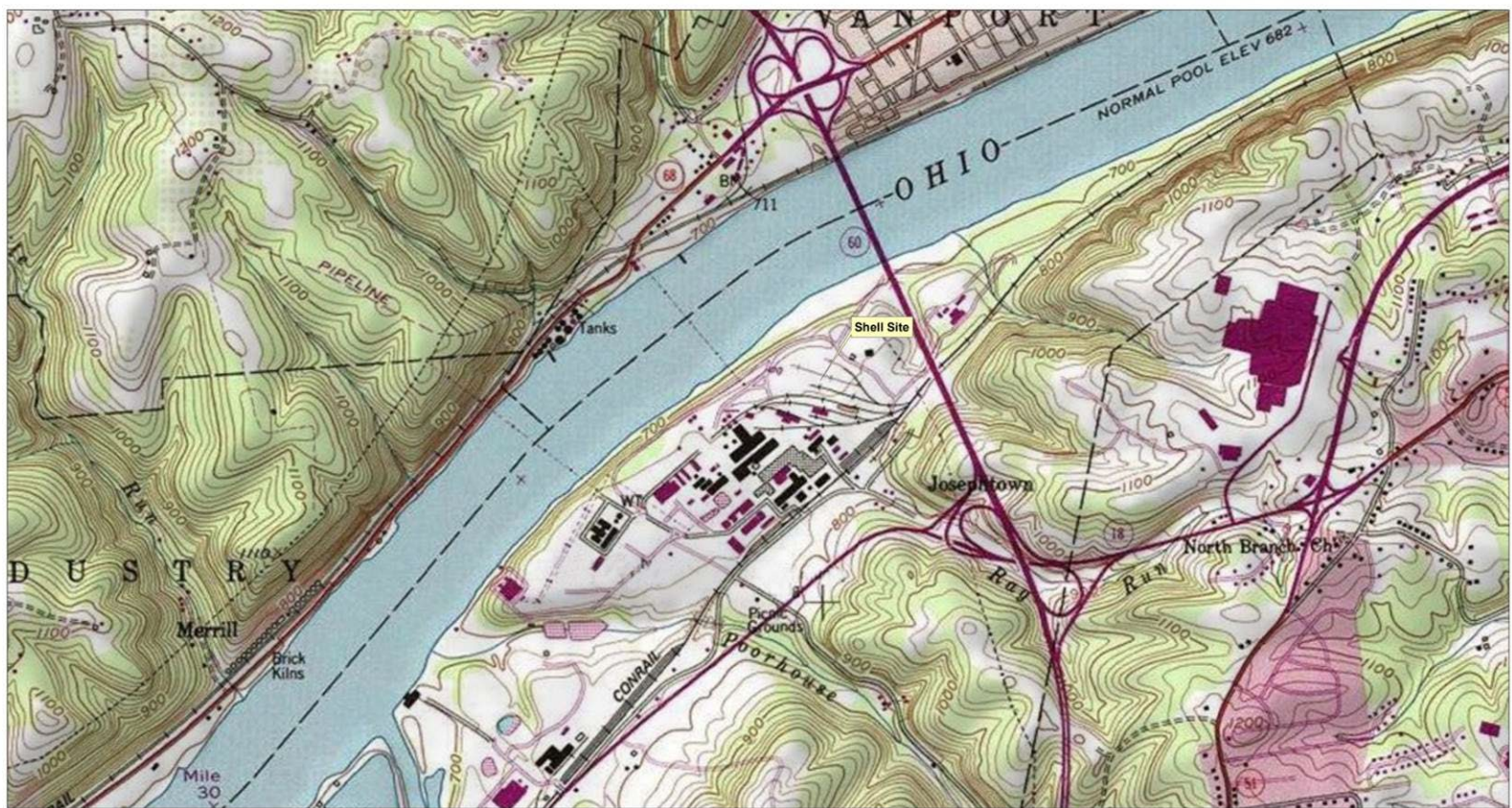


Figure 1. General Location of SPM



RTP ENVIRONMENTAL ASSOCIATES, INC.®

0 160 320 640 960 1,280 Meters



Sheet No.

Drawn By:

Checked by:

Date:

Figure 2. Specific Location of SPM

4.0 MODEL SELECTION AND MODEL INPUT

4.1 Model Selection

The latest version of the AMS/EPA Regulatory Model (AERMOD, Version 23132) was used to conduct the dispersion modeling analysis. AERMOD is a Gaussian plume dispersion model that is based on planetary boundary layer principles for characterizing atmospheric stability. The model evaluates the non-Gaussian vertical behavior of plumes during convective conditions with the probability density function and the superposition of several Gaussian plumes. AERMOD is a modeling system with three components: AERMAP is the terrain preprocessor program, AERMET is the meteorological data preprocessor and AERMOD includes the dispersion modeling algorithms.

AERMOD is the most appropriate model for calculating ambient concentrations near SPM based on the model's ability to incorporate multiple sources and source types. The model can also account for convective updrafts and downdrafts and meteorological data throughout the plume depth. The model also provides parameters required for use with up-to-date planetary boundary layer parameterization. The model also has the ability to incorporate building wake effects and to calculate concentrations within the cavity recirculation zone. All model options were selected as recommended in the EPA Guideline on Air Quality Models (Appendix W to 40 CFR 51).² Model runs were completed using the EPA executable available for download from the Support Center for Regulatory Atmospheric Modeling (SCRAM).³

4.2 Model Control Options and Land Use

AERMOD was run in the regulatory default mode. The default rural dispersion coefficients in the model were used. This is supported by the Land Use Procedure consistent with subsection 7.2.3(c) of the Guideline and Section 5.1 of the AERMOD Implementation Guide.^{4,5}

² *Guidelines on Air Quality Models*, Appendix W to 40 CFR Part 51, U.S. Environmental Protection Agency, January 2017.

³ <https://www.epa.gov/scram>

⁴ *Guidelines on Air Quality Models*, Appendix W to 40 CFR Part 51, U.S. Environmental Protection Agency, January 2017.

⁵ *AERMOD Implementation Guide*, EPA-454-B-23-009, October 12, 2023.

The USGS 2021 National Land Cover Data ("NLCD") within 3 km of the site were converted to Auer 1978 land use types. NLCD Categories 23 and 24, were considered as urban.⁶ It was determined that the land use in the vicinity of SPM is predominantly rural (22% of the area is classified as urban, Figure 3). A spreadsheet providing the results of the landuse analysis is provided with the modeling input and output files electronically. The potential for urban heat island affects, which are regional in character, was considered and determined not to be of concern.

4.3 Source Data

Source Characterization

Point Sources

Most emission sources at SPM vent to stacks with a well defined opening. These sources were modeled as point sources in AERMOD. The model source characteristics for the point sources are presented in Table 1. The modeled emission rates for each source can be found in Table 2 of Appendix D-3A. The location of each point source is shown in Figure 4.

⁶ Auer, Jr., A.H. "Correlation of Land Use and Cover with Meteorological Anomalies." Journal of Applied Meteorology, 17:636-643, 1978.

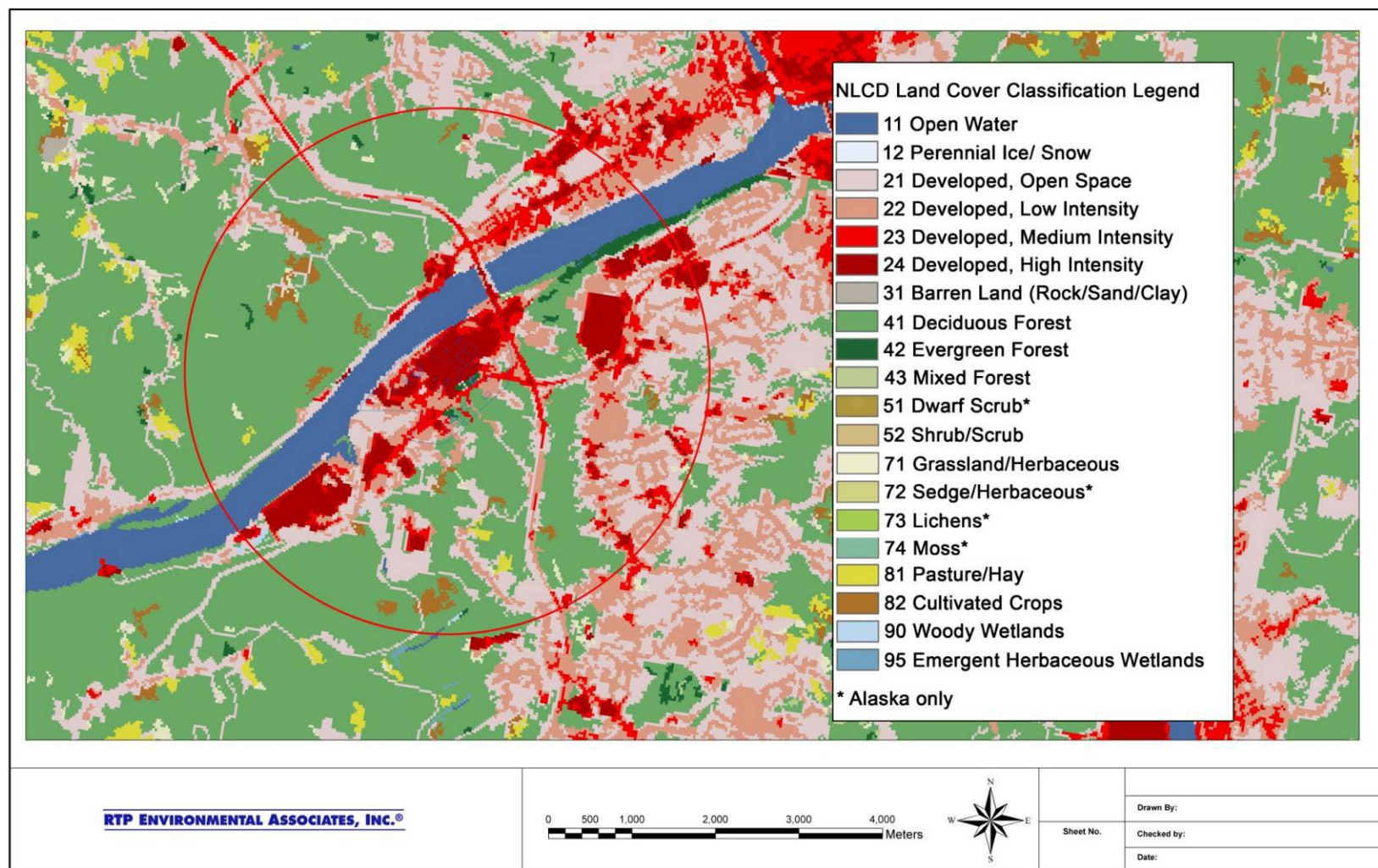


Figure 3. Land Use within Three Kilometers of SPM

Table 1. Point Source Input Parameters

AERMOD ID	Description	UTM Easting¹ (m)	UTM Northing¹ (m)	Elevation (m)	Stack Height (m)	Stack Temp. (K)	Exit Velocity (m/s)	Stack Diameter (m)
EC#1	Ethane Cracking Furnace #1	555502.11	4502199.00	242.32	83.82	396.26	12.25	2.59
EC#2	Ethane Cracking Furnace #2	555512.76	4502186.65	242.32	83.82	396.26	12.25	2.59
EC#3	Ethane Cracking Furnace #3	555534.48	4502160.24	242.32	83.82	396.26	12.25	2.59
EC#4	Ethane Cracking Furnace #4	555545.98	4502148.32	242.32	83.82	396.26	12.25	2.59
EC#5	Ethane Cracking Furnace #5	555561.73	4502131.29	242.32	83.82	396.26	12.25	2.59
EC#6	Ethane Cracking Furnace #6	555572.81	4502118.51	242.32	83.82	396.26	12.25	2.59
EC#7	Ethane Cracking Furnace #7	555590.27	4502098.92	242.32	83.82	396.26	12.25	2.59
CT1	Combustion Turbine/Duct Burner Unit #1	555945.76	4502058.51	242.32	64.92	428.15	24.08	3.05
CT2	Combustion Turbine/Duct Burner Unit #2	555991.73	4502098.68	242.32	64.92	428.15	24.08	3.05
CT3	Combustion Turbine/Duct Burner Unit #3	556038.01	4502138.02	242.32	64.92	428.15	24.08	3.05
GFLARE1	HP Ground Flare #1 (TEGF A)	555472.50	4502011.25	237.74	82.66	1273.15	20.00	10.96
GFLARE2	HP Ground Flare #2 (TEGF B)	555421.71	4502085.72	237.74	82.66	1273.15	20.00	10.96
HPFLARE	HP Elevated Flare	555385.33	4502007.13	237.74	151.24	1273.15	20.00	10.96
MPFLARE	Multipoint Ground Flare	556083.87	4502666.73	242.32	4.54	1273.15	20.00	0.28
INCIN	Continuous Vent Thermal Oxidizer (CVTO)	556066.31	4502619.14	242.32	76.20	1144.26	56.76	1.37
COI	Spent Caustic Vent Incinerator (SCTO)	555256.39	4502075.62	217.63	60.96	1144.26	13.71	0.61
FWP1	Fire Water Pump 1	556126.22	4501713.44	259.08	9.97	692.59	36.88	0.30
FWP2	Fire Water Pump 2	556118.30	4501706.53	259.08	9.97	692.59	36.88	0.30
GEN1	Diesel-Fired Emergency 1 - Parking Garage	556228.46	4501766.08	259.08	1.52	687.59	68.82	0.08
GEN2	Diesel-Fired Emergency Generator 2 - Telecom Hut	556275.53	4501732.18	259.08	1.83	763.15	42.62	0.06
GEN3	Natural Gas-Fired Emergency Generator 3 - Lift Station	556186.33	4502105.90	242.32	1.83	949.82	90.66	0.09
GEN4	Natural Gas-Fired Emergency Generator 4 - Lift Station	555907.33	4502035.53	242.32	1.83	960.93	37.26	0.06
COOLTWR1	Process Cooling Tower	555792.73	4502459.17	242.32	21.64	294.82	7.88	11.20
COOLTWR2	Process Cooling Tower	555804.58	4502468.80	242.32	21.64	294.82	7.88	11.20
COOLTWR3	Process Cooling Tower	555815.69	4502481.38	242.32	21.64	294.82	7.88	11.20
COOLTWR4	Process Cooling Tower	555828.28	4502492.49	242.32	21.64	294.82	7.88	11.20
COOLTWR5	Process Cooling Tower	555841.61	4502502.12	242.32	21.64	294.82	7.88	11.20
COOLTWR6	Process Cooling Tower	555853.33	4502512.89	242.32	21.64	294.82	7.88	11.20
COOLTWR7	Process Cooling Tower	555866.07	4502523.70	242.32	21.64	294.82	7.88	11.20
COOLTWR8	Process Cooling Tower	555878.57	4502535.24	242.32	21.64	294.82	7.88	11.20
COOLTWR9	Process Cooling Tower	555891.07	4502545.57	242.32	21.64	294.82	7.88	11.20
COLTWR10	Process Cooling Tower	555903.80	4502556.38	242.32	21.64	294.82	7.88	11.20
COLTWR11	Process Cooling Tower	555916.06	4502567.20	242.32	21.64	294.82	7.88	11.20
COLTWR12	Process Cooling Tower	555927.83	4502578.01	242.32	21.64	294.82	7.88	11.20
COLTWR13	Process Cooling Tower	555940.57	4502588.83	242.32	21.64	294.82	7.88	11.20
CAH1	PE Unit 1 Catalyst Vent Filter Vent	556294.39	4502493.32	242.32	45.72	473.15	10.67	0.41
CAH2	PE Unit 2 Catalyst Vent Filter Vent	556289.38	4502488.95	242.32	45.72	473.15	10.67	0.41
CAA	PE Unit 3 Catalyst Activator A Filter (External) Vent	556151.35	4502347.38	242.32	23.87	473.15	7.20	0.20
CAB	PE Unit 3 Catalyst Activator B Filter (External) Vent	556158.56	4502339.12	242.32	23.87	473.15	7.20	0.20

¹UTM NAD83, Zone 17.

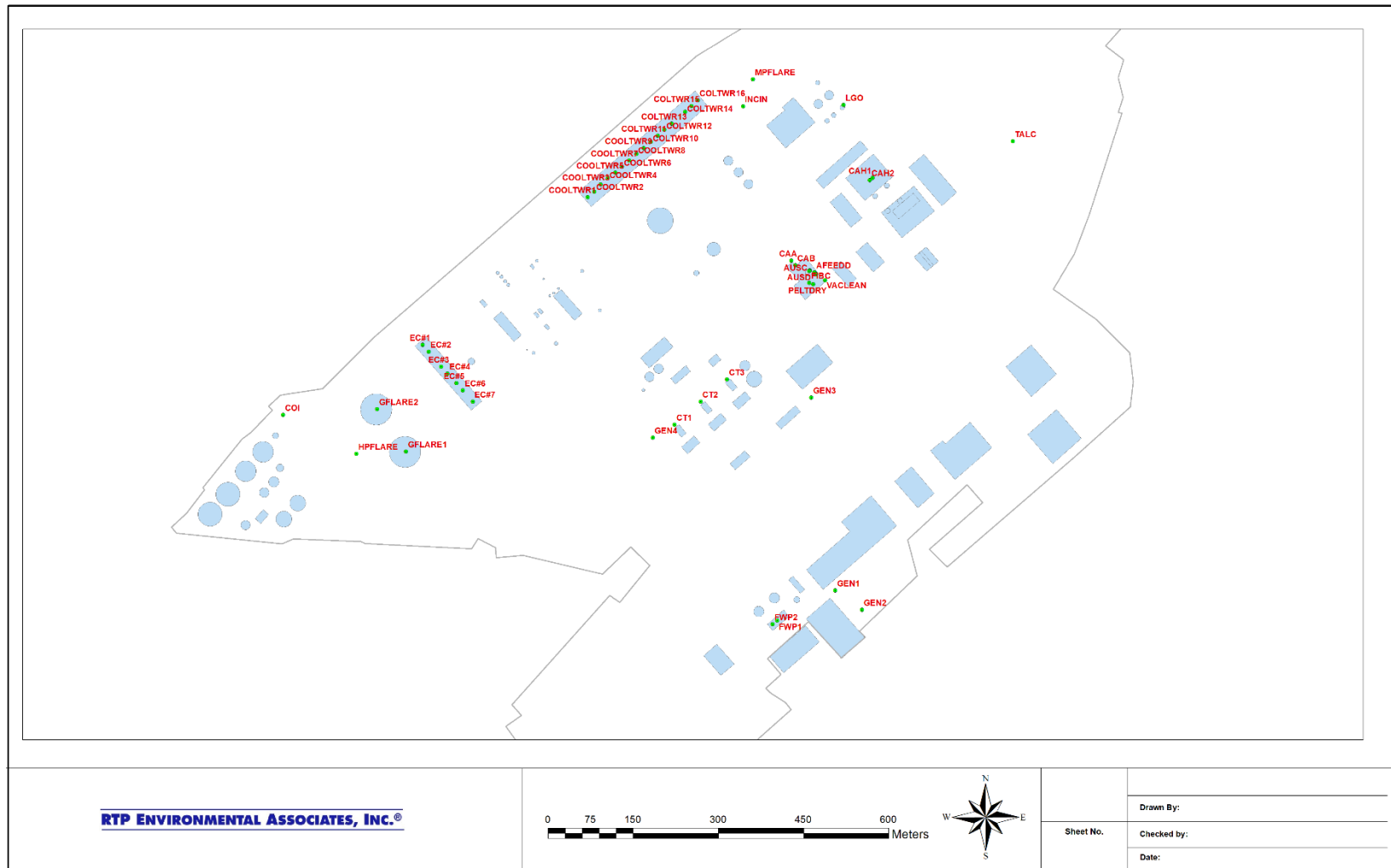


Figure 4. Modeled Point Source Locations

Flares

There is an elevated high pressure candlestick flare, two totally enclosed ground flares (TEGFs), and a multipoint ground flare (MPGF). The flares were modeled using the procedures outlined below as presented in Section 2.1.2 of the AERSCREEN User's Guide.⁷

The effective flare diameter (D , in meters) and height (h_{eff} , in meters) were computed as a function of heat release rate according to the following equations, where HR is the heat release rate of the flare in calories per second, HL is the heat loss fraction, and H_s is the physical height of the flare in meters:

$$D = 9.88 \times 10^{-4} \times \sqrt{HR \times (1 - HL)}$$

$$h_{eff} = H_s + 4.56 \times 10^{-3} \times HR^{0.478}$$

The multipoint ground flare was represented by one flare stack. The effective flare diameter and height for an individual flare was used for the representative flare stack and was calculated using the equivalent individual heat release rate, which was estimated as the total heat release rate (99 MMBtu/hr) divided by the total number of flare heads (38).

An exit temperature of 1273 Kelvin (K) and velocity of 20 meters per second (m/s) were assumed, consistent with the AERSCREEN default values.⁸

Fugitive Emissions from Tanks and Equipment Leaks

Fugitive emissions from tanks and equipment leaks were modeled as volume sources. The emission rate for a given COPC was determined by applying process area component speciation data to the VOC emissions rate associated with the equipment components contained within known process areas. The initial dispersion coefficients (sigma y and sigma z) were calculated based upon the dimensions of the area of

⁷ AERSCREEN User's Guide, EPA-454/B-21-005, April 2021.

⁸ Ibid.

release and the equations contained in Table 3-1 of the AERMOD User's Guide.⁹

The volume source parameter calculations can be found in Table 2. The modeled emission rates for each source are presented in Table 2 of Appendix D-3A. The location of each modeled volume source is shown in Figure 5. All source locations are based on a NAD83, UTM Zone 17 projection. Source elevations were determined from facility survey data, not from AERMAP.

⁹ *AERMOD User's Guide*, EPA-454-B-23-008, October 12, 2023.

Table 2. SPM Non-Road Volume Source Parameter Calculations

Model ID	Source Description	Source Dimensions				Initial Dispersion Coefficients			Footnote
		Length (ft)	Width (ft)	Square Root of Area (ft)	Structure Height/Vertical Dimension (ft)	Release Height (ft)	Initial Horizontal Dimension s _y (ft)	Initial Vertical Dimension s _z (ft)	
PEBLD	PE Blending Silos	147.6	82.0	110.0	141.0	141.0	25.58	65.6	1, 2, 3
PERC	PE Rail Loading Silos	98.4	98.4	98.4	187.0	187.0	22.88	87.0	1, 2, 3
PETK	PE Truck Loading Silos	213.2	196.8	204.8	151.0	151.0	47.64	70.2	1, 2, 3
PEU1	LDPE Vents	313.2	98.4	175.6	45.0	45.0	40.83	20.9	1, 2, 3
PEU2	LDPE Vents	213.2	164.0	187.0	145.0	145.0	43.49	67.4	1, 2, 3
PEU3	HDPE Vents	213.2	164.0	187.0	150.0	150.0	43.49	69.8	1, 2, 3
ECFUG1	Ethane Cracking	492.0	78.7	196.8	140.0	70.0	45.77	65.12	2, 4, 5
ECFUG2	Fuel Gas and Regeneration System	300.0	300.0	300.0	82.0	41.0	69.77	38.14	2, 4, 5
ECFUG3	Wash Water System	300.0	300.0	300.0	82.0	41.0	69.77	38.14	2, 4, 5
ECFUG4	Cracked Gas Compression	425.0	425.0	425.0	82.0	41.0	98.84	38.14	2, 4, 5
ECFUG5	Caustic Wash	300.0	300.0	300.0	82.0	41.0	69.77	38.14	2, 4, 5
ECFUG6	Gas Redistillation	300.0	300.0	300.0	82.0	41.0	69.77	38.14	2, 4, 5
ECFUG7	C2/C3 Separation	300.0	300.0	300.0	82.0	41.0	69.77	38.14	2, 4, 5
ECFUG8	C2 Hydrogenation	300.0	300.0	300.0	82.0	41.0	69.77	38.14	2, 4, 5
ECFUG9	C1/C2 Separation	300.0	300.0	300.0	82.0	41.0	69.77	38.14	2, 4, 5
ECFUG10	Spent Caustic Treatment	300.0	300.0	300.0	40.0	20.0	69.77	18.60	2, 4, 5
ECFUG11	Flare Condensate	300.0	300.0	300.0	82.0	41.0	69.77	38.14	2, 4, 5
ECFUG12	590	100.0	100.0	100.0	15.0	7.5	23.26	6.98	2, 4, 5
OSBLFUG1	Recovered Oil and Truck Loadout	300.0	300.0	300.0	48.0	24.0	69.77	22.33	2, 4, 5
OSBLFUG2	Rail for C3+	300.0	300.0	300.0	52.0	26.0	69.77	24.19	2, 4, 5
OSBLFUG3	Diesel Tanks	300.0	300.0	300.0	52.0	26.0	69.77	24.19	2, 4, 5
OSBLFUG4	C3+	164.0	98.4	127.0	83.0	41.5	29.54	38.60	2, 4, 5
OSBLFUG5	236LR	500.0	50.0	158.1	40.0	20.0	36.77	18.60	2, 4, 5
OSBLFUG6	646	200.0	200.0	200.0	15.0	7.5	46.51	6.98	2, 4, 5
OSBLFUG7	642	300.0	300.0	300.0	82.0	41.0	69.77	38.14	2, 4, 5
OSBLFUG8	Flare Header Segment 1	640.0	40.0	160.0	35.0	17.5	37.21	16.28	2, 4, 5
OSBLFUG9	Flare Header Segment 2	475.0	40.0	137.8	35.0	17.5	32.06	16.28	2, 4, 5
OSBLFUG10	Flare Header Segment 3	150.0	40.0	77.5	35.0	17.5	18.01	16.28	2, 4, 5
OSBLFUG11	Flare Header Segment 4	450.0	40.0	134.2	35.0	17.5	31.20	16.28	2, 4, 5

Table 2. SPM Non-Road Volume Source Parameter Calculations

Model ID	Source Description	Source Dimensions				Initial Dispersion Coefficients			Footnote
		Length (ft)	Width (ft)	Square Root of Area (ft)	Structure Height/Vertical Dimension (ft)	Release Height (ft)	Initial Horizontal Dimension σ_y (ft)	Initial Vertical Dimension σ_z (ft)	
OSBLFUG12	Flare Header Segment 5	480.0	40.0	138.6	35.0	17.5	32.22	16.28	2, 4, 5
OSBLFUG13	Flare Header Segment 6	630.0	40.0	158.7	35.0	17.5	36.92	16.28	2, 4, 5
OSBLFUG14	Flare Header Segment 7	510.0	40.0	142.8	35.0	17.5	33.22	16.28	2, 4, 5
WWTP	Waste Water Treatment Fugitives	225.0	225.0	225.0	30.0	15.0	52.33	13.95	2, 4, 5

¹ Release height equal to top of structure as process is aspirated and emissions occur at the top of the structure.

² Sigma Y value calculated as the square root of the area divided by 4.3 (Table 3-1 of AERMOD User's Guide for single volume source).

³ Sigma Z values for elevated sources on or adjacent to a building calculated as the building height divided by 2.15 (Table 3-1 of AERMOD User's Guide for Elevated Source on or Adjacent to Building).

⁴ Sigma Z value for ground flare assumed equal to effective stack height (vertical dimension) divided by 4.3. Effective height calculated based upon Ohio EPA Guidance and heat release rate of 98 MMBtu/hr $[60 + ((0.944 * (98)^{0.478}) * 3.28)]$.

⁵ Sigma Z values for surface-based source calculated as the vertical dimension of source divided by 2.15 (Table 3-1 of AERMOD Manual for Surface Based Source).

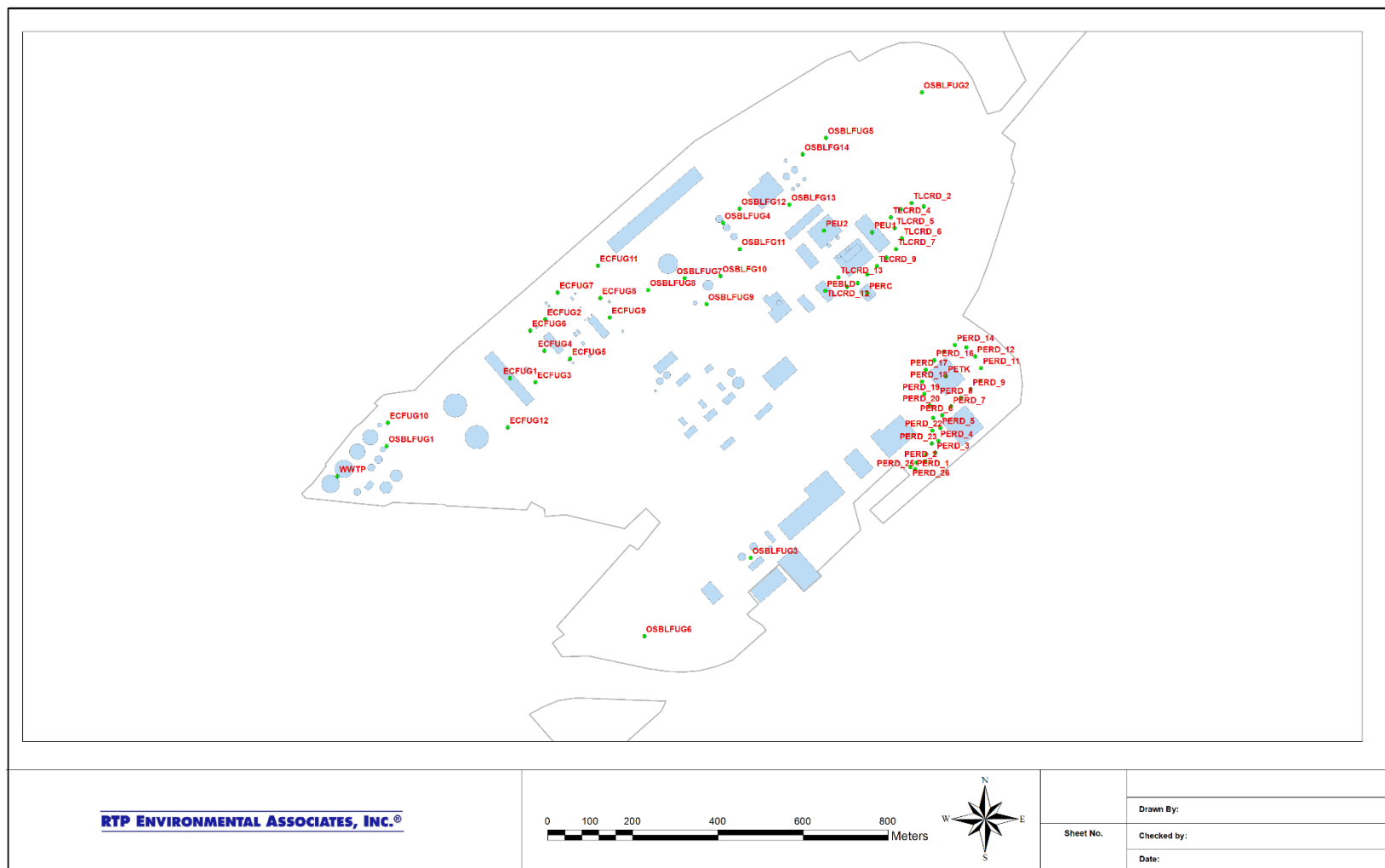


Figure 5. Modeled Volume Source Locations

Turbine Load/Operating Conditions

The combustion turbines may operate at a reduced load. Therefore, a range of conditions and operating modes representing potential unit operation were evaluated to identify the condition which results in the worst-case impact for each averaging period of concern. Three load conditions were evaluated for each turbine: 100%, 75%, and 45%. A unit (i.e., 1 lb/hr) emission rate was assumed to represent the 100% load condition for each turbine and the emissions and flows for the other loads and operating modes scaled from the 100% load condition. The condition resulting in the worst-case impacts (i.e., 100% load) was carried forward for the final AERMOD runs. The results of the load analysis are presented in Section 5.1 and supporting AERMOD input and output files will be provided electronically.

