COMMONWEALTH OF PENNSYLVANIA **MEMO**
Department of Environmental Protection
Southwest Regional Office

TO Air Quality Permit File PA-04-00740C

FROM Melissa L. Jativa/MLJ
Environmental Engineering Specialist
Air Quality Program

THROUGH Edward F. Orris, P.E./MRG for EFO
Environmental Engineer Manager
Air Quality Program

Mark R. Gorog, P.E./MRG
Program Manager
Air Quality Program

DATE September 22, 2020

RE Plan Approval Application
Shell Chemical Appalachia LLC
Shell Polymers Monaca Site
Potter and Center Townships, Beaver County
APS # 1011255, Auth # 1305377, PF # 775836

BACKGROUND

Shell Chemical Appalachia LLC ("Shell") submitted a plan approval application received by the Pennsylvania Department of Environmental Protection ("Department") on February 14, 2020, for "as-built" changes in design and construction associated with the Shell Polymers Monaca Site to be located in Potter and Center Townships, Beaver County. "As-built" changes in design and construction are common in large scale construction projects such as the Shell facility. The changes proposed in this plan approval include minor equipment additions, removal and downsizing of equipment permitted, and increases and decreases in the unit capacities of some equipment. This site has historically been used for industrial purposes and is located on the southern bank of the Ohio River approximately 2.5 miles southwest of the town of Monaca. Shell is requesting the following changes under PA-04-00740C authorization at this site:

Equipment Additions:

- Source ID 105: Two (2) diesel-fired emergency engines (103 bhp and 67 bhp)
- Source ID 107: Three (3) natural gas-fired emergency engines (158 bhp, 50 bhp, and 113 bhp)
- Source ID 408: Two (2) emergency engine diesel storage tanks (133 gallons and 140 gallons)
- Source ID 406: Two (2) 18,000-gallon vehicle fuel diesel storage tanks
- Source ID 202: Talc transport via railcar with all transfer points controlled by fabric filter with outlet grain loading not to exceed 0.005 gr/dscf
- Source ID 409: Three (3) pressurized methanol storage vessels (36,000 gal, 6,450 gal, and 67,200 gal) and associated components

- Source ID 202: Polyethylene Unit No. 3 intermittent particulate vents controlled by fabric filter with outlet grain loading not to exceed 0.005 gr/dscf
- Source ID 304: Liquefied petroleum gas (LPG) loading other than C3+

Equipment Changes - Removed or Downsized:

- Source ID 105: Removal of four 5,028 bhp diesel-fired emergency generator engines
- Source ID 406: Removal of four emergency generator diesel storage tanks
- Source ID 106: Removal of one 700 bhp firewater pump engine
- Source ID 405: Removal of one firewater pump engine diesel storage tank
- Source ID 106: Decreased rating of two (2) Firewater pump engines from 700 bhp to 488 bhp
- Source ID 206: Decrease in capacity of spent caustic vent thermal incinerator from 8 to 2.5 tons/hr (Heat input unchanged)
- Source ID 203: Decrease process cooling water tower rate from 305 to 295.9 MMgal/min
- Source ID 301: Decrease in blending silo rate from 3,00,000 metric tons per year to 2,400,000 metric tons per year
- Source ID 301: Deduster vent removal for Elutriator wash air
- Source ID 403: Decrease in light gasoline loading rate
- Source ID 304: Decrease in C3+ emissions
- Source ID 202: Decrease in PE3 activated catalyst vent emissions
- Source ID 503: Road length updated from 0.97 to 0.49 miles

Equipment Changes - Increased Equipment Capacities:

- Source ID 101, 102, and 103: Increase in three (3) combustion turbines heat input from 475 to 481.4 MMBtu/hr each and duct burner heat input increase from 189 to 234 MMBtu/hr each
- Source ID 401: Recovered oil & flow equalization & removal tank capacity increase from 24,000 to 521,000 gal and 742,000 to 878,000 gal
- Source ID 301: Increase in railcar handling and storage PE rates, truck handling and storage PE rates, railcar loading PE rates, and truck loading PE rates
- Source ID 303: Increase in pyrolysis fuel oil loading
- Source ID 104: Increase in Cogen cooling water tower circulation rate
- Source ID 204: Flare gas composition changes & sweep gas rate decreases for multipoint ground flare (MPGF) and low pressure thermal incinerator (LPTI).
- Source ID 205: Flare gas composition changes & sweep gas rate decreases for high pressure ground flare (HPGF) and high pressure elevated flare (HPEF)

The following is an updated list of sources at the Shell Polymers Monaca Site, including as-built changes and sources from PA-04-00740A:

- Seven (7) tail gas- and natural gas-fired ethane cracking furnaces, 620 MMBtu/hr heat input rating each; equipped with low-NO_x burners and controlled by selective catalytic reduction (SCR).

