Shell Chemical Appalachia LLC
300 Frankfort Rd
Monaca, PA 15061

March 23, 2023

BY ELECTRONIC MAIL

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

RE: March 2023 Monthly Submittal of Information Requested from Shell Chemical Appalachia LLC

Dear Mark:

Shell Chemical Appalachia LLC (Shell), located in Beaver County, Pennsylvania is submitting this monthly information request per the Pennsylvania Department of Environmental Protection's (PADEP) request.

As requested, the data associated with this submittal include:

- Current 12-month emission data including Hazardous Air Pollutants (HAPs) for each source and permitted pollutant per Plan Approval PA-04-00740C for the period through end of February 28, 2023.
- Updated emissions calculations protocol.
- List of Malfunction Reports submitted to the Department for 2022 and 2023.
- Fence line monitoring laboratory analytical data for February, 2023.

Shell is continuously quality assuring the emission calculations and data input to ensure the most representative emission quantifications. For example, more equipment components are being monitored for our leak detection and repair (LDAR) program and the updated emissions results are incorporated into the inventory.

As the Department knows we are currently in the process of providing additional information to the Department in response to its March 17, 2023, letter regarding the technical conclusions related to the January 2023 FlareGuardian destruction efficiency test. At this time, Shell is utilizing the results of the FlareGuardian test in calculating and providing its current 12-month emission data to the Department, with the understanding that Shell will continue to provide additional data supporting the validity of the technology. Shell will, in conjunction with the Department, conduct additional testing to verify the destruction efficiency.

If you have any questions or comments concerning the information included in this letter or the attached documentation, please feel free to contact me at kimberly.kaal@shell.com, or (724) 709-2467.

Sincerely,

Kimberly J. Kaal

Kimberly Kaal
Environmental Manager, Attorney in Fact

CC: Jim Miller, Regional Director
Elizabeth Speicher, Environmental Group Manager
Scott Beaudway, Air Quality Specialist

SHELL POLYMERS MONACA
AIR EMISSIONS PROTOCOL for PADEP's INVENTORY PROGRAM
Date: as of March 17, 2023

Emission Source or Activity	Emissions Approach/Methodology	Data Inputs
• 031: Ethane Cracking Furnace #1 • 032: Ethane Cracking Furnace #2 • 033: Ethane Cracking Furnace #3 • 034: Ethane Cracking Furnace #4 • 035: Ethane Cracking Furnace #5 • 036: Ethane Cracking Furnace #6 • 037: Ethane Cracking Furnace #7 Main Burners Fuel Gas (Tail Gas, Natural Gas or Mixture of Tail gas and Natural Gas) Rated Capacity: 620 MMBtu/hr, each	1. NO_x, CO • Temporary analyzer data used for Furnaces 2, 3, 5, 6, 7 during refractory dry-out (April through June 11, 2022) • Raw permanent analyzer data, where available used for all furnaces starting on June 24, 2022 (first valid PI data at furnaces) through November 11, 2022, where available. When analyzer data was not available, used emission factors from vendor data as contained in Feb. 2020 Update Plan Approval Application: ○ Normal Mode: CO – 0.035 lb/MMBtu; NO_x – 0.015 lb/MMBtu ○ Decoke Mode: CO – 0.290 lb/MMBtu; NO_x – 0.015 lb/MMBtu ○ Feed In/Out Mode: CO – 0.035 lb/MMBtu; NO_x – 0.015 lb/MMBtu ○ Hot Steam Stand-by Mode: CO – 0.035 lb/MMBtu; NO_x – 0.025 lb/MMBtu ○ Startup/Shutdown Mode: CO – 0.290 lb/MMBtu; NO_x – 0.180 lb/MMBtu • CEMS analyzer hourly-block average output used starting November 12, 2022. 2. PM-filt [all operating modes except decoke]: AP-42, Chapter 1.4, "Natural Gas Combustion", 7/1998. Site-specific emission factors to be developed after stack testing. 3. PM10, PM 2.5 [all operating modes except decoke]: Vendor Data at 0.005 lb/MMBtu [Feb. 2020 Update Plan Approval Application]. Site-specific emission factors to be developed after stack testing. 4. PM-filt, PM10, PM2.5 [de-coking]: 1.86 lbs/hr / 180 MMBtu/hr = 0.0103 lb/MMBtu (preliminary vendor data at 1.86 lbs/hr and estimated heat input during decoking). [Feb. 2020 Update Plan Approval Application]. Site-specific emission factors to be developed after stack testing. 5. PM-cond [all operating modes but decoke]: PM – PM filt. PM-cond emissions are negligible. 6. VOC: LAER emission factor at 0.0019 lb/MMBtu. [Feb. 2020 Update Plan Approval Application]. Site-specific emission factors to be developed after stack testing. 7. SO_2: material balance based on mass of fuel gas combusted, taking out the H_2 portion of the mass and using the sulfur content in natural gas. Equation: FUEL GAS MASS - H_2 (WT%) /100] * S CONTENT (WT%) / 100 * MW SO_2 / MW S. 8. H_2SO_4: Multiplication of SO_2 emissions and the SO_3/SO_2 Ratio of 5.7/142 based on the SO_3 and SO_2 emission factor for distillate oil in Table 1.3-1 of AP-42, Chapter 1.3, "Fuel Oil Combustion", 5/2010. 9. Total HAPs (minus lead and n-hexane): AP-42, Chapter 1.4, "Natural Gas Combustion", 7/1998. Site-specific emission factors to be developed after stack testing. 10. Lead: AP-42, Chapter 1.4, "Natural Gas Combustion", 7/1998, but only considering the natural gas portion by removing the H_2 content in the HHV of the fuel gas, consistent with the Feb. 2020 Plan Approval Application. 11. n-Hexane: 0.0063 lb/MMBtu, Ventura County Air Pollution Control District, AB 2588 Combustion Emission Factors, May 17, 2001, <10 MMBtu/hr (highest of external combustion factor). VCAPCD AB2588 combem[2].pdf 12. NH_3 (ammonia slip): In-stack analyzer data. 13. CO_2: Material balance based on mass of fuel gas combusted and carbon content in fuel. Equation: FUEL GAS MASS * C CONTENT (WT%) / 100 * MW CO_2 / MW C. 14. CH_4: 40 CFR Part 98 Subpart C Table C-2 emission factor for natural gas, but only considering the natural gas portion by removing the H_2 content in the HHV of the fuel gas, consistent with the Feb. 2020 Plan Approval Application. 15. N_2O: 40 CFR Part 98 Subpart C Table C-2 emission factor for natural gas.	<u>PI Inputs</u> 1. Fuel Gas Mass Combusted Burners A-D (kg/hr) 2. Fuel Gas Mass Combusted Burners E-H (kg/hr) 3. Fuel Gas Composition (% mol) 4. NG Sulfur (S) Content (ppmv), converted to wt % by assuming 16.92 ppmv per 1 grain/100 scf gas at 60F and 14.73 psia https://www.interline.nl/media/1000030/handbooksulfurmeasurements_002.pdf 5. NO_x, CO Raw permanent hourly data (ppmvd – minute) 6. NO_x, CO Analyzer Data (Block Average) (lbs/hr) 7. NH_3 Analyzer Data (ppmvd) 8. Feed Rate Ethane (tonne/hr) 9. Feed Rate Ethane (tonne/hr) 10. Furnace feed (tonne/hr) 11. Decoke Status (Open/Closed) 12. Coil temperature (C) <u>Calculated/Miscellaneous Inputs</u> 1. Fuel Gas Molecular Weight: Fuel Gas Composition and Standard Molecular Weight of Constituents 2. HHV of Fuel Gas: Fuel Gas Composition and Standard Heat of Combustion for Constituents 3. % Carbon by weight and % H_2 by weight: Fuel Gas Composition 4. Heat Rate of Fuel Gas: Fuel Gas Mass and HHV of Fuel Gas 5. H_2 HHV Heat Release in Fuel Gas: H_2 Composition (%mol), H_2 Molecular Weight, Fuel Gas Molecular Weight, Fuel Gas HHV, H_2 Heat of Combustion 6. Furnace Operating Mode a. Normal Mode: Feed Rate Ethane > 43 tonne/hr b. Feed IN/Out Mode: Feed Rate Ethane < 43 tonne/hr c. Hot Steam Standby Mode: Furnace feed <0.1 tonne/hr d. Decoke Mode: Open/Closed e. SU/SD Mode: Coil temperature <750