Good Engineering Practice Stack Height Analysis

A Good Engineering Practice (GEP) stack height evaluation was conducted to determine the direction-specific building dimensions to include in the model. Since flares are not subject to the GEP regulations, there is no requirement to calculate the GEP formula stack height for flares. The formula height is used to justify stack height credit for stacks constructed in excess of 65 m. Procedures used were in accordance with those described in the EPA Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations-Revised).^j GEP formula stack height, as defined in 40 CFR 51, is expressed as $GEP = H_b + 1.5L$, where H_b is the building height and L is the lesser of the building height or maximum projected width. Point source and building/structure locations were determined from a facility plot plan. The locations and heights were input to the EPA's Building Profile Input Program (BPIP-PRIME) computer program to calculate the direction-specific building dimensions needed for AERMOD. A plot plan for SPM is shown in Figure 6. A three dimensional rendering of the facility is shown in Figure 7. Downwash parameters for all point sources were included in the model runs.

^j *Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document for Stack Height Regulations (Revised)*. EPA-450/4-80-023R, U.S. Environmental Protection Agency, June 1985.



RTP ENVIRONMENTAL ASSOCIATES, INC.®

0 100 200 400 600 800 Meters



Sheet No.

Drawn By:

Checked by:

Date:

Figure 6. SPM Plot Plan

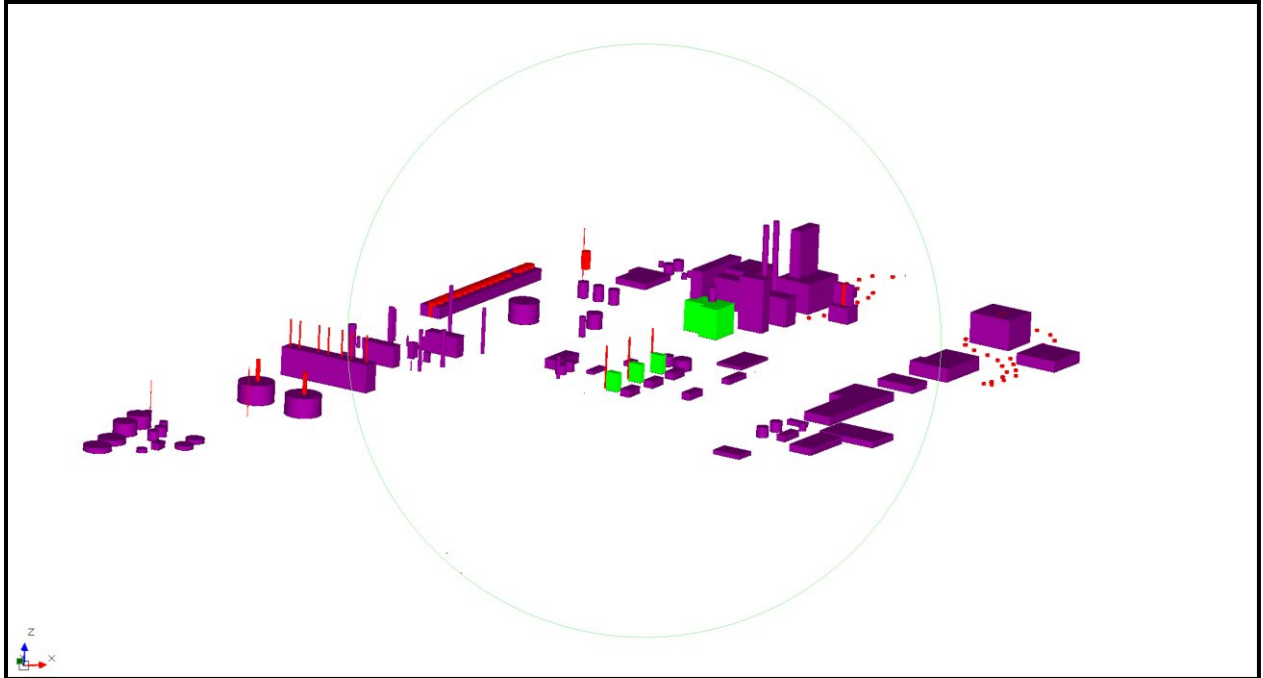


Figure 7. SPM Three-Dimensional Plot Plan (View from SW)

4.4 Receptor Data

Two receptor grids were developed for this analysis: one for assessing acute impacts and one for assessing chronic impacts. For the acute impacts assessment, modeled receptors were placed in all areas considered "ambient air" pursuant to 40 CFR 50.1(e) and the EPA's December 2, 2019 "Revised Policy on Exclusions from Ambient Air".¹¹ Ambient air is defined as that portion of the atmosphere, external to buildings, to which the general public has access. There is a fence which precludes public access to the entire SPM property. The fencing is placed around the entire facility perimeter as well as along each side of the railroad track that transects the facility. Entrances are secured by gate with cameras and remote-controlled access for truck deliveries. Gate, guard shack, and cameras are used for contractor and personnel vehicle entrances. In addition, security maintains a 24/7 presence on-site to ensure that unauthorized public access is not permitted.

The receptor grid consisted of three Cartesian grids and receptors spaced at 25 m

¹¹ *Revised Policy on Exclusions from "Ambient Air"*, memorandum from Andrew Wheeler to Regional Administrators, EPA, December 2, 2019.

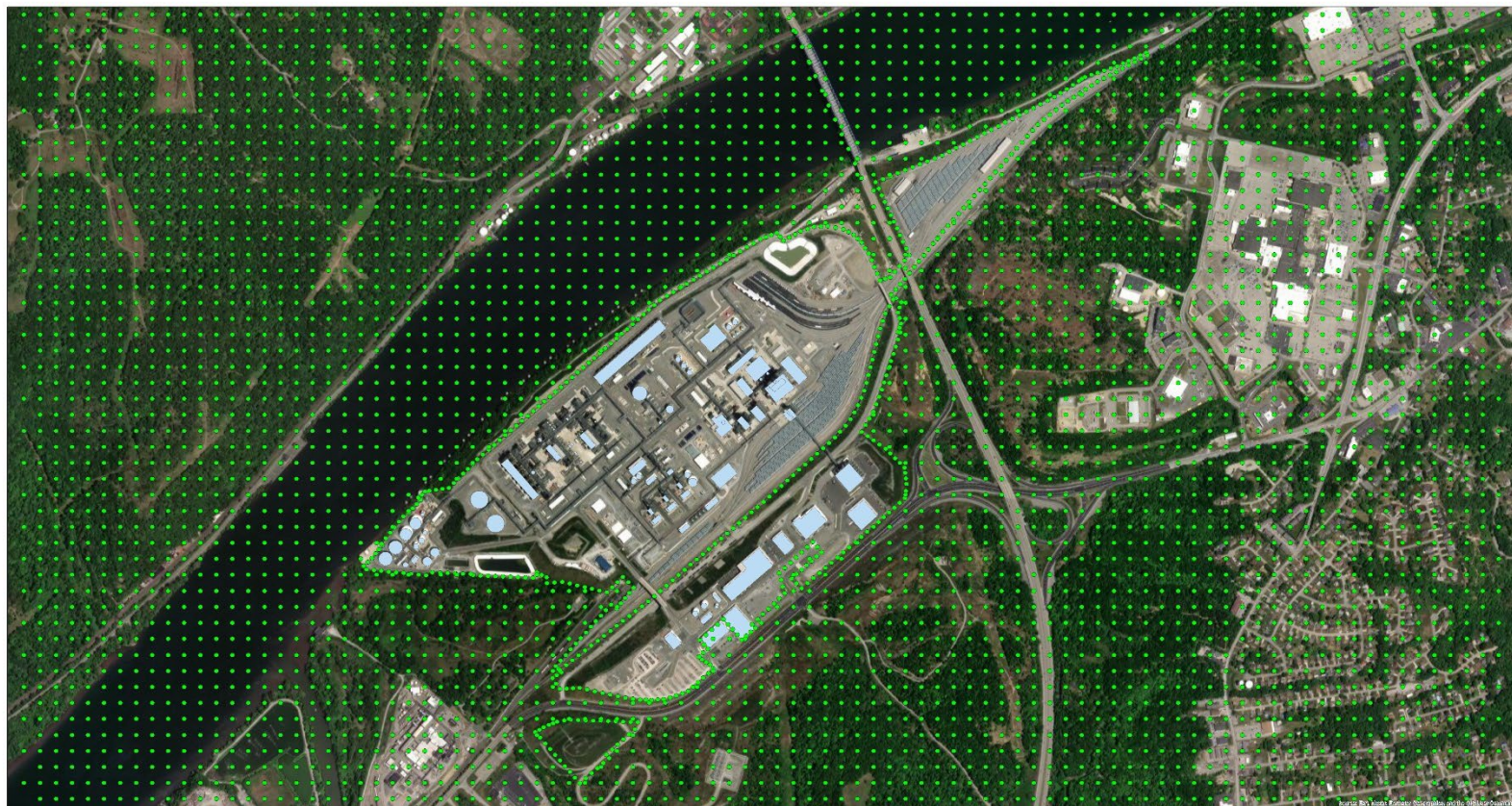
intervals along the facility fenceline and the railroad that transects the facility. The first cartesian grid extends approximately 1 km from the fence in all directions. Receptors in this region were spaced at 50 m intervals. The second grid extends to 3 km. Receptor spacing in this region is 100 m. The third grid extends to approximately 10 km with a spacing of 500m. Receptors with flagpole elevations were also placed along the Highway 376 bridge east of the facility. The receptor grid was designed such that maximum facility impacts fall within the 50 m spacing of receptors. The receptor grid spacing is presented in Table 3.

Table 3. Receptor Grid Spacing

Receptor Spacing (m)	Distance from Facility Fence (m)
50	1,000
100	3,000
500	10,000

A second grid was used for assessment of chronic impacts. This grid does not include receptors located on the Ohio River, facility property adjacent to the river, the Highway 376 bridge, or the railroad that transects the facility. These receptors were excluded from the assessment of chronic impacts as exposure in these areas is limited to the short-term.

SPM is located in western Pennsylvania. Terrain within 10 km of the site is gently rolling; however, there is terrain in excess of stack top elevation. Receptor elevations and hill height scale factors were calculated with AERMAP (18081). The elevation data were obtained from the USGS 1/3 arc second Three-Dimensional Elevation Program (3DEP) data obtained from the National Map from the USGS. Locations were based on a NAD83, UTM Zone 17 projection. The near-field receptor grids used in the acute and chronic assessments are shown in Figures 8 and 9, respectively.



RTP ENVIRONMENTAL ASSOCIATES, INC.®

0 150 300 600 900 1,200 Meters



Sheet No.

Drawn By:

Checked by:

Date:

Figure 8. SPM Acute Analysis Receptor Grid



RTP ENVIRONMENTAL ASSOCIATES, INC.®

0 150 300 600 900 1,200 Meters



Sheet No.

Drawn By:

Checked by:

Date:

Figure 9. SPM Chronic Analysis Receptor Grid

4.5 Meteorological Data

Data Selection and Representativeness

The 2018-2022, 5-year sequential hourly surface meteorological data collected at the Vistra Beaver Valley Nuclear Generating Station (Beaver Valley) and supplemental surface and upper air data from the Pittsburgh International Airport (KPIT, WBAN 94823) were used in the analysis. The Vistra surface data were collected as part of a continuous data collection program required by the U.S. Nuclear Regulatory Commission (“NRC”). For reasons discussed below, the meteorological data adequately represent atmospheric boundary layer conditions within the SPM analysis domain for AERMOD to properly characterize the transport and dispersion of the plumes from SPM. A profile base elevation of 228.6 m (750 feet) was employed which corresponds to the base elevation of the Beaver Valley tower.

The Vistra station is located approximately 8 km downstream of SPM, also on the Ohio River. The Beaver Valley meteorological station and SPM site also share a similar orientation in relation to the Ohio River (Figure 10). The river flows from the northeast to southwest relative to both the SPM site and the Beaver Valley meteorological station. The topography is also similar at each location. The wind patterns are therefore expected to be similar at each location. Wind speed and direction are measured at three levels at the Beaver Valley station (10.7 m, 45.7 m, and 152.4 m) (See the wind roses for each level in Figure 11). Temperature is also measured at the 10.7m level. These three levels provide adequate representation of plume behavior at the various release heights to be seen at SPM.

The Pittsburgh International Airport is located approximately 21 km southeast of the facility. Station pressure, cloud cover, and twice daily sounding data from Pittsburgh were used. These meteorological parameters are of synoptic scale and are adequately representative of the Beaver Valley area. Upper air data are also collected in Pittsburgh (Figure 10).

According to the EPA AERMOD Implementation Guide, the surface characteristics should be similar for the meteorological station and the study site.¹² A comparison was made of the surface characteristics at the Vistra Energy station and SPM. The AERSURFACE program (v. 20060) was run to determine the characteristics for comparison. The results of the albedo and Bowen ratio comparison by month are shown in Figure 12. The surface roughness comparison, by season, are shown in Figure 13. As can be seen, the surface characteristics values for the two sites, when compared on a monthly and seasonal and sector basis, are similar, especially when you considering the overall range in potential roughness values from 0 to 1.3 m.



Figure 10. Vistra Meteorological Tower and Pittsburgh Surface and Upper Air Station Locations Relative to SPM

¹² AERMOD Implementation Guide, EPA-454-B-23-009, October 12, 2023.

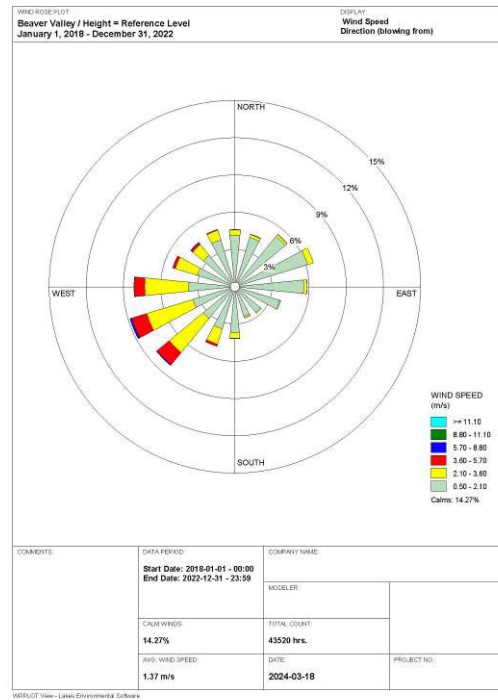
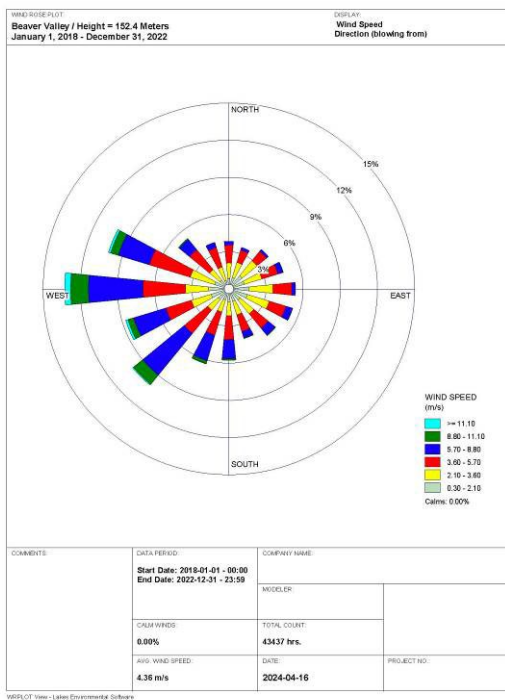
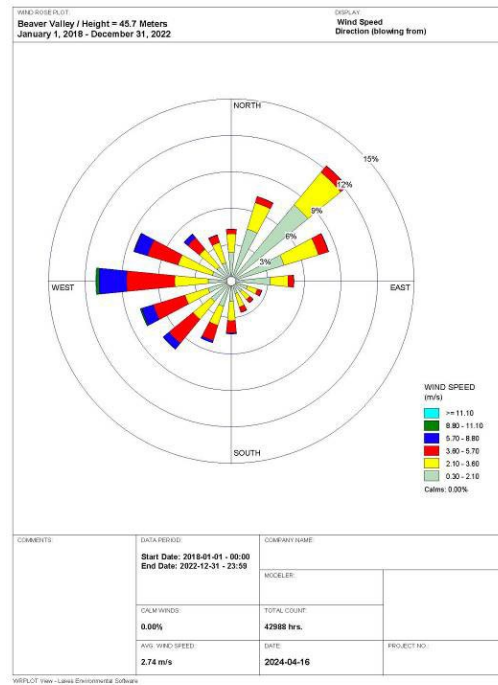
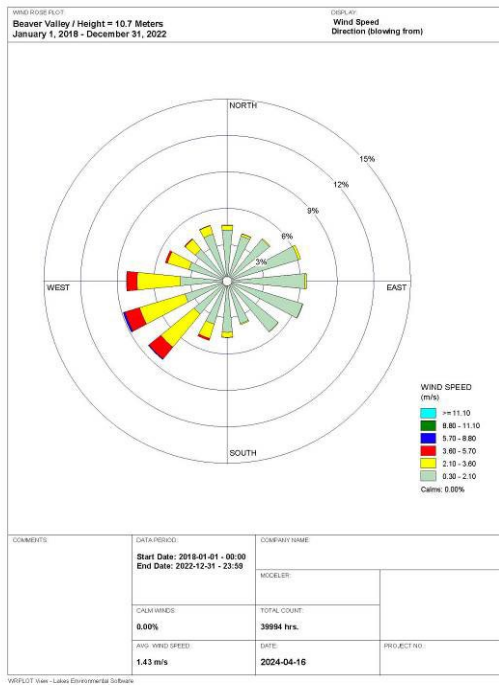


Figure 11. Beaver Valley Windrose 2018-2022

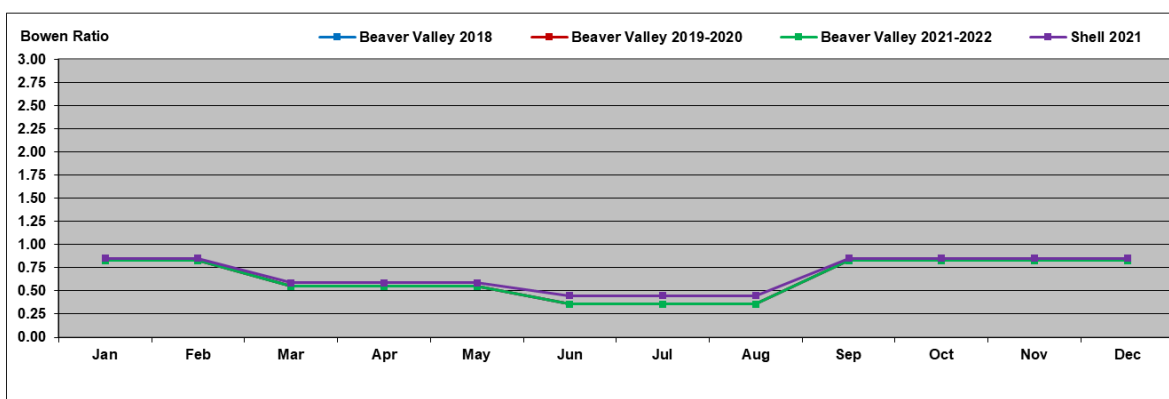
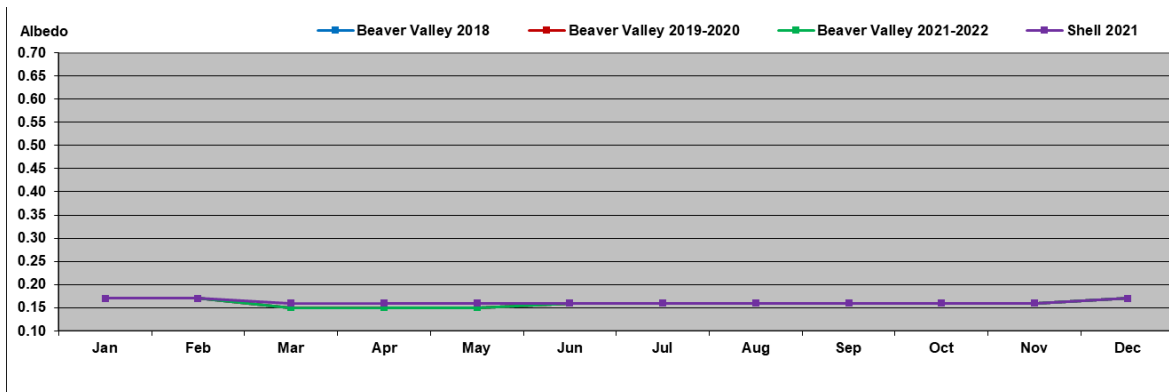


Figure 12. Albedo and Bowen Ratio Comparison Results

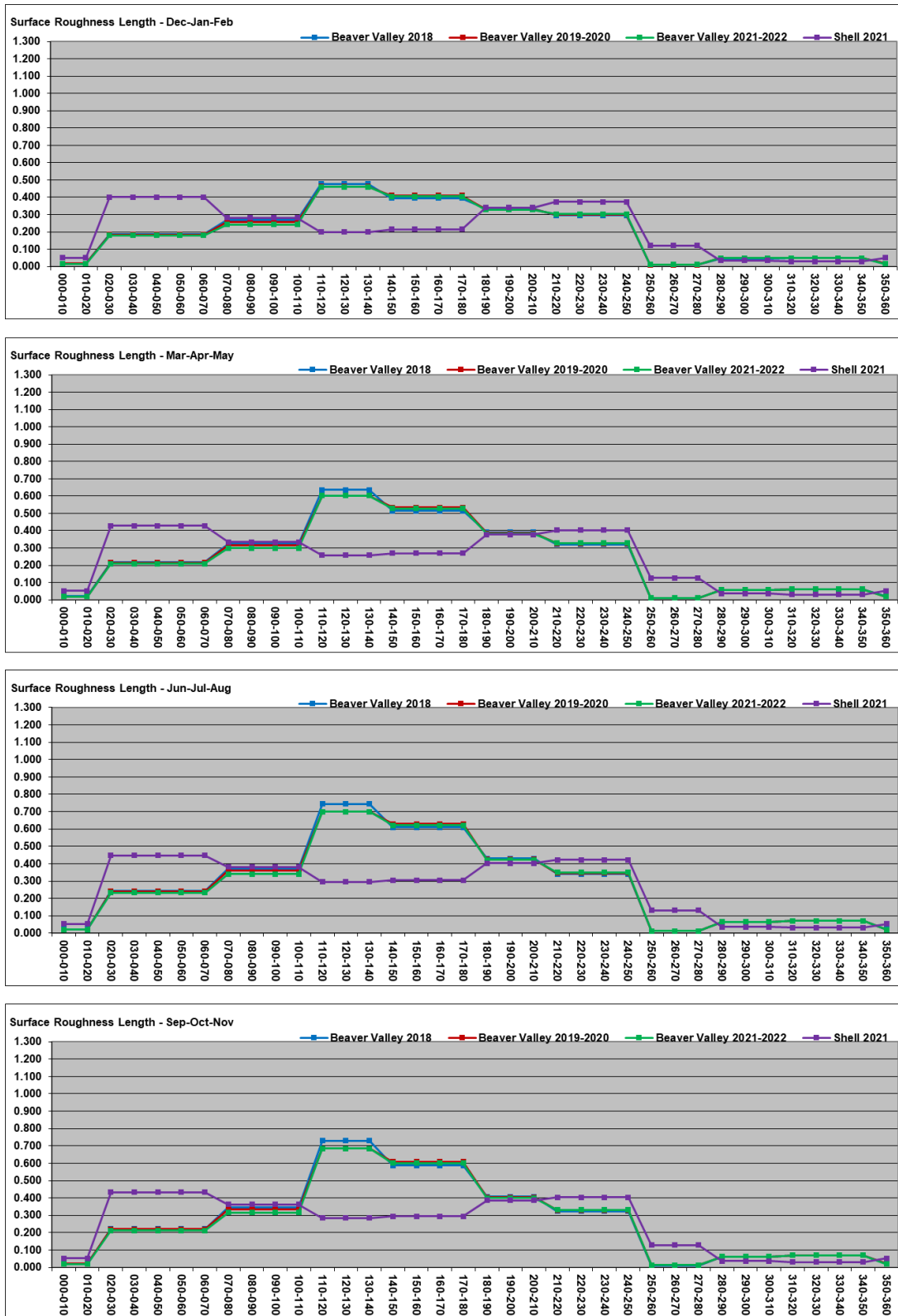


Figure 13. Surface Roughness Comparison Results

Data Processing

The meteorological data were provided to RTP Environmental by PADEP. PADEP processed the Beaver Valley surface data, Pittsburgh International Airport (KPIT) surface data, and KPIT upper air data using the meteorological preprocessor AERMET (Ver. 23132). In AERMET Stage 1, KPIT surface meteorological data in the Integrated Surface Data (ISD) format were extracted. KPIT upper air meteorological data in the Forecast Systems Laboratory (FSL) format were also extracted.

Also, the MODIFY keyword was entered to fill missing temperatures in the upper air data with interpolated values. In AERMET Stage 2, values of the surface characteristics (noon-time albedo, Bowen ratio, and surface roughness length) representative of the Beaver Valley surface meteorological site, were entered. These surface characteristics values were calculated by AERSURFACE (Ver. 20060) using USGS National Land Cover Data (NLCD) land cover, impervious surface, and tree canopy data for 2016, 2019, and 2021.¹³ The following options were selected in AERSURFACE: default 1-km radius and ten user-defined sectors defined as non-airport for surface roughness length, the default method for determining surface roughness length (ZORAD), monthly temporal resolution with default season assignment, and non-arid region.

AERSURFACE was executed for each surface moisture condition (average, dry, and wet), assuming both no continuous snow cover and continuous snow cover during the winter (i.e., AERSURFACE was executed six times). AERMET Stage 2 was then executed for each set of surface characteristics to produce six surface (.sfc) files. The final AERMET surface file was assembled by month, based on actual estimates of surface moisture condition and snow cover during the meteorological data period. Estimates of surface moisture condition were based on precipitation data for Pennsylvania Climate Division 9. Snow cover was based on National Centers for Environmental Information (NCEI) Local Climatological Data from KPIT.

¹³ 2016 NLCD data was used for processing meteorological data from 2018, 2019 NLCD data was used for processing meteorological data from years 2019 and 2020, and 2021 NLCD data was used for processing meteorological data from years 2021 and 2022.

4.6 Output Options

Modeling was conducted using a unit emission rate of 1 pound per hour (lb/hr). The output options were specified to generate plot files of dispersion factors ($\mu\text{g}/\text{m}^3$ per lb/hr) for each source for each averaging period. Acute impacts are based on the maximum 1-hour concentrations from the five years of meteorology. To assess the potential for acute impacts, the resulting 1-hour dispersion factor ($\mu\text{g}/\text{m}^3$ per lb/hr) for each emission source at each receptor was then multiplied by the source's estimated hourly emission rate to obtain pollutant-specific concentrations for each source, for each COPC, at each receptor. The resulting pollutant-specific concentration for each source was then summed on a receptor-by-receptor basis to obtain the total facility-wide 1-hour concentrations at each receptor for each COPC. This approach is conservative because it assumes that for each receptor, the maximum impact from each emission source occurs during the same hour, which it does not. Although this results in an overestimate of the acute health effects, this conservative assumption eliminates the need to do an individual AERMOD run for each of the forty-two (42) individual COPCs that has an acute inhalation RfC.