- One (1) ethylene manufacturing line, 1,500,000 metric tons/yr; compressor seal vents and startup/shutdown/maintenance/upsets controlled by the high pressure header system (HP System).
- Two (2) gas phase polyethylene manufacturing lines, 550,000 metric tons/yr each; VOC emission points controlled by the low pressure header system (LP System) or HP System, PM emission points controlled by filters.
- One (1) slurry technology polyethylene manufacturing line, 500,000 metric tons/yr; VOC emission points controlled by the LP System or HP System, PM emission points controlled by filters.
- One (1) LP System; routed to the LP incinerator, 10 metric tons/hr capacity, with backup multipoint ground flare (MPGF), 74 metric tons/hr total capacity.
- One (1) HP System; routed to two (2) HP enclosed ground flares 150 metric tons/hr capacity each, with backup emergency elevated flare, 1,500 metric tons/hr capacity.
- Three (3) General Electric, Frame 6B, natural gas-fired combustion turbines, 41.5 MW (481.4 MMBtu/hr heat input rating) each, including natural gas- or tail gas-fired duct burners, 234 MMBtu/hr heat input rating each; controlled by SCR and oxidation catalysts.
- Two (2) diesel-fired emergency generator engines, 67 bhp and 103 bhp rating.
- Two (2) diesel-fired fire pump engines, 488 bhp rating each.
- Three (3) natural gas-fired emergency generator engines, 50 bhp, 113 bhp, and 158 bhp rating
- One (1) process cooling tower, 26 cell counter-flow mechanical draft, 17.8 MMgal/hr water flow capacity; controlled by drift eliminators.
- One (1) cogen cooling tower, 6 cell counter-flow mechanical draft, 4.443 MMgal/hr water flow capacity; controlled by drift eliminators.
- Polyethylene pellet blending, handling, storage, and loadout; controlled by fabric filters.
- Liquid loadout, coke residue/tar and recovered oil; controlled by vapor capture and routing back to the process or Spent Caustic Vent incinerator, and low-leak couplings.
- Liquid loadout, pyrolysis fuel oil and light gasoline; controlled by vapor capture and routing to the LP System, and low-leak couplings.
- Liquid loadout, C_3+, butene, isopentane, isobutane, and C3+ refrigerant; controlled by pressurized transfer with vapor balance and low-leak couplings.
- 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, 2.5 metric tons/hr capacity.
- One (1) light gasoline, and two (2) hexene storage tanks; 85,856 and 607,596 gallon capacities; controlled by IFR and vapor capture routed to the LP System.
- Two (2) pyrolysis fuel oil storage tanks; 85,856 gallon capacity; controlled by vapor capture routed to the LP System.
- Miscellaneous storage tanks, diesel fuel, 1,849 to 18,000 gallon capacities; controlled by carbon canisters.
- Miscellaneous storage tanks, diesel fuel, 133 to 140 gallon capacities.
- Methanol storage vessels and associated components
- Miscellaneous components in gas, light liquid, and heavy liquid service; controlled by leak detection and repair (LDAR).
- Wastewater treatment plant (WWTP).
- Plant roadways; controlled by paving and a road dust control plan including sweeping and watering (as necessary).

The original plan approval application for Shell Polymers Monaca Site was submitted in May 2014, and a revised application in February 2015. The Plan Approval (PA-04-00740A) was issued by the Department on June 18, 2015. Construction of Shell Polymers Monaca Site commenced on February 10, 2016, within 18 months of issuance of PA-04-00740A. On November 5, 2019, the Department received a commencement of operation notification from Shell for the operation of SF_6 insulated high voltage equipment. The SF_6 insulated high voltage equipment was installed without authorization; therefore, Shell entered into a Consent Order and Agreement (COA) with the Department on November 11, 2019, requiring a submittal of a plan approval for the SF_6 insulated high voltage equipment. The plan approval (PA-04-00740B) was received on December 18, 2019. Although the SF_6 insulated high voltage equipment was not included in the original plan approval, it was part of the original design of the facility; therefore, the installation was considered as the beginning of the period of temporary operation in accordance with PA-04-00740A, Section B, Condition #003. The effective date of commencement of operation coincided with the date that the COA was executed on November 11, 2019, and the expiration date was modified to April 28, 2020. On April 7, 2020, the Department granted an extension of the 180-day period of temporary operation in accordance with PA-04-00740A, Section B, Condition #003(d), expiring on October 28, 2020.