Emission Source or Activity	Emissions Approach/Methodology	Data Inputs
• 031: Ethane Cracking Furnace #1 • 032: Ethane Cracking Furnace #2 • 033: Ethane Cracking Furnace #3 • 034: Ethane Cracking Furnace #4 • 035: Ethane Cracking Furnace #5 • 036: Ethane Cracking Furnace #6 • 037: Ethane Cracking Furnace #7 Pilots (Natural Gas)	1. NOx, CO: AP-42, Chapter 1.4, "Natural Gas Combustion", 7/1998 until CEMS is online and verified. 2. PM-filt, PM-cond, PM10, PM2.5, VOC, Total HAPs (except n-hexane): AP-42, Chapter 1.4, "Natural Gas Combustion", 7/1998. 3. n-Hexane: 0.0063 lb/MMBtu, Ventura County Air Pollution Control District, AB 2588 Combustion Emission Factors, May 17, 2001, <10 MMBtu/hr. VCAPCD AB2588 combem[2].pdf 4. SO2: Material balance based on mass of natural gas combusted and sulfur content in natural gas. Equation: NG FUEL MASS * S CONTENT NG (WT%) / 100 * MW SO2 / MW S. 5. H2SO4: Multiplication of SO2 emissions and the SO3/SO2 Ratio of 5.7/142 based on the SO3 and SO2 emission factor for distillate oil in Table 1.3-1 of AP-42, Chapter 1.3, "Fuel Oil Combustion", 5/2010. 6. CO2: Material balance based on mass of natural gas combusted and carbon content in fuel. Equation: NG FUEL MASS * C CONTENT (WT%) / 100 * MW CO2 / MW C. 7. CH4: 40 CFR Part 98 Subpart C, Table C-2 emission factor for natural gas. 8. N2O: 40 CFR Part 98 Subpart C, Table C-2 emission factor for natural gas.	PI Inputs 1. Pilot Natural Gas Mass Combusted (kg/hr) 2. Natural Gas HHV (Btu/scf), converted to Btu/lb using Natural Gas Density 3. Natural Gas Specific Gravity, density calculated assuming density of air at 1.2041 kg/Nm3 at 20 C and 1 atm (Normal) 4. Natural Gas Composition C1 – C6+ (%mol) 5. Natural Gas Sulfur (S) Content (ppmv) converted to wt % by assuming 16.92 ppmv per 1 grain/100 scf gas at 60F and 14.73 psia https://www.interline.nl/media/1000030/handbooksulfurmeasurements_002.pdf Calculated/Miscellaneous Inputs 1. Heat Rate (MMBtu/hr)of Pilot: Pilot Natural Gas Mass and Natural Gas HHV 2. Natural Gas Carbon (C) Content (wt%): Calculated based on Natural Gas Composition
• 101: Combustion Turbine/Duct Burner Unit #1 • 102: Combustion Turbine/Duct Burner Unit #2 • 103: Combustion Turbine/Duct Burner Unit #3	1. NOx, CO: Certified CEMS using analyzer data and 40 CFR Part 75 Appendix D and F equations. 2. NH3 (ammonia slip): In-stack analyzer data when feasible. 3. PM-filt, PM-cond, PM10, PM2.5: Stack test factors (most recent). 4. VOC: Stack test factors (most recent). 5. HCHO (formaldehyde), benzene, toluene: Stack test factors developed from retest Nov/Dec 2022 using approved alternative test methods with lower detection limits. 6. Total HAPs (minus formaldehyde, benzene, toluene): AP-42, Chapter 1.4, "Natural Gas Combustion", 7/1998. 7. SO2: Material balance based on mass of natural gas combusted and sulfur content in natural gas. Equation: NG FUEL MASS * S CONTENT NG (WT%) / 100 * MW SO2 / MW S. 8. H2SO4: Multiplication of SO2 emissions and the SO3/SO2 Ratio of 5.7/142 based on the SO3 and SO2 emission factor for distillate oil in Table 1.3-1 of AP-42, Chapter 1.3, "Fuel Oil Combustion", 5/2010. 9. CO2: Material balance based on mass of natural gas combusted and carbon content in fuel. Equation: NG FUEL MASS * C CONTENT (WT%) / 100 * MW CO2 / MW C. 10. CH4, N2O: 40 CFR Part 98 Subpart C, Table C-2 emission factor for natural gas.	PI Inputs 1. Fuel Gas Mass Combusted Combustion Turbine (kg/hr) 2. Fuel Gas Mass Combusted Duct Burners (kg/hr) 3. Natural Gas Gross Calorific Value (kJ/kg) 4. Natural Gas Composition C1 – C6+ (%mol) 5. Natural Gas Sulfur (S) Content (ppmv) converted to wt % by assuming 16.92 ppmv per 1 grain/100 scf gas at 60F and 14.73 psia https://www.interline.nl/media/1000030/handbooksulfurmeasurements_002.pdf Calculated/Miscellaneous Inputs 1. Natural Gas Gross Calorific Value (kJ/kg) 2. Total Heat Input: Natural Gas Rate and Gross Calorific Value 3. Fuel Gas Molecular Weight: Fuel Gas Composition and Standard Molecular Weight of Constituents 4. Natural Gas Carbon (C) Content (wt%): Calculated based on Natural Gas Composition
105: Diesel-Fired Emergency Generator Engines (2 unit) • Parking Garage Diesel Generator, 103 bhp, Cummins QSB5-G3 • Communications Tower Diesel Generator, 67 bhp, Kohler KDI 3404 TM	1. NOx, CO, HC (VOC), PM-filt: Manufacturer Data Sheet (g/bhp). 2. PM10, PM2.5: AP-42, Appendix B.2, "Generalized Particle Size Distribution", 9/90, PM10 = 0.96*PM and PM2.5 = 0.90*PM. 3. PM-cond: AP-42, Chapter 3.4, "Large Stationary Diesel and All Stationary Dual-Fuel Engines, 10/96. 4. SO2: Material balance based on estimated diesel mass and fuel sulfur content of diesel. Equation: DIESEL MASS * S CONTENT DIESEL (ppmw) / 10000 ppmw / 100 * MW SO2 / MW S. 5. HAP: AP-42, Chapter 3.3, "Gasoline and Diesel Industrial Engines", 10/96. 6. CO2: 40 CFR Part 98 Subpart C, Table C-1 emission factor for Distillate Fuel Oil No. 2. 7. CH4: 40 CFR Part 98 Subpart C, Table C-2 emission factor for Distillate Fuel Oil No. 2. 8. N2O: 40 CFR Part 98 Subpart C, Table C-2 emission factor for Distillate Fuel Oil No. 2.	Data Inputs 1. Operating Hours – collected internally on monthly basis 2. Brake Specific Fuel Consumption: 7,000 Btu/hp-hr (AP-42 Chapter 3.3) 3. Diesel HHV: 139,600 Btu/gal 4. Diesel Density: 7.674 lb/gal 5. Sulfur Content of Diesel: 15 ppmw Calculated/Miscellaneous Inputs 1. Heat Input (MMBtu/hr): Engine capacity and BSFC 2. Hourly Fuel Consumption: Heat Input and Diesel Density
106: Fire Pump Engines (2 units) • Fire Pump A (Diesel), 488 hp, Cummins CFP15E-F10 • Fire Pump B (Diesel), 488 hp, Cummins CFP15E-F10	1. NOx, CO, NMNH (VOC), PM-filt: Manufacturer Data Sheet (g/bhp). 2. PM10, PM2.5: AP-42, Appendix B.2, "Generalized Particle Size Distribution", 9/90, PM10 = 0.96*PM and PM2.5 = 0.90*PM. 3. PM-cond: AP-42, Chapter 3.4, "Large Stationary Diesel and All Stationary Dual-Fuel Engines, 10/96. 4. SO2: Material balance based on estimated diesel mass and fuel sulfur content of diesel. Equation: DIESEL MASS * S CONTENT DIESEL (ppmw) / 10000 ppmw / 100 * MW SO2 / MW S. 5. HAP: AP-42, Chapter 3.3, "Gasoline and Diesel Industrial Engines", 10/96. 6. CO2: 40 CFR Part 98 Subpart C, Table C-1 emission factor for Distillate Fuel Oil No. 2. 7. CH4: 40 CFR Part 98 Subpart C, Table C-2 emission factor for Distillate Fuel Oil No. 2. 8. N2O: 40 CFR Part 98 Subpart C, Table C-2 emission factor for Distillate Fuel Oil No. 2.	Data Inputs 1. Operating Hours – collected internally on monthly basis 2. Brake Specific Fuel Consumption: 7,000 Btu/hp-hr (AP-42 Chapter 3.3) 3. Diesel HHV: 139,600 Btu/gal 4. Diesel Density: 7.674 lb/gal 5. Sulfur Content of Diesel: 15 ppmw Calculated/Miscellaneous Inputs 1. Heat Input (MMBtu/hr): Engine capacity and BSFC 2. Hourly Fuel Consumption: Heat Input and Diesel Density

Emission Source or Activity	Emissions Approach/Methodology	Data Inputs
107: Natural Gas Fired Emergency Generator Engines (3) • Backup Generator Lift Station A, 50 bhp, GM Vortec 3.0L I-4 (4SLB) • Backup Generator Intermediate Lift Station, 158 bhp, GM Vortec 5.7L V-8 (4SRB) • PGT Building (Shell Visitor Center Backup Generator), 113 bhp, GM 5.7L V-8 (4SLB)	1. NOx + THC (assumed NOx), CO, CO2: Manufacturer Data Sheet (g/bhp). 2. VOC, SO2, PM-filt, PM-cond, PM10, PM2.5, HAP, CH4, CO2 (Intermediate Lift Station Only for CO2): AP-42, Chapter 3.2, "Natural Gas-Fired Reciprocating Engines", 7/2000. 3. N2O: 40 CFR Part 98 Subpart C, Table C-2 emission factor for natural gas.	Data Inputs 1. Operating Hours – collected internally on monthly basis 2. Maximum fuel consumption: provided on Manufacturer Data Sheets (scf/hr) 3. Natural Gas HHV: 1000 Btu/scf Calculated/Miscellaneous Inputs 1. Heat Input (MMBtu/hr): Maximum fuel consumption and Natural Gas HHV
204: Low Pressure (LP) Header System Continuous Vent Thermal Oxidizer (CVTO) Process Vents	1. NOx: 0.068 lb/MMBtu, John Zink Design Specification, 1/4/2018. Site-specific emission factors to be developed after stack testing. 2. CO: 0.0824 lb/MMBtu, John Zink Design Specification, 1/4/2018. Site-specific emission factors to be developed after stack testing. 3. PM10 and PM2.5: 0.0075 lb/MMBtu, John Zink Design Specification, 1/4/2018. Site-specific emission factors to be developed after stack testing. 4. VOC: Material balance based on quantity of vent gas flared, VOC content of the vent gas and VOC destruction efficiency. Equation: VENT GAS MASS TO FLARE * VOC CONTENT (WT%) / 100 * (1-DRE). 5. SO2: Material balance based on mass of vent gas flared and sulfur content in vent gas to flare. Equation: VENT GAS MASS TO FLARE * S CONTENT (WT%) / 100 * MW SO2 / MW S. 6. PM-filt, PM-cond, Total HAPs (except n-hexane): AP-42, Chapter 1.4, "Natural Gas Combustion", 7/1998. Site-specific emission factors for HAPs to be developed after stack testing. 7. n-Hexane: 0.029 lb/MMBtu, Ventura County Air Pollution Control District, AB 2588 Combustion Emission Factors, May 17, 2001, Flares. VCAPCD AB2588 combem[2].pdf 8. CO2: Material balance based on mass of vent gas to flare, carbon content in vent gas to flare, and destruction efficiency. Equation: VENT GAS MASS TO FLARE * C CONTENT (WT%) / 100 * MW CO2 / MW C * DRE. 9. CH4: Material balance based on quantity of vent gas to flare, CH4 content of the vent gas to flare and CH4 destruction efficiency. Equation: VENT GAS MASS TO FLARE * CH4 CONTENT (WT%) / 100 * (1-DRE). 10. N2O: 40 CFR Part 98 Subpart C, Table C-2 emission factor for fuel gas. 11. Thermal Oxidizer DRE: 99.9% John Zink Design Specification, 1/4/2018.	PI Inputs 1. CVTO/MPGF Header 3 Vent Gas Mass (kg/hr) 2. MPGF Header 3 Vent Gas Mass (kg/hr) 3. CVTO/MPGF Header 3 Vent Gas Composition (% mol) 4. CVTO/ MPGF Header 3 Vent Gas Sulfur Content (% wt) Calculated/Miscellaneous Inputs 1. CVTO Vent Gas Mass: CVTO/MPGF Header 3 Vent Gas Mass – MPGF Header 3 Vent Gas Mass 2. Molecular Weight of CVTO/MPGF Header 3 Vent Gas: CVTO/MPGF Header 3 Vent Gas Composition and Standard Molecular Weight of Constituents. 3. HHV of CVTO/MPGF Header 3 Vent Gas: CVTO/MPGF Header 3 Vent Gas Composition and Standard Heat of Combustion for Constituents. 4. % Carbon by weight: CVTO/MPGF Header 3 Vent Gas Composition 5. Heat Input of CVTO Vent Gas: CVTO Vent Gas Mass and HHV of CVTO/MPGF Header 3
204: Low Pressure (LP) Header System Continuous Vent Thermal Oxidizer (CVTO) Primary Firing Fuel (Natural Gas)	1. NOx, 0.068 lb/MMBtu, John Zink Design Specification, 1/4/2018. Site-specific emission factors to be developed after stack testing. 2. CO: 0.0824 lb/MMBtu, John Zink Design Specification, 1/4/2018. Site-specific emission factors to be developed after stack testing. 3. PM10 and PM2.5: 0.0075 lb/MMBtu, John Zink Design Specification, 1/4/2018. Site-specific emission factors to be developed after stack testing. 4. PM-filt, PM-cond, VOC, Total HAPs (except n-hexane): AP-42, Chapter 1.4, "Natural Gas Combustion", 7/1998. Site-specific emission factors for HAPs to be developed after stack testing. 5. n-Hexane: 0.0046 lb/MMBtu, Ventura County Air Pollution Control District, AB 2588 Combustion Emission Factors, May 17, 2001, 10-100 MMBtu/hr). VCAPCD AB2588 combem[2].pdf 6. SO2: Material balance based on mass of natural gas combusted and sulfur content in natural gas. Equation: NG FUEL MASS * S CONTENT NG (WT%) / 100 * MW SO2 / MW S. 7. H2SO4: Multiplication of SO2 emissions and the SO3/SO2 Ratio of 5.7/142 based on the SO3 and SO2 emission factor for distillate oil in Table 1.3-1 of AP-42, Chapter 1.3, "Fuel Oil Combustion", 5/2010. 8. CO2: Material balance based on mass of natural gas combusted and carbon content in fuel. Equation: NG FUEL MASS * C CONTENT (WT%) / 100 * MW CO2 / MW C. 9. CH4: 40 CFR Part 98 Subpart C, Table C-2 emission factor for natural gas. 10. N2O: 40 CFR Part 98 Subpart C, Table C-2 emission factor for natural gas.	PI Inputs 1. Natural Gas Flow Rate (Nm3/hr) 2. Natural Gas HHV (Btu/scf), converted to Btu/lb using Natural Gas Density 3. Natural Gas Specific Gravity, density calculated assuming density of air at 1.2041 kg/Nm3 at 20 C and 1 atm (Normal) 4. Natural Gas Composition C1 – C6+ (%mol) 5. Natural Gas Sulfur (S) Content (ppmv), converted to wt %by assuming 16.92 ppmv per 1 grain/100 scf gas at 60F and 14.73 psia https://www.interline.nl/media/1000030/handbooksulfurmeasurements_002.pdf Calculated/Miscellaneous Inputs 1. Natural Gas Mass: Calculated using Natural Gas Flow Rate and Density of Natural Gas 2. Heat Rate (MMBtu/hr): Natural Gas Mass and Natural Gas HHV 1. Natural Gas Carbon (C) Content (wt%): Calculated based on Natural Gas Composition