The chronic impacts are based on the maximum annual average across the five year period. Dispersion factors ($\mu\text{g}/\text{m}^3$ per lb/hr) for each receptor were determined by modeling a unit emissions rate (*i.e.*, 1 lb/hr) from each emission unit at SPM. The resulting dispersion factors were then multiplied by the estimated annual average emissions rate in lb/hr for each COPC from each emission unit to obtain pollutant-specific concentrations. In assessing chronic cancer and non-cancer risks, the 5-year average impacts and subsequent risk for each pollutant were summed for each receptor, and the receptor with the maximum total (*i.e.*, aggregate) excess lifetime cancer risk (ELCR) was used to assess the potential for a 1:100,000 risk.

5.0 RESULTS

5.1 Turbine Load Analysis Results

The results of the load analysis are presented in Table 4. As shown, the 100% load scenario for each turbine was found to generate the highest impacts. The 100% load case was therefore used in the final AERMOD runs for the risk assessment.

Table 4. Turbine Load Analysis Results

Averaging Period	Source Name	Modeled Concentration ($\mu\text{g}/\text{m}^3$)	Source Description
1-hr	CT1_100	1.36	Turbine 1, 100% load
	CT1_75	1.14	Turbine 1, 75% load
	CT1_45	0.82	Turbine 1, 45% load
	CT2_100	1.41	Turbine 2, 100% load
	CT2_75	1.18	Turbine 2, 75% load
	CT2_45	0.83	Turbine 2, 45% load
	CT3_100	1.42	Turbine 3, 100% load
	CT3_75	1.21	Turbine 3, 75% load
	CT3_45	0.88	Turbine 3, 45% load
Annual	CT1_100	0.013	Turbine 1, 100% load
	CT1_75	0.012	Turbine 1, 75% load
	CT1_45	0.009	Turbine 1, 45% load
	CT2_100	0.013	Turbine 2, 100% load
	CT2_75	0.012	Turbine 2, 75% load
	CT2_45	0.008	Turbine 2, 45% load
	CT3_100	0.013	Turbine 3, 100% load
	CT3_75	0.012	Turbine 3, 75% load
	CT3_45	0.008	Turbine 3, 45% load

5.2 Acute Pollutant Results

A spreadsheet summarizing the calculated 1-hour concentrations, as well as all model input and output files will be provided electronically. The calculated 1-hour concentrations and resulting acute hazard quotients (HQ) for each COPC are summarized in Appendix D-3C. Supporting calculations will also be provided electronically.

5.3 Chronic Pollutant Results

To calculate the ambient concentrations used in the chronic cancer and non-cancer risks, a unit emission rate of 1 lb/hr was modeled for each source. An AERMOD plot file was generated containing the dispersion factors by source and by receptor. The AERMOD input and output files and supporting calculations for the chronic impacts will be provided electronically. The calculated ELCRs, HQs, and hazard index (HI) are presented in Appendix D-3C.

APPENDIX D-3C

INHALATION RISK ASSESSMENT FOR SHELL POLYMERS MONACA SHELL CHEMICAL APPALACHIA LLC BEAVER COUNTY, PENNSYLVANIA



September 2024

Table of Contents

1.0 GENERAL DISCUSSION	1
1.1 Chronic Cancer and Non-cancer Risks.....	1
1.2 Acute Non-cancer Risks	2

List of Tables

Table 1. Chronic and Acute Risk Factors for Inhalation Risk Assessment	4
Table 2. Estimated Health Effects from COPCs at Receptors with the Highest Aggregate ELCR and Chronic HQ	8
Table 3. Acute Non-Cancer Risk Assessment.....	10

List of Figures

Figure 1. Location of Receptors with the Highest ELCR, Highest Chronic HI, and Highest Acute HQ	7

Inhalation Risk Assessment

1.0 General Discussion

This inhalation risk assessment for the Shell Chemical Appalachia LLC (Shell) Polymers Monaca (SPM) Site evaluates the potential cancer and non-cancer inhalation risks from the compounds of potential concern (COPC) emitted from the facility. The approach used to conduct the assessment is based on guidance provided by the Pennsylvania Department of Environmental Protection (PaDEP) as outlined in the approved Inhalation Risk Assessment Protocol.¹

1.1 Chronic Cancer and Non-cancer Risks

Chronic cancer and non-cancer impacts were estimated for each COPC at approximately 10,000 habitable points on a receptor grid surrounding SPM. As detailed in Appendix D-3B, dispersion factors ($\mu\text{g}/\text{m}^3$ per lb/hr) for each receptor were determined by modeling a unit emissions rate (*i.e.*, 1 lb/hr) from each emissions unit at SPM. The resulting dispersion factors were then multiplied by the estimated annual hourly average emissions rate for each COPC from each emissions unit to obtain pollutant-specific concentrations. Annual average emission rates used in this analysis are summarized in Table 2 of Appendix D-3A. For the chronic excess lifetime cancer risk (ELCR), the concentration of each pollutant at each receptor was multiplied by the compound-specific unit risk factor. The compound-specific unit risk factors used in the ELCR calculation are presented in Table 1. The risk factors have been updated from those used in the previous analysis based on data from the Risk Assessment Information System (RAIS) database.² The aggregate ELCR was then determined for each receptor by summing the individual COPC ELCR. All calculations are provided electronically along with the AERMOD input and output files. As shown in Figure 1, the receptor with the highest ELCR is located across the river from the facility in a wooded area. The ELCR at the maximum receptor is 0.84 in 100,000 (*i.e.*, $8.4\text{E-}6$) which is below

¹ Email from A. Binder, PaDEP to P. May, RTP Environmental Assoc., January 12, 2015

² <http://rais.ornl.gov>

PADEP's inhalation risk management facility-wide target level of cancer risk of 1 in 100,000 (i.e., $1\text{E-}5$).

For the chronic non-cancer risk, the concentration of each pollutant at each receptor was divided by the compound-specific inhalation reference concentration (RfC) to determine the hazard quotient (HQ) for that COPC. The inhalation reference concentrations used for this analysis are presented in Table 1. As with the unit risk factors, the RfCs were updated using the RAIS database. The aggregate health index (HI) was determined for each receptor by summing the individual COPC HQ values. The HQ for each COPC and the aggregate HI at each receptor, along with supporting calculations, are provided electronically. As shown in Figure 1, the receptor with the highest HI is located on the southwest corner of the facility's fence line in a wooded area. The facility HI at this receptor is 0.22, which is below PaDEP's inhalation risk management facility-wide target level for non-cancer HI of 0.25.

The maximum aggregate ELCR and chronic HI both occur in secluded, wooded areas away from residences, in locations where individuals would not be expected to remain for extended periods. Based on the magnitude and location of the maximum impacts, SPM is not expected to result in adverse chronic health effects in the surrounding area.

1.2 Acute Non-cancer Risks

To assess the potential for acute health impacts resulting from SPM, dispersion factors were obtained using AERMOD by modeling a unit emission rate of 1 pound per hour (lb/hr) for each emission source for the 1-hour averaging period. The resulting dispersion factor ($\mu\text{g}/\text{m}^3$ per lb/hr) for each emission source at each receptor was then multiplied by the source's estimated hourly emission rate to obtain pollutant-specific concentrations for each source, for each COPC, at each receptor. Hourly emission rates used in this analysis are summarized in Table 3 of Appendix D-3A. The resulting pollutant-specific concentration for each source was then summed on a receptor-by-receptor basis to obtain the total facility-wide 1-hour concentration for each COPC. This approach is conservative because it assumes that for each receptor, the maximum impact from each emission source occurs during the same hour, which it does not. Although this results in an overestimate of the acute health effects, this

conservative assumption eliminates the need to do an individual AERMOD run for each of the forty-two (42) individual COPCs that has an acute inhalation RfC.

The acute HQ was determined for a one-hour average exposure to each COPC at all points in the receptor grid. For each pollutant, the highest 1-hour concentration was divided by compound-specific inhalation RfC values derived from short-term exposure levels to determine the HQ for each pollutant. The compound-specific inhalation RfC values are presented in Table 1. As with the unit risk factors, the RfCs were updated using the RAIS database. Each HQ was then compared to the threshold of 1.0, the level at which no adverse effect would be expected from the exposure per PADEP guidance. As presented in Table 3, the HQ for each COPC is less than 1. The pollutant with the highest HQ is acrolein, with an HQ of 0.65. This is well below the threshold of 1 even with the conservative approach utilized in this analysis. As shown in Figure 1, the receptor with the highest acute HQ is located along the railroad which transects the facility. It's unlikely that an individual would be located on or along the railroad tracks for an hour. Given the magnitude and location of the maximum acute impact, SPM is not expected to result in adverse acute health effects in the surrounding area.

Table 1. Chronic and Acute Risk Factors for Inhalation Risk Assessment

Compound of Potential Concern	Chemical Abstracts Service (CAS) Number	Chronic Inhalation Reference Concentration (mg/m ³)	Chronic Inhalation Reference Concentration Reference	Acute Inhalation Reference Concentration (mg/m ³)	Acute Inhalation Reference Concentration Reference	Inhalation Unit Risk (μg/m ³) ⁻¹	Inhalation Unit Risk Reference ¹
Acenaphthene	83-32-9						
Acenaphthylene	208-96-8						
Acetaldehyde	75-07-0	0.009	IRIS	0.47	CALEPA	2.20E-06	IRIS
Acrolein	107-02-8	2.00E-05	IRIS	0.0025	Cal OEHHA		
Ammonia	7664-41-7	0.2	Cal OEHHA	1.18	ATSDR Final		
Anthracene	120-12-7			0.03	NIOSH		
Arsenic, Inorganic	7440-38-2	1.50E-05	Cal OEHHA	2.00E-04	CALEPA	0.0033	Cal OEHHA
Barium	7440-39-3	5.00E-04	HEAST	0.075	PADEP		
Benzene	71-43-2	0.003	Cal OEHHA	0.027	Cal OEHHA	7.80E-06	IRIS
Benzo[a]anthracene	56-55-3			0.03	PADEP	6.00E-05	EPA/RPF
Benzo[a]pyrene	50-32-8	2.00E-06	IRIS	0.03	PADEP	6.00E-04	IRIS
Benzo[b]fluoranthene	205-99-2					6.00E-05	EPA/RPF
Benzo[g,h,i]perylene	191-24-2						
Benzo[k]fluoranthene	207-08-9					6.00E-06	EPA/RPF
Beryllium and compounds	7440-41-7	7.00E-07	Cal OEHHA	2.50E-04	PADEP	0.0024	IRIS
Biphenyl	92-52-4	4.00E-04	SCREEN Current	0.15	NIOSH		
Butadiene, 1,3-	106-99-0	0.002	IRIS	0.66	CALEPA	3.00E-05	IRIS
Cadmium	7440-43-9	1.00E-05	ATSDR Final	3.00E-05	ATSDR Final	0.0018	IRIS
Chloroform	67-66-3	2.00E-05	Cal OEHHA	0.15	Cal OEHHA	5.30E-06	Cal OEHHA
Chromium(VI)	18540-29-9	1.00E-04	IRIS	0.01	PADEP	0.084	SURROGATE. Based on Total Chromium -- use 1:6 ratio (x7)
Chrysene	218-01-9			0.03	PADEP	6.00E-07	EPA/RPF
Cobalt	7440-48-4	6.00E-06	PPRTV Current	0.003	PADEP	0.009	PPRTV Current
Copper	7440-50-8			0.1	CALEPA		
Dibenzo[a,h]anthracene	53-70-3					6.00E-04	EPA/RPF

Compound of Potential Concern	Chemical Abstracts Service (CAS) Number	Chronic Inhalation Reference Concentration (mg/m ³)	Chronic Inhalation Reference Concentration Reference	Acute Inhalation Reference Concentration (mg/m ³)	Acute Inhalation Reference Concentration Reference	Inhalation Unit Risk (µg/m ³) ⁻¹	Inhalation Unit Risk Reference ¹
Dibutylphthalate	84-74-2						
Dichlorobenzene	106-46-7	0.8	IRIS	7.5	CALEPA	1.10E-05	Cal OEHHA
Dimethylbenz(a)anthracene, 7,12-	57-97-6					0.071	Cal OEHHA
Ethylbenzene	100-41-4	1	IRIS	21.7	ATSDR Final	2.50E-06	CALEPA
Fluoranthene	206-44-0						
Fluorene	86-73-7						
Formaldehyde	50-00-0	0.009	Cal OEHHA	0.049	ATSDR Final	6.00E-06	Cal OEHHA
Hexane, n-	110-54-3	0.7	IRIS	27	ACGIH		
Indeno[1,2,3-cd]pyrene	193-39-5					6.00E-05	EPA/RPF
Lead and Compounds	7439-92-1			0.0075	PADEP	1.20E-05	CALEPA
Manganese	7439-96-5	5.00E-05	IRIS	0.075	PADEP		
Mercury (elemental)	7439-97-6	3.00E-05	Cal OEHHA	6.00E-04	CALEPA		
Methanol	67-56-1	4	Cal OEHHA	28	CALEPA		
Methylcholanthrene, 3-	56-49-5					0.0063	Cal OEHHA
Methylnaphthalene, 2-	91-57-6						
Molybdenum	7439-98-7	0.002	ATSDR	0.45	CALEPA		
Naphthalene	91-20-3	0.003	IRIS	2.0	PADEP	3.40E-05	Cal OEHHA
Nickel	7440-02-0	1.40E-05	CALEPA	2.00E-04	CALEPA	2.60E-04	Cal OEHHA
PAH (polycyclic aromatic hydrocarbons)	NA			0.019		0.071	
Pentane	109-66-0	1	PPRTV Current	180	CALEPA		
Phenanthrene	85-01-8			0.03			
Phenol	108-95-2	0.2	CALEPA	5.8	CALEPA		
Propane	74-98-6			270	CALEPA		
Propylene Oxide	75-56-9	0.03	IRIS	3.1	CALEPA	3.70E-06	IRIS
Pyrene	129-00-0			0.03	NIOSH		
Selenium	7782-49-2	0.02	CALEPA	0.03	PADEP		

Compound of Potential Concern	Chemical Abstracts Service (CAS) Number	Chronic Inhalation Reference Concentration (mg/m ³)	Chronic Inhalation Reference Concentration Reference	Acute Inhalation Reference Concentration (mg/m ³)	Acute Inhalation Reference Concentration Reference	Inhalation Unit Risk (µg/m ³) ⁻¹	Inhalation Unit Risk Reference ¹
Styrene	100-42-5	0.9	Cal OEHHA	21.0	Cal OEHHA		
Toluene	108-88-3	0.42	Cal OEHHA	5.0	Cal OEHHA		
Vanadium	7440-62-2	1.00E-04	ATSDR	8.00E-04	ATSDR Final		
Xylenes	1330-20-7	0.1	IRIS	8.68	ATSDR Final		

¹Source: The Risk Assessment Information located at <http://rais.ornl.gov>. Propane not a listed chemical in the RAIS database.



Figure 1. Location of Receptors with the Highest ELCR, Highest Chronic HI, and Highest Acute HQ

Table 2. Estimated Health Effects from COPCs at Receptors with the Highest Aggregate ELCR and Chronic HQ

Compound of Potential Concern	Excess Lifetime Cancer Risk	Chronic Non-cancer HQ
1,3-Butadiene	1.13E-06	3.18E-02
2-Methylnaphthalene	-	-
3-Methylchloranthrene	5.53E-10	-
7,12-Dimethylbenz(a)anthracene	5.54E-08	-
Acenaphthene	-	-
Acenaphthylene	-	-
Acetaldehyde	2.50E-10	1.72E-05
Acrolein	-	3.07E-03
Ammonia	-	2.91E-04
Anthracene	-	-
Arsenic	3.22E-08	1.63E-04
Barium	-	1.07E-04
Benzene	1.77E-07	1.26E-01
Benzo(a)anthracene	5.76E-12	-
Benzo(a)pyrene	3.57E-11	8.17E-06
Benzo(b)fluoranthene	5.30E-12	-
Benzo(g,h,i)perylene	-	-
Benzo(g,h,l)perylene	-	-
Benzo(k)fluoranthene	5.32E-13	-
Beryllium	1.41E-09	2.09E-04
Biphenyl	-	5.15E-06
Cadmium	9.66E-08	1.34E-03
Chloroform	6.00E-12	3.99E-02
Chromium ¹	6.38E-06	2.78E-04
Chrysene	5.37E-14	-
Cobalt	3.69E-08	1.71E-04
Copper	-	-
Dibenzo(a,h)anthracene	3.68E-11	-
Dibutylphthalate	-	-
Dichlorobenzene	6.44E-10	1.83E-08
Ethylbenzene	1.69E-09	5.94E-05
Fluoranthene	-	-
Fluorene	-	-
Formaldehyde	2.69E-08	2.20E-04
Heptane	-	1.09E-06
Hexane	-	3.36E-05
Indeno(1,2,3-cd)pyrene	5.38E-12	-
Lead	2.92E-10	-
Manganese	-	9.27E-05

Compound of Potential Concern	Excess Lifetime Cancer Risk	Chronic Non-cancer HQ
Mercury	-	1.06E-04
Methanol	-	3.48E-06
Molybdenum	-	6.71E-06
Naphthalene	1.17E-07	5.73E-03
Nickel	2.66E-08	1.83E-03
PAH ²	3.25E-07	-
Pentane	-	3.17E-05
Phenanthrene	-	-
Phenol	-	4.28E-08
Propane	-	-
Propylene	-	9.03E-06
Propylene Oxide	1.77E-10	1.60E-06
Pyrene	-	-
Selenium	-	1.46E-08
Styrene	-	9.09E-04
Toluene	-	2.37E-03
Vanadium	-	2.81E-04
Xylenes	-	6.35E-04
Lead	-	-
Total at Receptor with Highest Impact	8.41E-06	0.22

¹ Emissions of chromium conservatively assumed to be in hexavalent form

² AP-42 factors for stationary combustion turbines are not available for individual PAH compounds.
For this assessment, PAH emissions from CTs were conservatively assumed to be benzo(a)pyrene

“ ” Denotes no available IUR and/or inhalation RfC

Table 3. Acute Non-Cancer Risk Assessment

Compound of Potential Concern	Modeled 1-hour Concentration ¹ (mg/m ³)	Updated Acute Non-Cancer RfC ² (mg/m ³)	HQ
1,3-Butadiene	8.89E-03	6.60E-01	1.35E-02
2-Methylnaphthalene	1.05E-05	-	-
3-Methylchloranthrene	2.06E-08	-	-
7,12-Dimethylbenz(a)anthracene	1.83E-07	-	-
Acenaphthene	1.15E-06	-	-
Acenaphthylene	4.01E-06	-	-
Acetaldehyde	2.83E-03	4.70E-01	6.03E-03
Acrolein	1.63E-03	2.50E-03	6.54E-01
Ammonia	3.75E-02	1.18E+00	3.16E-02
Anthracene	1.49E-06	3.00E-02	4.96E-05
Arsenic	2.28E-06	2.00E-04	1.14E-02
Barium	5.02E-05	7.50E-02	6.70E-04
Benzene	3.65E-03	2.70E-02	1.35E-01
Benzo(a)anthracene	1.33E-06	3.00E-02	4.43E-05
Benzo(a)pyrene	1.52E-07	3.00E-02	5.05E-06
Benzo(b)fluoranthene	8.32E-08	-	-
Benzo(g,h,i)perylene	1.37E-08	-	-
Benzo(g,h,l)perylene	3.86E-07	-	-
Benzo(k)fluoranthene	1.27E-07	-	-
Beryllium	1.37E-07	2.50E-04	5.48E-04
Biphenyl	6.63E-05	1.50E-01	4.42E-04
Cadmium	1.26E-05	3.00E-05	5.48E-04
Chloroform	8.92E-06	1.50E-01	4.42E-04
Chromium ³	2.27E-05	1.00E-02	4.19E-01
Chrysene	2.83E-07	3.00E-02	5.94E-05
Cobalt	9.59E-07	3.00E-03	2.27E-03
Copper	9.71E-06	1.00E-01	9.71E-05
Dibenzo(a,h)anthracene	4.63E-07	-	-
Dibutylphthalate	1.11E-06	-	-
Dichlorobenzene	1.37E-05	7.50E+00	1.83E-06
Ethylbenzene	8.02E-05	2.17E+01	3.70E-06
Fluoranthene	6.02E-06	-	-
Fluorene	2.31E-05	-	-
Formaldehyde	1.71E-02	4.91E-02	3.49E-01
Heptane	7.00E-05	-	-
Hexane	2.87E-03	2.70E+01	1.06E-04
Indeno(1,2,3-cd)pyrene	3.01E-07	-	-
Lead	5.71E-06	7.50E-03	7.61E-04
Manganese	4.34E-06	7.50E-02	5.79E-05

Compound of Potential Concern	Modeled 1-hour Concentration ¹ (mg/m ³)	Updated Acute Non-Cancer RfC ² (mg/m ³)	HQ
Mercury	2.97E-06	6.00E-04	4.95E-03
Methanol	1.48E-03	2.80E+01	5.27E-05
Molybdenum	1.26E-05	4.50E-01	2.79E-05
Naphthalene	4.37E-04	2.00E+00	2.19E-04
Nickel	2.40E-05	2.00E-04	1.20E-01
PAH ⁴	1.38E-04	1.90E-02	7.25E-03
Pentane	2.98E-02	1.80E+02	1.66E-04
Phenanthrene	2.33E-05	3.00E-02	7.75E-04
Phenol	7.65E-06	5.80E+00	1.32E-06
Propane	2.25E-02	2.70E+02	8.33E-05
Propylene	3.28E-03	-	-
Propylene Oxide	6.03E-05	3.10E+00	1.95E-05
Pyrene	4.05E-06	3.00E-02	1.35E-04
Selenium	2.74E-07	3.00E-02	9.13E-06
Styrene	1.43E-04	2.10E+01	6.81E-06
Toluene	1.16E-03	5.00E+00	2.32E-04
Vanadium	2.63E-05	8.00E-04	3.28E-02
Xylenes	3.38E-04	8.68E+00	3.89E-05
Zinc	3.31E-04	2.50E-01	1.32E-03

¹ All sources were modeled using a unit emission rate (1 lb/hr). The resulting dispersion factors from AERMOD (µg/m³ per lb/hr) for each emission source were then multiplied by the source's hourly potential emission rate (lb/hr) to obtain hourly concentrations for each COPC at each receptor. For each COPC, the concentration for each source was then summed on a receptor-by-receptor basis to obtain the total facility-wide 1-hour concentration at each receptor. This approach is conservative because it assumes for each receptor, the maximum impact for each source occurs during the same hour, which it does not.

² Reference concentrations developed using short term exposure limits as per PaDEP guidance. Refer to Table 1 for more information.

³ Emissions of chromium conservatively assumed to be in hexavalent form

⁴ AP-42 factors for stationary combustion turbines are not available for individual PAH compounds. For this assessment, PAH emissions from CTs were conservatively assumed to be benzo(k)fluoranthene

“ - ” Denotes no available inhalation RfCr

EPA RBLC Database Information

Process Type: 64.006 - SOCMI Wastewater Collection and Treatment
Pollutant: VOC
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
LA-0301	LAKE CHARLES CHEMICAL COMPLEX ETHYLENE 2 UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Benzene Stripper (EQT 1135)	0		VOC	Route emissions to the fuel gas system	0		BACT-PSD	
LA-0301	LAKE CHARLES CHEMICAL COMPLEX ETHYLENE 2 UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Wastewater Drums and Sumps	0		VOC	Flare	0		BACT-PSD	BACT is determined to be routing the above drums and sumps through a closed vent system to the Ground Flare (EQT 0982).
LA-0301	LAKE CHARLES CHEMICAL COMPLEX ETHYLENE 2 UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Sour Water Stripper (EQT 1128)	0		VOC	Route emissions to the fuel gas system	0		BACT-PSD	
LA-0301	LAKE CHARLES CHEMICAL COMPLEX ETHYLENE 2 UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Process Wastewater Treatment Plant (FUG 18)	12647	GALS/MIN	VOC	Compliance with 40 CFR 63 Subpart G and 40 CFR 61 Subpart FF	40.01	TPY	BACT-PSD	The wastewater treatment plant will receive Group 2 wastewater streams from multiple process units.
LA-0301	LAKE CHARLES CHEMICAL COMPLEX ETHYLENE 2 UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Process Water Tanks (EQTs 987, 988, & 989)	730531	GALS/YR	VOC	Internal Floating Roof	17.82	TPY	BACT-PSD	VOC limit is per tank.
LA-0302	LAKE CHARLES CHEMICAL COMPLEX EO/MEG UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Wastewater VOC Stripper (Vent) (EQT 1072)	0		VOC	Combustion (Process Heat Boiler)	0		BACT-PSD	BACT is determined to be routing the above vent through a closed vent system to Process Heat Boiler B-910A (EQT 1008) or to Process Heat Boiler B-910B (EQT 1009).
LA-0364	FG LA COMPLEX	FG LA LLC	1/6/2020	Wastewater Treatment System	0		VOC	Good design and venting the emissions to a control device in the primary treatment system enters the biological treatment unit.	0		BACT-PSD	
LA-0382	BIG LAKE FUELS METHANOL PLANT	BIG LAKE FUELS LLC	4/25/2019	Wastewater Treatment Plant (EQT0045)	0		VOC	Comply with 40 CFR 63 Subpart G	0		BACT-PSD	
OH-0378	PTTGCA PETROCHEMICAL COMPLEX	PTTGCA PETROCHEMICAL COMPLEX	12/21/2018	Wastewater Collection and Treatment (P806)	0		VOC	i. Use an enhanced biodegradation unit to maintain the annual benzene quantity from facility waste at less than 10 megagrams (MG; 11 tons) by combining waste streams with greater than 10 ppmw benzene with waste streams with less than 10 ppmw benzene to form a combined waste stream with a benzene concentration less than 10 ppmw; ii. Route emissions from wastewater generated in the ethylene manufacturing process to a thermal oxidizer designed to achieve >99.5% destruction efficiency for volatile organic compounds (VOC); iii. Cover and route emissions from the process wastewater equalization tank (T-6503), the waste oil drum (T-6502), the oily wastewater storage tank (T-6501) and the wet air oxidation unit to a thermal oxidizer designed to achieve >99.5% destruction efficiency for VOC; iv. Emissions from wastewater generated in the high-density polyethylene units must comply with the applicable requirements of 40 CFR Part 63, Subpart FFFF.	0.01	LB/H	BACT-PSD	
TX-0858	GULF COAST GROWTH VENTURES PROJECT	GCGV ASSET HOLDING LLC	6/12/2019		0		VOC	Glycol Plant and the Olefins plant must be covered and the vapor space must be directed to the shared vent system for control. Stormwater drains and wastewater conveyances associated with the polyethylene plants do not require control because they do not have the potential to accept contaminated process water. All vapors from the equalization tanks and the dissolved air flotation basin must also be captured and controlled. The required controls are a catalytic oxidizer and the shared vent system, respectively. The catalytic oxidizer must achieve a minimum destruction efficiency of 99%, to be demonstrated through stack sampling. The level of mixed liquor suspended solids (MLSS) in the biological oxidation treatment unit must be maintained above 2000 mg/L.	0		BACT-PSD	

Process Type: 64.006 - SOCMI Wastewater Collection and Treatment
Pollutant: VOC
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
TX-0865	EQUISTAR CHEMICALS CHANNELVIEW COMPLEX	EQUISTAR CHEMICALS, LP	9/9/2019	Wastewater Collection and Treatment	0		VOC	Process wastewater will be collected via covered sumps and hard-piped to the wastewater tank (EPN: TK8511) and then piped to the existing enhanced wastewater treatment facility (under NSR Permit No. 49120) at the site that will treat the VOCs contained in the wastewater to remove greater than 90%. The wastewater tank emissions are routed to the multi-point ground flare for control at an efficiency of 98%.	0		LAER	
TX-0876	PORT ARTHUR ETHANE CRACKER UNIT	MOTIVA ENTERPRISE LLC	2/6/2020	Wastewater treatment plant	0		VOC	Covered conveyances, benzene stripper, activated sludge biological treatment, thermal oxidizer	3100	MG/L	BACT-PSD	