This application addressing the differences between the "as-built" facility and plan approval PA-04-00740A was received on February 14, 2020, and determined to be administratively complete on March 4, 2020, including a determination of completeness for the air quality analysis for Prevention of Significant Deterioration (PSD) by Andrew Fleck of the Department's Air Quality Modeling Section. The "as-built" changes included in this plan approval application include equipment additions, removal and downsizing of equipment permitted, and increases and decreases in the unit capacities of some equipment. The application included a control technology analysis for equipment additions that are in a previously not evaluated class or category, an update to the air quality impacts analysis developed in support of PA-04-00740A that incorporates the proposed changes, and an update of inhalation risk assessment developed in support PA-04-00740A that incorporates the proposed changes to the facilities. Changes to stack heights and stack diameters were accounted for in the modeling and risk assessment analysis. Any changes to conditions from plan approval PA-04-00740A are detailed in the special conditions section of this memo.

Notification of receipt and a copy of the application were sent to the National Park Service (NPS) and the Forest Service (FS) on March 4, 2020. On April 1, 2020, Holly Salazar of the NPS notified the Department that "…After review, the NPS will not be requesting any additional Class I analyses for Shenandoah National Park…" On April 30, 2020, Jeremy Ash of the FS notified the Department that "…Based on the estimated emissions and distances to Class I areas, we anticipate modeling would not show any significant additional impacts to air quality related values (AQRV) at the Class I area(s) administered by the US Forest Service. Therefore, we are not requesting that a Class I AQRV analysis be included in the PSD permit application…"

Additional information was requested from the applicant during the course of this application review. This included revised application forms, unit-by-unit potential to emit (PTE) summary table and source-wide PTE, and revised modeling information. All requested information was provided prior to the finalization of this document to address the proposed modifications to this project.

Primary air contaminants of concern from this facility will be NO_x, CO, PM_{10}, $PM_{2.5}$, VOC, HAP, and CO_2 products of combustion from the cracking furnaces, combined cycle turbines, flares, and incinerators; and VOC and HAP from the polyethylene units, liquid loadout, component fugitives, and process cooling tower. This will be a Title V facility because potential to emit (PTE) from multiple pollutants will exceed the major source thresholds. Below is a summary and analysis of the proposed changes.

In accordance with PA-04-00740A, Shell is required to conduct periodic sampling of VOC content at the three polyethylene manufacturing lines to demonstrate compliance with the emission limits in PA-04-00740A as follows:

- Condition #002 of Source ID 301: Polyethylene residual VOC content shall not exceed 50 ppmw on a monthly average for each polyethylene manufacturing line.*
  *As measured downstream of the product purge bin in the gas phase technology polyethylene manufacturing line and downstream of and including the degasser at the slurry polyethylene manufacturing line
- Condition #004 of Source ID 301: Polyethylene residual VOC content shall be measured no less than once per calendar month and once per product formulation 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.

On July 25, 2016, Shell submitted a request for approval of proposed method to measure residual VOC content at polyethylene manufacturing lines. In this submittal, Shell requests approval from the Department for the use of Method SL-QC202 (single extraction headspace method) for measuring residual VOC content. The submittal summarizes the SL-QC202 single extraction headspace method, including sampling, apparatus and reagents, and calibration techniques. This method is used to determine the level of hydrocarbons, C2 to C14, present in powder and/or pellets. Shell states that the reference standard for INEOS Method SL-QC202 is ASTM D4526 - Standard Practice for Determination of Volatiles in Polymers by Static Headspace Gas Chromatography. This is the standard VOC headspace method for INEOS licensee sites. INEOS is the licensor for the Shell Polymers Monaca slurry loop reactor polyethylene manufacturing unit (PE3). This method is currently used on INEOS licensee sites. The Department finds this method acceptable.

Under Condition #026 of Section C of PA-04-00740A, Shell is required to develop and implement an LDAR program. On August 6, 2019, Shell submitted to the Department a Leak Detection and Repair (LDAR) Initial Monitoring Timing Requirement. In this submittal, Shell requests that the Department confirm Shell's interpretation of the schedule for initial monitoring under the LDAR program. The submittal identifies and clarifies the timing of initial monitoring required under the LDAR program and Shell's intention to meet or exceed all monitoring requirements.

In this submittal, Shell states that they intend to commence LDAR monitoring for equipment in organic compound service as soon as practicable within regulatory-required frequencies after the commissioning period and initial startup of each process unit. This will begin with pumps and valves which have the most frequent monitoring basis of monthly and move to other components with longer monitoring frequencies as dictated by 40 CFR Part 63 Subpart UU. The letter goes

on further to define the meaning of "after initial startup" for the combustion turbine/duct burner units, ethane cracking furnaces, ethylene manufacturing line, polyethylene manufacturing lines, low pressure header system, high pressure header system, spent caustic header system, liquid loadout and storage tanks, equipment components, and wastewater treatment plant[1]. The Department finds Shell's interpretation of the schedule for initial monitoring under the LDAR program acceptable. Shell's Leak Detection and Repair (LDAR) Initial Monitoring Timing Requirement" submittal to the Department is included in Appendix A of this review memorandum.