Emission Source or Activity	Emissions Approach/Methodology	Data Inputs
204: Low Pressure (LP) Header System Continuous Vent Thermal Oxidizer (CVTO) Pilot (Natural Gas)	1. NOx, CO, PM-filt, PM-cond, PM10, PM2.5, VOC, Total HAPs (except n-hexane): AP-42, Chapter 1.4, "Natural Gas Combustion", 7/1998. 2. n-Hexane: 0.0063 lb/MMBtu, Ventura County Air Pollution Control District, AB 2588 Combustion Emission Factors, May 17, 2001, <10 MMBtu/hr. VCAPCD AB2588 combem[2].pdf 3. SO2: Material balance based on mass of natural gas combusted and sulfur content in natural gas. Equation: NG FUEL MASS * S CONTENT NG (WT%) / 100 * MW SO2 / MW S. 4. H2SO4: Multiplication of SO2 emissions and the SO3/SO2 Ratio of 5.7/142 based on the SO3 and SO2 emission factor for distillate oil in Table 1.3-1 of AP-42, Chapter 1.3, "Fuel Oil Combustion", 5/2010. 5. CO2: Material balance based on mass of natural gas combusted and carbon content in fuel. Equation: NG FUEL MASS * C CONTENT (WT%) / 100 * MW CO2 / MW C. 6. CH4: 40 CFR Part 98 Subpart C, Table C-2 emission factor for natural gas. 7. N2O: 40 CFR Part 98 Subpart C, Table C-2 emission factor for natural gas.	PI Inputs 1. Natural Gas HHV (Btu/scf), converted to Btu/lb using Natural Gas Density 2. Natural Gas Specific Gravity, density calculated assuming density of air at 1.2041 kg/Nm3 at 20 C and 1 atm (Normal) 3. Natural Gas Composition C1 – C6+ (%mol) 4. Natural Gas Sulfur (S) Content (ppmv) converted to wt % by assuming 16.92 ppmv per 1 grain/100 scf gas at 60F and 14.73 psia https://www.interline.nl/media/1000030/handbooksulfurmeasurements_002.pdf Calculated/Miscellaneous Inputs 1. Pilot Heat Rate: Constant at 0.5023 MMBtu/hr based on design specifications 2. Natural Gas Mass: Calculated using Pilot Heat Input, HHV of Natural Gas, and natural Gas Density 3. Natural Gas Carbon (C) Content (wt%): Calculated based on Natural Gas Composition
204: Low Pressure (LP) Header System Multipoint Ground Flare (MPGF) PE 1/PE 2 Episodic Vent Flaring (Supplemental gas added with vent gas if needed)	1. NOx and CO: AP-42, Chapter 13.5, "Industrial Flares", 2/2018. 2. VOC: Material balance based on quantity of vent gas flared, VOC content of the vent gas and VOC destruction efficiency. Equation: VENT GAS MASS TO FLARE * VOC CONTENT (WT%) / 100 * (1-DRE). 3. SO2: Material balance based on mass of vent gas flared and sulfur content in vent gas to flare. Equation: VENT GAS MASS TO FLARE * S CONTENT (WT%) / 100 * MW SO2 / MW S. 4. PM-filt, PM-cond, PM10, PM2.5, Total HAPs (except n-hexane): AP-42, Chapter 1.4, "Natural Gas Combustion", 7/1998. 5. n-Hexane: 0.029 lb/MMBtu, Ventura County Air Pollution Control District, AB 2588 Combustion Emission Factors, May 17, 2001, Flares. VCAPCD AB2588 combem[2].pdf 6. CO2: Material balance based on mass of vent gas to flare, carbon content in vent gas to flare, and destruction efficiency. Equation: VENT GAS MASS TO FLARE * C CONTENT (WT%) / 100 * MW CO2 / MW C * DRE. 7. CH4: Material balance based on quantity of vent gas to flare, CH4 content of the vent gas to flare and CH4 destruction efficiency. Equation: VENT GAS MASS TO FLARE * CH4 CONTENT (WT%) / 100 * (1-DRE). 8. N2O: 40 CFR Part 98 Subpart C, Table C-2 emission factor for fuel gas. 9. Flare DRE: 99% DRE for compounds containing three (3) or fewer carbon atoms and 98% for compounds with greater than three (3) carbon atoms, Texas Commission on Environmental Quality Air Permits Division, "New Source Review (NSR) Emission Calculations" (APD-ID 6v1, Revised March 2021).	PI Inputs 1. Vent Gas Mass to Flare – MPGF Header 1 (kg/hr) 2. Supplemental Natural Gas Flow to Flare (Nm3/hr), mixed with vent gas mass MPGF Header 1, converted to lbs/hr using natural gas specific gravity 3. Natural Gas Specific Gravity, density calculated assuming density of air at 1.2041 kg/Nm3 at 20 C and 1 atm (Normal) 4. Total Vent Gas to Flare Composition (% mol), includes supplemental natural gas 5. Total Vent Gas to Flare Sulfur Content (% wt), includes supplemental natural gas Calculated/Miscellaneous Inputs 1. Molecular Weight of Total Vent Gas to Flare: Total Vent Gas to Flare Composition and Standard Molecular Weight of Constituents 2. HHV of Total Vent Gas to Flare: Total Vent Gas to Flare Composition and Standard Heat of Combustion for Constituents 3. Supplemental Natural Gas Mass: Supplemental Natural Gas to Flare (Nm3/hr) and specific gravity of natural gas 4. Total Vent Gas Mass to Flare: Vent Gas Mass to Flare + Supplemental Natural Gas Mass 5. % Carbon by weight: Total Vent Gas to Flare Composition 6. Heat Input of Total Vent Gas to Flare: Total Vent Gas Mass to Flare and HHV of Vent Gas to Flare
204: Low Pressure (LP) Header System Multipoint Ground Flare (MPGF) Ethylene Storage Tank Vent Flaring	1. NOx and CO: AP-42, Chapter 13.5, "Industrial Flares", 2/2018. 2. VOC: Material balance based on quantity of vent gas flared, VOC content of the vent gas and VOC destruction efficiency. Equation: VENT GAS MASS TO FLARE * VOC CONTENT (WT%) / 100 * (1-DRE). 3. SO2: No Sulfur in Vent Gas. 4. PM-filt, PM-cond, PM10, PM2.5, Total HAPs (except n-hexane): AP-42, Chapter 1.4, "Natural Gas Combustion", 7/1998. 5. n-Hexane: 0.029 lb/MMBtu, Ventura County Air Pollution Control District, AB 2588 Combustion Emission Factors, May 17, 2001, Flares. VCAPCD AB2588 combem[2].pdf 6. CO2: Material balance based on mass of vent gas to flare, carbon content in vent gas to flare, and destruction efficiency. Equation: VENT GAS MASS TO FLARE * C CONTENT (WT%) / 100 * MW CO2 / MW C * DRE. 7. CH4: Material balance based on quantity of vent gas to flare, CH4 content of the vent gas to flare and CH4 destruction efficiency. Equation: VENT GAS MASS TO FLARE * CH4 CONTENT (WT%) / 100 * (1-DRE). 8. N2O: 40 CFR Part 98 Subpart C, Table C-2 emission factor for fuel gas. 9. Flare DRE: 99% DRE for compounds containing three (3) or fewer carbon atoms and 98% for compounds with greater than three (3) carbon atoms, Texas Commission on Environmental Quality Air Permits Division, "New Source Review (NSR) Emission Calculations" (APD-ID 6v1, Revised March 2021).	PI Inputs 1. Vent Gas Mass to Flare – MPGF Header 2 (kg/hr) Calculated/Miscellaneous Inputs 1. Composition is 100% ethylene 2. Flare DRE: 99% DRE for ethylene. Note: for initial startup (a portion of 9/2022 only), supplemental natural gas was used to ensure proper heating value of vent gas since it was mainly nitrogen. Additionally, an alternative method was utilized to account for the high amounts of nitrogen and one-time only use of natural gas.

Emission Source or Activity	Emissions Approach/Methodology	Data Inputs
204: Low Pressure (LP) Header System Multipoint Ground Flare (MPGF) Continuous Vent Thermal Oxidizer (CVTO) Trips	1. NOx and CO: AP-42, Chapter 13.5, "Industrial Flares", 2/2018. 2. VOC: Material balance based on quantity of vent gas flared, VOC content of the vent gas and VOC destruction efficiency. Equation: VENT GAS MASS TO FLARE * VOC CONTENT (WT%) / 100 * (1-DRE). 3. SO2: Material balance based on mass of vent gas flared and sulfur content in vent gas to flare. Equation: VENT GAS MASS TO FLARE * S CONTENT (WT%) / 100 * MW SO2 / MW S. 4. PM-filt, PM-cond, PM10, PM2.5, Total HAPs (except n-hexane): AP-42, Chapter 1.4, "Natural Gas Combustion", 7/1998. 5. n-Hexane: 0.029 lb/MMBtu, Ventura County Air Pollution Control District, AB 2588 Combustion Emission Factors, May 17, 2001, Flares. VCAPCD AB2588 combem[2].pdf 6. CO2: Material balance based on mass of vent gas to flare, carbon content in vent gas to flare, and destruction efficiency. Equation: VENT GAS MASS TO FLARE * C CONTENT (WT%) / 100 * MW CO2 / MW C * DRE. 7. CH4: Material balance based on quantity of vent gas to flare, CH4 content of the vent gas to flare and CH4 destruction efficiency. Equation: VENT GAS MASS TO FLARE * CH4 CONTENT (WT%) / 100 * (1-DRE). 8. N2O: 40 CFR Part 98 Subpart C, Table C-2 emission factor for fuel gas. 9. Flare DRE: 99% DRE for compounds containing three (3) or fewer carbon atoms and 98% for compounds with greater than three (3) carbon atom, , Texas Commission on Environmental Quality Air Permits Division, "New Source Review (NSR) Emission Calculations" (APD-ID 6v1, Revised March 2021).	PI Inputs 1. Vent Gas Mass to Flare – MPGF Header 3 (kg/hr) 2. CVTO/MPGF Header 3 Vent Gas to Flare Composition (% mol) 3. CVTO/MPGF Header 3 Vent Gas Sulfur Content (% wt) Calculated/Miscellaneous Inputs 1. Molecular Weight of CVTO/MPGF Header 3 Vent Gas: CVTO/MPGF Header 3 Vent Gas Composition and Standard Molecular Weight of Constituents. 2. HHV of CVTO/MPGF Header 3 Vent Gas: CVTO/MPGF Header 3 Vent Gas Composition and Standard Heat of Combustion for Constituents. 3. % Carbon by weight: CVTO/MPGF Header 3 Vent Gas Composition 4. Heat Input of Vent Gas to Flare: Vent Gas Mass to Flare and HHV of Vent Gas to Flare
204: Low Pressure (LP) Header System Multipoint Ground Flare (MPGF) Pilot (Natural Gas)	1. NOx, CO, PM-filt, PM-cond, PM10, PM2.5, VOC, Total HAPs (except n-hexane): AP-42, Chapter 1.4, "Natural Gas Combustion", 7/1998. 2. n-Hexane: 0.0063 lb/MMBtu, Ventura County Air Pollution Control District, AB 2588 Combustion Emission Factors, May 17, 2001, <10 MMBtu/hr. VCAPCD AB2588 combem[2].pdf 3. SO2: Material balance based on mass of natural gas combusted and sulfur content in natural gas. Equation: NG FUEL MASS * S CONTENT NG (WT%) / 100 * MW SO2 / MW S. 4. H2SO4: Multiplication of SO2 emissions and the SO3/SO2 Ratio of 5.7/142 based on the SO3 and SO2 emission factor for distillate oil in Table 1.3-1 of AP-42, Chapter 1.3, "Fuel Oil Combustion", 5/2010. 5. CO2: Material balance based on mass of natural gas combusted and carbon content in fuel. Equation: NG FUEL MASS * C CONTENT (WT%) / 100 * MW CO2 / MW C. 6. CH4: 40 CFR Part 98 Subpart C, Table C-2 emission factor for natural gas. 7. N2O: 40 CFR Part 98 Subpart C, Table C-2 emission factor for natural gas.	PI Inputs 1. Natural Gas HHV (Btu/scf), converted to Btu/lb using Natural Gas Density 2. Natural Gas Specific Gravity, density calculated assuming density of air at 1.2041 kg/Nm3 at 20 C and 1 atm (Normal) 3. Natural Gas Composition C1 – C6+ (%mol) 4. Natural Gas Sulfur (S) Content (ppmv) converted to wt % by assuming 16.92 ppmv per 1 grain/100 scf gas at 60F and 14.73 psia https://www.interline.nl/media/1000030/handbooksulfurmeasurements_002.pdf Calculated/Miscellaneous Inputs 1. Pilot Heat Rate. Constant at 2.47 MMBtu/hr based on design specifications. 2. Natural Gas Mass: Calculated using Pilot Heat Input, HHV of Natural Gas, and natural Gas Density 3. Natural Gas Carbon (C) Content (wt%): Calculated based on Natural Gas Composition