Process Type: 19.310 - Chemical Plant Flares
Pollutant: CO
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
AK-0082	POINT THOMSON PRODUCTION FACILITY	EXXON MOBIL CORPORATION	1/23/2015	Drilling, HP, and LP Flares	50	MMscf/yr	CO		0.37	LB/MMBTU	BACT-PSD	
AK-0083	KENAI NITROGEN OPERATIONS	AGRIUM U.S. INC.	1/6/2015	Three (3) Flares	1.25	MMBTU/H	CO	Work Practice Requirements and Limited Use (limit venting to 168 hr/yr each during startup, shutdown, and maintenance events)	0.37	LB/MMBTU	BACT-PSD	
AK-0086	KENAI NITROGEN OPERATIONS	AGRIUM U.S. INC.	3/26/2021	Three (3) Flares	1.25	MMBtu/hr	CO	Work Practice Requirements and Limited Use	0.31	LB/MMBTU	BACT-PSD	Limited to 168 hours per year for each flare.
*IL-0134	CRONUS CHEMICALS	CRONUS CHEMICALS, LLC	12/21/2023	Front End Flare	2.22	mmBtu/hr	CO	Flare Minimization Plan and Root Cause Analysis, Steam-assist flare design, Work Practices in accordance with 40 CFR 63.11(b), GCP, use of nitrogen as purge gas	0.08	LB/MMBTU	BACT-PSD	Also 43.28 tons/year (both Pilot and SSM) and 43.28 tons/bi-month period during commissioning/shutdown period
*IL-0134	CRONUS CHEMICALS	CRONUS CHEMICALS, LLC	12/21/2023	Ammonia Flare	2.22	mmBtu/hr	CO	Flare Minimization Plan and Root Cause Analysis, Steam-assist flare design, Work Practices in accordance with 40 CFR 63.11(b), GCP, use of nitrogen as purge gas	0.08	LB/MMBTU	BACT-PSD	Also 35.87 tons/year (Pilot and SSM) and 35.87 tons/bi-month period (Pilot and SSM) during commissioning/shutdown period
*IL-0134	CRONUS CHEMICALS	CRONUS CHEMICALS, LLC	12/21/2023	Ammonia Storage Flare	0.4	mmBtu/hr	CO	Flare Minimization Plan and Root Cause Analysis, Steam-assist flare design, Work Practices in accordance with 40 CFR 60.18(b), GCP, use of nitrogen as purge gas	0.08	LB/MMBTU	BACT-PSD	Also 8.36 tons/year (pilot and boil-off)
IN-0173	MIDWEST FERTILIZER CORPORATION	MIDWEST FERTILIZER CORPORATION	6/4/2014	FRONT END FLARE	4	MMBTU/H	CO	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	0.37	LB/MMBTU	BACT-PSD	
IN-0173	MIDWEST FERTILIZER CORPORATION	MIDWEST FERTILIZER CORPORATION	6/4/2014	BACK END FLARE	4	MMBTU/H	CO	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	0.37	LB/MMBTU	BACT-PSD	
IN-0173	MIDWEST FERTILIZER CORPORATION	MIDWEST FERTILIZER CORPORATION	6/4/2014	AMMONIA STORAGE FLARE	1.5	MMBTU/H	CO	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	0.37	LB/MMBTU	BACT-PSD	
IN-0180	MIDWEST FERTILIZER CORPORATION	MIDWEST FERTILIZER CORPORATION	6/4/2014	FRONT END FLARE	4	MMBTU/H	CO	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	0.37	LB/MMBTU	BACT-PSD	
IN-0180	MIDWEST FERTILIZER CORPORATION	MIDWEST FERTILIZER CORPORATION	6/4/2014	BACK END FLARE	4	MMBTU/H	CO	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	0.37	LB/MMBTU	BACT-PSD	
IN-0180	MIDWEST FERTILIZER CORPORATION	MIDWEST FERTILIZER CORPORATION	6/4/2014	AMMONIA STORAGE FLARE	1.5	MMBTU/H	CO	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	0.37	LB/MMBTU	BACT-PSD	
KY-0113	WESTLAKE CHEMICAL OPCO, LP	WESTLAKE CHEMICAL OPCO, LP	9/21/2020	Ethylene Flare EU#007 (EPN321)	5979	mmBtu/hr	CO	employ good flare design, minimize the amount of gases going to flare and use the appropriate instrumentation, control and best operational practices as best available control options for reducing CO emissions from flare.	0		BACT-PSD	The flare must be operated in compliance with 40 CFR 60.18 and 40 CFR 63.11 in order to meet BACT.
LA-0291	LAKE CHARLES CHEMICAL COMPLEX GTL UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Multi-Point Ground Flares (EQT 836 & 837)	0		CO	Compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subparts FFFF and SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987 and 40 CFR 63.2450(f), and the flame monitoring requirements of 40 CFR 63.987; minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas.	5837.62	LB/HR	BACT-PSD	

Process Type: 19.310 - Chemical Plant Flares
Pollutant: CO
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
LA-0296	LAKE CHARLES CHEMICAL COMPLEX LDPE UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	LLPDE/LDPE Multi-Point Ground Flare (EQT 640)	0		CO	Compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS; minimization of flaring through adherence to the SSMP developed in accordance with 40 CFR 63.6(e)(3); continuously monitoring the volume of vent gas routed to the flare, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tip; and the use of natural gas as pilot gas.	947.25	LB/HR	BACT-PSD	BACT is compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987 and 40 CFR 63.2450(f), and the flame monitoring requirements of 40 CFR 63.987. BACT is also determined to be minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); continuously monitoring the volume of vent gas routed to the flare, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tip; and the use of natural gas as pilot gas.
LA-0299	LAKE CHARLES CHEMICAL COMPLEX ETHOXYLATION UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	ETO/Guerbet Elevated Flare (EQT 1079)	0		CO	Compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart PPP	46.32	LB/HR	BACT-PSD	The permittee shall continuously monitor and record the volume of vent gas routed to the following flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips.
LA-0301	LAKE CHARLES CHEMICAL COMPLEX ETHYLENE 2 UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Elevated Flare (EQT 981)	0		CO	Compliance with 40 CFR 63.11(b) and 40 CFR 63 Subpart SS; minimization of flaring through adherence to Sasol's SSMP; monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas	67378.78	LB/HR	BACT-PSD	BACT is compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987, and the flame monitoring requirements of 40 CFR 63.987. In addition, BACT is minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas.
LA-0301	LAKE CHARLES CHEMICAL COMPLEX ETHYLENE 2 UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Ground Flare (EQT 982)	0		CO	Compliance with 40 CFR 63.11(b) and 40 CFR 63 Subpart SS; minimization of flaring through adherence to Sasol's SSMP; monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas	46605.38	LB/HR	BACT-PSD	BACT is compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987, and the flame monitoring requirements of 40 CFR 63.987. In addition, BACT is minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas.

Process Type: 19.310 - Chemical Plant Flares
Pollutant: CO
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
LA-0302	LAKE CHARLES CHEMICAL COMPLEX EO/MEG UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Elevated Flare and Ground Flare (EQTs 1012 & 1013)	0		CO	Compliance with 40 CFR 63.11(b) and the closed vent system requirements of 40 CFR 63.148; minimization of flaring through adherence to the SSMP developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas	13.23	LB/HR	BACT-PSD	Pound per hour CO limitations are per flare. *Annual CO emissions from both flares are limited to the TPY value reported.
LA-0303	LAKE CHARLES CHEMICAL COMPLEX ZIEGLER ALCOHOL UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Elevated Flare (EQT 133)	0		CO	Compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS; minimization of flaring through adherence to the SSMP developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas	300.93	LB/HR	BACT-PSD	BACT is compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987 and 40 CFR 63.2450(f), and the flame monitoring requirements of 40 CFR 63.987. In addition, BACT is determined to be minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas.
LA-0303	LAKE CHARLES CHEMICAL COMPLEX ZIEGLER ALCOHOL UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Emission Combustion Unit #3 Ground Flare (EQT 500)	0		CO	Compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS; minimization of flaring through adherence to the SSMP developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas	270.32	LB/HR	BACT-PSD	BACT is compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.987 and 40 CFR 63.2450(f), and the flame monitoring requirements of 40 CFR 63.987. In addition, BACT is determined to be minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas.
LA-0305	LAKE CHARLES METHANOL FACILITY	LAKE CHARLES METHANOL, LLC	6/30/2016	Flares	1008	MM BTU/hr	CO	good flare design	0		BACT-PSD	
*LA-0306	TOPCHEM POLLOCK, LLC	TOPCHEM POLLOCK, LLC	12/20/2016	Process Flare FL-16-1 (EQT034)	2.17	MM BTU/hr	CO	Compliance with the Louisiana Non-NSPS Flare Requirements	0.87	LB/H	BACT-PSD	Correct Flare Design and Proper Combustion
LA-0314	INDORAMA LAKE CHARLES FACILITY	INDORAMA VENTURES OLEFINS, LLC	8/3/2016	Flare No. 1 - 008	85097	MM BTU/yr	CO	complying with 40 CFR 60.18; good combustion practices (including establishment of flare minimization practices)	0.31	LB/MM BTU	BACT-PSD	
LA-0314	INDORAMA LAKE CHARLES FACILITY	INDORAMA VENTURES OLEFINS, LLC	8/3/2016	Pyrolysis Gasoline Tank Flare - 009	0.66	mm btu/hr	CO	complying with 40 CFR 60.18 and 63.11; good combustion practices (including establishment of flare minimization practices)	0.31	LB/MM BTU	BACT-PSD	
LA-0314	INDORAMA LAKE CHARLES FACILITY	INDORAMA VENTURES OLEFINS, LLC	8/3/2016	vessel evacuation flare - 018	3.04	mm btu/hr	CO	good combustion practices (including establishment of flare minimization practices)	0.31	LBS/MM BTU	BACT-PSD	
LA-0317	METHANEX - GEISMAR METHANOL PLANT	METHANEX USA, LLC	12/22/2016	flares (I-X-703, II-X-703)	3723	mm btu/hr	CO	complying with 40 CFR 63.11	0		BACT-PSD	
LA-0323	MONSANTO LULING PLANT	MONSANTO COMPANY	1/9/2017	Emergency Flare	0.4	mmbtu/h	CO	Proper design and operation	0		BACT-PSD	
LA-0346	GULF COAST METHANOL COMPLEX	IGP METHANOL LLC	1/4/2018	Flares (4)	6.6	mm btu/hr	CO	Complying with 40 CFR 63.11(b)	0		BACT-PSD	

Process Type: 19.310 - Chemical Plant Flares
Pollutant: CO
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
LA-0348	GEISMAR SYNGAS SEPARATION UNIT	PRAXAIR INC.	2/18/2018	Hot Flare - T2	501	mm btu/hr	CO	Good flare design, Good operating and combustion practices, flare minimization practices	0		BACT-PSD	
LA-0382	BIG LAKE FUELS METHANOL PLANT	BIG LAKE FUELS LLC	4/25/2019	Flares (EQT0012, EQT0039, EQT0040)	0		CO	Comply with requirements of 40 CFR 63.11(b)	0		BACT-PSD	
LA-0388	LACC LLC US - ETHYLENE PLANT	LACC, LLC US	2/25/2022	Ethylene Plant Flares Emissions Cap	0		CO		180.38	T/YR	BACT-PSD	
*LA-0401	KOCH METHANOL (KME) FACILITY	KOCH METHANOL ST. JAMES, LLC	12/20/2023	FLR - Flare	0		CO	Use of good operating practices and compliance with 40 CFR 60.18 and 40 CFR 63.11	0		BACT-PSD	
OH-0378	PTTGCA PETROCHEMICAL COMPLEX	PTTGCA PETROCHEMICAL COMPLEX	12/21/2018	High Pressure Ground Flare (P003)	1.8	MMBTU/H	CO	use of natural gas as pilot light fuel	2.9171	T/YR	BACT-PSD	The high pressure (HP) ground flare is used to meet control requirements associated with BACT, NSPS, BAT, and MACT for affected facility operations and process vents. For efficient permitting structure, the HP ground flare has been permitted as a separate and individual emissions unit to contain limitations, operational restrictions, monitoring, record keeping, reporting, and testing associated with control requirements. The high pressure (HP) flare controls VOC emissions from units P801, P802, P803, P804, and P805.
OH-0378	PTTGCA PETROCHEMICAL COMPLEX	PTTGCA PETROCHEMICAL COMPLEX	12/21/2018	Low Pressure Ground Flare (P004)	0.78	MMBTU/H	CO	use of natural gas as pilot light fuel	1.26	T/YR	BACT-PSD	The low pressure (LP) ground flare is used to meet control requirements associated with BACT, NSPS, BAT, and MACT for affected facility operations and process vents. For efficient permitting structure, the ECU ground flare has been permitted as a separate and individual emissions unit to contain limitations, operational restrictions, monitoring, record keeping, reporting, and testing associated with control requirements. The low pressure (LP) flare controls VOC emissions from units P804 and P805.
TX-0697	ETHYLENE PRODUCTION PLANT	THE DOW CHEMICAL COMPANY	3/27/2014	Low Pressure Flare	10000	Btu/scf	CO	Good combustion	0.3503	LB/MMBTU	OTHER CASE-BY-CASE	
TX-0728	PEONY CHEMICAL MANUFACTURING FACILITY	BASF	4/1/2015	ammonia flare	106396	MMBtu/yr	CO	flare good combustion practices	950.41	LB/H	OTHER CASE-BY-CASE	Emission rates provided are for worst-case MSS scenarios
TX-0795	BEAUMONT CHEMICAL PLANT	EXXONMOBIL OIL CORPORATION	4/18/2016	PARAXYLENE FLARE	5351	MM SCF / HR	CO	VOC emissions are controlled by the flare. Increasing clean supplemental fuel (natural gas) improves reliability and effectiveness of the primary function of this control device. The increase in natural gas yields the CO emissions increase.	50	T/YR	BACT-PSD	60.18
TX-0795	BEAUMONT CHEMICAL PLANT	EXXONMOBIL OIL CORPORATION	4/18/2016	East Low Pressure Flare and West High Pressure Flare	8464	MM SCF / HR	CO	VOC emissions are controlled by the flares. Increasing clean supplemental fuel (natural gas) improves reliability and effectiveness of the primary function of these control devices. The increase in natural gas yields the CO emissions increase	188	T/YR	BACT-PSD	Â§60.18f
TX-0795	BEAUMONT CHEMICAL PLANT	EXXONMOBIL OIL CORPORATION	4/18/2016	Udex Flare	2914	MM SCF / HR	CO	VOC emissions are controlled by the flare. Increasing clean supplemental fuel (natural gas) improves reliability and effectiveness of the primary function of this control device. The increase in natural gas yields the CO emissions increase.	40	T/YR	BACT-PSD	60.18
TX-0795	BEAUMONT CHEMICAL PLANT	EXXONMOBIL OIL CORPORATION	4/18/2016	C&S FLARE	746	MM SCF / HR	CO	VOC emissions are controlled by the flare. Increasing clean supplemental fuel (natural gas) improves reliability and effectiveness of the primary function of this control device. The increase in natural gas yields the CO emissions increase.	55	T/YR	BACT-PSD	60.18

Process Type: 19.310 - Chemical Plant Flares
Pollutant: CO
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
TX-0796	BEAUMONT POLYETHYLENE PLANT	EXXONMOBIL OIL CORPORATION	4/20/2016	High Pressure Flare	4988	MM SCF / HR	CO	VOC emissions are controlled by the flare. Increasing clean supplemental fuel (natural gas) improves reliability and effectiveness of the primary function of this control device. The increase in natural gas yields the CO emissions increase.	155	T/YR	BACT-PSD	60.18
TX-0815	PORT ARTHUR ETHANE SIDE CRACKER	TOTAL PETROCHEMICALS & REFINING USA, INC.	1/17/2017	Multi Point Ground Flare	0		CO	Good Combustion Practices & Design	375.46	T/YR	BACT-PSD	Emission rate of 375.46 tpy is the sum of 142.82 tpy CO for routine operations and 232.64 tpy CO for MSS operations.
TX-0838	BEAUMONT CHEMICAL PLANT	EXXONMOBIL OIL CORPORATION	6/13/2018	High and Low Pressure Flare cap	0		CO	Meet the design and operating requirements of 40 CFR 60.18.	0		BACT-PSD	NSPS YY
TX-0838	BEAUMONT CHEMICAL PLANT	EXXONMOBIL OIL CORPORATION	6/13/2018	UDEX FLARE	0		CO	Meet the design and operating requirements of 40 CFR 60.18.	0		BACT-PSD	
TX-0838	BEAUMONT CHEMICAL PLANT	EXXONMOBIL OIL CORPORATION	6/13/2018	PARAXYLENE FLARE	0		CO	Meet the design and operating requirements of 40 CFR 60.18.	0		BACT-PSD	
TX-0838	BEAUMONT CHEMICAL PLANT	EXXONMOBIL OIL CORPORATION	6/13/2018	C & S FLARE	0		CO	Meet the design and operating requirements of 40 CFR 60.18.	0		BACT-PSD	
TX-0857	LIGHT HYDROCARBON 7	THE DOW CHEMICAL COMPANY	4/16/2019	Large Flare	0		CO	Meet the design and operating requirements of 40 CFR 60.18.	0		BACT-PSD	
TX-0857	LIGHT HYDROCARBON 7	THE DOW CHEMICAL COMPANY	4/16/2019	Small Flare	0		CO	Meet the design and operating requirements of 40 CFR 60.18.	0		BACT-PSD	
TX-0863	POLYETHYLENE 7 FACILITY	THE DOW CHEMICAL COMPANY	9/3/2019	FLARE	0		CO	GOOD COMBUSTION PRACTICES	0		BACT-PSD	
TX-0864	EQUISTAR CHEMICALS CHANNELVIEW COMPLEX	EQUISTAR CHEMICALS, LP	9/9/2019	Multi Point Ground Flare	0		CO	good combustion practices, design, natural gas fuel	0		BACT-PSD	
TX-0865	EQUISTAR CHEMICALS CHANNELVIEW COMPLEX	EQUISTAR CHEMICALS, LP	9/9/2019	MULTIPOINT GROUND FLARE	0		CO	Good combustion practices, proper design and operation	0		BACT-PSD	
TX-0865	EQUISTAR CHEMICALS CHANNELVIEW COMPLEX	EQUISTAR CHEMICALS, LP	9/9/2019	MEROX ELEVATED FLARE	0		CO	Good combustion practices, proper design and operation	0		BACT-PSD	
TX-0893	HYDOW DROCARBONS FACILITIES	THE DOW CHEMICAL COMPANY	8/7/2020	Flare	0		CO	Good combustion practices	0.2755	LB/MMBTU	BACT-PSD	
TX-0904	MOTIVA POLYETHYLENE MANUFACTURING COMPLEX		9/9/2020	FLARE	0		CO	good combustion practices and the use of gaseous fuel	0		BACT-PSD	
TX-0905	DIAMOND GREEN DIESEL PORT ARTHUR FACILITY	DIAMOND GREEN DIESEL	9/16/2020	FLARE	0		CO	good combustion practices and the use of gaseous fuel	0		BACT-PSD	
TX-0931	ROEHM AMERICA BAY CITY SITE	ROEHM AMERICA LLC	12/16/2021	FLARE	0		CO	good combustion practices and use of gaseous fuel	0		BACT-PSD	
TX-0945	FORMOSA POINT COMFORT PLANT OL3	FORMOSA PLASTICS CORPORATION, TEXAS	4/6/2023	FLARES	0		CO	CLEAN FUEL, GOOD COMBUSTION PRACTICES	0		BACT-PSD	
*TX-0956	ENTERPRISE MONT BELVIEU COMPLEX	ENTERPRISE PRODUCTS OPERATING LLC	6/8/2023	FLARE	0		CO	Good design & combustion practices	0		BACT-PSD	
*TX-0957	LINDE GAS LA PORTE SYNGAS PLANT	LYONDELLBASELL ACETYLS, LLC	5/25/2023	FLARES	0		CO	CLEAN FUEL SUPPLEMENTS WASTE STREAM BTU	0		BACT-PSD	
*TX-0964	NEDERLAND FACILITY	LINDE, INC	10/5/2023	FLARE	0		CO	40 CFR 60.18 and good combustion practices	0		BACT-PSD	
*TX-0965	ORANGE PLANT	CHEVRON PHILLIPS CHEMICAL COMPANY LP	12/29/2023	FLARE	0		CO	GOOD COMBUSTION PRACTICES	0		BACT-PSD	

Process Type: 19.310 - Chemical Plant Flares
Pollutant: NOx
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
IN-0173	MIDWEST FERTILIZER CORPORATION	MIDWEST FERTILIZER CORPORATION	6/4/2014	FRONT END FLARE	4	MMBTU/H	NOx	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	0.068	LB/MMBTU	BACT-PSD	
IN-0173	MIDWEST FERTILIZER CORPORATION	MIDWEST FERTILIZER CORPORATION	6/4/2014	BACK END FLARE	4	MMBTU/H	NOx	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	0.068	LB/MMBTU	BACT-PSD	
IN-0173	MIDWEST FERTILIZER CORPORATION	MIDWEST FERTILIZER CORPORATION	6/4/2014	AMMONIA STORAGE FLARE	1.5	MMBTU/H	NOx	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	0.068	LB/MMBTU	BACT-PSD	
IN-0180	MIDWEST FERTILIZER CORPORATION	MIDWEST FERTILIZER CORPORATION	6/4/2014	FRONT END FLARE	4	MMBTU/H	NOx	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	0.068	LB/MMBTU	BACT-PSD	
IN-0180	MIDWEST FERTILIZER CORPORATION	MIDWEST FERTILIZER CORPORATION	6/4/2014	BACK END FLARE	4	MMBTU/H	NOx	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	0.068	LB/MMBTU	BACT-PSD	
IN-0180	MIDWEST FERTILIZER CORPORATION	MIDWEST FERTILIZER CORPORATION	6/4/2014	AMMONIA STORAGE FLARE	1.5	MMBTU/H	NOx	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	0.068	LB/MMBTU	BACT-PSD	
LA-0291	LAKE CHARLES CHEMICAL COMPLEX GTL UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Multi-Point Ground Flares (EQT 836 & 837)	0		NOx	Compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subparts FFFF and SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987 and 40 CFR 63.2450(f), and the flame monitoring requirements of 40 CFR 63.987; minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas.	1072.86	LB/HR	BACT-PSD	
LA-0295	WESTLAKE FACILITY	EQUISTAR CHEMICALS, LP	7/12/2016	Cogeneration Plant Flare (449, EQT 326)	0		NOx		12.6	LB/H	BACT-PSD	Annual NOx emissions from the Cogeneration Plant Flare (449, EQT 326); the M-Line Production Area Flare (Z2, EQT 19); and the Plant 5 Flare (Z1, EQT 138) (not addressed in the PSD permit) are limited to 36.65 TPY (GRP 12).
LA-0296	LAKE CHARLES CHEMICAL COMPLEX LDPE UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	LLPDE/LDPE Multi-Point Ground Flare (EQT 640)	0		NOx	Compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS; minimization of flaring through adherence to the SSMP developed in accordance with 40 CFR 63.6(e)(3); continuously monitoring the volume of vent gas routed to the flare, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tip; and the use of natural gas as pilot gas.	174.09	LB/HR	BACT-PSD	BACT is compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987 and 40 CFR 63.2450(f), and the flame monitoring requirements of 40 CFR 63.987. BACT is also determined to be minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); continuously monitoring the volume of vent gas routed to the flare, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tip; and the use of natural gas as pilot gas.
LA-0299	LAKE CHARLES CHEMICAL COMPLEX ETHOXYLATION UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	ETO/Guerbet Elevated Flare (EQT 1079)	0		NOx	Compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart PPP	8.51	LB/HR	BACT-PSD	The permittee shall continuously monitor and record the volume of vent gas routed to the following flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips.

Process Type: 19.310 - Chemical Plant Flares
Pollutant: NOx
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
LA-0301	LAKE CHARLES CHEMICAL COMPLEX ETHYLENE 2 UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Elevated Flare (EQT 981)	0		NOx	Compliance with 40 CFR 63.11(b) and 40 CFR 63 Subpart SS; minimization of flaring through adherence to Sasol's SSMP; monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas	12383.13	LB/HR	BACT-PSD	BACT is compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987, and the flame monitoring requirements of 40 CFR 63.987. In addition, BACT is minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas.
LA-0301	LAKE CHARLES CHEMICAL COMPLEX ETHYLENE 2 UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Ground Flare (EQT 982)	0		NOx	Compliance with 40 CFR 63.11(b) and 40 CFR 63 Subpart SS; minimization of flaring through adherence to Sasol's SSMP; monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas	8565.31	LB/HR	BACT-PSD	BACT is compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987, and the flame monitoring requirements of 40 CFR 63.987. In addition, BACT is minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas.
LA-0302	LAKE CHARLES CHEMICAL COMPLEX EO/MEG UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Elevated Flare and Ground Flare (EQTs 1012 & 1013)	0		NOx	Compliance with 40 CFR 63.11(b) and the closed vent system requirements of 40 CFR 63.148; minimization of flaring through adherence to the SSMP developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas	2.43	LB/HR	BACT-PSD	Pound per hour NOx limitations are per flare. *Annual NOx emissions from both flares are limited to the TPY value reported.
LA-0303	LAKE CHARLES CHEMICAL COMPLEX ZIEGLER ALCOHOL UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Elevated Flare (EQT 133)	0		NOx	Compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS; minimization of flaring through adherence to the SSMP developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas	55.32	LB/HR	BACT-PSD	BACT is compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987 and 40 CFR 63.2450(f), and the flame monitoring requirements of 40 CFR 63.987. In addition, BACT is determined to be minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas.

Process Type: 19.310 - Chemical Plant Flares
Pollutant: NOx
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
LA-0303	LAKE CHARLES CHEMICAL COMPLEX ZIEGLER ALCOHOL UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Emission Combustion Unit #3 Ground Flare (EQT 500)	0		NOx	Compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS; minimization of flaring through adherence to the SSMP developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas	49.68	LB/HR	BACT-PSD	BACT is compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987 and 40 CFR 63.2450(f), and the flame monitoring requirements of 40 CFR 63.987. In addition, BACT is determined to be minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas.
LA-0305	LAKE CHARLES METHANOL FACILITY	LAKE CHARLES METHANOL, LLC	6/30/2016	Flares	1008	MM BTU/hr	NOx		0		BACT-PSD	
LA-0314	INDORAMA LAKE CHARLES FACILITY	INDORAMA VENTURES OLEFINS, LLC	8/3/2016	Flare No. 1 - 008	85097	MM BTU/yr	NOx	complying with 40 CFR 60.18; good combustion practices (including establishment of flare minimization practices)	0.068	LB/MM BTU	BACT-PSD	
LA-0314	INDORAMA LAKE CHARLES FACILITY	INDORAMA VENTURES OLEFINS, LLC	8/3/2016	Pyrolysis Gasoline Tank Flare - 009	0.66	mm btu/hr	NOx	complying with 40 CFR 60.18 and 63.11; good combustion practices (including establishment of flare minimization practices)	0.068	LB/MM BTU	BACT-PSD	
LA-0314	INDORAMA LAKE CHARLES FACILITY	INDORAMA VENTURES OLEFINS, LLC	8/3/2016	vessel evacuation flare - 018	3.04	mm btu/hr	NOx	good combustion practices (including establishment of flare minimization practices)	0.068	LB/MM BTU	BACT-PSD	
LA-0317	METHANEX - GEISMAR METHANOL PLANT	METHANEX USA, LLC	12/22/2016	flares (I-X-703, II-X-703)	3723	mm btu/hr	NOx	complying with 40 CFR 63.11	0		BACT-PSD	BACT = LAER (Permit 0180-00210-V4, dated 12/22/2016)
LA-0323	MONSANTO LULING PLANT	MONSANTO COMPANY	1/9/2017	Emergency Flare	0.4	mmbtu/h	NOx	Proper design and operation	0		BACT-PSD	
LA-0346	GULF COAST METHANOL COMPLEX	IGP METHANOL LLC	1/4/2018	Flares (4)	6.6	mm btu/hr	NOx	Complying with 40 CFR 63.11(b)	0		BACT-PSD	
LA-0382	BIG LAKE FUELS METHANOL PLANT	BIG LAKE FUELS LLC	4/25/2019	Flares (EQT0012, EQT0039, EQT0040)	0		NOx	Comply with requirements of 40 CFR 63.11(b)	0		BACT-PSD	
*LA-0401	KOCH METHANOL (KME) FACILITY	KOCH METHANOL ST. JAMES, LLC	12/20/2023	FLR - Flare	0		NOx	Use of good operating practices and compliance with 40 CFR 60.18 and 40 CFR 63.11	0		BACT-PSD	
OH-0378	PTTGCA PETROCHEMICAL COMPLEX	PTTGCA PETROCHEMICAL COMPLEX	12/21/2018	High Pressure Ground Flare (P003)	1.8	MMBTU/H	NOx	use of natural gas as pilot light fuel	0.536	T/YR	BACT-PSD	The high pressure (HP) ground flare is used to meet control requirements associated with BACT, NSPS, BAT, and MACT for affected facility operations and process vents. For efficient permitting structure, the HP ground flare has been permitted as a separate and individual emissions unit to contain limitations, operational restrictions, monitoring, record keeping, reporting, and testing associated with control requirements. The high pressure (HP) flare controls VOC emissions from units P801, P802, P803, P804, and P805.
OH-0378	PTTGCA PETROCHEMICAL COMPLEX	PTTGCA PETROCHEMICAL COMPLEX	12/21/2018	Low Pressure Ground Flare (P004)	0.78	MMBTU/H	NOx	use of natural gas as pilot light fuel	0.232	T/YR	BACT-PSD	The low pressure (LP) ground flare is used to meet control requirements associated with BACT, NSPS, BAT, and MACT for affected facility operations and process vents. For efficient permitting structure, the ECU ground flare has been permitted as a separate and individual emissions unit to contain limitations, operational restrictions, monitoring, record keeping, reporting, and testing associated with control requirements. The low pressure (LP) flare controls VOC emissions from units P804 and P805.