In accordance with Source Level Condition #013 of Source ID: 204 and Condition #009 of Source ID: 205 in PA-04-00740A, Shell is required to minimize flaring resulting from startups, shutdowns, and unforeseeable events by operating at all times in accordance with an approved flare minimization plan (FMP). The plan shall include the following:

- Procedures for operating and maintaining the HP and LP Systems during periods of process unit startup, shutdown, and unforeseeable events.
- A program of corrective action for malfunctioning process equipment.
- Procedures to minimize discharges either directly to the atmosphere or to the HP and LP Systems during the planned and unplanned startup or shutdown or process unit and air pollution control equipment.
- Procedures for conducting root cause analyses.
- Procedures for taking identified corrective actions.
- The baseline flow to the HP and LP Systems determined in accordance with the provisions of 40 CFR §60.103a(a)(4).

On July 21, 2020, Shell submitted to the Department a Shell Polymers Monaca Flare Minimization Plan. In this submittal, Shell addresses the following requirements of the FMP:

- Establish a baseline flow volume for all operating scenarios;
- Document procedures for operating and maintaining the High Pressure and Low Pressure flaring systems during periods of process unit startup, shutdown, and unforeseeable events;
- Implement a program of corrective action for malfunctioning process equipment;
- Identify procedures to minimize discharges either directly to the atmosphere or to the HP and LP systems during the planned and unplanned startup or shutdown or process unit and air pollution control equipment;
- Conduct a root cause analysis (RCA) and corrective action analysis (CAA) into the cause of flaring that exceeds an applicable flow threshold (500,000 standard cubic feet per day [SCFD] over identified baseline in any 24-hour period);
- Implement (or develop a schedule for implementing) the corrective actions identified through the RCAs; and
- Continuously monitor the volume, composition/net heating value (NHV) of streams vented to flare, pilot flame presence, and visible emissions from the flares.

The Department submitted an email to Shell on August 31, 2020, requesting additional information regarding the FMP. Shell submitted the requested information to the Department on September 8, 2020, by email. On September 14, 2020, Shell submitted a revised FMP. The Department finds the flare minimization plan acceptable. Shell's FMP is included in Appendix A of this review memorandum.

[1] See August 6, 2019, LDAR Initial Monitoring Letter for "after initial startup" definitions.

REGULATORY ANALYSIS

This section addresses the applicability of Pennsylvania and Federal air quality regulations to the proposed changes to the facility.

25 Pa. Code §129.56 – Storage tanks greater than 40,000 gallons capacity containing VOCs, will apply to the 67,200 gallon methanol storage vessel to be located at this facility. Per 25 Pa. Code §129.56, "No person may permit the placing, storing or holding in a stationary tank, reservoir or other container with a capacity greater than 40,000 gallons of volatile organic compounds with a vapor pressure greater than 1.5 psia (10.5 kilopascals) under actual storage conditions unless the tank, reservoir or other container is a pressure tank capable of maintaining working pressures sufficient at all times to prevent vapor or gas loss to the atmosphere or is designed and equipped with one of the following vapor loss control devices… an external or internal floating roof… [or a] vapor recovery system…" This vessel will be a pressurized vessel capable of maintaining working pressures to prevent vapor loss to the atmosphere and will meet the requirements of this section.

25 Pa. Code §129.57 – Storage tanks less than or equal to 40,000 gallons capacity containing VOCs, will apply to the 6,450 gallon and 36,000 gallon methanol storage vessels. Per 25 Pa. Code Section 129.57, "The provisions of this section apply to above ground stationary storage tanks with a capacity equal to or greater than 2,000 gallons which contain volatile organic compounds with vapor pressure greater than 1.5 psia (10.5 kilopascals) under actual storage conditions." These methanol vessels will be pressurized vessels capable of maintaining working pressures to prevent vapor loss to the atmosphere and will meet the requirements of this section.

NSPS from 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 will not apply to the methanol storage vessels proposed with this plan approval. Per 40 CFR §60.110b(d)(2), this subpart does not apply to pressure vessels designed to operate in excess of 204.9 kPa and without emissions to the atmosphere. These methanol storage vessels will be pressurized vessels with design pressure greater than 204.9 kPa. Shell will meet all applicable requirements of 40 CFR Part 60 Subpart Kb for affected source categories.