Emission Source or Activity	Emissions Approach/Methodology	Data Inputs
205: High Pressure (HP) Header System (Flares)	1. NOx and CO for Totally Enclosed Ground Flares (TEGFs) from Zeeco Manufacturer Data: a. NOx: 0.068 lb/MMBtu b. CO: 0.038 lb/MMBtu for Total Heat Input ≥ 8,396 MMBtu/hr; 0.2755 lb/MMBtu for Heat Input <8,396 MMBtu/hr 2. NOx and CO for Elevated Flare from Zeeco Manufacturer Data: a. NOx: 0.068 lb/MMBtu b. CO: 0.31 lb/MMBt 3. VOC: Material balance based on quantity of vent gas flared, VOC content of the vent gas and VOC destruction efficiency. Equation: VENT GAS MASS TO FLARE * VOC CONTENT (WT%) / 100 * (1-DRE). 4. SO2: Material balance based on mass of vent gas flared and sulfur content in vent gas to flare. Equation: VENT GAS MASS TO FLARE * S CONTENT (WT%) / 100 * MW SO2 / MW S. 5. PM-filt, PM-cond, PM10, PM2.5: AP-42, Chapter 1.4, "Natural Gas Combustion", 7/1998. 6. Total HAPs (except n-hexane) resulting from products of combustion: AP-42, Chapter 1.4, "Natural Gas Combustion", 7/1998. 7. n-Hexane resulting from products of combustion: 0.029 lb/MMBtu, Ventura County Air Pollution Control District, AB 2588 Combustion Emission Factors, May 17, 2001, Flares. VCAPCD AB2588 combem[2].pdf 8. HAPs in Waste Gas: Material balance based on vent gas mass to flare, continuous inline analyzer results for C4 olefin (to potentially include 1,3 butadiene) and C6+ (to potentially include benzene, toluene, ethylbenzene and n-hexane) and speciating using C3+ composition from lab analysis. Events are reviewed with Production Group to ensure accuracy of emissions based on the various activities. 9. CO2: Material balance based on mass of vent gas to flare, carbon content in vent gas to flare, and destruction efficiency. Equation: VENT GAS MASS TO FLARE * C CONTENT (WT%) / 100 * MW CO2 / MW C * DRE. 10. CH4: Material balance based on quantity of vent gas to flare, CH4 content of the vent gas to flare and CH4 destruction efficiency. Equation: VENT GAS MASS TO FLARE * CH4 CONTENT (WT%) / 100 * (1-DRE). 11. N2O: 40 CFR Part 98 Subpart C, Table C-2 emission factor for fuel gas. 12. Totally Enclosed Ground Flares (TEGFs) DRE: 99.55% based on a January 2023 diagnostic testing on TEGF B using Video Imaging Spectral Radiometer (FlareGuardian) technology. 13. Elevated Flare DRE: 99% DRE for compounds containing three (3) or fewer carbon atoms and 98% for compounds with greater than three (3) carbon atoms, , Texas Commission on Environmental Quality Air Permits Division, "New Source Review (NSR) Emission Calculations" (APD-ID 6v1, Revised March 2021).	PI Inputs 1. Vent Gas Flow to Flare (Actual m3/hr), includes Supplemental Natural Gas 2. Vent Gas to Flare Pressure (bar-g) 3. Vent Gas to Flare Temperature (C) 4. Vent Gas to Flare Composition (% mol), includes Supplemental Natural Gas from inline analyzer 5. Vent Gas to Flare Sulfur Content (% wt) Calculated/Miscellaneous Inputs 1. Molecular Weight of Vent Gas to Flare: Vent Gas to Flare Composition and Standard Molecular Weight of Constituents 2. HHV of Vent Gas to Flare: Vent Gas to Flare Composition and Standard Heat of Combustion for Constituents 3. Vent Gas to Flare Density: Molecular Weight, Pressure and Temperature of Vent Gas to Flare 4. Vent Gas Mass to Flare: Vent Gas Flow to Flare (actual m3/hr) and Vent Gas to Flare Density 5. % Carbon by weight and % H2 by weight: Vent Gas to Flare Composition 6. Heat Input of Vent Gas to Flare: Vent Gas Mass to Flare and HHV of Vent Gas to Flare
205: High Pressure (HP) Header System (Flares) • TGEF #1 Pilot • TGEF #2 Pilot • Elevated Flare Pilot	1. NOx, CO, PM-filt, PM-cond, PM10, PM2.5, VOC, Total HAPs (except n-hexane): AP-42, Chapter 1.4, "Natural Gas Combustion", 7/1998. 2. n-Hexane: 0.0063 lb/MMBtu, Ventura County Air Pollution Control District, AB 2588 Combustion Emission Factors, May 17, 2001, <10 MMBtu/hr. VCAPCD AB2588 combem[2].pdf 3. SO2: Material balance based on mass of natural gas combusted and sulfur content in natural gas. Equation: NG FUEL MASS * S CONTENT NG (WT%) / 100 * MW SO2 / MW S. 4. H2SO4: Multiplication of SO2 emissions and the SO3/SO2 Ratio of 5.7/142 based on the SO3 and SO2 emission factor for distillate oil in Table 1.3-1 of AP-42, Chapter 1.3, "Fuel Oil Combustion", 5/2010. 5. CO2: Material balance based on mass of natural gas combusted and carbon content in fuel. Equation: NG FUEL MASS * C CONTENT (WT%) / 100 * MW CO2 / MW C. 6. CH4: 40 CFR Part 98 Subpart C, Table C-2 emission factor for natural gas. 7. N2O: 40 CFR Part 98 Subpart C, Table C-2 emission factor for natural gas.	PI Inputs 1. Natural Gas HHV (Btu/scf) 2. Natural Gas Specific Gravity, density calculated assuming density of air at 1.2041 kg/Nm3 at 20 C and 1 atm (Normal) 3. Natural Gas Composition C1 – C6+ (%mol) 4. Natural Gas Sulfur (S) Content (ppmv) converted to wt % by assuming 16.92 ppmv per 1 grain/100 scf gas at 60F and 14.73 psia https://www.interline.nl/media/1000030/handbooksulfurmeasurements_002.pdf Calculated/Miscellaneous Inputs 1. Pilot Natural Gas Mass Combusted • TGEF #1 and #2: Constant at 1.105 MMBtu/hr per TGEF per design specifications. • Elevated Flare Pilot: Constant at 0.26 MMBtu/hr per design specifications] 2. Natural Gas Mass: Calculated using Pilot Heat Input, HHV of Natural Gas, and natural Gas Density 3. Natural Gas Carbon (C) Content (wt%): Calculated based on Natural Gas Composition