Process Type: 19.310 - Chemical Plant Flares
Pollutant: NOx
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
TX-0728	PEONY CHEMICAL MANUFACTURING FACILITY	BASF	4/1/2015	ammonia flare	106396	MMBtu/yr	NOx	no control	223.41	LB/H	LAER	The TPY emission rate is based on all operating scenarios. the lb/hr rate is based on worst case MSS scenarios.
TX-0815	PORT ARTHUR ETHANE SIDE CRACKER	TOTAL PETROCHEMICALS & REFINING USA, INC.	1/17/2017	Multi Point Ground Flare	0		NOx	Good Combustion Practices & Design	94.27	T/YR	BACT-PSD	Emission rate of 94.27 tpy is the sum of 35.86 tpy NOx for routine operations and 58.41 tpy NOx for MSS operations.
TX-0838	BEAUMONT CHEMICAL PLANT	EXXONMOBIL OIL CORPORATION	6/13/2018	High and Low Pressure Flare cap	0		NOx	Meet the design and operating requirements of 40 CFR 60.18.	0		BACT-PSD	
TX-0838	BEAUMONT CHEMICAL PLANT	EXXONMOBIL OIL CORPORATION	6/13/2018	UDEX FLARE	0		NOx	Meet the design and operating requirements of 40 CFR 60.18.	0		BACT-PSD	
TX-0838	BEAUMONT CHEMICAL PLANT	EXXONMOBIL OIL CORPORATION	6/13/2018	PARAXYLENE FLARE	0		NOx	Meet the design and operating requirements of 40 CFR 60.18.	0		BACT-PSD	
TX-0838	BEAUMONT CHEMICAL PLANT	EXXONMOBIL OIL CORPORATION	6/13/2018	C & S FLARE	0		NOx	Meet the design and operating requirements of 40 CFR 60.18.	0		BACT-PSD	
TX-0863	POLYETHYLENE 7 FACILITY	THE DOW CHEMICAL COMPANY	9/3/2019	FLARE	0		NOx	GOOD COMBUSTION PRACTICES	0		BACT-PSD	
TX-0864	EQUISTAR CHEMICALS CHANNELVIEW COMPLEX	EQUISTAR CHEMICALS, LP	9/9/2019	Multi Point Ground Flare	0		NOx	good combustion practices, design, natural gas fuel	0		BACT-PSD	
TX-0864	EQUISTAR CHEMICALS CHANNELVIEW COMPLEX	EQUISTAR CHEMICALS, LP	9/9/2019	Elevated Flare	0		NOx	good combustion practices, design, natural gas fuel	0		BACT-PSD	
TX-0865	EQUISTAR CHEMICALS CHANNELVIEW COMPLEX	EQUISTAR CHEMICALS, LP	9/9/2019	MULTIPOINT GROUND FLARE	0		NOx	Good combustion practices, proper design and operation	0		BACT-PSD	
TX-0865	EQUISTAR CHEMICALS CHANNELVIEW COMPLEX	EQUISTAR CHEMICALS, LP	9/9/2019	MEROX ELEVATED FLARE	0		NOx	Good combustion practices, proper design and operation	0		BACT-PSD	
TX-0893	HYDOW DROCARBONS FACILITIES	THE DOW CHEMICAL COMPANY	8/7/2020	Flare	0		NOx	Good combustion practices	0.138	LB/MMBTU	LAER	
TX-0894	CHEVRON PHILLIPS CHEMICAL SWEENY COMPLEX	CHEVRON PHILLIPS CHEMICAL COMPANY LP	10/30/2020	Unit 81 Flare (EPN 81-97-9611)	0		NOx	Good combustion practices, proper design and operation.	0.068	LB/MMBTU	LAER	
TX-0901	EQUISTAR CHEMICALS LA PORTE COMPLEX	EQUISTAR CHEMICALS, LP	11/6/2020	FLARE	0		NOx	Good combustion practices, proper design and operation, steam assisted.	0		LAER	
TX-0904	MOTIVA POLYETHYLENE MANUFACTURING COMPLEX		9/9/2020	FLARE	0		NOx	good combustion practices and the use of gaseous fuel	0		BACT-PSD	
TX-0905	DIAMOND GREEN DIESEL PORT ARTHUR FACILITY	DIAMOND GREEN DIESEL	9/16/2020	FLARE	0		NOx	good combustion practices and the use of gaseous fuel	0		BACT-PSD	
TX-0916	CEDAR BAYOU	CHEVRON PHILLIPS CHEMICAL COMPANY LP	2/1/2021	Flare EPN 1592-40 and 1592-16	0		NOx	Good combustion practices, proper design and operation. Meets the design and operating requirements of 40 CFR 60.18. High Btu stream-assisted flare equipped with flow monitor and GC analyzer. Continuous monitoring of pilot flame	0		LAER	
TX-0917	POLYETHYLENE UNIT 1799	CHEVRON PHILLIPS CHEMICAL COMPANY LP	1/29/2021	Flare FS-9004 (EPN 1799-20)	0		NOx	Good combustion practices, proper design and operation. Meets the design and operating requirements of 40 CFR 60.18. The flare is an air-assisted flare and can operate as a high or low Btu flare. The flare is equipped with a continuous flow monitor, composition analyzer, and has continuous pilot flame monitoring.	0		LAER	
TX-0917	POLYETHYLENE UNIT 1799	CHEVRON PHILLIPS CHEMICAL COMPANY LP	1/29/2021	Flare FS-9004 (EPN 1799-20)	0		NOx	Good combustion practices, proper design and operation. Meets the design and operating requirements of 40 CFR 60.18. The flare is an air-assisted flare and can operate as a high or low Btu flare. The flare is equipped with a continuous flow monitor, composition analyzer, and has continuous pilot flame monitoring.	0		LAER	
TX-0931	ROEHM AMERICA BAY CITY SITE	ROEHM AMERICA LLC	12/16/2021	FLARE	0		NOx	good combustion practices and use of gaseous fuel	0		BACT-PSD	
TX-0945	FORMOSA POINT COMFORT PLANT OL3	FORMOSA PLASTICS CORPORATION, TEXAS	4/6/2023	FLARES	0		NOx	CLEAN FUEL, GOOD COMBUSTION PRACTICES	0		BACT-PSD	
TX-0955	INEOS OLIGOMERS CHOCOLATE BAYOU	INEOS OLIGOMERS USA LLC	3/14/2023	FLARE	0		NOx	Burner tip design and supplemental fuel control assure combustion, open air combustion does not add temperature to the NOx formation potential	0		LAER	

Process Type: 19.310 - Chemical Plant Flares
Pollutant: NOx
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
*TX-0956	ENTERPRISE MONT BELVIEU COMPLEX	ENTERPRISE PRODUCTS OPERATING LLC	6/8/2023	FLARE	0		NOx	Good design & combustion practices,	0		LAER	
*TX-0964	NEDERLAND FACILITY	LINDE, INC	10/5/2023	FLARE	0		NOx	40 CFR 60.18 and good combustion practices	0		BACT-PSD	

Process Type: 19.310 - Chemical Plant Flares
Pollutant: PM_{2.5}
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
AK-0082	POINT THOMSON PRODUCTION FACILITY	EXXON MOBIL CORPORATION	1/23/2015	Drilling, HP, and LP Flares	50	MMscf/yr	FPM2.5		0.0264	LB/MMBTU	BACT-PSD	
AK-0083	KENAI NITROGEN OPERATIONS	AGRIUM U.S. INC.	1/6/2015	Three (3) Flares	1.25	MMBTU/H	TPM2.5	Work Practice Requirements and Limited Use (limit venting to 168 hr/yr each during startup, shutdown, and maintenance events)	0.0074	LB/MMBTU	BACT-PSD	
AK-0086	KENAI NITROGEN OPERATIONS	AGRIUM U.S. INC.	3/26/2021	Three (3) Flares	1.25	MMBtu/hr	TPM2.5	Work Practice Requirements and Limited Use	0.0075	LB/MMBTU	BACT-PSD	Limited to 168 hours per year for each flare.
*IL-0134	CRONUS CHEMICALS	CRONUS CHEMICALS, LLC	12/21/2023	Front End Flare	2.22	mmBtu/hr	TPM2.5	Flare Minimization Plan and Root Cause Analysis, Steam-assist, smokeless flare design, Work Practices in accordance with 40 CFR 63.11(b), GCP, use of nitrogen as purge gas	0.0075	LB/MMBTU	BACT-PSD	Also 0.10 tons/year and 0.10 tons/bi-month period during commissioning/shutdown period
*IL-0134	CRONUS CHEMICALS	CRONUS CHEMICALS, LLC	12/21/2023	Ammonia Flare	2.22	mmBtu/hr	TPM2.5	Flare Minimization Plan and Root Cause Analysis, Steam-assist, smokeless flare design, Work Practices in accordance with 40 CFR 63.11(b), GCP, use of nitrogen as purge gas	0.0075	LB/MMBTU	BACT-PSD	Also 0.07 tons/year and 0.07 tons/bi-month period during commissioning/shutdown period
*IL-0134	CRONUS CHEMICALS	CRONUS CHEMICALS, LLC	12/21/2023	Ammonia Storage Flare	0.4	mmBtu/hr	TPM2.5	Flare Minimization Plan and Root Cause Analysis, Steam-assist, smokeless flare design, Work Practices in accordance with 40 CFR 60.18(b), GCP, use of nitrogen as purge gas	0.01	TONS/YEAR	BACT-PSD	
IN-0173	MIDWEST FERTILIZER CORPORATION	MIDWEST FERTILIZER CORPORATION	6/4/2014	FRONT END FLARE	4	MMBTU/H	TPM2.5	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	7.6	LB/MMCF	BACT-PSD	
IN-0173	MIDWEST FERTILIZER CORPORATION	MIDWEST FERTILIZER CORPORATION	6/4/2014	BACK END FLARE	4	MMBTU/H	TPM2.5	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	0.0075	LB/MMBTU	BACT-PSD	
IN-0173	MIDWEST FERTILIZER CORPORATION	MIDWEST FERTILIZER CORPORATION	6/4/2014	AMMONIA STORAGE FLARE	1.5	MMBTU/H	TPM2.5	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	0.0075	LB/MMBTU	BACT-PSD	
IN-0180	MIDWEST FERTILIZER CORPORATION	MIDWEST FERTILIZER CORPORATION	6/4/2014	FRONT END FLARE	4	MMBTU/H	TPM2.5	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	7.6	LB/MMCF	BACT-PSD	
IN-0180	MIDWEST FERTILIZER CORPORATION	MIDWEST FERTILIZER CORPORATION	6/4/2014	BACK END FLARE	4	MMBTU/H	TPM2.5	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	0.0075	LB/MMBTU	BACT-PSD	
IN-0180	MIDWEST FERTILIZER CORPORATION	MIDWEST FERTILIZER CORPORATION	6/4/2014	AMMONIA STORAGE FLARE	1.5	MMBTU/H	TPM2.5	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	0.0075	LB/MMBTU	BACT-PSD	
KY-0113	WESTLAKE CHEMICAL OPCO, LP	WESTLAKE CHEMICAL OPCO, LP	9/21/2020	Ethylene Flare EU#007 (EPN321)	5979	mmBtu/hr	TPM2.5	Employ natural gas as a pilot fuel, good flare design, the use of appropriate instrumentation, control and best operational practices as BACT for reducing PM/PM10/PM2.5 emissions from the pilot flame of the flare.	0		BACT-PSD	The flare must be operated in compliance with 40 CFR 60.18 and 40 CFR 63.11 in order to meet BACT. The permittee shall conduct a visible emission test by EPA Test Method 22, with a 2 hour observation period within 5 years of the previous test approved by the Division. Final design could be elevated flare or ground flare.
LA-0291	LAKE CHARLES CHEMICAL COMPLEX GTL UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Multi-Point Ground Flares (EQT 836 & 837)	0		TPM2.5	Compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subparts FFFF and SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987 and 40 CFR 63.2450(f), and the flame monitoring requirements of 40 CFR 63.987; minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas.	170.84	LB/HR	BACT-PSD	

Process Type: 19.310 - Chemical Plant Flares
Pollutant: PM_{2.5}
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
LA-0296	LAKE CHARLES CHEMICAL COMPLEX LDPE UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	LLPDE/LDPE Multi-Point Ground Flare (EQT 640)	0		TPM2.5	Compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS; minimization of flaring through adherence to the SSMP developed in accordance with 40 CFR 63.6(e)(3); continuously monitoring the volume of vent gas routed to the flare, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tip; and the use of natural gas as pilot gas.	37.51	LB/HR	BACT-PSD	BACT is compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987 and 40 CFR 63.2450(f), and the flame monitoring requirements of 40 CFR 63.987. BACT is also determined to be minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); continuously monitoring the volume of vent gas routed to the flare, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tip; and the use of natural gas as pilot gas.
LA-0299	LAKE CHARLES CHEMICAL COMPLEX ETHOXYLATION UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	ETO/Guerbet Elevated Flare (EQT 1079)	0		TPM2.5	Compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart PPP	0.23	LB/HR	BACT-PSD	The permittee shall continuously monitor and record the volume of vent gas routed to the following flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips.
LA-0301	LAKE CHARLES CHEMICAL COMPLEX ETHYLENE 2 UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Elevated Flare (EQT 981)	0		TPM2.5	Compliance with 40 CFR 63.11(b) and 40 CFR 63 Subpart SS; minimization of flaring through adherence to Sasol's SSMP; monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas	562.23	LB/HR	BACT-PSD	BACT is compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987, and the flame monitoring requirements of 40 CFR 63.987. In addition, BACT is minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas.
LA-0301	LAKE CHARLES CHEMICAL COMPLEX ETHYLENE 2 UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Ground Flare (EQT 982)	0		TPM2.5	Compliance with 40 CFR 63.11(b) and 40 CFR 63 Subpart SS; minimization of flaring through adherence to Sasol's SSMP; monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas	1041.94	LB/HR	BACT-PSD	BACT is compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987, and the flame monitoring requirements of 40 CFR 63.987. In addition, BACT is minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas.

Process Type: 19.310 - Chemical Plant Flares
Pollutant: PM_{2.5}
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
LA-0302	LAKE CHARLES CHEMICAL COMPLEX EO/MEG UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Elevated Flare and Ground Flare (EQTs 1012 & 1013)	0		TPM2.5	Compliance with 40 CFR 63.11(b) and the closed vent system requirements of 40 CFR 63.148; minimization of flaring through adherence to the SSMP developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas	0.18	LB/HR	BACT-PSD	Pound per hour PM2.5 limitations are per flare. *Annual PM2.5 emissions from both flares are limited to the TPY value reported.
LA-0303	LAKE CHARLES CHEMICAL COMPLEX ZIEGLER ALCOHOL UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Elevated Flare (EQT 133)	0		TPM2.5	Compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS; minimization of flaring through adherence to the SSMP developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas	0.9	LB/HR	BACT-PSD	BACT is compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987 and 40 CFR 63.2450(f), and the flame monitoring requirements of 40 CFR 63.987. In addition, BACT is determined to be minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas.
LA-0303	LAKE CHARLES CHEMICAL COMPLEX ZIEGLER ALCOHOL UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Emission Combustion Unit #3 Ground Flare (EQT 500)	0		TPM2.5	Compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS; minimization of flaring through adherence to the SSMP developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas	1.52	LB/HR	BACT-PSD	BACT is compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987 and 40 CFR 63.2450(f), and the flame monitoring requirements of 40 CFR 63.987. In addition, BACT is determined to be minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas.
LA-0305	LAKE CHARLES METHANOL FACILITY	LAKE CHARLES METHANOL, LLC	6/30/2016	Flares	1008	MM BTU/hr	TPM2.5	good flare design	0		BACT-PSD	
*LA-0306	TOPCHEM POLLOCK, LLC	TOPCHEM POLLOCK, LLC	12/20/2016	Process Flare FL-16-1 (EQT034)	2.17	MM BTU/hr	TPM2.5	Compliance with the Louisiana Non-NSPS Flare Requirements	0.01	LB/H	BACT-PSD	Correct Flare Design and Proper Combustion
LA-0314	INDORAMA LAKE CHARLES FACILITY	INDORAMA VENTURES OLEFINS, LLC	8/3/2016	Flare No. 1 - 008	85097	MM BTU/yr	TPM2.5	complying with 40 CFR 60.18; good combustion practices (including establishment of flare minimization practices); steam assisted	0.007	LB/MM BTU	BACT-PSD	
LA-0314	INDORAMA LAKE CHARLES FACILITY	INDORAMA VENTURES OLEFINS, LLC	8/3/2016	Pyrolysis Gasoline Tank Flare - 009	0.66	mm btu/hr	TPM2.5	complying with 40 CFR 60.18 and 63.11; good combustion practices (including establishment of flare minimization practices); steam assisted	0.007	LBS/MM BTU	BACT-PSD	
LA-0314	INDORAMA LAKE CHARLES FACILITY	INDORAMA VENTURES OLEFINS, LLC	8/3/2016	vessel evacuation flare - 018	3.04	mm btu/hr	TPM2.5	good combustion practices (including establishment of flare minimization practices)	0.007	LB/MM BTU	BACT-PSD	
LA-0317	METHANEX - GEISMAR METHANOL PLANT	METHANEX USA, LLC	12/22/2016	flares (I-X-703, II-X-703)	3723	mm btu/hr	TPM2.5	complying with 40 CFR 63.11	0		BACT-PSD	
LA-0323	MONSANTO LULING PLANT	MONSANTO COMPANY	1/9/2017	Emergency Flare	0.4	mmbtu/h	TPM2.5	Proper design and operation	0		BACT-PSD	

Process Type: 19.310 - Chemical Plant Flares
Pollutant: PM_{2.5}
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
LA-0346	GULF COAST METHANOL COMPLEX	IGP METHANOL LLC	1/4/2018	Flares (4)	6.6	mm btu/hr	TPM2.5	Complying with 40 CFR 63.11(b)	0		BACT-PSD	
LA-0382	BIG LAKE FUELS METHANOL PLANT	BIG LAKE FUELS LLC	4/25/2019	Flares (EQT0012, EQT0039, EQT0040)	0		TPM2.5	Comply with requirements of 40 CFR 63.11(b)	0		BACT-PSD	
LA-0388	LACC LLC US - ETHYLENE PLANT	LACC, LLC US	2/25/2022	Ethylene Plant Flares Emissions Cap	0		TPM2.5	Minimize Flaring	4.33	T/YR	BACT-PSD	
*LA-0401	KOCH METHANOL (KME) FACILITY	KOCH METHANOL ST. JAMES, LLC	12/20/2023	FLR - Flare	0		TPM2.5	Use of good operating practices and compliance with 40 CFR 60.18 and 40 CFR 63.11	0		BACT-PSD	
OH-0378	PTTGCA PETROCHEMICAL COMPLEX	PTTGCA PETROCHEMICAL COMPLEX	12/21/2018	High Pressure Ground Flare (P003)	1.8	MMBTU/H	TPM2.5	use of natural gas as pilot light fuel	0.059	T/YR	BACT-PSD	The high pressure (HP) ground flare is used to meet control requirements associated with BACT, NSPS, BAT, and MACT for affected facility operations and process vents. For efficient permitting structure, the HP ground flare has been permitted as a separate and individual emissions unit to contain limitations, operational restrictions, monitoring, record keeping, reporting, and testing associated with control requirements. The high pressure (HP) flare controls VOC emissions from units P801, P802, P803, P804, and P805.
OH-0378	PTTGCA PETROCHEMICAL COMPLEX	PTTGCA PETROCHEMICAL COMPLEX	12/21/2018	Low Pressure Ground Flare (P004)	0.78	MMBTU/H	TPM2.5	use of natural gas as pilot light fuel	0.026	T/YR	BACT-PSD	The low pressure (LP) ground flare is used to meet control requirements associated with BACT, NSPS, BAT, and MACT for affected facility operations and process vents. For efficient permitting structure, the ECU ground flare has been permitted as a separate and individual emissions unit to contain limitations, operational restrictions, monitoring, record keeping, reporting, and testing associated with control requirements. The low pressure (LP) flare controls VOC emissions from units P804 and P805.
TX-0905	DIAMOND GREEN DIESEL PORT ARTHUR FACILITY	DIAMOND GREEN DIESEL	9/16/2020	FLARE	0		TPM2.5	good combustion practices and the use of gaseous fuel	0		BACT-PSD	
*TX-0956	ENTERPRISE MONT BELVIEU COMPLEX	ENTERPRISE PRODUCTS OPERATING LLC	6/8/2023	FLARE	0		TPM2.5	Good design & combustion practices	0		BACT-PSD	

Process Type: 19.310 - Chemical Plant Flares
Pollutant: CO₂e
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
AK-0083	KENAI NITROGEN OPERATIONS	AGRIUM U.S. INC.	1/6/2015	Three (3) Flares	1.25	MMBTU/H	CO2e	Work Practice Requirements and Limited Use (limit venting to 168 hr/yr each during startup, shutdown, and maintenance events)	59.61	TONS/MMCF	BACT-PSD	
AK-0086	KENAI NITROGEN OPERATIONS	AGRIUM U.S. INC.	3/26/2021	Three (3) Flares	1.25	MMBtu/hr	CO2e	Work Practice Requirements and Limited Use	60.2	TON/MMSCF	BACT-PSD	Limited to 168 hours per year for each flare.
*IL-0134	CRONUS CHEMICALS	CRONUS CHEMICALS, LLC	12/21/2023	Front End Flare	2.22	mmBtu/hr	CO2e	Flare Minimization Plan and Root Cause Analysis, Steam-assist flare design, Work Practices in accordance with 40 CFR 63.11(b), GCP, use of nitrogen as purge gas	18603	TONS/YEAR	BACT-PSD	
*IL-0134	CRONUS CHEMICALS	CRONUS CHEMICALS, LLC	12/21/2023	Ammonia Flare	2.22	mmBtu/hr	CO2e	Flare Minimization Plan and Root Cause Analysis, Steam-assist flare design, Work Practices in accordance with 40 CFR 63.11(b), GCP, use of nitrogen as purge gas	16093	TONS/YEAR	BACT-PSD	
*IL-0134	CRONUS CHEMICALS	CRONUS CHEMICALS, LLC	12/21/2023	Ammonia Storage Flare	0.4	mmBtu/hr	CO2e	Flare Minimization Plan and Root Cause Analysis, Steam-assist flare design, Work Practices in accordance with 40 CFR 60.18(b), GCP, use of nitrogen as purge gas	3305	TONS/YEAR	BACT-PSD	
KY-0113	WESTLAKE CHEMICAL OPCO, LP	WESTLAKE CHEMICAL OPCO, LP	9/21/2020	Ethylene Flare EU#007 (EPN321)	5979	mmBtu/hr	CO2e	Employ low carbon assist gas, good flare design, minimize the amount of gases going to flare and use the appropriate instrumentation, control and best operational practices as best available control options for reducing flare GHGs.	0		BACT-PSD	Good Combustion Practices include: 1. Good air/fuel mixing, residence time, fuel supply, optimum temperature and oxygen levels will be controlled as required to maintain efficiency and guaranteed performance. 2. Preventative maintenance of the flares includes calibration of fuel gas flow meters and cleaning of burner tips.
LA-0291	LAKE CHARLES CHEMICAL COMPLEX GTL UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Multi-Point Ground Flares (EQT 836 & 837)	0		CO2e	Compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subparts FFFF and SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987 and 40 CFR 63.2450(f), and the flame monitoring requirements of 40 CFR 63.987; minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas.	115911	TPY	BACT-PSD	CO2e limits are based on a CH4 global warming potential (GWP) of 21 and a N2O GWP of 310. In the event any GWP is revised, the CO2e limits shall be revised accordingly without the need to modify the permit.
LA-0296	LAKE CHARLES CHEMICAL COMPLEX LDPE UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	LLPDE/LDPE Multi-Point Ground Flare (EQT 640)	0		CO2e	Compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS; minimization of flaring through adherence to the SSMP developed in accordance with 40 CFR 63.6(e)(3); continuously monitoring the volume of vent gas routed to the flare, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tip; and the use of natural gas as pilot gas.	68285	TPY	BACT-PSD	BACT is compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987 and 40 CFR 63.2450(f), and the flame monitoring requirements of 40 CFR 63.987. BACT is also determined to be minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); continuously monitoring the volume of vent gas routed to the flare, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tip; and the use of natural gas as pilot gas. The CO2e limits are based on a CH4 global warming potential (GWP) of 21 and a N2O GWP of 310. In the event any GWP is revised, the CO2e limits shall be revised accordingly without the need to modify the permit.

Process Type: 19.310 - Chemical Plant Flares
Pollutant: CO₂e
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
LA-0299	LAKE CHARLES CHEMICAL COMPLEX ETHOXYLATION UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	ETO/Guerbet Elevated Flare (EQT 1079)	0		CO2e	Compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart PPP	3986	TPY	BACT-PSD	The permittee shall continuously monitor and record the volume of vent gas routed to the following flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips. The CO2e limits are based on a CH4 global warming potential (GWP) of 21 and a N2O GWP of 310. In the event any GWP is revised, the CO2e limits shall be revised accordingly without the need to modify the permit.
LA-0301	LAKE CHARLES CHEMICAL COMPLEX ETHYLENE 2 UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Elevated Flare (EQT 981)	0		CO2e	Compliance with 40 CFR 63.11(b) and 40 CFR 63 Subpart SS; minimization of flaring through adherence to Sasol's SSMP; monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas	44516	TPY	BACT-PSD	BACT is compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987, and the flame monitoring requirements of 40 CFR 63.987. In addition, BACT is minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas. The CO2e limits are based on a CH4 global warming potential (GWP) of 21 and a N2O GWP of 310. In the event any GWP is revised, the CO2e limits shall be revised accordingly without the need to modify the permit.
LA-0301	LAKE CHARLES CHEMICAL COMPLEX ETHYLENE 2 UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Ground Flare (EQT 982)	0		CO2e	Compliance with 40 CFR 63.11(b) and 40 CFR 63 Subpart SS; minimization of flaring through adherence to Sasol's SSMP; monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas	100085	TPY	BACT-PSD	BACT is compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987, and the flame monitoring requirements of 40 CFR 63.987. In addition, BACT is minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas. The CO2e limits are based on a CH4 global warming potential (GWP) of 21 and a N2O GWP of 310. In the event any GWP is revised, the CO2e limits shall be revised accordingly without the need to modify the permit.

Process Type: 19.310 - Chemical Plant Flares
Pollutant: CO₂e
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
LA-0302	LAKE CHARLES CHEMICAL COMPLEX EO/MEG UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Elevated Flare and Ground Flare (EQTs 1012 & 1013)	0		CO2e	Compliance with 40 CFR 63.11(b) and the closed vent system requirements of 40 CFR 63.148; minimization of flaring through adherence to the SSMP developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas	1998	TPY*	BACT-PSD	*Annual CO2e emissions from both flares are limited to the TPY value reported. The CO2e limits are based on a CH4 global warming potential (GWP) of 21 and a N2O GWP of 310. In the event any GWP is revised, the CO2e limits shall be revised accordingly without the need to modify the permit.
LA-0303	LAKE CHARLES CHEMICAL COMPLEX ZIEGLER ALCOHOL UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Elevated Flare (EQT 133)	0		CO2e	Compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS; minimization of flaring through adherence to the SSMP developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas	94386	TPY	BACT-PSD	BACT is compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987 and 40 CFR 63.2450(f), and the flame monitoring requirements of 40 CFR 63.987. In addition, BACT is determined to be minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas. The CO2e limits are based on a CH4 global warming potential (GWP) of 21 and a N2O GWP of 310. In the event any GWP is revised, the CO2e limits shall be revised accordingly without the need to modify the permit.
LA-0303	LAKE CHARLES CHEMICAL COMPLEX ZIEGLER ALCOHOL UNIT	SASOL CHEMICALS (USA) LLC	5/23/2014	Emission Combustion Unit #3 Ground Flare (EQT 500)	0		CO2e	Compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS; minimization of flaring through adherence to the SSMP developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas	24567	TPY	BACT-PSD	BACT is compliance with 40 CFR 63.11(b) and the applicable provisions of 40 CFR 63 Subpart SS, including, but not limited to, the closed vent system requirements of 40 CFR 63.983, the flare compliance assessment requirements of 40 CFR 63.987 and 40 CFR 63.2450(f), and the flame monitoring requirements of 40 CFR 63.987. In addition, BACT is determined to be minimization of flaring through adherence to the Lake Charles Chemical Complex's startup, shutdown, and malfunction plan (SSMP) developed in accordance with 40 CFR 63.6(e)(3); monitoring the volume of vent gas routed to the flares, the lower heating value or composition of the vent gas, the fuel gas flow rate, and for steam-assisted flares, the flow of steam to the flare tips; and the use of natural gas as pilot gas. The CO2e limits are based on a CH4 global warming potential (GWP) of 21 and a N2O GWP of 310. In the event any GWP is revised, the CO2e limits shall be revised accordingly without the need to modify the permit.
LA-0305	LAKE CHARLES METHANOL FACILITY	LAKE CHARLES METHANOL, LLC	6/30/2016	Flares	1008	MM BTU/hr	CO2e	good equipment design and good combustion practices	0		BACT-PSD	
*LA-0306	TOPCHEM POLLOCK, LLC	TOPCHEM POLLOCK, LLC	12/20/2016	Process Flare FL-16-1 (EQT034)	2.17	MM BTU/hr	CO2e	Compliance with the Louisiana Non-NSPS Flare Requirements	370	T/YR	BACT-PSD	Correct Flare Design and Proper Combustion
LA-0314	INDORAMA LAKE CHARLES FACILITY	INDORAMA VENTURES OLEFINS, LLC	8/3/2016	Flare No. 1 - 008	85097	MM BTU/yr	CO2e	good management practices, good combustion practices, proper flare design	0		BACT-PSD	