NSPS from 40 CFR Part 60 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines will apply to the diesel-fired emergency generator engines. Per 40 CFR §60.4200(a)(2), "The provisions of this subpart are applicable to… Owners and operators of stationary CI ICE that commence construction after July 11, 2005, where the stationary CI ICE are:

(i) Manufactured after April 1, 2006, and are not fire pump engines, or
(ii) Manufactured as a certified National Fire Protection Association (NFPA) fire pump engine after July 1, 2006."

Per 40 CFR 60.4205(b), which references to 40 CFR 60.4202, the proposed CI ICE engines included in this application will be subject to the emissions standards in Table 1 of 40 CFR 89.112:

Table 1: NSPS Subpart IIII Emission Standards

Source	Pollutant					
	NOx +VOC		CO		PM	
	(g/kw-hr)	(g/hp-hr)	(g/kw-hr)	(g/hp-hr)	(g/kw-hr)	(g/hp-hr)
77 kW Emergency Generator Engine	4.0	3.0	5.0	3.7	0.30	0.22
50 kW Emergency Generator Engine	4.7	3.5	5.0	3.7	0.40	0.30

Applicable requirements for the emergency generators include emission, diesel fuel, and work practice standards; and monitoring and recordkeeping. The emergency generator engines will be subject to the emission standards under 40 CFR § 89.112 as shown in Table 1 above. Non-resettable hour meters will be required to be installed per the requirements of 40 CFR § 60.4209(a) on each engine. Each engine's hours of operation are not limited during use in emergency situations, but shall otherwise limited to 100 hours or less annually according to the qualifications under 40 CFR § 60.4211(f)(2).

NSPS from 40 CFR Part 60 Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines will apply to the natural gas-fired emergency generator engines. Per 40 CFR §60.4200(a)(4), "The provisions of this subpart are applicable to… Owners and operators of stationary spark ignition (SI) internal combustion engines (ICE) that commence construction after July 12, 2006, where the stationary SI ICE are manufactured:

> (iv) on or after January 1, 2009, for emergency engines with a maximum engine power greater than 19 KW (25 HP).

Applicable requirements for the spark ignition emergency generators include emission standards, monitoring, recordkeeping, and reporting requirements. Per 40 CFR 60.4233(d) and (e), the following proposed SI ICE engines included in this application will be subject to the emissions standards in Table 1 of 40 CFR Part 60 Subpart JJJJ:

Table 2: NSPS Subpart JJJJ Emission Standards

Source	Pollutant					
	NOx		VOC		CO	
	g/hp-hr	ppmvd @ 15% O_2	g/hp-hr	ppmvd @ 15% O_2	g/hp-hr	ppmvd @ 15% O_2
Intermediate Lift Station Sanitary Water Pump (158 BHP)	2.0	160	1.0	86	4.0	540
Lift Station A Sanitary Water Pump (50 BHP)	10[a]	-	-	-	387	-
PGT Shell Office Building (113 BHP)	10[a]	-	-	-	387	-

[a] The emission standards applicable to emergency engines between 25 bhp and 130 bhp are in terms of NO_X + VOC.

NSPS from 40 CFR Part 60 Subpart TTTT- Standards of Performance for Greenhouse Gas Emissions for Electric Utility Generating Units will apply to the three cogeneration units at this facility. Per 40 CFR §60.5509(a), "…the GHG standards included in this subpart apply to any steam generating unit, IGCC, or stationary combustion turbine that commenced construction after January 8, 2014 or commenced reconstruction after June 18, 2014 that meets the relevant applicability conditions in paragraphs (a)(1) and (2) of this section...

(1) Has a base load rating greater than 260 GJ/h (250 MMBtu/h) of fossil fuel (either alone or in combination with any other fuel); and
(2) Serves a generator or generators capable of selling greater than 25 MW of electricity to a utility power distribution system."

The proposed combustion turbines will commence construction after the above date, have a base load rating greater than 250 MMBtu/hr (481.4 MMBtu/hr HHV + 234 MMBtu/hr from duct burners), and serve generators capable of selling greater than 25 MW of electricity to a utility power distribution system. Applicable requirements from this subpart include a gross energy output CO_2 emission standard; continuous monitoring of CO_2, O_2, or fuel flow and gross electric output; notifications; electronic quarterly reporting; and associated recordkeeping and retention.

Per 40 CFR §60.5520(a), affected EGUs subject to NSPS Subpart TTTT are required to meet the applicable emission standards for CO_2 specified in Table 1 or 2 to this subpart. Table 2 to Subpart TTTT establishes a CO_2 emission standard of 1,000 lb/MWh gross energy output for a newly constructed stationary combustion turbine that supplies more than its design efficiency or 50 percent, whichever is less, times its potential electric output as net-electric sales on both a 12-operating month and a 3-year rolling average basis and combusts more than 90% natural gas on a heat input basis on a 12-operating-month rolling average basis.