Emission Source or Activity	Emissions Approach/Methodology	Data Inputs
206: Spent Caustic Vent Header System Process Vents	1. NOx: 0.068 lb/MMBtu, John Zink Design Specification, 7/12/2017. Site-specific emission factors to be developed after stack testing. 2. CO: 0.0824 lb/MMBtu, John Zink Design Specification, 7/12/2017. Site-specific emission factors to be developed after stack testing. 3. PM10 and PM2.5: 0.0075 lb/MMBtu, John Zink Design Specification, 7/12/2017. Site-specific emission factors to be developed after stack testing. 4. VOC: 0.0303 lb/MMBtu based on 3.2 g/Nm3 VOC, design basis. [Feb. 2020 Update Plan Approval Application] 5. SO2: 0.0879 lb/MMBtu based on 0.05 g/Nm3 H2S, design basis. [Feb. 2020 Update Plan Approval Application] 6. H2SO4: Multiplication of SO2 emissions and the SO3/SO2 Ratio of 5.7/142 based on the SO3 and SO2 emission factor for distillate oil in Table 1.3-1 of AP-42, Chapter 1.3, "Fuel Oil Combustion", 5/2010. 7. PM-filt, PM-cond, Total HAPs (n-hexane): AP-42, Chapter 1.4, "Natural Gas Combustion", 7/1998. Site-specific emission factors for HAP to be developed after stack testing. 8. n-Hexane: 0.029 lb/MMBtu, Ventura County Air Pollution Control District, AB 2588 Combustion Emission Factors, May 17, 2001, Flares. VCAPCD AB2588 combem[2].pdf 9. CO2: 7.8 lb/MMBtu based on 8.4 g/Nm3 CO2, design basis. [Feb. 2020 Update Plan Approval Application] 10. CH4: 40 CFR Part 98 Subpart C, Table C-2 emission factor for natural gas. 11. N2O: 40 CFR Part 98 Subpart C, Table C-2 emission factor for natural gas. 12. Thermal Oxidizer DRE: 99.9% John Zink Design Specification, 7/12/2017.	Calculated/Miscellaneous Inputs 1. Heat Rate: 0.7 MMBtu/hr [Design Basis Heat Input from VOC]
206: Spent Caustic Vent Header System Primary Firing Fuel (Natural Gas)	1. NOx: 0.068 lb/MMBtu, John Zink Design Specification, 7/12/2017. Site-specific emission factors to be developed after stack testing. 2. CO: 0.0824 lb/MMBtu, John Zink Design Specification, 7/12/2017. Site-specific emission factors to be developed after stack testing. 3. PM10 and PM2.5: 0.0075 lb/MMBtu, John Zink Design Specification, 7/12/2017. Site-specific emission factors to be developed after stack testing. 4. PM-filt, PM-cond, VOC, Total HAPs (except n-hexane): AP-42, Chapter 1.4, "Natural Gas Combustion", 7/1998. Site-specific emission factors for HAP to be developed after stack testing, 5. n-Hexane: 0.0063 lb/MMBtu, Ventura County Air Pollution Control District, AB 2588 Combustion Emission Factors, May 17, 2001, <10 MMBtu/hr. VCAPCD AB2588 combem[2].pdf 6. SO2: Material balance based on mass of natural gas combusted and sulfur content in natural gas. Equation: NG FUEL MASS * S CONTENT NG (WT%) / 100 * MW SO2 / MW S. 7. H2SO4: Multiplication of SO2 emissions and the SO3/SO2 Ratio of 5.7/142 based on the SO3 and SO2 emission factor for distillate oil in Table 1.3-1 of AP-42, Chapter 1.3, "Fuel Oil Combustion", 5/2010. 8. CO2: Material balance based on mass of natural gas combusted and carbon content in fuel. Equation: NG FUEL MASS * C CONTENT (WT%) / 100 * MW CO2 / MW C. 9. CH4: 40 CFR Part 98 Subpart C, Table C-2 emission factor for natural gas. 10. N2O: 40 CFR Part 98 Subpart C, Table C-2 emission factor for natural gas.	PI Inputs 1. Natural Gas Flow Rate (Nm3/hr) 2. Natural Gas HHV (Btu/scf), converted to Btu/lb using Natural Gas Density 3. Natural Gas Specific Gravity, density calculated assuming density of air at 1.2041 kg/Nm3 at 20 C and 1 atm (Normal) 4. Natural Gas Composition C1 – C6+ (%mol) 5. Natural Gas Sulfur (S) Content (ppmv), converted to wt %by assuming 16.92 ppmv per 1 grain/100 scf gas at 60F and 14.73 psia https://www.interline.nl/media/1000030/handbooksulfurmeasurements_002.pdf Calculated/Miscellaneous Inputs 1. Natural Gas Mass: Calculated using Natural Gas Flow Rate and Density of Natural Gas 2. Heat Rate (MMBtu/hr): Natural Gas Mass and Natural Gas HHV 3. Natural Gas Carbon (C) Content (wt%): Calculated based on Natural Gas Composition
206: Spent Caustic Vent Header System Pilot (Natural Gas)	1. NOx, CO, PM-filt, PM-cond, PM10, PM2.5, VOC, Total HAPs (except n-hexane): AP-42, Chapter 1.4, "Natural Gas Combustion", 7/1998. 2. n-Hexane: 0.0063 lb/MMBtu, Ventura County Air Pollution Control District, AB 2588 Combustion Emission Factors, May 17, 2001, <10 MMBtu/hr. VCAPCD AB2588 combem[2].pdf 3. SO2: Material balance based on mass of natural gas combusted and sulfur content in natural gas. Equation: NG FUEL MASS * S CONTENT NG (WT%) / 100 * MW SO2 / MW S. 4. H2SO4: Multiplication of SO2 emissions and the SO3/SO2 Ratio of 5.7/142 based on the SO3 and SO2 emission factor for distillate oil in Table 1.3-1 of AP-42, Chapter 1.3, "Fuel Oil Combustion", 5/2010. 5. CO2: Material balance based on mass of natural gas combusted and carbon content in fuel. Equation: NG FUEL MASS * C CONTENT (WT%) / 100 * MW CO2 / MW C. 6. CH4: 40 CFR Part 98 Subpart C, Table C-2 emission factor for natural gas. 7. N2O: 40 CFR Part 98 Subpart C, Table C-2 emission factor for natural gas.	PI Inputs 1. Natural Gas HHV (Btu/scf), converted to Btu/lb using Natural Gas Density 2. Natural Gas Specific Gravity, density calculated assuming density of air at 1.2041 kg/Nm3 at 20 C and 1 atm (Normal) 3. Natural Gas Composition C1 – C6+ (%mol) 4. Natural Gas Sulfur (S) Content (ppmv) converted to wt % by assuming 16.92 ppmv per 1 grain/100 scf gas at 60F and 14.73 psia https://www.interline.nl/media/1000030/handbooksulfurmeasurements_002.pdf Calculated/Miscellaneous Inputs 1. Pilot Heat Rate. Constant at 0.5023 MMBtu/hr, per design specifications. 2. Natural Gas Mass: Calculated using Pilot Heat Input, HHV of Natural Gas, and natural Gas Density 3. Natural Gas Carbon (C) Content (wt%): Calculated based on Natural Gas Composition

Emission Source or Activity	Emissions Approach/Methodology	Data Inputs
104: Cogeneration Plant Cooling Tower	1. PM-filt: 0.0005% wt / 100 * Circulation Rate (gal/hr) x 8.34 lb/gal (water density) x TDS Correlation Factor (ppmx/uS/cm) x Conductivity (uS.cm) / 1000000 [Feb. 2020 Plan Approval Application] 2. PM-10 and PM2.5: 63.5% and 0.21 % wt fraction of PM-filt based on "Calculating Realistic PM10 Emissions from Cooling Towers"; Reisman & Frisbie [Feb. 2020 Plan Approval Application]	PI Inputs 1. Water conductivity 2. Water Discharge Flow 3. Water Make-up Flow Calculated/Miscellaneous Inputs 1. Cogen Cooling Water TDS Sampling Results 2. Circulation Rate = Discharge Flow plus Make-Up Flow
203: Process Cooling Tower	1. PM-filt: 0.0005% wt / 100 * Circulation Rate (gal/hr) x 8.34 lb/gal (water density) x TDS Correlation Factor (ppmx/uS/cm) x Conductivity (uS.cm) / 1000000 [Feb. 2020 Plan Approval Application] 2. PM10 and PM2.5: 63.5% and 0.21 % wt fraction of PM-filt based on "Calculating Realistic PM10 Emissions from Cooling Towers"; Reisman & Frisbie [Feb. 2020 Plan Approval Application] 3. VOC: Process Water VOC (ppmw)/1,000,000 * Circulation Rate (gal/hr) * 8.34 lb/gal (water density).	PI Inputs 1. Water conductivity 2. Water Discharge Flow 3. Water Make-up Flow Calculated/Miscellaneous Inputs 1. Circulation Rate = Discharge Flow plus Make-Up Flow 2. Process Cooling Water TDS Sampling Results 3. Process Cooling Water VOC Sampling Results
202:Polyethylene Manufacturing LInes	1. PM-Filt: Outlet Grain Loading and Flow Rate or Vendor Emissions Estimations to yield an tons/day rate.	PI Inputs 1. PE 1, PE 2, PE 3 Ethylene Feed Rates – used for operational time since ethylene feed is required to operate the unit and correlates directly to run time.
301: Polyethylene Pellet Material Storage, Handling and Loadout	2. PM-filt: Outlet Grain Loading and Flow Rate or Inlet Grain Loading, Control Efficiency (%) and Flow Rate (dscf/hr). 3. VOC: Periodic Sampling of VOC Headspace.	Calculated/Miscellaneous Inputs 1. Vendor-Provided Outlet Grain Loading and Flow Rate 2. Vendor-Provided Inlet Grain Loading and Control Efficiency and Flow Rate 3. Polyethylene mass produced at each reactor grade per sample
302: Liquid Loadout (Recovered Oil)	VOC, HAP: AP-42 Chapter 5.2, "Transportation and Marketing of Petroleum Liquids", 6/2008.	Calculated/Miscellaneous Inputs 1. Quantity of material loaded Stream composition data from engineering heat and material balance (wt% VOC, HAP, CH4
303: Liquid Loadout (Pyrolysis Fuel Oil, Light Gasoline)	VOC, HAP: Hose disconnect loss from TODO dry disconnect couple loss per disconnect manufacturer data.	PI Inputs 1. Truck Loading Connection Valve (Open/Close) Calculated/Miscellaneous Inputs 1. Manufacturer Hose Coupling Disconnect Factor (ml/disconnect)
304: Liquid Loadout (C3+, Butene, Isopentane, Isobutane, C3+ Ref)	VOC , HAP: Hose disconnect loss from TODO dry disconnect couple loss per disconnect manufacturer data.	PI Inputs 1. Truck Loading Connection Valve (Open/Close) Calculated/Miscellaneous Inputs 1. Manufacturer Hose Coupling Disconnect Factor (ml/disconnect)
305: Liquid Loadout (Coke Residue, Tar)	VOC, HAP: AP-42 Chapter 5.2, "Transportation and Marketing of Petroleum Liquids", 6/2008.	Calculated/Miscellaneous Inputs 2. Quantity of material loaded 3. Stream composition data from engineering heat and material balance (wt% VOC, HAP, CH4)
401-409: Storage Tanks	1. Non-diesel VOC and HAP: Controlled and accounted for in the flares. 2. Diesel VOC: VOC and HAP: AP-42 Chapter 7.1, "Organic Liquid Storage Tanks", 6/2020.	Calculated/Miscellaneous Inputs 1. Diesel fuel throughput
501: Equipment Components	1. VOC, CH4, HAP (unmonitored): EPA Protocol for Equipment Leak Emission Estimates Chapter 2.3 November 1995. SOCMI Average Emission Factors (lb/hr/src) * Equipment Type Count (src) * Chemical Composition (wt%VOC/CH4/HAP) * Operating Hours (hr). 2. VOC, CH4, HAP (monitored): EPA Protocol for Equipment Leak Emission Estimates Chapter 2.3 November 1995. SOCMI Leak Rate/Screening Value Correlation Equations, Leak Rate (lb) = Correlation Factor (lb/hr/src/ppm) * Screening Value Factor (ppm) * Equipment Type Count (src) * Chemical Composition (wt%VOC/CH4/HAP) * Operating Hours (hr).	Calculated/Miscellaneous Inputs 1. Monitored leak rates into LeakDAS (ppm) 2. Stream composition data from engineering heat and material balance (wt% VOC, HAP, CH4)

Emission Source or Activity	Emissions Approach/Methodology	Data Inputs
502: Wastewater Treatment Plant	USEPA Water9, Version 3 (or similar)	PI Inputs 1. Wastewater flow rate to Biotreaters A/B Calculated/Miscellaneous Inputs 1. Wastewater composition data from laboratories. 2. Various Water 9 Inputs on stream characteristics and unit dimensions/data provided by Operations.
503: Plant Roadways	PM-filt, PM10, PM2.5: AP-42, Chapter 13.2.1, "Paved Roads", 1/2011 using the following Equation: Emission Factor (lb/VMT) = k $(sL)^{0.91}$ $(W)^{1.02}$ (1 – P/(4*N)). • k = particle size multiplier = 0.011 for PM-filt, 0.0022 for PM10 and 0.00054 for PM2.5 [Table 13.2.1 AP-42] • SL = Road Surface Silt Content = 0.2 g/m3 [LAER per Feb.2020 Plan Approval Application] • W = Average Weight of Vehicle (tons) = 25 tons average [Feb.2020 Plan Approval Application] • P = Number of Days with rainfall greater than 0.01 inch = 150 days [Figure 13.2.1-2 AP-42] • N = Number of days in period.	Calculated/Miscellaneous Inputs 1. Number of Trips 2. Road Length
Building Utilities (Heat and Water) Natural Gas Combustion	1. NOx, CO, PM-filt, PM-cond, PM10, PM2.5, VOC, SO2, Total HAPs (except n-hexane): AP-42, Chapter 1.4, "Natural Gas Combustion", 7/1998. 2. n-Hexane: 0.0063 lb/MMBtu, Ventura County Air Pollution Control District, AB 2588 Combustion Emission Factors, May 17, 2001, <10 MMBtu/hr. VCAPCD AB2588 combem[2].pdf 3. H2SO4: Multiplication of SO2 emissions and the SO3/SO2 Ratio of 5.7/142 based on the SO3 and SO2 emission factor for distillate oil in Table 1.3-1 of AP-42, Chapter 1.3, "Fuel Oil Combustion", 5/2010. 4. CO2: 40 CFR Part 98 Subpart C, Table C-2 emission factor for natural gas. 5. CH4: 40 CFR Part 98 Subpart C, Table C-2 emission factor for natural gas. 6. N2O: 40 CFR Part 98 Subpart C, Table C-2 emission factor for natural gas.	Calculated/Miscellaneous Inputs 1. Natural Gas Consumption – Peoples Invoices

List of Malfunction Reports - HP Flare System
Shell Polymers Monaca
Date: March 20, 2023