Process Type: 19.310 - Chemical Plant Flares
Pollutant: CO₂e
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
LA-0314	INDORAMA LAKE CHARLES FACILITY	INDORAMA VENTURES OLEFINS, LLC	8/3/2016	Pyrolysis Gasoline Tank Flare - 009	0.66	mm btu/hr	CO2e	good management practices, good combustion practices, proper flare design	0		BACT-PSD	
LA-0314	INDORAMA LAKE CHARLES FACILITY	INDORAMA VENTURES OLEFINS, LLC	8/3/2016	vessel evacuation flare - 018	3.04	mm btu/hr	CO2e	Insulation, Gaseous fuels, good combustion practices, and proper operation and maintenance	0		BACT-PSD	
LA-0317	METHANEX - GEISMAR METHANOL PLANT	METHANEX USA, LLC	12/22/2016	flares (I-X-703, II-X-703)	3723	mm btu/hr	CO2e	complying with 40 CFR 63.11	0		BACT-PSD	
LA-0323	MONSANTO LULING PLANT	MONSANTO COMPANY	1/9/2017	Emergency Flare	0.4	mmbtu/h	CO2e	Proper design and operation	0		BACT-PSD	
LA-0348	GEISMAR SYNGAS SEPARATION UNIT	PRAXAIR INC.	2/18/2018	Hot Flare - T2	501	mm btu/hr	CO2e	Good design and operational practices	0		BACT-PSD	
LA-0388	LACC LLC US - ETHYLENE PLANT	LACC, LLC US	2/25/2022	Ethylene Plant Flares Emissions Cap	0		CO2e		72927	T/YR	BACT-PSD	
OH-0378	PTTGCA PETROCHEMICAL COMPLEX	PTTGCA PETROCHEMICAL COMPLEX	12/21/2018	High Pressure Ground Flare (P003)	1.8	MMBTU/H	CO2e	use of natural gas as pilot light fuel	923	T/YR	BACT-PSD	The high pressure (HP) ground flare is used to meet control requirements associated with BACT, NSPS, BAT, and MACT for affected facility operations and process vents. For efficient permitting structure, the HP ground flare has been permitted as a separate and individual emissions unit to contain limitations, operational restrictions, monitoring, record keeping, reporting, and testing associated with control requirements. The high pressure (HP) flare controls VOC emissions from units P801, P802, P803, P804, and P805.
OH-0378	PTTGCA PETROCHEMICAL COMPLEX	PTTGCA PETROCHEMICAL COMPLEX	12/21/2018	Low Pressure Ground Flare (P004)	0.78	MMBTU/H	CO2e	use of natural gas as pilot light fuel	400	T/YR	BACT-PSD	The low pressure (LP) ground flare is used to meet control requirements associated with BACT, NSPS, BAT, and MACT for affected facility operations and process vents. For efficient permitting structure, the ECU ground flare has been permitted as a separate and individual emissions unit to contain limitations, operational restrictions, monitoring, record keeping, reporting, and testing associated with control requirements. The low pressure (LP) flare controls VOC emissions from units P804 and P805.
TX-0814	AMMONIA AND UREA PLANT	AGRIUM US, INC	1/5/2017	Ammonia Emergency Flare	0.31	MMBTU/HR	CO2e	Agrium uses good engineering practices to minimize CO2 e emissions.	157	T/YR	BACT-PSD	
TX-0814	AMMONIA AND UREA PLANT	AGRIUM US, INC	1/5/2017	Urea Emergency Flare	2.76	MMBTU/H	CO2e	good engineering practices to minimize CO2 e emissions.	1418	T/YR	BACT-PSD	
TX-0814	AMMONIA AND UREA PLANT	AGRIUM US, INC	1/5/2017	Process NameUrea Emergency Flare (maintenance)	0		CO2e	good engineering practices to minimize CO2 e emissions	5.9	T/YR	BACT-PSD	
TX-0838	BEAUMONT CHEMICAL PLANT	EXXONMOBIL OIL CORPORATION	6/13/2018	High and Low Pressure Flare cap	0		CO2e	Meet the design and operating requirements of 40 CFR 60.18.	0		BACT-PSD	MACT YY
TX-0838	BEAUMONT CHEMICAL PLANT	EXXONMOBIL OIL CORPORATION	6/13/2018	UDEX FLARE	0		CO2e	Meet the design and operating requirements of 40 CFR 60.18.	0		BACT-PSD	
TX-0838	BEAUMONT CHEMICAL PLANT	EXXONMOBIL OIL CORPORATION	6/13/2018	PARAXYLENE FLARE	0		CO2e	Meet the design and operating requirements of 40 CFR 60.18.	0		BACT-PSD	
TX-0838	BEAUMONT CHEMICAL PLANT	EXXONMOBIL OIL CORPORATION	6/13/2018	C & S FLARE	0		CO2e	Meet the design and operating requirements of 40 CFR 60.18.	0		BACT-PSD	
TX-0864	EQUISTAR CHEMICALS CHANNELVIEW COMPLEX	EQUISTAR CHEMICALS, LP	9/9/2019	Multi Point Ground Flare	0		CO2e	good combustion practices, design, natural gas fuel	0		BACT-PSD	
TX-0864	EQUISTAR CHEMICALS CHANNELVIEW COMPLEX	EQUISTAR CHEMICALS, LP	9/9/2019	Elevated Flare	0		CO2e	good combustion practices, design, natural gas fuel	0		BACT-PSD	
TX-0865	EQUISTAR CHEMICALS CHANNELVIEW COMPLEX	EQUISTAR CHEMICALS, LP	9/9/2019	MULTIPOINT GROUND FLARE	0		CO2e	Good combustion practices, proper design and operation	0		BACT-PSD	
TX-0865	EQUISTAR CHEMICALS CHANNELVIEW COMPLEX	EQUISTAR CHEMICALS, LP	9/9/2019	MEROX ELEVATED FLARE	0		CO2e	Good combustion practices, proper design and operation	0		BACT-PSD	

Process Type: 19.310 - Chemical Plant Flares
Pollutant: CO₂e
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
TX-0904	MOTIVA POLYETHYLENE MANUFACTURING COMPLEX		9/9/2020	FLARE	0		CO2e	good combustion practices and the use of gaseous fuel	0		BACT-PSD	
TX-0905	DIAMOND GREEN DIESEL PORT ARTHUR FACILITY	DIAMOND GREEN DIESEL	9/16/2020	FLARE	0		CO2e	good combustion practices and the use of gaseous fuel	0		BACT-PSD	
TX-0931	ROEHM AMERICA BAY CITY SITE	ROEHM AMERICA LLC	12/16/2021	FLARE	0		CO2e	good combustion practices and use of gaseous fuel	0		BACT-PSD	
TX-0945	FORMOSA POINT COMFORT PLANT OL3	FORMOSA PLASTICS CORPORATION, TEXAS	4/6/2023	FLARES	0		CO2e	CLEAN FUEL, GOOD COMBUSTION PRACTICES	0		BACT-PSD	
*TX-0956	ENTERPRISE MONT BELVIEU COMPLEX	ENTERPRISE PRODUCTS OPERATING LLC	6/8/2023	FLARE	0		CO2e	Good design & combustion practices	0		BACT-PSD	
*TX-0964	NEDERLAND FACILITY	LINDE, INC	10/5/2023	FLARE	0		CO2e	Good combustion practices and fire low carbon natural gas	0		BACT-PSD	

Process Type: 19.330 - Refinery Flares
Pollutant: CO
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
NM-0052	ZIA II GAS PLANT	DCP MIDSTREAM L.P.	4/25/2014	Units FL1 & FL2: Refinery Flares (Inlet Gas Flare & Acid Gas Flare)	2.3	mmBtu/hr	CO	NOx, CO, PM10, PM2.5, SO2 controlled through Good Combustion Practices (GCP), pipeline quality natural gas for pilot; limits on flaring events. VOC & CO2e controlled through GCP, limits on flaring and meet 40 CFR 60.18.	3782.5	PPH	BACT-PSD	
TX-0832	EXXONMOBIL BEAUMONT REFINERY	EXXONMOBIL OIL CORPORATION	1/9/2018	No.12 flare	0		CO	Meets 40 CFR 60.18 and MACT CC design requirements	94	TON/YR	BACT-PSD	NSPS Ja, MACT CC
TX-0872	CONDENSATE SPLITTER FACILITY	MAGELLAN PROCESSING, L.P.	10/31/2019	Flare (Routine and MSS)	12000	SCR.H	CO	Use of natural gas. Good combustion practices will be used to reduce CO including maintaining proper air-to-fuel ratio, necessary residence time, temperature and turbulence.	0.2755	LB/MMBTU	BACT-PSD	
TX-0873	PORT ARTHUR REFINERY	MOTIVA ENTERPRISES LLC	2/4/2020	FLARE	0		CO	Stream-assisted flare equipped with CPMS and flow meter. Hourly net heating value calculated. Continuous pilot flame. Limited hourly and yearly tank degassing	0		BACT-PSD	
TX-0930	CENTURION BROWNSVILLE	JUPITER BROWNSVILLE, LLC	10/19/2021	Main Flare	0		CO	Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.	0.3465	LB/MMBTU	BACT-PSD	
TX-0930	CENTURION BROWNSVILLE	JUPITER BROWNSVILLE, LLC	10/19/2021	Butane (Rail Car) Flare	0		CO	Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.	0.3465	LB/MMBTU	BACT-PSD	

Process Type: 19.330 - Refinery Flares
Pollutant: NOx
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
NM-0052	ZIA II GAS PLANT	DCP MIDSTREAM L.P.	4/25/2014	Units FL1 & FL2: Refinery Flares (Inlet Gas Flare & Acid Gas Flare)	2.3	mmBtu/hr	NOx	NOx, CO, PM10, PM2.5, SO2 controlled through Good Combustion Practices (GCP), pipeline quality natural gas for pilot; limits on flaring events. VOC & CO2e controlled through GCP, limits on flaring and meet 40 CFR 60.18.	695.2	PPH	BACT-PSD	The 2 emissions limits represent limits for Units FL1 and FL2.
TX-0861	BUCKEYE TEXAS PROCESSING CORPUS CHRISTI FACILITY	BUCKEYE TEXAS PROCESSING, LLC	8/29/2019	FLARE	0		NOx	GOOD COMBUSTION PRACTICES	0		BACT-PSD	
TX-0873	PORT ARTHUR REFINERY	MOTIVA ENTERPRISES LLC	2/4/2020	FLARE	0		NOx	Stream-assisted flare equipped with CPMS and flow meter. Hourly net heating value calculated. Continuous pilot flame. Limited hourly and yearly tank degassing	0		BACT-PSD	
TX-0930	CENTURION BROWNSVILLE	JUPITER BROWNSVILLE, LLC	10/19/2021	Main Flare	0		NOx	Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.	0.068	LB/MMBTU	BACT-PSD	
TX-0930	CENTURION BROWNSVILLE	JUPITER BROWNSVILLE, LLC	10/19/2021	Butane (Rail Car) Flare	0		NOx	Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.	0.068	LB/MMBTU	BACT-PSD	

Process Type: 19.330 - Refinery Flares
Pollutant: CO₂e
Permit Date Range: 1/1/2014 - 8/2024

RBLC ID	Facility Name	Corporate/Company Name	Permit Issuance Date	Process Name	Throughput	Unit	Pollutant	Control Method Description	Emission Limit	Unit	Basis	Compliance Notes
NM-0052	ZIA II GAS PLANT	DCP MIDSTREAM L.P.	4/25/2014	Units FL1 & FL2: Refinery Flares (Inlet Gas Flare & Acid Gas Flare)	2.3	mmBtu/hr	CO2e	NOx, CO, PM10, PM2.5, SO2 controlled through Good Combustion Practices (GCP), pipeline quality natural gas for pilot; limits on flaring events. VOC & CO2e controlled through GCP, limits on flaring and meet 40 CFR 60.18.	5626	PPH	BACT-PSD	The emission limits above represent CO2e from SSM for Units FL1 & FL2. Additional limits for CO2e from pilot & purge are 1331.0 pph from unit FL1 and 1331.0 pph from Unit FL2.
TX-0832	EXXONMOBIL BEAUMONT REFINERY	EXXONMOBIL OIL CORPORATION	1/9/2018	No.12 flare	0		CO2e	Meets 40 CFR 60.18 and MACT CC design requirem	2716	TON/YR	BACT-PSD	NSPS Ja, MACT CC
TX-0861	BUCKEYE TEXAS PROCESSING CORPUS CHRISTI FACILITY	BUCKEYE TEXAS PROCESSING, LLC	8/29/2019	FLARE	0		CO2e	GOOD COMBUSTION PRACTICES	0		BACT-PSD	
TX-0872	CONDENSATE SPLITTER FACILITY	MAGELLAN PROCESSING, L.P.	10/31/2019	Flare (Routine and MSS)	12000	SCR.H	CO2e	Use of natural gas. Good combustion practices will be used to reduce CO2e including maintaining proper air-to-fuel ratio, necessary residence time, temperature and turbulence.	0		BACT-PSD	
TX-0873	PORT ARTHUR REFINERY	MOTIVA ENTERPRISES LLC	2/4/2020	FLARE	0		CO2e	Stream-assisted flare equipped with CPMS and flow meter. Hourly net heating value calculated. Continuous pilot flame. Limited hourly and yearly tank degassing	0		BACT-PSD	
TX-0930	CENTURION BROWNSVILLE	JUPITER BROWNSVILLE, LLC	10/19/2021	Main Flare	0		CO2e	Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.	0		BACT-PSD	
TX-0930	CENTURION BROWNSVILLE	JUPITER BROWNSVILLE, LLC	10/19/2021	Butane (Rail Car) Flare	0		CO2e	Use of natural gas or fuel gas as supplemental fuel and good combustion practices, including maintaining proper air-to-fuel ratio and necessary residence time, temperature, and turbulence.	0		BACT-PSD	

General Information Form – Authorization Application



GENERAL INFORMATION FORM – AUTHORIZATION APPLICATION

Before completing this General Information Form (GIF), read the step-by-step instructions provided in this application package. This form is used by the Department of Environmental Protection (DEP) to inform our programs regarding what other DEP permits or authorizations may be needed for the proposed project or activity. This version of the General Information Form (GIF) must be completed and returned with any program-specific application being submitted to the DEP.

Related ID#s (If Known)		DEP USE ONLY
Client ID#	311950	Date Received & General Notes
Site ID#	102360	
Facility ID#	775836 (PFID)	
APS ID#		
Auth ID#		

CLIENT INFORMATION

DEP Client ID#	Client Type/Code	Dun & Bradstreet ID#	
311950	LLC	131489817	
Legal Organization Name or Registered Fictitious Name		Employer ID# (EIN)	Is the EIN a SSN?
Shell Chemical Appalachia LLC		46-1624986	☐ Yes ☒ No
State of Incorporation or Registration of Fictitious Name	☐ Corporation ☒ LLC ☐ Partnership ☐ LLP ☐ LP ☐ Sole Proprietorship ☐ Association/Organization ☐ Estate/Trust ☐ Other		
Delaware Limited Liability Company			
Individual Last Name	First Name	MI	Suffix
Additional Individual Last Name	First Name	MI	Suffix
Mailing Address Line 1		Mailing Address Line 2	
300 Frankfort Road			
Address Last Line – City	State	ZIP+4	Country
Monaca	PA	15061	USA
Client Contact Last Name	First Name	MI	Suffix
Kaal	Kimberly	J	
Client Contact Title	Phone	Ext	Cell Phone
Environmental Manager	724-709-2467		
Email Address	FAX		
kimberly.kaal@shell.com			

SITE INFORMATION

DEP Site ID#	Site Name				
102360	Shell Polymers Monaca				
EPA ID#	Estimated Number of Employees to be Present at Site				
1506WSHLL3FRAN	~600				
Description of Site					
Ethylene manufacturing, polyethylene manufacturing, and cogeneration power plant					
Tax Parcel ID(s):					
County Name(s)	Municipality(ies)	City	Boro	Twp	State
Beaver	Potter	☐	☐	☒	PA
Beaver	Center	☐	☐	☒	PA

Site Location Line 1		Site Location Line 2	
300 Frankfort Road			
Site Location Last Line – City	State	ZIP+4	
Monaca	PA	15061	
Detailed Written Directions to Site			
From Pittsburgh International Airport, take 376 North to Exit 39 (Monaca), turn left onto Rt 18 South and proceed for 1.5 miles, and then turn right into facility.			
Site Contact Last Name	First Name	MI	Suffix
Kaal	Kimberly	J	
Site Contact Title		Site Contact Firm	
Environmental Manager			
Mailing Address Line 1		Mailing Address Line 2	
300 Frankfort Road			
Mailing Address Last Line – City	State	ZIP+4	
Monaca	PA	15061	
Phone	Ext	FAX	Email Address
724-709-2467			kimberly.kaal@shell.com
NAICS Codes (Two- & Three-Digit Codes – List All That Apply)		6-Digit Code (Optional)	
325 and 221		325110, 325211, and 221112	
Client to Site Relationship			
Owner/Operator			

FACILITY INFORMATION

Modification of Existing Facility		Yes	No
1.	Will this project modify an existing facility, system, or activity?	☒	☐
2.	Will this project involve an addition to an existing facility, system, or activity?	☒	☐
<i>If "Yes", check all relevant facility types and provide DEP facility identification numbers below.</i>			
Facility Type	DEP Fac ID#	Facility Type	DEP Fac ID#
☒ Air Emission Plant	775836	☐ Industrial Minerals Mining Operation	
☐ Beneficial Use (water)		☐ Laboratory Location	
☐ Blasting Operation		☐ Land Recycling Cleanup Location	
☐ Captive Hazardous Waste Operation		☐ Mine Drainage Treatment / Land Recycling Project Location	
☐ Coal Ash Beneficial Use Operation		☐ Municipal Waste Operation	
☐ Coal Mining Operation		☐ Oil & Gas Encroachment Location	
☐ Coal Pillar Location		☐ Oil & Gas Location	
☐ Commercial Hazardous Waste Operation		☐ Oil & Gas Water Poll Control Facility	
☐ Dam Location		☐ Public Water Supply System	
☐ Deep Mine Safety Operation -Anthracite		☐ Radiation Facility	
☐ Deep Mine Safety Operation -Bituminous		☐ Residual Waste Operation	
☐ Deep Mine Safety Operation -Ind Minerals		☐ Storage Tank Location	
☐ Encroachment Location (water, wetland)		☒ Water Pollution Control Facility	417201
☐ Erosion & Sediment Control Facility		☐ Water Resource	
☐ Explosive Storage Location		☐ Other:	

Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
CBTAR	40	40	17.724	80	20	10.724
Horizontal Accuracy Measure	Feet	18	--or--	Meters		
Horizontal Reference Datum Code	☐ North American Datum of 1927 ☒ North American Datum of 1983 ☐ World Geodetic System of 1984					
Horizontal Collection Method Code	GISDR					
Reference Point Code	CINTER					
Altitude	Feet	785.91	--or--	Meters		
Altitude Datum Name	☐ The National Geodetic Vertical Datum of 1929 ☒ The North American Vertical Datum of 1988 (NAVD88)					
Altitude (Vertical) Location Datum Collection Method Code	SRVEY					
Geometric Type Code	POINT					
Data Collection Date	5/26/2012					
Source Map Scale Number	1	Inch(es)	=	200	Feet	
	--or--	Centimeter(s)	=		Meters	

PROJECT INFORMATION

Project Name

Wastewater Treatment Plant (WWTP) Permanent Controls Project, Ethylene Maximum Achievable Control Technology (EMACT) Project, and Plan Approval Reconciliations

Project Description

- Shell is proposing to implement the WWTP Permanent Controls Project to install permanent equipment at SPM that will improve the oils, grease, and VOC removal efficiency of the primary treatment section of SPM's WWTP. The WWTP Permanent Controls Project will include the installation of settlement drum(s), two dissolved nitrogen flotation units, a float/sludge drum, and a steam stripper and associated reflux drum.
- Shell is proposing the EMACT Project at SPM to comply with the 40 CFR Part 63 Subpart YY pressure-assisted multi-point flare minimum net heating value of flare combustion zone gas (NHV_{cz}) requirement that recently became applicable to the Totally Enclosed Ground Flare (TEGF) A (Source ID C205A) and TEGF B (Source ID C205B).
- After successfully commissioning all of SPM's operations and 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 PA-04-00740A, PA-04-00740B, and PA-04-00740C, Shell is proposing to reconcile specific plan approval source descriptions, potential to emit calculations, and conditions. These proposed plan approval reconciliations are referenced as the "Plan Approval Reconciliations."

Project Consultant Last Name	First Name	MI	Suffix
Carbon	Michael	H	
Project Consultant Title	Consulting Firm		
Senior Principal	Landau Associates		
Mailing Address Line 1	Mailing Address Line 2		
8280 YMCA Plaza Dr, Bldg. 10, Suite B			
Address Last Line – City	State	ZIP+4	
Baton Rouge	LA	70810-0927	

Phone (225) 412-8169	Ext	FAX	Email Address mcarbon@landauinc.com
Time Schedules	Project Milestone (Optional)		

1. Is the project located in or within a 0.5-mile ☒ Yes ☐ No
radius of an Environmental Justice community as defined by DEP?

To determine if the project is located in or within a 0.5-mile radius of an environmental justice community, please use [the online PennEnviroScreen tool](#). To see specific EJ areas, select the appropriate year of your submittal from the themes box on the right.

2. Have you informed the surrounding community ☒ Yes ☐ No
prior to submitting the application to the Department?

Method of notification: Virtual community town hall meetings, small community group meetings, community advisory panel meetings, meetings with elected officials, and municipal notifications.

3. Have you addressed community concerns ☒ Yes ☐ No ☐ N/A
that were identified?

If no, please briefly describe the community concerns that have been expressed and not addressed.

4. Is your project funded by state or federal ☐ Yes ☒ No
grants?

Note: If "Yes", specify what aspect of the project is related to the grant and provide the grant source, contact person and grant expiration date.

Aspect of Project Related to Grant

Grant Source: _____

Grant Contact Person: _____

Grant Expiration Date: _____

5. Is this application for an authorization on ☐ Yes ☒ No
Appendix A of the Land Use Policy? (For
referenced list, see Appendix A of the Land
Use Policy attached to GIF instructions)

Note: If "No" to Question 5, [the application is not subject to the Land Use Policy](#).

If "Yes" to Question 5, the application is subject to this policy and the Applicant should answer the additional questions in the **Land Use Information** section.

LAND USE INFORMATION

Note: Applicants should submit copies of local land use approvals or other evidence of compliance with local comprehensive plans and zoning ordinances. *NOT APPLICABLE TO PROJECT*

1. Is there an adopted county or multi-county comprehensive plan? ☐ Yes ☐ No
2. Is there a county stormwater management plan? ☐ Yes ☐ No
3. Is there an adopted municipal or multi-municipal comprehensive plan? ☐ Yes ☐ No
4. Is there an adopted county-wide zoning ordinance, municipal zoning ordinance or joint municipal zoning ordinance? ☐ Yes ☐ No

Note: If the Applicant answers "No" to either Questions 1, 3 or 4, [the provisions of the PA MPC are not applicable and the Applicant does not need to respond to questions 5 and 6 below](#).

If the Applicant answers "Yes" to questions 1, 3 and 4, the Applicant should respond to questions 5 and 6 below.

5. Does the proposed project meet the provisions of the zoning ordinance or does the proposed project have zoning approval? ☐ Yes ☐ No
If zoning approval has been received, attach documentation.
6. Have you attached Municipal and County Land Use Letters for the project? ☐ Yes ☐ No

COORDINATION INFORMATION

Note: The PA Historical and Museum Commission must be notified of proposed projects in accordance with DEP Technical Guidance Document 012-0700-001 [at PHMC's online portal, PA-SHARE](#).

If the activity will be a mining project (i.e., mining of coal or industrial minerals, coal refuse disposal and/or the operation of a coal or industrial minerals preparation/processing facility), respond to questions 1.0 through 2.5 below.

If the activity will not be a mining project, skip questions 1.0 through 2.5 and begin with question 3.0.

1.0	Is this a coal mining project? If "Yes", respond to 1.1-1.6. If "No", skip to Question 2.0.	☐	Yes	☒	No
1.1	Will this coal mining project involve coal preparation/processing activities in which the total amount of coal prepared/processed will be equal to or greater than 200 tons/day?	☐	Yes	☐	No
1.2	Will this coal mining project involve coal preparation/processing activities in which the total amount of coal prepared/processed will be greater than 50,000 tons/year?	☐	Yes	☐	No
1.3	Will this coal mining project involve coal preparation/processing activities in which thermal coal dryers or pneumatic coal cleaners will be used?	☐	Yes	☐	No
1.4	For this coal mining project, will sewage treatment facilities be constructed and treated waste water discharged to surface waters?	☐	Yes	☐	No
1.5	Will this coal mining project involve the construction of a permanent impoundment meeting one or more of the following criteria: (1) a contributory drainage area exceeding 100 acres; (2) a depth of water measured by the upstream toe of the dam at maximum storage elevation exceeding 15 feet; (3) an impounding capacity at maximum storage elevation exceeding 50 acre-feet?	☐	Yes	☐	No
1.6	Will this coal mining project involve underground coal mining to be conducted within 500 feet of an oil or gas well?	☐	Yes	☐	No
2.0	Is this a non-coal (industrial minerals) mining project? If "Yes", respond to 2.1-2.6. If "No", skip to Question 3.0.	☐	Yes	☒	No
2.1	Will this non-coal (industrial minerals) mining project involve the crushing and screening of non-coal minerals other than sand and gravel?	☐	Yes	☐	No
2.2	Will this non-coal (industrial minerals) mining project involve the crushing and/or screening of sand and gravel with the exception of wet sand and gravel operations (screening only) and dry sand and gravel operations with a capacity of less than 150 tons/hour of unconsolidated materials?	☐	Yes	☐	No
2.3	Will this non-coal (industrial minerals) mining project involve the construction, operation and/or modification of a portable non-metallic (i.e., non-coal) minerals processing plant under the authority of the General Permit for Portable Non-metallic Mineral Processing Plants (i.e., BAQ-PGPA/GP-3)?	☐	Yes	☐	No
2.4	For this non-coal (industrial minerals) mining project, will sewage treatment facilities be constructed and treated waste water discharged to surface waters?	☐	Yes	☐	No

2.5	Will this non-coal (industrial minerals) mining project involve the construction of a permanent impoundment meeting one or more of the following criteria: (1) a contributory drainage area exceeding 100 acres; (2) a depth of water measured by the upstream toe of the dam at maximum storage elevation exceeding 15 feet; (3) an impounding capacity at maximum storage elevation exceeding 50 acre-feet?	☐	Yes	☐	No
3.0	Will your project, activity, or authorization have anything to do with a well related to oil or gas production, have construction within 200 feet of, affect an oil or gas well, involve the waste from such a well, or string power lines above an oil or gas well? If "Yes", respond to 3.1-3.3. If "No", skip to Question 4.0.	☐	Yes	☒	No
3.1	Does the oil- or gas-related project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a watercourse, floodway or body of water (including wetlands)?	☐	Yes	☐	No
3.2	Will the oil- or gas-related project involve discharge of industrial wastewater or stormwater to a dry swale, surface water, ground water or an existing sanitary sewer system or storm water system? If "Yes", discuss in <i>Project Description</i> .	☐	Yes	☐	No
3.3	Will the oil- or gas-related project involve the construction and operation of industrial waste treatment facilities?	☐	Yes	☐	No
4.0	Will the project involve a construction activity that results in earth disturbance? If "Yes", specify the total disturbed acreage.	☒	Yes	☐	No
4.0.1	Total Disturbed Acreage ~1 acre				
4.0.2	Will the project discharge or drain to a special protection water (EV or HQ) or an EV wetland?	☐	Yes	☒	No
4.0.3	Will the project involve a construction activity that results in earth disturbance in the area of the earth disturbance that are contaminated at levels exceeding residential or non-residential medium-specific concentrations (MSCs) in 25 Pa. Code Chapter 250 at residential or non-residential construction sites, respectively? No known contamination has been identified at levels exceeding residential or non-residential MSCs in the area of the planned construction activities.	☐	Yes	☒	No
5.0	Does the project involve any of the following: water obstruction and/or encroachment, wetland impacts, or floodplain project by the Commonwealth/political subdivision or public utility? If "Yes", respond to 5.1-5.7. If "No", skip to Question 6.0.	☐	Yes	☒	No
5.1	Water Obstruction and Encroachment Projects – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a watercourse, floodway or body of water?	☐	Yes	☐	No

5.2	Wetland Impacts – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a wetland?	☐	Yes	☐	No
5.3	Floodplain Projects by the Commonwealth, a Political Subdivision of the Commonwealth or a Public Utility – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a floodplain?	☐	Yes	☐	No
5.4	Is your project an interstate transmission natural gas pipeline?	☐	Yes	☐	No
5.5	Does your project consist of linear construction activities which result in earth disturbance in two or more DEP regions AND three or more counties?	☐	Yes	☐	No
5.6	Does your project utilize Floodplain Restoration as a best management practice for Post Construction Stormwater Management?	☐	Yes	☐	No
5.7	Does your project utilize Class V Gravity / Injection Wells as a best management practice for Post Construction Stormwater Management?	☐	Yes	☐	No
6.0	Will the project involve discharge of construction related stormwater to a dry swale, surface water, ground water or separate storm water system?	☒	Yes	☐	No
6.1	Will the project involve discharge of industrial waste stormwater or wastewater from an industrial activity or sewage to a dry swale, surface water, ground water or an existing sanitary sewer system or separate storm water system?	☒	Yes	☐	No
7.0	Will the project involve the construction and operation of industrial waste treatment facilities?	☒	Yes	☐	No
8.0	Will the project involve construction of sewage treatment facilities, sanitary sewers, or sewage pumping stations? If “Yes”, indicate estimated proposed flow (gal/day). Also, discuss the sanitary sewer pipe sizes and the number of pumping stations/treatment facilities/name of downstream sewage facilities in the <i>Project Description</i>, where applicable.	☐	Yes	☒	No
8.0.1 Estimated Proposed Flow (gal/day)					
9.0	Will the project involve the subdivision of land, or the generation of 800 gpd or more of sewage on an existing parcel of land or the generation of an additional 400 gpd of sewage on an already-developed parcel, or the generation of 800 gpd or more of industrial wastewater that would be discharged to an existing sanitary sewer system?	☐	Yes	☒	No
9.0.1	Was Act 537 sewage facilities planning submitted and approved by DEP? If “Yes” attach the approval letter. Approval required prior to 105/NPDES approval.	☐	Yes	☐	No

10.0	Is this project for the beneficial use of biosolids for land application within Pennsylvania? If "Yes" indicate how much (i.e. gallons or dry tons per year).	☐	Yes	☒	No
10.0.1	Gallons Per Year (residential septage)				
10.0.2	Dry Tons Per Year (biosolids)				
11.0	Does the project involve construction, modification or removal of a dam? If "Yes", identify the dam.	☐	Yes	☒	No
11.0.1	Dam Name				
12.0	Will the project interfere with the flow from, or otherwise impact, a dam? If "Yes", identify the dam.	☐	Yes	☒	No
12.0.1	Dam Name				
13.0	Will the project involve operations (excluding during the construction period) that produce air emissions (i.e., NOX, VOC, etc.)?	☒	Yes	☐	No
13.0.1	If "Yes", is the operation subject to the agricultural exemption in 35 P.S. § 4004.1?	☐	Yes	☒	No
13.0.2	If the answer to 13.0.1 is "No", identify each type of emission followed by the estimated amount of that emission. Enter all types & amounts of emissions; See Appendix B of this submittal for a list of the types and amounts of emissions. separate each set with semicolons.				
14.0	Does the project include the construction or modification of a drinking water supply to serve 15 or more connections or 25 or more people, at least 60 days out of the year? If "Yes," check all proposed sub-facilities.	☐	Yes	☒	No
14.0.1	Number of Persons Served				
14.0.2	Number of Employee/Guests				
14.0.3	Number of Connections				
14.0.4	Sub-Fac: Distribution System	☐	Yes	☐	No
14.0.5	Sub-Fac: Water Treatment Plant	☐	Yes	☐	No
14.0.6	Sub-Fac: Source	☐	Yes	☐	No
14.0.7	Sub-Fac: Pump Station	☐	Yes	☐	No
14.0.8	Sub-Fac: Transmission Main	☐	Yes	☐	No
14.0.9	Sub-Fac: Storage Facility	☐	Yes	☐	No
15.0	Will your project include infiltration of storm water or waste water to ground water within one-half mile of a public water supply well, spring or infiltration gallery?	☐	Yes	☒	No
16.0	Is your project to be served by an existing public water supply? If "Yes", indicate name of supplier and attach letter from supplier stating that it will serve the project.	☒	Yes	☐	No
16.0.1	Supplier's Name Center Township Water Authority (existing)				
16.0.2	Letter of Approval from Supplier is Attached	☐	Yes	☒	No

17.0	Will this project be served by on-lot drinking water wells?	☐	Yes	☒	No
18.0	Will this project involve a new or increased drinking water withdrawal from a river, stream, spring, lake, well or other water bod(ies)? If "Yes," reference Safe Drinking Water Program.	☐	Yes	☒	No
18.0.1	Source Name				
19.0	Will the construction or operation of this project involve treatment, storage, reuse, or disposal of waste? If "Yes," indicate what type (i.e., hazardous, municipal (including infectious & chemotherapeutic), residual) and the amount to be treated, stored, re-used or disposed. No known contamination has been identified in the area of the planned construction activities nor will any onsite activities generate waste requiring treatment, storage, reuse or disposal.	☐	Yes	☒	No
19.0.1	Type & Amount				
20.0	Will your project involve the removal of coal, minerals, contaminated media, or solid waste as part of any earth disturbance activities? No known contamination has been identified in the area of the planned construction activities.	☐	Yes	☒	No
21.0	Does your project involve installation of a field constructed underground storage tank? If "Yes," list each Substance & its Capacity. Note: Applicant may need a Storage Tank Site Specific Installation Permit.	☐	Yes	☒	No
21.0.1	Enter all substances & capacity of each; separate each set with semicolons.				
22.0	Does your project involve installation of an aboveground storage tank greater than 21,000 gallons capacity at an existing facility? If "Yes," list each Substance & its Capacity. Note: Applicant may need a Storage Tank Site Specific Installation Permit.	☐	Yes	☒	No
22.0.1	Enter all substances & capacity of each; separate each set with semicolons.				
23.0	Does your project involve installation of a tank greater than 1,100 gallons which will contain a highly hazardous substance as defined in DEP's Regulated Substances List, 2570-BK-DEP2724? If "Yes," list each Substance & its Capacity. Note: Applicant may need a Storage Tank Site Specific Installation Permit.	☐	Yes	☒	No
23.0.1	Enter all substances & capacity of each; separate each set with semicolons.				
24.0	Does your project involve installation of a storage tank at a new facility with a total AST capacity greater than 21,000 gallons? If "Yes", list each Substance & its Capacity. Note: Applicant may need a Storage Tank Site Specific Installation Permit.	☐	Yes	☒	No
24.0.1	Enter all substances & capacity of each; separate each set with semicolons.				
NOTE: If the project includes the installation of a regulated storage tank system, including diesel emergency generator systems, the project may require the use of a Department Certified Tank Handler. For a full list of regulated storage tanks and substances, please go to www.dep.pa.gov search term storage tanks					
25.0	Will the intended activity involve the use of a radiation source?	☐	Yes	☒	No

CERTIFICATION

I certify that I have the authority to submit this application on behalf of the applicant named herein and that the information provided in this application is true and correct to the best of my knowledge and information.