NESHAPS for Stationary Reciprocating Internal Combustion Engines (RICE) from 40 CFR Part 63 Subpart ZZZZ will apply to the proposed diesel-fired and natural gas-fired emergency engines at this facility. Per 40 CFR §63.6585, "You are subject to this subpart if you own or operate a stationary RICE at a major or area source of HAP emissions, except if the stationary RICE is being tested at a stationary RICE test cell/stand." This facility will be a major source of HAP emissions and will not include stationary RICE test cells/stands. The proposed diesel-fired and natural gas-fired emergency generators therefore will be subject to 40 CFR Part 63 Subpart ZZZZ.

According to 40 CFR §63.6590(a)(2)(ii), these engines will be classified as new stationary RICE. However, Subpart ZZZZ continues per 40 CFR 63.6590(c) to subject an affected source to the requirements of 40 CFR Part 60 Subpart JJJJ or IIII and remove all further requirements under NESHAP Subpart ZZZZ. The proposed natural gas-fired emergency engines will meet the requirements of Subpart ZZZZ by complying with the requirements of 40 CFR Part 60 Subpart JJJJ. The proposed diesel-fired emergency engines will meet the requirements of Subpart ZZZZ by complying with the requirements of 40 CFR Part 60 Subpart IIII.

NESHAPS for Organic Liquids Distribution (Non-gasoline) from 40 CFR Part 63 Subpart EEEE will apply to the proposed methanol storage system including storage vessels, transfer racks, equipment leak components, and transfer vehicles. Per 40 CFR §63.2334, "…you are subject to this subpart if you own or operate an OLD operation that is located at, or is part of, a major source of HAP emissions." This subpart establishes emission limitations, operating limits, and work practice standards for organic hazardous air pollutants (HAP) emitted from organic

liquids distribution (OLD) (non-gasoline) operations at major sources of HAP emissions. This subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations, operating limits, and work practice standards. Shell will meet all applicable requirements of 40 CFR Part 63 Subpart EEEE for affected source categories.

Prevention of Significant Deterioration Review

On May 31, 1980, PA DEP adopted Prevention of Significant Deterioration ("PSD") requirements promulgated by the EPA under the Clean Air Act. These requirements have been adopted in their entirety and incorporated by reference in 25 Pa. Code Chapter 127 Subchapter D. Per 40 CFR 52.21(a)(2)(i), "The requirements of [40 CFR Part 52.21, *Prevention of Significant Deterioration of Air Quality*] apply to the construction of any new major stationary source… in an area designated as attainment or unclassifiable under sections 107(d)(1)(A)(ii) or (iii) of the Act." Attainment or unclassifiable designations (listed under 40 CFR §81.339 for Pennsylvania) are established in reference to the National Ambient Air Quality Standards ("NAAQS") established under 40 CFR Part 50.

Per 40 CFR §81.339, Potter and Center Townships, Beaver County are currently designated as areas of attainment for all NAAQS except for Pb (2008). Additionally, Potter Township, Beaver County is designated as an area of nonattainment for SO_2 (2010). The re-designation of Beaver County attainment status for Pb and SO_2 is in progress and will likely be submitted to the USEPA in 2021. All of the Commonwealth of Pennsylvania is located in the Northeast Ozone Transport Region and is therefore treated like a moderate ozone nonattainment area. Recognized precursor pollutants for ozone are NO_x and VOC. NO_x is unique in that it is potentially subject to both PSD and nonattainment new source review (NNSR) by virtue of its standing as an attainment criteria pollutant (NO_2) and as a nonattainment ozone precursor. Attainment status for $PM_{2.5}$ has changed since the issuance of PA-04-00740A on June 18, 2015, and construction began in accordance with this plan approval prior to re-designation. During the issuance of PA-04-00740A, Potter and Center Townships, Beaver County were designated as areas of nonattainment for annual (1997) and 24-hour (2006) $PM_{2.5}$. Recognized precursor pollutants for $PM_{2.5}$ are SO_2, NO_x, VOC, and ammonia (NH_3). This plan approval will follow the non-attainment rules for $PM_{2.5}$ since they were in effect at the time of the original permitting of PA-04-00740A.