E&R ID	Unit Implicated	Incident Description	Incident Start Date	Incident Start Time	Incident End Date	Incident End Time	Initially Reported to PADEP Date	Date Final Malfunction Report Sent to PADEP
MAL1	PE3	PE3 reactor blowdown due to pump failure	9/3/2022	15:40	9/4/2022	17:15	9/16/2022	10/4/2022
MAL2	ECU	TEGF visible emissions	9/6/2022	~7:30	9/24/2022	09:00	9/6/2022	9/20/2022
MAL4-a/b	ECU	ECU Demethanizer Cold Drum 3 Leak During Startup - Flaring and Flange Leak	9/8/2022	14:25	9/8/2022	22:45	9/16/2022	10/7/2022
MAL5-a/b	ECU	ECU Cold Flare Drum Inlet Flange Leak V-19031 During Startup - Flaring and Flange Leak	9/8/2022	22:45	9/10/2022	9:26	9/16/2022	10/7/2022
MAL6-a/b	ECU	ECU ERC and CGC trip during startup and Reestablishing previous conditions	9/10/2022	9:26	9/13/2022	15:10	9/16/2022	10/11/2022
MAL7-a/b	ECU	ECU CGC Trip of 4th stage level transmitter failure and reestablishing previous conditions	9/15/2022	23:05	9/18/2022	12:02	9/16/2022	10/16/2022
MAL8-a/b	ECU	ECU P3R Compressor Low Suction P Trip and reestablishing previous conditions	9/18/2022	12:02	9/21/2021	2:01	9/18/2022	10/20/2022
MAL9-a/b	ECU	ECU AC Reactor Trip due to Methanol Drum High Level and reestablishing previous conditions	9/21/2022	2:01	9/24/2022	22:40	9/21/2022	10/22/2022
MAL10	UGF	Visible Emissions from CVTO Trip	9/25/2022	15:30	9/25/2022	16:50	9/26/2022	Report not submitted
MAL12	PE	PE3 reactor blowdowns due to circulation pump seal leak (HP Flare)	10/2/2022	14:30	10/2/2022	17:00	N/A	11/2/2022
MAL13-a-c	ECU	ECU Offspec Ethylene (Plugged C2 Inlet Strainer) Outage - Shutdown/Restartup	10/5/2022	19:15	10/22/2022	14:00	10/6/2022	11/16/2022
MAL15	ECU	Ethylene Tank BOG Compressor A & B Malfunction	10/17/2022	16:30	11/25/2022	08:15	10/21/2022	11/17/2022
MAL16	ECU	TEGF Smoke Malfunction	10/22/2022	15:34	10/22/2022	17:15	10/24/2022	Report not submitted
MAL17	ECU	ECU AC Reactor Malfunction (Elevated Flare)	10/24/2022	14:30	10/26/2022	16:30	10/24/2022	11/25/2022
MAL18-a	ECU	Furnace 2 Excess NOx	10/22/2022	14:00	10/23/2022	03:00	11/7/2022	11/23/2022
MAL18-b	ECU	Furnace 6 Excess NOx	10/22/2022	14:00	10/23/2022	04:00	11/7/2022	11/23/2022
MAL18-c	ECU	Furnace 4 Excess NOx	10/31/2022	4:47	10/31/2022	11:00	11/7/2022	12/1/2022
MAL20	UGF	Cogen Unit 2 Nox	11/5/2022	22:16	11/5/2022	23:16	11/7/2022	12/7/2022
MAL20	UGF	Cogen Units 1, 2, 3 Nox	11/7/2022	9:30	11/7/2022	10:30	11/7/2022	12/7/2022
MAL20	UGF	Cogen Unit 3 Restart Nox	11/17/2022	15:00	11/17/2022	20:00	11/21/2022	12/7/2022
MAL23	ECU/UGF	Malodor from WWTP (PFO)	11/7/2022	TBD	12/13/2022	TBD	11/7/2022	1/13/2023
MAL21	ECU	ECU AC Reactor Malfunction (Ground Flare)	11/15/2022	22:50	11/16/2022	5:32	11/17/2022	12/16/2022
MAL22	ECU	ECU C2 Offspec (Ground Flare)	11/20/2022	02:59	11/20/2022	07:17	11/21/2022	12/19/2022
MAL19	ECU/UGF	ECU SHP Steam Loss (Cogen Trip) AC Rx Offspec (Ground Flare)	11/28/2022	15:03	11/29/2022	23:50	11/29/2022	12/8/2022
MAL25	PE2	MPGF (PE1/2 Episodic) Visible Emissions During PE2 SD	12/14/2022	07:45	12/14/2022	08:30	12/15/2022	1/13/2023
MAL27	Site	Boiler Feedwater Loss and Site Shutdown Flaring (Elevated Flare)	12/24/2022	07:05	12/24/2022	11:50	12/24/2022	2/6/2023
MAL28	UGF	Cogen Units 1, 2, 3 CO (Recurring/Ongoing)	12/21/2022	00:00	12/28/2022	10:00	12/27/2022	1/23/2023
MAL29	UGF	Cogen Unit 3 Nox SCR Heater Trip	12/23/2022	13:15	12/23/2022	18:00	12/27/2022	1/23/2023
MAL30	UGF	Cogen Unit 2 Nox (Restart after Trip)	12/24/2022	11:38	12/24/2022	15:25	12/27/2022	1/23/2023
MAL31	UGF	Cogen Unit 1 Nox (Startup)	12/24/2022	5:50	12/25/2022	11:00	12/27/2022	1/23/2023
MAL32	UGF	SCTO Trip on Low Fuel Pressure (Regulator)	1/4/2023	20:38	1/10/2023	12:00	1/6/2023	2/9/2023
MAL33	ECU	ECU Demethanizer Malfunction (Ground Flare)	1/20/2023	7:17	1/20/2023	11:28	1/20/2023	2/6/2023
MAL34	ECU/UGF	Malodor from WWTP	1/25/2023		2/16/2023		1/25/2023	Forthcoming
MAL35	ECU	Furnace Nox Ammonia System Failure	2/1/2023	9:35	2/1/2023	10:35	2/3/2023	3/2/2023

PAMS Concentration Data (Bi-weekly)

PAMS ID	DATE	RESULTS	UNITS	COMPOUND NAME	NOTES
1	2/1/2023	0.09	µg/m3	Naphthalene	
1	2/1/2023	0.14	µg/m3	1,3-Butadiene	
1	2/1/2023	0.64	µg/m3	Benzene	
1	2/1/2023	0.48	µg/m3	Toluene	
1	2/1/2023	0.40	µg/m3	n-Hexane	
1BLK	2/1/2023	0.07	µg/m3	Naphthalene	
1BLK	2/1/2023	0.14	µg/m3	1,3-Butadiene	
1BLK	2/1/2023	0.21	µg/m3	Benzene	
1BLK	2/1/2023	0.25	µg/m3	Toluene	
1BLK	2/1/2023	0.23	µg/m3	n-Hexane	
2	2/1/2023	0.07	µg/m3	Naphthalene	
2	2/1/2023	0.14	µg/m3	1,3-Butadiene	
2	2/1/2023	0.67	µg/m3	Benzene	
2	2/1/2023	0.40	µg/m3	Toluene	
2	2/1/2023	0.51	µg/m3	n-Hexane	
3	2/1/2023	0.07	µg/m3	Naphthalene	
3	2/1/2023	0.14	µg/m3	1,3-Butadiene	
3	2/1/2023	0.58	µg/m3	Benzene	
3	2/1/2023	0.36	µg/m3	Toluene	
3	2/1/2023	0.32	µg/m3	n-Hexane	
4	2/1/2023	0.07	µg/m3	Naphthalene	
4	2/1/2023	0.14	µg/m3	1,3-Butadiene	
4	2/1/2023	0.66	µg/m3	Benzene	
4	2/1/2023	0.43	µg/m3	Toluene	
4	2/1/2023	0.32	µg/m3	n-Hexane	
5	2/1/2023	0.07	µg/m3	Naphthalene	
5	2/1/2023	0.14	µg/m3	1,3-Butadiene	
5	2/1/2023	0.61	µg/m3	Benzene	
5	2/1/2023	0.41	µg/m3	Toluene	
5	2/1/2023	0.32	µg/m3	n-Hexane	
6	2/1/2023	0.07	µg/m3	Naphthalene	
6	2/1/2023	0.14	µg/m3	1,3-Butadiene	
6	2/1/2023	0.66	µg/m3	Benzene	
6	2/1/2023	0.42	µg/m3	Toluene	
6	2/1/2023	0.34	µg/m3	n-Hexane	
7	2/1/2023	0.07	µg/m3	Naphthalene	
7	2/1/2023	0.14	µg/m3	1,3-Butadiene	
7	2/1/2023	0.80	µg/m3	Benzene	
7	2/1/2023	0.75	µg/m3	Toluene	
7	2/1/2023	0.36	µg/m3	n-Hexane	
8	2/1/2023	0.08	µg/m3	Naphthalene	
8	2/1/2023	0.14	µg/m3	1,3-Butadiene	
8	2/1/2023	0.72	µg/m3	Benzene	
8	2/1/2023	0.67	µg/m3	Toluene	
8	2/1/2023	0.37	µg/m3	n-Hexane	
9	2/1/2023	0.07	µg/m3	Naphthalene	
9	2/1/2023	0.14	µg/m3	1,3-Butadiene	
9	2/1/2023	0.61	µg/m3	Benzene	
9	2/1/2023	0.42	µg/m3	Toluene	
9	2/1/2023	0.32	µg/m3	n-Hexane	
10	2/1/2023	0.07	µg/m3	Naphthalene	
10	2/1/2023	0.14	µg/m3	1,3-Butadiene	
10	2/1/2023	0.62	µg/m3	Benzene	
10	2/1/2023	0.50	µg/m3	Toluene	
10	2/1/2023	0.35	µg/m3	n-Hexane	
11	2/1/2023	0.07	µg/m3	Naphthalene	
11	2/1/2023	0.14	µg/m3	1,3-Butadiene	
11	2/1/2023	0.66	µg/m3	Benzene	
11	2/1/2023	0.52	µg/m3	Toluene	
11	2/1/2023	0.31	µg/m3	n-Hexane	
11DUP	2/1/2023	0.08	µg/m3	Naphthalene	
11DUP	2/1/2023	0.14	µg/m3	1,3-Butadiene	
11DUP	2/1/2023	0.64	µg/m3	Benzene	

PAMS Concentration Data (Bi-weekly)