For applicants supplying an EIN number: I am applying for a permit or authorization from the Pennsylvania Department of Environmental Protection (DEP). As part of this application, I will provide DEP with an accurate EIN number for the applicant entity. By filing this application with DEP, I hereby authorize DEP to confirm the accuracy of the EIN number provided with the Pennsylvania Department of Revenue. As applicant, I further consent to the Department of Revenue discussing the same with DEP prior to issuance of the Commonwealth permit or authorization.

Type or Print Name James Howell

James Howell

Signature

Production Manager

Title

9/12/24

Date

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 6/19/2024

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-04-00740A/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
James Howell Production 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
6/17/2024	Shell Polymers Monaca	PA-04- 00740A/B/C	Visible Emissions >5 min in consecutive 2 hrs from the MPGF Source C204B.	Notice of Violation	Pending	TBD
8/19/2024	Shell Polymers Monaca	PA-04- 00740A/B/C	Visible Emissions >5 min in consecutive 2 hrs from the MPGF 204B, TEGF A C205A and TEGF B C205B	Notice of Violation	Pending	TBD
9/5/2024	Shell Polymers Monaca	PA-04- 00740A/B/C	Exceedances of 12- Month Emission Limitations for NOx [February 2024 through July 2024]	Notice of Violation	Pending	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	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.
4/3/2024	Shell Polymers Monaca	04-00740A/C	Leak Detection and Repair: Late initial repair attempt for one leaking valve by one (1) day.	Corrected: Shell will review assurance process to ensure timely repair of leaks.
7/4/2024 7/8/2024 8/8/2024	Shell Polymers Monaca	04-00740A/C	Cogeneration Units: Exceeded NOx 2 ppmvd at 15% O2 as detailed below: Unit 2: 1 hr on 7/4/2024 Unit 3: 1 hr on 7/8/2024 and 1 hr on 8/8/2024.	Corrected after each incident. See Malfunction Report submitted on July 25, 2024 for the July 4, 2024 deviation. Each deviation will be addressed in future quarterly excess emission reports.
6/21/2024 6/22/2024	Shell Polymers Monaca	04-00740A/C	Ethane Cracking Furnace 3 exceeded NOx 6.2 lbs/hr for 1 hr on 6/21/2024 and 3 hrs on 6/22/2024.	Corrected after each incident. See Malfunction Report submitted on July 11, 2024. The deviations are addressed in the submitted quarterly excess emission report.
1/16/2023 1/17/2023 1/18/2023 2/8/2023 Test Dates	Shell Polymers Monaca	04-00740A/C	Furnace stack test results not compliant for PM10 and PM2.5 on Furnaces 2, 3, 4, 6.	Update with June 2024 Submission: Furnace 3 was tested March 11, 2024. Furnace 6 was tested March 12, 2024. Both tests showed compliance with the PM10 and PM2.5 limits. Retest for Furnaces 2 and 4 scheduled for week of June 3, 2024. Update with September 2024 Submission: Furnace 2 was tested June 4, 2024. Furnace 4 was tested June 25, 2024. Both tests showed compliance with the PM10 and PM2.5 limits. This deviation was reported on previous Compliance Review Forms. This is not a new incident, just updating incident status.
2022 to present	Shell Polymers Monaca	04-00740A/C	Maximum designed water circulation rate through the cogeneration cooling tower is greater than limit in permit.	Correcting the designed water circulation rate for as-built in the plan approval modification 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
6/26/2024 (1 15-min block period): TEGF A 6/29/2024 (1 15-min block period): TEGF A/B 7/2/2024 (1 15-min block period): TEGF A/B 7/15/2024 (1 15-min block period): TEGF A/B 7/24/2024 (3 15-min block periods): TEGF A/B	Shell Polymers Monaca	04-00740A/C	Net Heating Value TEGFs A/B. Did not meeting requirements for NHV of ≥ 800 Btu/scf in 40 CFR Part 63 Subparts YY and FFFF as required for pressure-assisted multi-point flares.	Corrected after each incident.
7/28/2024 (1 15-minute period)	Shell Polymers Monaca	04-00740A/C	Exit Velocity (Vtip) MPGF PE1/PE2 Header. Did not meet Vtip limit in 40 CFR Part 63 Subpart FFFF for one (1) 15-min block period. Slightly over the limit of 60 ft/sec.	Corrected after incident.
7/26/2023 to present	Shell Polymers Monaca	04-00740A/C	HPEF is not equipped with required monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist stream.	Monitoring equipment will be added to measure and calculate the assist steam flow to the flare by October 2024.
7/26/2023 to present	Shell Polymers Monaca	04-00740A/C	HPEF is not equipped with automated controls for the control of the total steam mass flow rate to the flare.	A control valve will be installed in the small steam assist line to ensure proper controls are in place by October 2024. The large steam line has an existing control valve and automated controls.
6/17/2024	Shell Polymers Monaca	04-00740A/C	Visible Emissions TEGF B. Visible emissions > 5 minutes in consecutive 2 hours.	Corrected. See Malfunction Report submitted on 7/11/2024.
7/11/2024	Shell Polymers Monaca	04-00740A/C	Visible Emissions TEGF A and B. Visible emissions > 5 minutes in consecutive 2 hours for each flare.	Corrected. See Malfunction Report submitted on 8/7/2024.
7/6/2023 to 6/28/2024	Shell Polymers Monaca	04-00740A/C	Pilots TEGF A/B: Each stage of pilots must have two (2) pilots. Stages 2, 3, 4, 5, 8, and 9 only have 1 pilots.	Update: Corrected. Additional pilots installed and operating on June 19, 2024 for TEGF A and June 28, 2024 for TEGF B. This deviation was reported on previous Compliance Review Forms. This is not a new incident, just updating incident status.

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
9/2022 to present	Shell Polymers Monaca	04-00740A/C	LP and HP Header Systems: Root cause analysis (RCA) is required within 45 days after any startup, shutdown, or unforeseeable flaring event. HP Flare System: 9 RCAs were not completed within the 45-day window. Of these, 1 RCA remains outstanding as of submittal. LP Flare System: 28 RCAs were not completed within the 45-day window. Of these, 21 remain outstanding as of submittal.	Continuing deviation. A work process has been implemented with tracking and assurances in place to ensure all flaring events are addressed with a root cause analysis within the 45-day window. SPM has committed to ensuring any outstanding RCAs are completed by end of October 2024.
5/21/2024 Test Date	Shell Polymers Monaca	04-00740A/C	CVTO stack test results not compliant with emission limitations for PM10 and PM2.5.	Retest planned for the week of September 16, 2024 for PM10 and PM2.5.
5/23/2023 Test Date	Shell Polymers Monaca	04-00740A/C	SCTO stack test results not compliant with emission limitations for NOx, PM10, and PM2.5.	Retest planned for the week of September 16, 2024 for PM10 and PM2.5. Burner tip modifications with the vendor are required to address NOx emissions and will be conducted by end of 2024. The NOx re-test will be scheduled once burners are modified and/or replaced. Burner work timeline is excepted no later than 1Q2025 barring any issues in procurement and scoping.
FEORs/ROT Blower Downtime: 6/4/2024: 2.14 hrs 6/11/2024: 8.93 hrs 6/13/2024: 6.15 hrs 7/10/2024: 1.08 hrs 7/11/2024: 3.60 hrs 7/17/2024: 2.28 hrs 8/5/2024: ~ 2 min Spent Caustic Blower Downtime: 5/24/2024: ~ 2min 6/3/2024: ~ 2 min 6/30/2024: ~ 5min 7/10/2024: 1.08 hrs 7/11/2024: 3.60 hrs 7/17/2024: 2.28 hrs	Shell Polymers Monaca	04-00740A/C	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 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.

- 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
3/30/2023 for PE 1 Pellet Dryer 4/30/2023 for PE 2 Pellet Dryer	Shell Polymers Monaca	04-00740A/C	Pellet Dryers for PE 1 and PE2: Did not test within 180 days of startup. Testing was required by 3/30/2023 for the PE 1 Pellet Dryer, and 4/30/2023 for the PE 2 Pellet Dryer.	Corrected. PE 1 Pellet Dryer was tested on 8/24/2023 and PE 2 Pellet Dryer was testing on 8/28/2023.
3/25/2024 4/25/2024 6/28/2024	Shell Polymers Monaca	04-00740A/C	Residual VOC Content Sampling for PE Unit. Missed the required sampling for PE2 grade changes.	Corrected. Shell is continuing to improve sampling procedures and pellet grade tracking.

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

9/12/24

Date

James Howell

Name (Print or Type)

Production Manager

Title

Local Municipality and County Notifications and Proof of Receipt

Note at the time of this submittal (September 13, 2024) the Certified Mail Receipts for the attached notifications have not been received. Shell will submit these to DEP as soon as they are received in accordance with the requirements of 25 Pa. Code Chapter 127, Subchapter B, Plan Approval Requirements, §127.43a, Municipal Notification and section 1905-A of The Administrative Code of 1929 (71 P.S. § 510-5).



Shell Chemical Appalachia LLC
300 Frankfort Rd
Monaca, PA 15061

Certified Mail: 7022 2410 0001 5986 1994

September 9, 2024

Beaver County Commissioners
Beaver County Courthouse
810 Third Street
Beaver, PA 15009

Attn: Daniel C. Camp III, Chairman

**Re: Notification of Submittal of Plan Approval Application
Shell Chemical Appalachia LLC
Shell Polymers Monaca Site
Potter and Center Townships, Beaver County, PA**

Dear Mr. Camp:

Shell Chemical Appalachia LLC (“Shell”) is submitting this letter to notify Beaver County that Shell is submitting a plan approval application to the Pennsylvania Department of Environmental Protection (PA DEP) for the Shell Polymers Monaca (“SPM”) Site in accordance with 25 Pa. Code Chapter 127, Subchapter B. The plan approval application proposes the following SPM projects and plan approval reconciliations.

Plan Approval Nos.: 04-00740A, 04-00740B, and 04-00740C

Application Name: Shell Chemical Appalachia, LLC

Applicant Contact: James Howell, Production Manager
300 Frankfort Road
Monaca, PA 15061
724-709-2463

Site Location: 300 Frankfort Road, Monaca, PA 15061

Municipality/County: Potter and Center Townships, Beaver County, PA

This letter is intended to satisfy the requirements of 25 Pa. Code Chapter 127, Subchapter B, Plan Approval Requirements, §127.43a, Municipal Notification. Each applicant for a plan approval shall notify the local municipality and county where the air pollution source is to be located that the applicant has applied for the plan approval as required by section 1905-A of The Administrative Code of 1929 (71 P.S. § 510-5).

The plan approval application proposes the following SPM projects and plan approval reconciliations.

- Shell is proposing to implement the Wastewater Treatment Plant (WWTP) Permanent Controls Project to install permanent equipment at SPM that will improve the oils, grease, and VOC removal efficiency of the primary treatment section of SPM’s WWTP.

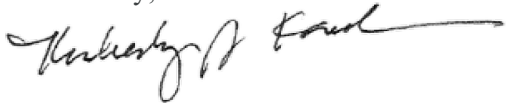
- Shell is proposing the Ethylene Maximum Achievable Control Technology (EMACT) Project at SPM to comply with the 40 Code of Federal Regulations (CFR) Part 63 Subpart YY pressure-assisted multi-point flare minimum net heating value of flare combustion zone gas (NHV_{cz}) requirement that recently became applicable to the High Pressure (HP) Ground Flare #1 and HP Ground Flare #2.
- After successfully commissioning all of SPM's operations and 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 PA-04-00740A, PA-04-00740B, and PA-04-00740C, Shell is proposing to reconcile specific plan approval source descriptions, potential to emit calculations, and conditions.

The 30-day comment period begins upon receipt of this notice by the municipality and county. Any comments should be addressed to the PA DEP Southwest Regional Office:

Pennsylvania Department of Environmental Protection
Southwest Regional Office
400 Waterfront Drive
Pittsburgh, PA 15222-4745

For any questions regarding this notification, please contact me at 724-709-2467 or kimberly.kaal@shell.com.

Sincerely,

A handwritten signature in black ink, appearing to read 'Kimberly A. Kaal', with a long horizontal flourish extending to the right.

Kimberly Kaal
Environmental Manager



Shell Chemical Appalachia LLC
300 Frankfort Rd
Monaca, PA 15061

Certified Mail: 7022 2410 0001 5986 2083

September 9, 2024

Center Township Board of Supervisors
224 Center Grange Road
Aliquippa, PA 15001

Attn: Bill DiCioccio, Jr., Chairman

**Re: Notification of Submittal of Plan Approval Application
Shell Chemical Appalachia LLC
Shell Polymers Monaca Site
Potter and Center Townships, Beaver County, PA**

Dear Mr. DiCioccio:

Shell Chemical Appalachia LLC (“Shell”) is submitting this letter to notify Center Township that Shell is submitting a plan approval application to the Pennsylvania Department of Environmental Protection (PA DEP) for the Shell Polymers Monaca (“SPM”) Site in accordance with 25 Pa. Code Chapter 127, Subchapter B. The plan approval application proposes the following SPM projects and plan approval reconciliations.

Plan Approval Nos.: 04-00740A, 04-00740B, and 04-00740C

Application Name: Shell Chemical Appalachia, LLC

Applicant Contact: James Howell, Production Manager
300 Frankfort Road
Monaca, PA 15061
724-709-2463

Site Location: 300 Frankfort Road, Monaca, PA 15061

Municipality/County: Potter and Center Townships, Beaver County, PA

This letter is intended to satisfy the requirements of 25 Pa. Code Chapter 127, Subchapter B, Plan Approval Requirements, §127.43a, Municipal Notification. Each applicant for a plan approval shall notify the local municipality and county where the air pollution source is to be located that the applicant has applied for the plan approval as required by section 1905-A of The Administrative Code of 1929 (71 P.S. § 510-5).

The plan approval application proposes the following SPM projects and plan approval reconciliations.

- Shell is proposing to implement the Wastewater Treatment Plant (WWTP) Permanent Controls Project to install permanent equipment at SPM that will improve the oils, grease, and VOC removal efficiency of the primary treatment section of SPM’s WWTP.

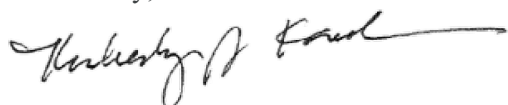
- Shell is proposing the Ethylene Maximum Achievable Control Technology (EMACT) Project at SPM to comply with the 40 Code of Federal Regulations (CFR) Part 63 Subpart YY pressure-assisted multi-point flare minimum net heating value of flare combustion zone gas (NHV_{cz}) requirement that recently became applicable to the High Pressure (HP) Ground Flare #1 and HP Ground Flare #2.
- After successfully commissioning all of SPM's operations and 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 PA-04-00740A, PA-04-00740B, and PA-04-00740C, Shell is proposing to reconcile specific plan approval source descriptions, potential to emit calculations, and conditions.

The 30-day comment period begins upon receipt of this notice by the municipality and county. Any comments should be addressed to the PA DEP Southwest Regional Office:

Pennsylvania Department of Environmental Protection
Southwest Regional Office
400 Waterfront Drive
Pittsburgh, PA 15222-4745

For any questions regarding this notification, please contact me at 724-709-2467 or kimberly.kaal@shell.com.

Sincerely,

A handwritten signature in black ink, appearing to read 'Kimberly Kaal', with a long horizontal flourish extending to the right.

Kimberly Kaal
Environmental Manager



Shell Chemical Appalachia LLC
300 Frankfort Rd
Monaca, PA 15061

Certified Mail: 7022 2410 0001 5986 2007

September 9, 2024

Potter Township Board of Supervisors
206 Mowry Road
Monaca, PA 15061

Attn: Rebecca Matsco, Chairwoman

**Re: Notification of Submittal of Plan Approval Application
Shell Chemical Appalachia LLC
Shell Polymers Monaca Site
Potter and Center Townships, Beaver County, PA**

Dear Ms. Matsco:

Shell Chemical Appalachia LLC ("Shell") is submitting this letter to notify Potter Township that Shell is submitting a plan approval application to the Pennsylvania Department of Environmental Protection (PA DEP) for the Shell Polymers Monaca ("SPM") Site in accordance with 25 Pa. Code Chapter 127, Subchapter B.

Plan Approval Nos.: 04-00740A, 04-00740B, and 04-00740C

Application Name: Shell Chemical Appalachia, LLC

Applicant Contact: James Howell, Production Manager
300 Frankfort Road
Monaca, PA 15061
724-709-2463

Site Location: 300 Frankfort Road, Monaca, PA 15061

Municipality/County: Potter and Center Townships, Beaver County, PA

This letter is intended to satisfy the requirements of 25 Pa. Code Chapter 127, Subchapter B, Plan Approval Requirements, §127.43a, Municipal Notification. Each applicant for a plan approval shall notify the local municipality and county where the air pollution source is to be located that the applicant has applied for the plan approval as required by section 1905-A of The Administrative Code of 1929 (71 P.S. § 510-5).

The plan approval application proposes the following SPM projects and plan approval reconciliations.

- Shell is proposing to implement the Wastewater Treatment Plant (WWTP) Permanent Controls Project to install permanent equipment at SPM that will improve the oils, grease, and VOC removal efficiency of the primary treatment section of SPM's WWTP.

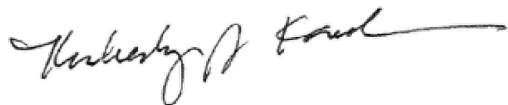
- Shell is proposing the Ethylene Maximum Achievable Control Technology (EMACT) Project at SPM to comply with the 40 Code of Federal Regulations (CFR) Part 63 Subpart YY pressure-assisted multi-point flare minimum net heating value of flare combustion zone gas (NHV_{cz}) requirement that recently became applicable to the High Pressure (HP) Ground Flare #1 and HP Ground Flare #2.
- After successfully commissioning all of SPM's operations and 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 PA-04-00740A, PA-04-00740B, and PA-04-00740C, Shell is proposing to reconcile specific plan approval source descriptions, potential to emit calculations, and conditions.

The 30-day comment period begins upon receipt of this notice by the municipality and county. Any comments should be addressed to the PA DEP Southwest Regional Office:

Pennsylvania Department of Environmental Protection
Southwest Regional Office
400 Waterfront Drive
Pittsburgh, PA 15222-4745

For any questions regarding this notification, please contact me at 724-709-2467 or kimberly.kaal@shell.com.

Sincerely,

A handwritten signature in black ink, appearing to read 'Kimberly Kaal', with a long horizontal flourish extending to the right.

Kimberly Kaal
Environmental Manager

RECEIVED

AIR QUALITY

DEP, Southwest Regional Office

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Potter Township Board of Supervisors
206 Mowry Road
Monaca, PA 15061

ATTN: Rebecca Matsco, Chairwoman



9590 9402 8298 3094 9406 17

2. Article Number (Transfer from service label)

7022 2410 0001 5986 2007

COMPLETE THIS SECTION ON DELIVERY

A. Signature

[Handwritten Signature]

- ☐ Agent
- ☐ Addressee

B. Received by (Printed Name)

C. Date of Delivery

9/11/24

- D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type

- ☐ Adult Signature
- ☐ Adult Signature Restricted Delivery
- ☒ Certified Mail®
- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery
- ☐ Collect on Delivery Restricted Delivery
- ☐ Priority Mail Express®
- ☐ Registered Mail™
- ☐ Registered Mail Restricted Delivery
- ☐ Signature Confirmation™
- ☐ Signature Confirmation Restricted Delivery
- ☐ Mail Restricted Delivery

PS Form 3811, July 2020 PSN 7530-02-000-9053

Domestic Return Receipt

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Daniel C. Camp III, Chairman
Beaver County Commissioners
Beaver County Courthouse
810 Third Street
Beaver, PA 15009



9590 9402 8298 3094 9406 00

2. Article Number (Transfer from service label)

7022 2410 0001 5986 1994

COMPLETE THIS SECTION ON DELIVERY

A. Signature

Kristen Mancini ☐ Agent
☐ Addressee

B. Received by (Printed Name)

Kristen Mancini

C. Date of Delivery

9-10-24

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☒ No

3. Service Type

☐ Adult Signature	☐ Priority Mail Express®
☐ Adult Signature Restricted Delivery	☐ Registered Mail™
☒ Certified Mail®	☐ Registered Mail Restricted Delivery
☐ Certified Mail Restricted Delivery	☐ Signature Confirmation™
☐ Collect on Delivery	☐ Signature Confirmation Restricted Delivery
☐ Collect on Delivery Restricted Delivery	

Mail
Restricted Delivery
00)

USPS Tracking®

Tracking

FAQs >

Track Packages
Anytime, Anywhere

Get the free Informed Delivery® feature to receive automated notifications on your packages

Learn More

Tracking Number:

70222410000159862083

 Copy  Add to Informed Delivery

Remove X

Latest Update

Your item was delivered to an individual at the address at 12:58 pm on September 18, 2024 in ALIQUIPPA, PA 15001.

Get More Out of USPS Tracking:

 USPS Tracking Plus®

 Delivered

Delivered, Left with Individual

ALIQUIPPA, PA 15001

September 18, 2024, 12:58 pm

[See All Tracking History](#)

What Do USPS Tracking Statuses Mean?

- Text & Email Updates
- USPS Tracking Plus®
- Product Information

See Less ^

June 28, 2024 Letter from Shell to DEP Regarding NO_x and PM_{2.5} ERC Transfers



Shell Chemical Appalachia LLC
300 Frankfort Rd
Monaca, PA 15061

June 28, 2024

Pennsylvania Department of Environmental Protection
Attn: Mr. Sean Wenrich, Environmental Engineer Manager
400 Market Street 12th Floor
Harrisburg, PA 17101

Re: Transfer of NOx and PM2.5 Emission Reduction Credits from AES Beaver Valley, LLC to Shell Chemical Appalachia LLC

Dear Mr. Wenrich:

AES Beaver Valley, LLC, by its agent, AES US Services, LLC ("Seller") has agreed to transfer ownership and use of 319 tons per year of Nitrogen Oxide Emission Reduction Credits ("NOx ERCs") and 19 tons per year of Particulate Matter 2.5 ERCs ("PM2.5 ERCs") to Shell Chemical Appalachia LLC ("Buyer"). Please perform any required RACT analysis to make sure the 319 NOx ERCs and 19 PM2.5 ERCs are surplus and available for use prior to transfer.

The ERCs were created by AES Beaver Valley facility located in Beaver County, Pennsylvania. Buyer is requesting transfer for use at Buyer's facility located in Potter Township, Beaver County, Pennsylvania.

Buyer's representative for this matter and relevant contact information is: Kimberly Kaal, 724-709-2467, Kimberly.Kaal@shell.com

Please send notification once NOx ERCs and PM2.5 ERCs transfer is complete to my contact information listed above. In addition, if you have any questions or require further information, please contact me at the phone number and/or email address as referenced above.

June 28, 2024

Thank you for your prompt attention to this matter.

Sincerely,

Kimberly
Kaal

Digitally signed by
Kimberly Kaal
DN: cn=Kimberly Kaal
Date: 2024.06.28
14:36:18 -04'00'

Kimberly Kaal
Environmental Manager

Shipment Receipt: Page #1 of 1

THIS IS NOT A SHIPPING LABEL. PLEASE SAVE FOR YOUR RECORDS.

SHIP DATE: MON 1 JUL 2024	SHIPMENT INFORMATION: UPS NEXT DAY AIR SAVER COM 0 lb 0.7 oz actual wt LTR Billed Weight CARRIER LETTER = 100.00
EXPECTED DELIVERY DATE: TUES 2 JUL 2024 EOD	
SHIP FROM: KRISTINA DEONARINE 1051 LEXINGTON DR ALTOUITPPA PA 15001 (412) 716-0079	TRACKING NUMBER: 1Z0RU1591345552195 SHIPMENT ID: MHJSZUQYXD9XQ SHIP REF 1: - - SHIP REF 2: - -
SHIP TO: PA DEPT OF ENVIRONMENTAL PROTECTION MR. SEAN HENRICHER 400 MARKET ST 12TH FLOOR HARRISBURG PA 17101 BUSINESS	DESCRIPTION OF GOODS: DOCUMENTS
SHIPPED THROUGH: THE UPS STORE #5820 MONACA, PA 15061-2431 (724) 774-4942	SHIPMENT CHARGES: NEXT DAY AIR SAVER COM 35.42 SERVICE OPTIONS 0.00 FUEL SURCHARGE 5.87 CHS PROCESSING FEE 0.22
TOTAL \$41.31	

COMPLETE ONLINE TRACKING: ENTER THIS ADDRESS IN YOUR WEB BROWSER TO TRACK:
[HTTP://THEUPSSTORE.COM](http://theupsstore.com) (SELECT TRACKING, ENTER SHIPMENT ID #) SHIPMENT
QUESTIONS? CONTACT SHIPPED THROUGH ABOVE.
NEED PACKAGE HELP? (LOST/DAMAGED). PROVIDE DETAILS SO WE CAN HELP:
[HTTPS://ONLINE.UPSCAPITAL.COM/TCCP](https://online.ups.com/tccp)

SHIPMENT ID: MHJSZUQYXD9XQ



Powered by iShip(r)
07-01-2024 05:25 PM Pacific Time F

The UPS Store



SEE NOTICE ON REVERSE regarding UPS terms, and notice of limitation of liability. Where allowed by law, shipper authorizes UPS to act as forwarding agent for export control and customs purposes. If exported from the US, shipper certifies that the commodities, technology or software were exported from the US in accordance with the Export Administration Regulations. Diversion contrary to law is prohibited.

RRD R 0524



SEE NOTICE ON REVERSE regarding UPS terms, and notice of limitation of liability. Where allowed by law, shipper authorizes UPS to act as forwarding agent for export control and customs purposes. If exported from the US, shipper certifies that the commodities, technology or software were exported from the US in accordance with the Export Administration Regulations. Diversion contrary to law is prohibited.