Per 40 CFR §52.21(i)(2), "The requirements of paragraphs (j) through (r) of this section shall not apply to a major stationary source or major modification with respect to a particular pollutant if the owner or operator demonstrates that, as to that pollutant, the source or modification is located in an area designated as nonattainment under section 107 of the Act." Paragraphs (j) through (r) of 40 CFR §52.21 contain the PSD requirements including *control technology review*, *source impact analysis*, *air quality models*, *air quality analysis*, *source information*, *additional impacts analysis*, *sources impacting Federal Class I areas – additional requirements*, *public participation*, and *source obligation*. Therefore, only NNSR requirements have been applied to $PM_{2.5}$. This is also consistent with EPA's guidance on implementing permitting requirements to areas with distinct designations for separate averaging times of the $PM_{2.5}$ NAAQS.[2] Application of LAER (through NNSR) to $PM_{2.5}$ is expected to be more stringent than BACT because LAER does not include consideration of the economic, energy, or other environmental factors as part of its definition. LAER is generally considered to be the most stringent level of control required

[2] *Federal Register*, Vol. 78, No. 10, Tuesday, January 15, 2013, Rules and Regulations, p. 3263.

under the Clean Air Act. Application of NNSR will further require the procurement of emission offsets ensuring that the region's total $PM_{2.5}$ emissions do not increase as a result of this project.

A major stationary source is defined as either: (a) a source in one of the 28 source categories identified in 40 CFR 52.21 that has a potential to emit 100 tons or more per year of any regulated NSR pollutant[3], or (b) any other stationary source that has the potential to emit 250 tons or more per year of a regulated NSR pollutant (separate GHG emission thresholds are described below). Once PSD requirements are triggered for one air contaminant, a review must be conducted for the other regulated NSR pollutants to determine if they exceed the significant levels as defined in 40 CFR 52.21(b)(23). This facility will qualify for multiple listed categories including chemical process plant and fossil fuel-fired steam electric plants of more than 250 MMBtu/hr of heat input. Therefore, the threshold for PSD applicability is 100 tons per year of a regulated pollutant (except GHG).

U.S. EPA determined on December 07, 2009, that GHGs are a threat to public health and welfare. This determination was made final effective on January 14, 2010.[4] GHG emissions are those emissions of carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons, perfluorocarbons, and other fluorinated greenhouse gases defined in 40 CFR Part 98 Subpart A. Each different GHG emission is considered to impact global warming at varying levels. Carbon dioxide equivalent ("CO_2e") emissions are the combined impact of each GHG emission after it is normalized to the impact of CO_2 as a reference. On May 13, 2010, EPA issued a final Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule ("GHG Tailoring Rule") which became effective on August 2, 2010.[5] This rule established an applicability timeline and GHG emission thresholds for requiring facilities to be permitted for GHG emissions. Implementation occurred in steps with the last "Step 3" being finalized on June 29, 2012. PSD major source thresholds were established at 100,000 tons of CO_2e PTE for new sources and 75,000 tons of CO_2e PTE for existing major facilities. Title V permitting requirements applied to facilities with a potential to emit of at least 100,000 tpy CO_2e.

On June 23, 2014, the Supreme Court of the United States ruled that "EPA exceeded its statutory authority when it interpreted the Clean Air Act to require PSD and Title V permitting for stationary sources based on their greenhouse-gas emissions. Specifically, the Agency may not treat greenhouse gases as a pollutant for purposes of defining a "major emitting facility" (or a "modification" thereof) in the PSD context or a "major source" in the Title V context. To the extent its regulations purport to do so, they are invalid. EPA may, however, continue to treat greenhouse gases as a "pollutant subject to regulation under this chapter" for purposes of requiring BACT for "anyway" sources."[6] In effect, the GHG Tailoring Rule and included GHG major source thresholds have been rescinded. However, this facility will be an "anyway" source because of its NO_2, CO, and PM_{10} PTE. BACT requirements will apply to other pollutants with a PTE that exceeds the *Significant* thresholds under 40 CFR §52.21(b)(23). Pollutants with a PTE below these thresholds are considered *de minimis* for PSD purposes and will not be subject to BACT requirements. In response to the above decision, U.S. EPA has formally proposed to revise the PSD and Title V permitting regulations and establish a significant emission rate ("SER") of 75,000 tpy CO_2e below which GHG emissions would be considered *de minimis* for PSD purposes. GHG is proposed to be subject to PSD and Title V permitting requirements only

[3] For purposed of PSD regulations, a regulated NSR pollutant is defined under 40 CFR §52.21(b)(50).
[4] *Federal Register*, Vol. 74, No. 239, Tuesday, December 15, 2009, Rules and Regulations, p. 66496.
[5] *Federal Register*, Vol. 75, No. 106, Thursday, June 3, 2010, Rules and Regulations, p. 31514
[6] *Utility Air Regulatory Group v. EPA*, Docket No. 12-1146, June 23, 2014, http://www.supremecourt.gov/opinions/13pdf/12-1146_4g18.pdf, p.29.

if the source is subject to these requirements for another regulated pollutant. The public comment period for this proposed rule has closed but it has not yet been finalized.