PAMS ID	DATE	RESULTS	UNITS	COMPOUND NAME	NOTES
11DUP	2/1/2023	0.47	µg/m3	Toluene	
11DUP	2/1/2023	0.27	µg/m3	n-Hexane	
12	2/1/2023	0.08	µg/m3	Naphthalene	
12	2/1/2023	0.14	µg/m3	1,3-Butadiene	
12	2/1/2023	0.80	µg/m3	Benzene	
12	2/1/2023	0.67	µg/m3	Toluene	
12	2/1/2023	0.28	µg/m3	n-Hexane	
12BLK	2/1/2023	0.07	µg/m3	Naphthalene	
12BLK	2/1/2023	0.14	µg/m3	1,3-Butadiene	
12BLK	2/1/2023	0.20	µg/m3	Benzene	
12BLK	2/1/2023	0.25	µg/m3	Toluene	
12BLK	2/1/2023	0.23	µg/m3	n-Hexane	
13	2/1/2023	0.07	µg/m3	Naphthalene	
13	2/1/2023	0.14	µg/m3	1,3-Butadiene	
13	2/1/2023	0.64	µg/m3	Benzene	
13	2/1/2023	0.42	µg/m3	Toluene	
13	2/1/2023	0.28	µg/m3	n-Hexane	
14	2/1/2023	0.07	µg/m3	Naphthalene	
14	2/1/2023	0.14	µg/m3	1,3-Butadiene	
14	2/1/2023	0.61	µg/m3	Benzene	
14	2/1/2023	0.47	µg/m3	Toluene	
14	2/1/2023	0.25	µg/m3	n-Hexane	
14DUP	2/1/2023	0.07	µg/m3	Naphthalene	
14DUP	2/1/2023	0.14	µg/m3	1,3-Butadiene	
14DUP	2/1/2023	0.60	µg/m3	Benzene	
14DUP	2/1/2023	0.47	µg/m3	Toluene	
14DUP	2/1/2023	0.26	µg/m3	n-Hexane	
15	2/1/2023	0.07	µg/m3	Naphthalene	
15	2/1/2023	0.14	µg/m3	1,3-Butadiene	
15	2/1/2023	0.72	µg/m3	Benzene	
15	2/1/2023	0.56	µg/m3	Toluene	
15	2/1/2023	0.28	µg/m3	n-Hexane	
16	2/1/2023	0.07	µg/m3	Naphthalene	
16	2/1/2023	0.14	µg/m3	1,3-Butadiene	
16	2/1/2023	0.75	µg/m3	Benzene	
16	2/1/2023	0.50	µg/m3	Toluene	
16	2/1/2023	0.31	µg/m3	n-Hexane	
17	2/1/2023	0.07	µg/m3	Naphthalene	
17	2/1/2023	0.14	µg/m3	1,3-Butadiene	
17	2/1/2023	0.68	µg/m3	Benzene	
17	2/1/2023	0.44	µg/m3	Toluene	
17	2/1/2023	0.29	µg/m3	n-Hexane	
18	2/1/2023	0.07	µg/m3	Naphthalene	
18	2/1/2023	0.14	µg/m3	1,3-Butadiene	
18	2/1/2023	0.66	µg/m3	Benzene	
18	2/1/2023	0.48	µg/m3	Toluene	
18	2/1/2023	0.34	µg/m3	n-Hexane	
19	2/1/2023	0.07	µg/m3	Naphthalene	
19	2/1/2023	0.14	µg/m3	1,3-Butadiene	
19	2/1/2023	0.75	µg/m3	Benzene	
19	2/1/2023	0.54	µg/m3	Toluene	
19	2/1/2023	0.38	µg/m3	n-Hexane	
20	2/1/2023	0.07	µg/m3	Naphthalene	
20	2/1/2023	0.14	µg/m3	1,3-Butadiene	
20	2/1/2023	0.58	µg/m3	Benzene	
20	2/1/2023	0.44	µg/m3	Toluene	
20	2/1/2023	0.33	µg/m3	n-Hexane	

High Benzene Reading:	0.8
Low Benzene Reading:	0.58
Benzene Action Level:	9.0
Action Threshold Exceeded (Y/N):	N

PAMS Concentration Data (Bi-weekly)

PAMS ID	DATE	RESULTS	UNITS	COMPOUND NAME	NOTES
1	2/15/2023	0.08	μg/m3	Naphthalene	
1	2/15/2023	0.14	μg/m3	1,3-Butadiene	
1	2/15/2023	0.71	μg/m3	Benzene	
1	2/15/2023	0.74	μg/m3	Toluene	
1	2/15/2023	0.48	μg/m3	n-Hexane	
1BLK	2/15/2023	0.07	μg/m3	Naphthalene	
1BLK	2/15/2023	0.14	μg/m3	1,3-Butadiene	
1BLK	2/15/2023	0.19	μg/m3	Benzene	
1BLK	2/15/2023	0.25	μg/m3	Toluene	
1BLK	2/15/2023	0.23	μg/m3	n-Hexane	
2	2/15/2023	0.07	μg/m3	Naphthalene	
2	2/15/2023	0.14	μg/m3	1,3-Butadiene	
2	2/15/2023	0.85	μg/m3	Benzene	
2	2/15/2023	0.69	μg/m3	Toluene	
2	2/15/2023	0.53	μg/m3	n-Hexane	
3	2/15/2023	0.07	μg/m3	Naphthalene	
3	2/15/2023	0.14	μg/m3	1,3-Butadiene	
3	2/15/2023	0.65	μg/m3	Benzene	
3	2/15/2023	0.62	μg/m3	Toluene	
3	2/15/2023	0.42	μg/m3	n-Hexane	
4	2/15/2023	0.07	μg/m3	Naphthalene	
4	2/15/2023	0.14	μg/m3	1,3-Butadiene	
4	2/15/2023	0.66	μg/m3	Benzene	
4	2/15/2023	0.60	μg/m3	Toluene	
4	2/15/2023	0.37	μg/m3	n-Hexane	
5	2/15/2023	0.07	μg/m3	Naphthalene	
5	2/15/2023	0.14	μg/m3	1,3-Butadiene	
5	2/15/2023	0.72	μg/m3	Benzene	
5	2/15/2023	0.59	μg/m3	Toluene	
5	2/15/2023	0.40	μg/m3	n-Hexane	
6	2/15/2023	0.07	μg/m3	Naphthalene	
6	2/15/2023	0.14	μg/m3	1,3-Butadiene	
6	2/15/2023	0.60	μg/m3	Benzene	
6	2/15/2023	0.58	μg/m3	Toluene	
6	2/15/2023	0.37	μg/m3	n-Hexane	
7	2/15/2023	0.07	μg/m3	Naphthalene	
7	2/15/2023	0.14	μg/m3	1,3-Butadiene	
7	2/15/2023	0.78	μg/m3	Benzene	
7	2/15/2023	0.95	μg/m3	Toluene	
7	2/15/2023	0.43	μg/m3	n-Hexane	
8	2/15/2023	0.07	μg/m3	Naphthalene	
8	2/15/2023	0.14	μg/m3	1,3-Butadiene	
8	2/15/2023	0.72	μg/m3	Benzene	
8	2/15/2023	0.83	μg/m3	Toluene	
8	2/15/2023	0.42	μg/m3	n-Hexane	
9	2/15/2023	0.08	μg/m3	Naphthalene	
9	2/15/2023	0.14	μg/m3	1,3-Butadiene	
9	2/15/2023	0.65	μg/m3	Benzene	
9	2/15/2023	0.68	μg/m3	Toluene	
9	2/15/2023	0.38	μg/m3	n-Hexane	
10	2/15/2023	0.07	μg/m3	Naphthalene	
10	2/15/2023	0.14	μg/m3	1,3-Butadiene	
10	2/15/2023	1.8	μg/m3	Benzene	
10	2/15/2023	1.8	μg/m3	Toluene	
10	2/15/2023	0.70	μg/m3	n-Hexane	
11	2/15/2023	0.07	μg/m3	Naphthalene	
11	2/15/2023	0.14	μg/m3	1,3-Butadiene	
11	2/15/2023	5.7	μg/m3	Benzene	
11	2/15/2023	4.7	μg/m3	Toluene	
11	2/15/2023	0.35	μg/m3	n-Hexane	
11DUP	2/15/2023	0.08	μg/m3	Naphthalene	
11DUP	2/15/2023	0.14	μg/m3	1,3-Butadiene	
11DUP	2/15/2023	5.8	μg/m3	Benzene	

PAMS Concentration Data (Bi-weekly)

PAMS ID	DATE	RESULTS	UNITS	COMPOUND NAME	NOTES
11DUP	2/15/2023	4.8	µg/m3	Toluene	
11DUP	2/15/2023	0.36	µg/m3	n-Hexane	
12	2/15/2023	0.13	µg/m3	Naphthalene	
12	2/15/2023	0.47	µg/m3	1,3-Butadiene	
12	2/15/2023	35	µg/m3	Benzene	*See Field Investigation Below
12	2/15/2023	30	µg/m3	Toluene	
12	2/15/2023	0.34	µg/m3	n-Hexane	
12BLK	2/15/2023	0.07	µg/m3	Naphthalene	
12BLK	2/15/2023	0.14	µg/m3	1,3-Butadiene	
12BLK	2/15/2023	0.19	µg/m3	Benzene	
12BLK	2/15/2023	0.25	µg/m3	Toluene	
12BLK	2/15/2023	0.23	µg/m3	n-Hexane	
13	2/15/2023	0.07	µg/m3	Naphthalene	
13	2/15/2023	0.14	µg/m3	1,3-Butadiene	
13	2/15/2023	0.71	µg/m3	Benzene	
13	2/15/2023	0.68	µg/m3	Toluene	
13	2/15/2023	0.34	µg/m3	n-Hexane	
14	2/15/2023	0.07	µg/m3	Naphthalene	
14	2/15/2023	0.14	µg/m3	1,3-Butadiene	
14	2/15/2023	0.96	µg/m3	Benzene	
14	2/15/2023	0.87	µg/m3	Toluene	
14	2/15/2023	0.35	µg/m3	n-Hexane	
14DUP	2/15/2023	0.08	µg/m3	Naphthalene	
14DUP	2/15/2023	0.14	µg/m3	1,3-Butadiene	
14DUP	2/15/2023	0.80	µg/m3	Benzene	
14DUP	2/15/2023	0.81	µg/m3	Toluene	
14DUP	2/15/2023	0.33	µg/m3	n-Hexane	
15	2/15/2023	0.08	µg/m3	Naphthalene	
15	2/15/2023	0.14	µg/m3	1,3-Butadiene	
15	2/15/2023	4.0	µg/m3	Benzene	
15	2/15/2023	3.8	µg/m3	Toluene	
15	2/15/2023	0.33	µg/m3	n-Hexane	
16	2/15/2023	0.08	µg/m3	Naphthalene	
16	2/15/2023	0.16	µg/m3	1,3-Butadiene	
16	2/15/2023	1.9	µg/m3	Benzene	
16	2/15/2023	1.9	µg/m3	Toluene	
16	2/15/2023	0.37	µg/m3	n-Hexane	
17	2/15/2023	0.08	µg/m3	Naphthalene	
17	2/15/2023	0.14	µg/m3	1,3-Butadiene	
17	2/15/2023	1.2	µg/m3	Benzene	
17	2/15/2023	1.2	µg/m3	Toluene	
17	2/15/2023	0.34	µg/m3	n-Hexane	
18	2/15/2023	0.08	µg/m3	Naphthalene	
18	2/15/2023	0.14	µg/m3	1,3-Butadiene	
18	2/15/2023	1.2	µg/m3	Benzene	
18	2/15/2023	1.1	µg/m3	Toluene	
18	2/15/2023	0.38	µg/m3	n-Hexane	
19	2/15/2023	0.07	µg/m3	Naphthalene	
19	2/15/2023	0.14	µg/m3	1,3-Butadiene	
19	2/15/2023	0.88	µg/m3	Benzene	
19	2/15/2023	0.88	µg/m3	Toluene	
19	2/15/2023	0.44	µg/m3	n-Hexane	
20	2/15/2023	0.09	µg/m3	Naphthalene	
20	2/15/2023	0.14	µg/m3	1,3-Butadiene	
20	2/15/2023	0.72	µg/m3	Benzene	
20	2/15/2023	1.2	µg/m3	Toluene	
20	2/15/2023	0.92	µg/m3	n-Hexane	

High Benzene Reading µg/m3:	35
High Benzene Reading ppmv:	10.96
Low Benzene Reading µg/m3:	0.60
Benzene Action Level µg/m3:	9.0
Action Threshold Exceeded (Y/N):	Y

PAMS Concentration Data (Bi-weekly)

PAMS ID	DATE	RESULTS	UNITS	COMPOUND NAME	NOTES
*Field Investigation	* Benzene was detected above the Action Level of 9 µg/m3, in the biotreater area. This area is in the upwind direction, and benzene was not detected above the Action Level in any of the downwind sample locations. Corrective action to the biotreater system has been implemented.				