RRD R 0524

Summary of SPM Stack Test Results and Emission Source Actual Emissions Reporting Emission Factors

Appendix J - Summary of SPM Stack Test Results and Emission Source Actual Emissions Reporting Emission Factors
Shell Polymers Monaca

Source	Source ID	Compliance Test End Date	Pollutant Tested	Protocol number	Tested Emission Rate	Emission Rate UOM	Note/Status	Test Result	Test Result UOM	Emission Limit or PTE Basis	Emission Limit UOM	Factor Proposed for Use in Inventory
Cogen 1	101	1/28/2022	PM10/PM2.5	2021-0002	3.10E-03	lb/MMBtu	Initial Final	3.10E-03	lb/MMBtu	0.0066	lb/MMBtu	3.10E-3 lb/MMBtu
Cogen 1	101	1/28/2022	VOC	2021-0002	0	lb/MMBtu	Initial Final	0	ppbvd @15% O3	1	ppbvd @15% O3	Sum of organic HAPs
Cogen 1	101	1/28/2022	Ammonia	2021-0002	-	-	Using TDL NH3 Monitor	2.4	ppbvd @15% O2	5	ppbvd @15% O2	NA - In-stack Ammonia TDL
Cogen 1	101	1/28/2022	Benzene	2021-0002	7.87E-05	lb/MMBtu	Retested	0.017	ppbvd	1.20E-06	lb/MMBtu	
Cogen 1	101	1/28/2022	Toluene	2021-0002	5.62E-04	lb/MMBtu	Retested	0.1	ppbvd	0.000013	lb/MMBtu	
Cogen 1	101	1/28/2022	Formaldehyde	2021-0002	1.30E-04	lb/MMBtu	Retested	48.8	ppbvd @15% O1	91	ppbvd @15% O3	
Cogen 1	101	12/1/2022	Benzene	2022-2424	9.30E-07	lb/MMBtu	Initial Final	2.10E-04	ppbvd	1.20E-06	lb/MMBtu	9.30E-07 lb/MMBtu
Cogen 1	101	12/1/2022	Toluene	2022-2424	2.00E-04	lb/MMBtu	Initial Final	0.038	ppbvd	0.000013	lb/MMBtu	2.00E-04 lb/MMBtu
Cogen 1	101	12/1/2022	Formaldehyde	2022-2424	1.20E-04	lb/MMBtu	Initial Final	51.7	ppbvd @15% O2	91	ppbvd @15% O2	
Cogen 1	101	6/11/2024	Formaldehyde	2022-2424	9.89E-05	lb/MMBtu	Annual Test	28.8	ppbvd @15% O2	91	ppbvd @15% O2	9.89E-05 lb/MMBtu
Cogen 2	102	1/21/2022	PM10/PM2.5	2021-0002	2.40E-03	lb/MMBtu	Initial Final	2.40E-03	lb/MMBtu	0.0066	lb/MMBtu	2.40E-03 lb/MMBtu
Cogen 2	102	1/21/2022	VOC	2021-0002	0	lb/MMBtu	Initial Final	0	ppbvd @15% O2	1	ppbvd @15% O2	Sum of organic HAPs
Cogen 2	102	1/21/2022	Ammonia	2021-0002	-	-	Using TDL NH3 Monitor	4	ppbvd @15% O2	5	ppbvd @15% O2	NA - In-stack Ammonia TDL
Cogen 2	102	1/21/2022	Benzene	2021-0002	7.40E-05	lb/MMBtu	Retested	0.016	ppbvd	1.20E-06	lb/MMBtu	
Cogen 2	102	1/21/2022	Toluene	2021-0002	1.40E-03	lb/MMBtu	Retested	0.27	ppbvd	0.000013	lb/MMBtu	
Cogen 2	102	1/21/2022	Formaldehyde	2021-0002	1.19E-04	lb/MMBtu	Retested	46.3	ppbvd @15% O2	91	ppbvd @15% O2	
Cogen 2	102	12/9/2022	Benzene	2022-2424	5.50E-07	lb/MMBtu	Initial Final	1.30E-04	ppbvd	1.20E-06	lb/MMBtu	5.50E-07 lb/MMBtu
Cogen 2	102	12/9/2022	Toluene	2022-2424	1.20E-04	lb/MMBtu	Initial Final	0.025	ppbvd	0.000013	lb/MMBtu	1.20E-04 lb/MMBtu
Cogen 2	102	12/9/2022	Formaldehyde	2022-2424	1.40E-04	lb/MMBtu	Initial Final	57.1	ppbvd @15% O2	91	ppbvd @15% O2	
Cogen 2	102	6/12/2024	Formaldehyde	2022-2424	1.08E-04	lb/MMBtu	Annual Test	31.2	ppbvd @15% O2	91	ppbvd @15% O2	1.08E-04 lb/MMBtu
Cogen 3	103	1/26/2022	PM10/PM2.5	2021-0002	1.40E-03	lb/MMBtu	Initial Final	1.40E-03	lb/MMBtu	6.60E-03	lb/MMBtu	1.40E-03 lb/MMBtu
Cogen 3	103	1/26/2022	VOC	2021-0002	0	lb/MMBtu	Initial Final	0	ppbvd @15% O2	1	ppbvd @15% O2	Sum of organic HAPs
Cogen 3	103	1/26/2022	Ammonia	2021-0002	-	-	Using TDL NH3 Monitor	2.4	ppbvd @15% O2	5	ppbvd @15% O2	NA - In-stack Ammonia TDL
Cogen 3	103	1/26/2022	Benzene	2021-0002	7.42E-05	lb/MMBtu	Retested	0.017	ppbvd	1.20E-06	lb/MMBtu	
Cogen 3	103	1/26/2022	Toluene	2021-0002	2.47E-03	lb/MMBtu	Retested	0.47	ppbvd	0.000013	lb/MMBtu	
Cogen 3	103	1/26/2022	Formaldehyde	2021-0002	1.18E-04	lb/MMBtu	Retested	46.8	ppbvd @15% O2	91	ppbvd @15% O2	
Cogen 3	103	12/8/2022	Benzene	2022-2424	7.90E-07	lb/MMBtu	Initial Final	1.90E-04	ppbvd	1.20E-06	lb/MMBtu	7.90E-07 lb/MMBtu
Cogen 3	103	12/8/2022	Toluene	2022-2424	1.80E-04	lb/MMBtu	Initial Final	0.038	ppbvd	0.000013	lb/MMBtu	1.80E-04 lb/MMBtu
Cogen 3	103	12/8/2022	Formaldehyde	2022-2424	1.70E-04	lb/MMBtu	Initial Final	68.6	ppbvd @15% O2	91	ppbvd @15% O2	
Cogen 3	103	6/13/2024	Formaldehyde	2022-2424	1.78E-04	lb/MMBtu	Annual Test	50.4	ppbvd @15% O2	91	ppbvd @15% O2	1.78E-04 lb/MMBtu
Furnace 1 (Decoking)	031	11/27/2022	PM2.5	2021-1292	0.0053	lb/MMBtu	Initial Final	0.8	lb/hr	1.86 (0.103)	lb/hr (lb/MMBtu)	0.0053 lb/MMBtu
Furnace 1 (Decoking)	031	11/27/2022	PM10	2021-1292	0.0071	lb/MMBtu	Initial Final	1.1	lb/hr	1.86 (0.103)	lb/hr (lb/MMBtu)	0.0071 lb/MMBtu
Furnace 1	031	12/22/2022	PM2.5	2021-1292	0.0037	lb/MMBtu	Initial Final Test	1.7	lb/hr	3.1 (0.0050)	lb/h (lb/MMBtu)	0.0037 lb/MMBtu

Appendix J - Summary of SPM Stack Test Results and Emission Source Actual Emissions Reporting Emission Factors
Shell Polymers Monaca

Source	Source ID	Compliance Test End Date	Pollutant Tested	Protocol number	Tested Emission Rate	Emission Rate UOM	Note/Status	Test Result	Test Result UOM	Emission Limit or PTE Basis	Emission Limit UOM	Factor Proposed for Use in Inventory
Furnace 1	031	12/22/2022	PM10	2021-1292	0.0044	lb/MMBtu	Initial Final Test	2	lb/hr	3.1 (0.0050) lb/h (lb/MMBtu)r		0.0044 lb/MMBtu
Furnace 1	031	12/22/2022	VOC	2021-1292	8.70E-04	lb/MMBtu	Retested due to invalid background data.	0.44	lb/hr	1.18 (0.0019) lb/h (lb/MMBtu)r		
Furnace 1	031	12/22/2022	Ammonia	2021-1292	0.0017	lb/MMBtu	Using TDL NH3 Monitor	3.6	ppbvd @15% O2	10 ppbvd @15% O2 (0.0038) (lb/MMBtu)		NA - In-stack Ammonia TDL
Furnace 1	031	12/22/2022	n-Hexane	2021-1292	8.00E-05	lb/MMBtu	Initial Final Test	0.032	ppmvd	4.07E-04 lb/MMBtu		8.0E-05 lb/MMBtu
Furnace 1	031	6/4/2024	VOC	2024-2709	N/A	lb/MMBtu	Final Retest	0.000041	lb/hr	1.18 (0.0019) lb/h (lb/MMBtu)		6.10E-04 lb/MMBtu - Very low mass emissions detected during test - use worst case VOC from all 7 furnaces.
Furnace 2 (Decoking)	032	12/12/2022	PM2.5	2021-1292	0.003	lb/MMBtu	Initial Final	1.5	lb/hr	1.86 (0.103) lb/hr (lb/MMBtu)		0.0030 lb/MMBtu
Furnace 2 (Decoking)	032	12/12/2022	PM10	2021-1292	0.0046	lb/MMBtu	Initial Final	1.7	lb/hr	1.86 (0.103) lb/hr (lb/MMBtu)		0.0046 lb/MMBtu
Furnace 2	032	2/8/2023	PM2.5	2021-1292	0.021	lb/MMBtu	Retested with updated method.	7.6	lb/hr	3.1 (0.0050) lb/h (lb/MMBtu)		
Furnace 2	032	2/8/2023	PM10	2021-1292	0.029	lb/MMBtu	Retested with updated method.	10.2	lb/hr	3.1 (0.0050) lb/h (lb/MMBtu)		
Furnace 2	032	2/8/2023	VOC	2021-1292	3.60E-04	lb/MMBtu	Initial Final Test	0.014	lb/hr	1.18 (0.0019) lb/h (lb/MMBtu)r		3.60E-04 lb/MMBtu
Furnace 2	032	2/8/2023	Ammonia	2021-1292	1.10E-03	lb/MMBtu	Using TDL NH3 Monitor	2.3	ppbvd @15% O2	10 ppbvd @15% O2 (0.0038) (lb/MMBtu)		NA - In-stack Ammonia TDL
Furnace 2	032	2/8/2023	n-Hexane	2021-1292	7.90E-05	lb/MMBtu	Initial Final Test	0.029	ppmvd	4.07E-04 lb/MMBtu		7.9E-05 lb/MMBtu
Furnace 2	032	6/4/2024	PM2.5	2024-2708	NA	lb/MMBtu	Final Retest	1.08	lb/hr	3.1 (0.0050) lb/h (lb/MMBtu)		0.0017 lb/MMBtu (ratio from lb/hr results and PTE factor)
Furnace 2	032	6/4/2024	PM10	2024-2708	NA	lb/MMBtu	Final Retest	1.38	lb/hr	3.1 (0.0050) lb/h (lb/MMBtu)		0.0022 lb/MMBtu (ratio from lb/hr results and PTE factor)
Furnace 3 (Decoking)	033	11/8/2022	PM2.5	2021-1292	0.0023	lb/MMBtu	Initial Final (Resubmitted Feb-23)	0.38	lb/hr	1.86 (0.103) lb/hr (lb/MMBtu)		0.0023 lb/MMBtu
Furnace 3 (Decoking)	033	11/8/2022	PM10	2021-1292	0.0035	lb/MMBtu	Initial Final (Resubmitted Feb-23)	0.6	lb/hr	1.86 (0.103) lb/hr (lb/MMBtu)		0.0035 lb/MMBtu
Furnace 3	033	1/17/2023	PM2.5	2021-1292	0.036	lb/MMBtu	Retested with updated method.	12.2	lb/hr	3.1 (0.0050) lb/h (lb/MMBtu)		
Furnace 3	033	1/17/2023	PM10	2021-1292	0.037	lb/MMBtu	Retested with updated method.	12.5	lb/hr	3.1 (0.0050) lb/h (lb/MMBtu)		
Furnace 3	033	1/17/2023	VOC	2021-1292	6.10E-04	lb/MMBtu	Initial Final Test	0.22	lb/hr	1.18 (0.0019) lb/h (lb/MMBtu)r		6.10E-04 lb/MMBtu
Furnace 3	033	1/17/2023	Ammonia	2021-1292	2.00E-03	lb/MMBtu	Using TDL NH3 Monitor	4.1	ppbvd @15% O2	10 ppbvd @15% O2 (0.0038) (lb/MMBtu)		NA - In-stack Ammonia TDL
Furnace 3	033	1/17/2023	n-Hexane	2021-1292	1.50E-03	lb/MMBtu	Retested due to invalid data.	0.59	ppmvd	4.07E-04 lb/MMBtu		
Furnace 3	033	8/22/2023	n-Hexane	2021-1292	4.50E-05	lb/MMBtu	Final Retest	0.02	ppmvd	4.07E-04 lb/MMBtu		4.5E-05 lb/MMBtu
Furnace 3	033	3/11/2024	PM10	2021-1292	0.0019	lb/MMBtu	Final Retest	1.02	lb/hr	3.1 (0.0050) lb/h (lb/MMBtu)		0.0019 lb/MMBtu
Furnace 3	033	3/11/2024	PM2.5	2021-1292	0.0013	lb/MMBtu	Final Retest	0.727	lb/hr	3.1 (0.0050) lb/h (lb/MMBtu)		0.0013 lb/MMBtu
Furnace 4 (Decoking)	034	11/18/2022	PM2.5	2021-1292	0.0044	lb/MMBtu	Initial Final	0.65	lb/hr	1.86 (0.103) lb/hr (lb/MMBtu)		0.0044 lb/MMBtu
Furnace 4 (Decoking)	034	11/18/2022	PM10	2021-1292	0.0061	lb/MMBtu	Initial Final	0.79	lb/hr	1.86 (0.103) lb/hr (lb/MMBtu)		0.0061 lb/MMBtu
Furnace 4	034	1/16/2023	PM2.5	2021-1292	0.0023	lb/MMBtu	Retested with updated method.	8.7	lb/hr	3.1 (0.0050) lb/h (lb/MMBtu)		

Appendix J - Summary of SPM Stack Test Results and Emission Source Actual Emissions Reporting Emission Factors
Shell Polymers Monaca

Source	Source ID	Compliance Test End Date	Pollutant Tested	Protocol number	Tested Emission Rate	Emission Rate UOM	Note/Status	Test Result	Test Result UOM	Emission Limit or PTE Basis	Emission Limit UOM	Factor Proposed for Use in Inventory
Furnace 4	034	1/16/2023	PM10	2021-1292	0.024	lb/MMBtu	Restested with updated method.	9.1	lb/hr	3.1 (0.0050)	lb/h (lb/MMBtu)	
Furnace 4	034	1/16/2023	VOC	2021-1292	1.50E-03	lb/MMBtu	Restested due to invalid data.	0.6	lb/hr	1.18 (0.0019)	lb/h (lb/MMBtu)r	
Furnace 4	034	1/16/2023	Ammonia	2021-1292	1.60E-03	lb/MMBtu	Using TDL NH3 Monitor	3.4	ppbvd @15% O2	10 (0.0038)	ppbvd @15% O2 (lb/MMBtu)	
Furnace 4	034	1/16/2023	n-Hexane	2021-1292	3.40E-03	lb/MMBtu	Restested due to invalid data.	1.3	ppmvd	4.07E-04	lb/MMBtu	
Furnace 4	034	8/25/2023	VOC	2021-1292	NA	lb/MMBtu	Final Retest	0.11	lb/hr	1.18 (0.0019)	lb/h (lb/MMBtu)	0.00018 lb/MMBtu (ratio from ppbvd results and PTE factor)
Furnace 4	034	8/25/2023	Ammonia	2021-1292	NA	lb/MMBtu	Using TDL NH3 Monitor	2.9	ppbvd @15% O2	10 (0.0038)	ppbvd @15% O2 (lb/MMBtu)	NA - In-stack Ammonia TDL
Furnace 4	034	8/25/2023	n-Hexane	2021-1292	4.50E-05	lb/MMBtu	Final Retest	0.02	ppmvd	4.07E-04	lb/MMBtu	4.5E-05 lb/MMBtu
Furnace 4	034	6/25/2024	PM2.5	2021-1292	NA	lb/MMBtu	Final Retest	0.57	lb/hr	3.1 (0.0050)	lb/h (lb/MMBtu)	0.0009 lb/MMBtu (ratio from lb/hr results and PTE factor)
Furnace 4	034	6/25/2024	PM10	2021-1292	NA	lb/MMBtu	Final Retest	0.95	lb/hr	3.1 (0.0050)	lb/h (lb/MMBtu)	0.0015 lb/MMBtu (ratio from lb/hr results and PTE factor)
Furnace 5 (Decoking)	035	11/25/2022	PM2.5	2021-1292	0.0069	lb/MMBtu	Initial Final	0.8	lb/hr	1.86 (0.103)	lb/hr (lb/MMBtu)	0.0069 lb/MMBtu
Furnace 5 (Decoking)	035	11/25/2022	PM10	2021-1292	0.0092	lb/MMBtu	Initial Final	1.08	lb/hr	1.86 (0.103)	lb/hr (lb/MMBtu)	0.0092 lb/MMBtu
Furnace 5	035	12/21/2022	PM2.5	2021-1292	0.0037	lb/MMBtu	Initial Final Test	1.8	lb/hr	3.1 (0.0050)	lb/h (lb/MMBtu)	0.0037 lb/MMBtu
Furnace 5	035	12/21/2022	PM10	2021-1292	0.0044	lb/MMBtu	Initial Final Test	2.1	lb/hr	3.1 (0.0050)	lb/h (lb/MMBtu)	0.0044 lb/MMMBTU
Furnace 5	035	12/21/2022	VOC	2021-1292	3.70E-04	lb/MMBtu	Retested due to invalid background data.	0.19	lb/hr	1.18 (0.0019)	lb/h (lb/MMBtu)	
Furnace 5	035	12/21/2022	Ammonia	2021-1292	1.40E-03	lb/MMBtu	Using TDL NH3 Monitor	3	ppbvd @15% O2	10 (0.0038)	ppbvd @15% O2 (lb/MMBtu)	NA - In-stack Ammonia TDL
Furnace 5	035	12/21/2022	n-Hexane	2021-1292	3.30E-04	lb/MMBtu	Initial Final Test	0.14	ppmvd	4.07E-04	lb/MMBtu	3.3E-04 lb/MMBtu
Furnace 5	035	6/5/2024	VOC	2021-1292	N/A	lb/MMBtu	Final Retest	0.011	lb/hr	1.18 (0.0019)	lb/h (lb/MMBtu)	6.10E-04 lb/MMBtu - Very low mass emissions detected during test - use worst case VOC from all 7 furnaces.
Furnace 6 (Decoking)	036	11/23/2022	PM2.5	2021-1292	0.0071	lb/MMBtu	Initial Final	0.87	lb/hr	1.86 (0.103)	lb/hr (lb/MMBtu)	0.0071 lb/MMBtu
Furnace 6 (Decoking)	036	11/23/2022	PM10	2021-1292	0.009	lb/MMBtu	Initial Final	1.1	lb/hr	1.86 (0.103)	lb/hr (lb/MMBtu)	0.0090 lb/MMBtu
Furnace 6	036	1/18/2023	PM2.5	2021-1292	0.012	lb/MMBtu	Restested with updated method.	4.8	lb/hr	3.1 (0.0050)	lb/h (lb/MMBtu)	
Furnace 6	036	1/18/2023	PM10	2021-1292	0.013	lb/MMBtu	Restested with updated method.	5.2	lb/hr	3.1 (0.0050)	lb/h (lb/MMBtu)	
Furnace 6	036	1/18/2023	VOC	2021-1292	4.90E-04	lb/MMBtu	Initial Final Test	0.21	lb/hr	1.18 (0.0019)	lb/h (lb/MMBtu)	0.00049 lb/MMBtu
Furnace 6	036	1/18/2023	Ammonia	2021-1292	2.10E-03	lb/MMBtu	Using TDL NH3 Monitor	4.4	ppbvd @15% O2	10 (0.0038)	ppbvd @15% O2 (lb/MMBtu)	NA - In-stack Ammonia TDL
Furnace 6	036	1/18/2023	n-Hexane	2021-1292	3.90E-04	lb/MMBtu	Initial Final Test	0.143	ppmvd	4.07E-04	lb/MMBtu	3.9E-04 lb/MMBtu
Furnace 6	036	3/12/2024	PM2.5	2021-1292	0.0005	lb/MMBtu	Final Retest	0.284	lb/hr	3.1 (0.0050)	lb/h (lb/MMBtu)	0.0005 lb/MMBtu
Furnace 6	036	3/12/2024	PM10	2021-1292	0.0011	lb/MMBtu	Final Retest	0.588	lb/hr	3.1 (0.0050)	lb/h (lb/MMBtu)	0.0011 lb/MMBtu
Furnace 7 (Decoking)	037	11/5/2022	PM2.5	2021-1292	0.0045	lb/MMBtu	Initial Final (Resubmitted Feb-23)	0.62	lb/hr	1.86 (0.103)	lb/hr (lb/MMBtu)	0.0045 lb/MMBtu

Appendix J - Summary of SPM Stack Test Results and Emission Source Actual Emissions Reporting Emission Factors
Shell Polymers Monaca

Source	Source ID	Compliance Test End Date	Pollutant Tested	Protocol number	Tested Emission Rate	Emission Rate UOM	Note/Status	Test Result	Test Result UOM	Emission Limit or PTE Basis	Emission Limit UOM	Factor Proposed for Use in Inventory
Furnace 7 (Decoking)	037	11/5/2022	PM10	2021-1292	0.0057	lb/MMBtu	Initial Final (Resubmitted Feb-23)	0.78	lb/hr	1.86 (0.103)	lb/hr (lb/MMBtu)	0.0057/MMBTU
Furnace 7	037	3/3/2023	PM2.5	2021-1292	0.0059	lb/MMBtu	Initial Final Test	2.6	lb/hr	3.1 (0.0050)	lb/h (lb/MMBtu)	0.0059 lb/MMBtu
Furnace 7	037	3/3/2023	PM10	2021-1292	0.0068	lb/MMBtu	Initial Final Test	3	lb/hr	3.1 (0.0050)	lb/h (lb/MMBtu)	0.0068 lb/MMBtu
Furnace 7	037	3/3/2023	VOC	2021-1292	5.40E-04	lb/MMBtu	Retested due to invalid background data.	0.27	lb/hr	1.18 (0.0019)	lb/h (lb/MMBtu)	
Furnace 7	037	3/3/2023	Ammonia	2021-1292	3.70E-03	lb/MMBtu	Using TDL NH3 Monitor	7.8	ppbvd @15% O2	10 (0.0038)	ppbvd @15% O2 (lb/MMBtu)	NA - In-stack Ammonia TDL
Furnace 7	037	3/3/2023	n-Hexane	2021-1292	6.00E-04	lb/MMBtu	Initial Final Test	0.24	ppmvd	4.07E-04	lb/MMBtu	6.0E-04 lb/MMBtu
Furnace 7	037	6/6/2024	VOC	2021-1292	N/A	lb/MMBtu	Final Retest	4.70E-05	lb/hr	1.18 (0.0019)	lb/h (lb/MMBtu)	6.10E-04 lb/MMBtu - Very low mass emissions detected during test - use worst case VOC from all 7 furnaces.
PE1 Pellet Dryer A	202	8/24/2023	PM	2021-1292	0.048	lb/hr	Initial Final	8.50E-04	grain/dscf	0.01	grain/dscf	0.048 lb/hr
PE1 Pellet Dryer B	202	8/24/2023	PM	2021-1292	0.042	lb/hr	Initial Final	7.20E-04	grain/dscf	0.01	grain/dscf	0.042 lb/hr
PE2 Pellet Dryer A	202	8/28/2023	PM	2021-1292	0.06	lb/hr	Initial Final	1.10E-03	grain/dscf	0.01	grain/dscf	0.06 lb/hr
PE2 Pellet Dryer B	202	8/28/2023	PM	2021-1292	0.067	lb/hr	Initial Final	1.10E-03	grain/dscf	0.01	grain/dscf	0.067 lb/hr
PE3 Pellet Dryer	202	9/5/2024	PM	2021-1292	TBD	TBD	TBD	TBD	TBD	0.01	grain/dscf	PTE until Test Results are Final
SCTO	204	5/23/2024	PM	2024-1844-001	0.0110	lb/MMBtu	Noncompliant	0.011	lb/MMBtu	0.0075	lb/MMBtu	0.0075 lb/MMBtu
SCTO	204	5/23/2024	NOx	2024-1844-001	0.087	lb/MMBtu	Noncompliant	0.087	lb/MMBtu	0.068	lb/MMBtu	0.087 lb/MMBtu
SCTO	204	5/23/2024	CO	2024-1844-001	0.0176	lb/MMBtu	Compliant	0.0176	lb/MMBtu	0.0824	lb/MMBtu	0.0176 lb/MMBtu
SCTO	204	5/23/2024	Benzene	2024-1844-001	0.00625	lb/hr	Final	0.211	ppmvd	NA	NA	.00625 lb/hr
SCTO	204	5/23/2024	DRE	2024-1844-001	99.99	%	Compliant	100	%	>99	%	99.99
SCTO	204	TBD	PM	2024-1844-001	TBD	TBD	TBD	TBD	TBD	0.0075	lb/MMBtu	PTE until Test Results are Final
SCTO	204	TBD	NOx	2024-1844-001	TBD	TBD	TBD	TBD	TBD	0.068	lb/MMBtu	PTE until Test Results are Final
CVTO	206	5/21/2024	PM	2024-1844-002	0.0080	lb/MMBtu	Noncompliant	0.008	lb/MMBtu	0.0075	lb/MMBtu	0.0075 lb/MMBtu
CVTO	206	5/21/2024	NOx	2024-1844-002	0.051	lb/MMBtu	Complaint	0.051	lb/MMBtu	0.068	lb/MMBtu	0.051 lb/MMBtu
CVTO	206	5/21/2024	CO	2024-1844-002	0.00847	lb/MMBtu	Complaint	0.00847	lb/MMBtu	0.0824	lb/MMBtu	0.00847 lb/MMBtu
CVTO	206	5/21/2024	n-Hexane	2024-1844-002	0.109	lb/hr	MDL Result	0.26	ppmvd	NA	NA	NA - Gas Chromatograph
CVTO	206	5/21/2024	DRE	2024-1844-002	99.99	%	Complaint	99.99	%	>99.9	%	99.99
CVTO	206	TBD	PM	2024-1844-002	TBD	TBD	TBD	TBD	TBD	0.0075	lb/MMBtu	PTE until Test Results are Final
PE3 Cat Act A	202	7/19/2024	PM (filt) Inlet (MON Rule)	2022-0000	3.64E-04	lb/hr	Initial Final	3.67E-04	grain/dscf	NA	NA	NA
PE3 Cat Act A	202	7/19/2024	PM (filt) Outlet (MON Rule)	2022-0000	7.73E-04	lb/hr	Initial Final	7.97E-04	grain/dscf	0.002	grain/dscf	7.97E-04 grain/dscf
PE3 Cat Act A	202	TBD	CrVI	2022-0000	TBD	TBD	TBD	TBD	TBD	0.000022	lb/hr	PTE until Test Results are Final
PE3 Cat Act B	202	TBD	PM (filt) Inlet (MON Rule)	2022-0000	TBD	TBD	TBD	TBD	TBD	NA	NA	PTE until Test Results are Final
PE3 Cat Act B	202	TBD	PM (filt) Outlet (MON Rule)	2022-0000	TBD	TBD	TBD	TBD	TBD	0.002	grain/dscf	PTE until Test Results are Final
PE3 Cat Act B	202	TBD	CrVI	2022-0000	TBD	TBD	TBD	TBD	TBD	0.000022	lb/hr	PTE until Test Results are Final

AIR QUALITY FEES FOR NEW PLAN APPROVAL

Company Information				
Federal Tax ID: 46-1624986		Firm Name: Shell Chemical Appalachia LLC		
Permit # (If any): PA-00740A/B/C		Facility Name: Shell Polymers Monaca		
Municipality: Potter, Center		County: Beaver		
Contact Person Name: Kimberly Kaal		Telephone Number: 724-709-2467		
E-mail: kimberly.kaal@shell.com				
New Plan Approval (The following fees are cumulative.)				
Line #	Check the appropriate boxes below	Type of review requested	Fee 2021 - 2025	Total Fees
1		Base Fee	\$2,500	\$2,500
2	☒	New Source Review, Subchapter E	\$7,500	\$7,500
3	☒	NSPS/NESHAP /MACT standard A. # of NSPS: _____ B. # of NESHAP/MACT: _____ C. Add lines A and B: _____ D. Maximum applicable standards: <u>3</u> E. Enter smaller of line C or line D: _____ Multiply line E by \$2,500 and enter the amount in the "Total Fees" column.	\$2,500	\$7,500
4	☐	Case-by-Case MACT	\$9,500	
5	☒	Prevention of Significant Deterioration (PSD) requirements. Subchapter D	\$32,500	\$32,500
6	☐	Plantwide Applicability Limit (PAL) for NSR regulated pollutants or PAL for PSD regulated pollutants or both	\$7,500	
7	☒	Risk Assessment Analysis – Inhalation only	\$10,000	\$10,000
8	☐	Risk Assessment Analysis – Multi-pathway	\$25,000	
Add Lines 1 thru 8 of Total Fees column and write it here. 				\$60,000