PAMS Concentration Data (Bi-weekly)

PAMS ID	DATE	RESULTS	UNITS	COMPOUND NAME	NOTES
1	3/1/2023	0.07	µg/m3	Naphthalene	
1	3/1/2023	0.14	µg/m3	1,3-Butadiene	
1	3/1/2023	0.68	µg/m3	Benzene	
1	3/1/2023	0.61	µg/m3	Toluene	
1	3/1/2023	0.36	µg/m3	n-Hexane	
1BLK	3/1/2023	0.07	µg/m3	Naphthalene	
1BLK	3/1/2023	0.14	µg/m3	1,3-Butadiene	
1BLK	3/1/2023	0.19	µg/m3	Benzene	
1BLK	3/1/2023	0.25	µg/m3	Toluene	
1BLK	3/1/2023	0.23	µg/m3	n-Hexane	
2	3/1/2023	0.07	µg/m3	Naphthalene	
2	3/1/2023	0.14	µg/m3	1,3-Butadiene	
2	3/1/2023	0.57	µg/m3	Benzene	
2	3/1/2023	0.51	µg/m3	Toluene	
2	3/1/2023	0.32	µg/m3	n-Hexane	
3	3/1/2023	0.07	µg/m3	Naphthalene	
3	3/1/2023	0.14	µg/m3	1,3-Butadiene	
3	3/1/2023	0.57	µg/m3	Benzene	
3	3/1/2023	0.48	µg/m3	Toluene	
3	3/1/2023	0.36	µg/m3	n-Hexane	
4	3/1/2023	0.07	µg/m3	Naphthalene	
4	3/1/2023	0.14	µg/m3	1,3-Butadiene	
4	3/1/2023	0.72	µg/m3	Benzene	
4	3/1/2023	0.49	µg/m3	Toluene	
4	3/1/2023	0.32	µg/m3	n-Hexane	
5	3/1/2023	0.07	µg/m3	Naphthalene	
5	3/1/2023	0.14	µg/m3	1,3-Butadiene	
5	3/1/2023	0.67	µg/m3	Benzene	
5	3/1/2023	0.44	µg/m3	Toluene	
5	3/1/2023	0.29	µg/m3	n-Hexane	
6	3/1/2023	0.07	µg/m3	Naphthalene	
6	3/1/2023	0.14	µg/m3	1,3-Butadiene	
6	3/1/2023	0.65	µg/m3	Benzene	
6	3/1/2023	0.44	µg/m3	Toluene	
6	3/1/2023	0.29	µg/m3	n-Hexane	
7	3/1/2023	0.07	µg/m3	Naphthalene	
7	3/1/2023	0.14	µg/m3	1,3-Butadiene	
7	3/1/2023	0.61	µg/m3	Benzene	
7	3/1/2023	0.60	µg/m3	Toluene	
7	3/1/2023	0.27	µg/m3	n-Hexane	
8	3/1/2023	0.07	µg/m3	Naphthalene	
8	3/1/2023	0.14	µg/m3	1,3-Butadiene	
8	3/1/2023	0.75	µg/m3	Benzene	
8	3/1/2023	0.75	µg/m3	Toluene	
8	3/1/2023	0.33	µg/m3	n-Hexane	
9	3/1/2023	0.07	µg/m3	Naphthalene	
9	3/1/2023	0.14	µg/m3	1,3-Butadiene	
9	3/1/2023	0.69	µg/m3	Benzene	
9	3/1/2023	0.55	µg/m3	Toluene	
9	3/1/2023	0.29	µg/m3	n-Hexane	
10	3/1/2023	0.07	µg/m3	Naphthalene	
10	3/1/2023	0.14	µg/m3	1,3-Butadiene	
10	3/1/2023	0.80	µg/m3	Benzene	
10	3/1/2023	0.84	µg/m3	Toluene	
10	3/1/2023	0.42	µg/m3	n-Hexane	
11	3/1/2023	0.07	µg/m3	Naphthalene	
11	3/1/2023	0.14	µg/m3	1,3-Butadiene	
11	3/1/2023	0.86	µg/m3	Benzene	
11	3/1/2023	0.72	µg/m3	Toluene	
11	3/1/2023	0.25	µg/m3	n-Hexane	
11DUP	3/1/2023	0.07	µg/m3	Naphthalene	
11DUP	3/1/2023	0.14	µg/m3	1,3-Butadiene	
11DUP	3/1/2023	0.95	µg/m3	Benzene	

PAMS Concentration Data (Bi-weekly)

PAMS ID	DATE	RESULTS	UNITS	COMPOUND NAME	NOTES
11DUP	3/1/2023	0.75	µg/m3	Toluene	
11DUP	3/1/2023	0.28	µg/m3	n-Hexane	
12	3/1/2023	0.07	µg/m3	Naphthalene	
12	3/1/2023	0.14	µg/m3	1,3-Butadiene	
12	3/1/2023	1.3	µg/m3	Benzene	
12	3/1/2023	1.0	µg/m3	Toluene	
12	3/1/2023	0.23	µg/m3	n-Hexane	
12BLK	3/1/2023	0.07	µg/m3	Naphthalene	
12BLK	3/1/2023	0.14	µg/m3	1,3-Butadiene	
12BLK	3/1/2023	0.19	µg/m3	Benzene	
12BLK	3/1/2023	0.25	µg/m3	Toluene	
12BLK	3/1/2023	0.23	µg/m3	n-Hexane	
13	3/1/2023	0.07	µg/m3	Naphthalene	
13	3/1/2023	0.14	µg/m3	1,3-Butadiene	
13	3/1/2023	0.67	µg/m3	Benzene	
13	3/1/2023	0.46	µg/m3	Toluene	
13	3/1/2023	0.24	µg/m3	n-Hexane	
14	3/1/2023	0.07	µg/m3	Naphthalene	
14	3/1/2023	0.14	µg/m3	1,3-Butadiene	
14	3/1/2023	0.60	µg/m3	Benzene	
14	3/1/2023	0.52	µg/m3	Toluene	
14	3/1/2023	0.26	µg/m3	n-Hexane	
14DUP	3/1/2023	0.07	µg/m3	Naphthalene	
14DUP	3/1/2023	0.14	µg/m3	1,3-Butadiene	
14DUP	3/1/2023	0.64	µg/m3	Benzene	
14DUP	3/1/2023	0.48	µg/m3	Toluene	
14DUP	3/1/2023	0.26	µg/m3	n-Hexane	
15	3/1/2023	0.07	µg/m3	Naphthalene	
15	3/1/2023	0.14	µg/m3	1,3-Butadiene	
15	3/1/2023	0.79	µg/m3	Benzene	
15	3/1/2023	0.71	µg/m3	Toluene	
15	3/1/2023	0.26	µg/m3	n-Hexane	
16	3/1/2023	0.07	µg/m3	Naphthalene	
16	3/1/2023	0.14	µg/m3	1,3-Butadiene	
16	3/1/2023	0.70	µg/m3	Benzene	
16	3/1/2023	0.56	µg/m3	Toluene	
16	3/1/2023	0.28	µg/m3	n-Hexane	
17	3/1/2023	0.07	µg/m3	Naphthalene	
17	3/1/2023	0.14	µg/m3	1,3-Butadiene	
17	3/1/2023	0.80	µg/m3	Benzene	
17	3/1/2023	1.0	µg/m3	Toluene	
17	3/1/2023	0.31	µg/m3	n-Hexane	
18	3/1/2023	0.07	µg/m3	Naphthalene	
18	3/1/2023	0.14	µg/m3	1,3-Butadiene	
18	3/1/2023	0.70	µg/m3	Benzene	
18	3/1/2023	0.56	µg/m3	Toluene	
18	3/1/2023	0.31	µg/m3	n-Hexane	
19	3/1/2023	0.07	µg/m3	Naphthalene	
19	3/1/2023	0.14	µg/m3	1,3-Butadiene	
19	3/1/2023	0.70	µg/m3	Benzene	
19	3/1/2023	0.55	µg/m3	Toluene	
19	3/1/2023	0.30	µg/m3	n-Hexane	
20	3/1/2023	0.07	µg/m3	Naphthalene	
20	3/1/2023	0.14	µg/m3	1,3-Butadiene	
20	3/1/2023	0.72	µg/m3	Benzene	
20	3/1/2023	0.66	µg/m3	Toluene	
20	3/1/2023	0.30	µg/m3	n-Hexane	

High Benzene Reading µg/m3:	1.3
High Benzene Reading ppmv:	0.00039
Low Benzene Reading µg/m3:	0.57
Benzene Action Level µg/m3:	9.0
Action Threshold Exceeded (Y/N):	N

Summa Canister Laboratory Analytical Results

Date	CAMS	Benzene results ppbv	1,3-Butadiene results ppbv	Toluene results ppbv	Hexane results ppbv	Naphthalene results ppbv
2/1/2023	CAMS 010	0.15	0	0.49	0	0
2/1/2023	CAMS 020	0.17	0	0.69	0	0
2/1/2023	CAMS 040	0.18	0	0.21	0	0
2/2/2023	CAMS 010	0.17	0	0.18	0	0
2/2/2023	CAMS 020	0.18	0	0.25	0	0
2/2/2023	CAMS 040	0.17	0	0.55	0	0
2/3/2023	CAMS 010	0.13	0	0.15	0	0
2/3/2023	CAMS 020	0.15	0	0.2	0	0
2/3/2023	CAMS 040	0.14	0	0.15	0	0
2/6/2023	CAMS 010	0.11	0	0	0	0
2/6/2023	CAMS 020	0.15	0	0.2	0	0
2/6/2023	CAMS 040	0.15	0	0.16	0	0
2/7/2023	CAMS 010	0.14	0	0.21	0	0
2/7/2023	CAMS 020	0.17	0	0.19	0	0
2/7/2023	CAMS 040	0.14	0	0.14	0	0
2/8/2023	CAMS 010	0.14	0	0.22	0	0
2/8/2023	CAMS 020	0.13	0	0.15	0	0
2/8/2023	CAMS 040	0.12	0	0.13	0	0
2/9/2023	CAMS 010	0.42	0	0.67	0	0
2/9/2023	CAMS 020	0.43	0	0.56	0	0
2/9/2023	CAMS 040	0.24	0	0.3	0	0
2/10/2023	CAMS 010	0.19	0	0.41	0	0
2/10/2023	CAMS 020	0.14	0	0.18	0	0
2/10/2023	CAMS 040	0.11	0	0.14	0	0
2/13/2023	CAMS 010	0.24	0	0.62	0	0
2/13/2023	CAMS 020	0.19	0	0.24	0	0
2/13/2023	CAMS 040	0.18	0	0.19	0	0
2/14/2023	CAMS 010	0.16	0	0.28	0	0
2/14/2023	CAMS 020	0.15	0	0.17	0	0
2/14/2023	CAMS 040	0.15	0	0.15	0	0
2/15/2023	CAMS 010	0.14	0	0.17	0	0
2/15/2023	CAMS 020	0	0	0	0	0
2/15/2023	CAMS 040	0	0	0	0	0
2/16/2023	CAMS 010	0.25	0	0.38	0	0
2/16/2023	CAMS 020	0.22	0	0.32	0	0
2/16/2023	CAMS 040	0.18	0	0.25	0	0
2/17/2023	CAMS 010	0.16	0	0.31	0	0
2/17/2023	CAMS 020	0.12	0	0.13	0	0
2/17/2023	CAMS 040	0.12	0	0.12	0	0

2/21/2023	CAMS 010	0.19	0	0.27	0	0
2/21/2023	CAMS 020	0.14	0	0.19	0	0
2/21/2023	CAMS 040	0.12	0	0.15	0	0
2/22/2023	CAMS 010	0.17	0	0.22	0	0
2/22/2023	CAMS 020	0.14	0	0.21	0	0
2/22/2023	CAMS 040	0.13	0	0.12	0	0
2/23/2023	CAMS 010	0	0	0.17	0	0
2/23/2023	CAMS 020	0	0	0.15	0	0
2/23/2023	CAMS 040	0	0	0	0	0
2/24/2023	CAMS 010	0.12	0	0.12	0	0
2/24/2023	CAMS 020	0.11	0	0.11	0	0
2/24/2023	CAMS 040	0.11	0	0	0	0
2/27/2023	CAMS 010	0.29	0	0.4	0	0
2/27/2023	CAMS 020	0.32	0	0.46	0	0
2/27/2023	CAMS 040	0.34	0	0.4	0	0