Per 40 CFR §52.21(j)(2), "A new major stationary source shall apply best available control technology for each regulated NSR pollutant that it would have the potential to emit in significant amounts." This is a new facility and the PTE from each individual source shall be considered to determine if the facility is a "new major stationary source". In the original plan approval, Shell exceeded the PSD major source threshold for NO_2, CO, and PM_{10}; and the PSD significant thresholds for PM and CO_2e. There is currently no formally established significant threshold for GHG although Shell's CO_2e PTE will be greater than any *de minimis* threshold for GHG (when established). The as-built changes in emission rates are minor for PSD and when considered with the new facilities' potential-to-emit does not change the PSD applicability of the original project. This plan approval is being handled using the PSD requirements that were in effect at the time of the original permitting of PA-04-00740A. Shell is therefore subject to BACT requirements for NO_2, CO, PM, PM_{10}, and CO_2e.

Nonattainment New Source Review

On May 19, 2007, PA DEP adopted revised New Source Review regulations in 25 Pa. Code Chapter 127 Subchapter E. Per 25 Pa. Code §127.201(a), "a person may not cause or permit the construction or modification of an air contamination facility in a nonattainment area… unless the Department… has determined that the requirements of this subchapter have been met." Per 25 Pa. Code §127.203(a), "This subchapter applies to the construction of a new major facility…" In accordance with the definition of *Major facility* under 25 Pa. Code §121.1, this facility is major if the potential to emit exceeds 100 tons of $PM_{2.5}$, 100 tons of NO_x, 50 tons of VOC, 100 tons of SO_2, or 100 tons of Pb per year. VOC and NH_3 as $PM_{2.5}$ precursors are not evaluated because at the time of plan approval issuance in June 2015, Pennsylvania or EPA had not yet finalized the State Implementation Plan requirements for the fine particulate matter National Ambient Air Quality Standards.

Per 25 Pa. Code §127.205(1), "A new or modified facility subject to this subchapter shall comply with LAER…" The as-built changes in emission rates are minor for NNSR and when considered with the new facilities' potential-to-emit does not change the NNSR applicability of the original project. This plan approval is being handled using the NNSR requirements that were in effect at the time of the original permitting of PA-04-00740A. Shell exceeded the NNSR major source threshold for NO_x, VOC, and $PM_{2.5}$ in PA-04-00740A. Shell is therefore subject to LAER requirements for NO_x, VOC, and $PM_{2.5}$.

Per 25 Pa. Code §127.210, "The emissions offset ratios for NSR purposes and ERC transactions subject to the requirements of this subchapter must be in an amount equal to or greater than the ratios specified in the following table:

Table 3: Required Emission Offsets, Expressed in Tons per Year

Pollutant/Area	Flue Emissions	Fugitive Emissions
VOC/Transport Region	1.15:1	1.3:1
NO_x/Transport Region	1.15:1	1.15:1
$PM_{2.5}$	1:1	1:1

Table 4: Calculated Offsets, Expressed in Tons per Year

Pollutant/Area	Flue PTE / Offsets	Fugitive PTE / Offsets	Total Offsets
VOC/Transport Region	409/ 471	108 / 141	612
NO_x/Transport Region	329 / 379	0	379
$PM_{2.5}$	164 / 164	0[a]	164[b]

[a] Fugitive $PM_{2.5}$ PTE is greater than zero but minimal compared to flue $PM_{2.5}$ PTE. Facility-wide $PM_{2.5}$ PTE is represented as flue $PM_{2.5}$ for convenience in this table because the ratio does not change and it makes no difference.
[b] Emission offsets include an additional 5 tons of $PM_{2.5}$ as a result of as built changes.

Shell will be required by plan approval condition and regulation under 25 Pa. Code §127.206 to secure the above amount of ERCs which have been certified by the Department prior to commencement of operation. Shell has already acquired all the needed offsets and the acquisition of the offsets was memorialized in PA-04-00740A. PA-04-00740C will incorporate an additional 5 tons of $PM_{2.5}$ ERCs.

EQUIPMENT ADDITIONS - BACT/LAER/BAT

A control technology analysis for equipment additions that are in a previously not evaluated class or category have been addressed in this application.

The applicant has conducted a BACT analysis for NO_2, CO, PM, PM_{10}, and GHG following a 5 step "top-down" analysis which has been recommended by EPA for traditional attainment pollutants as well as the new GHG pollutants.[7] The steps of this analysis are summarized as follows:

1. Identify all available control technologies.
2. Eliminate technically infeasible options.
3. Rank remaining control technologies by effectiveness.
4. Evaluate the most effective controls and document results.
5. Select BACT.

PM and PM_{10} BACT analyses will be equivalent for this facility. Gaseous fuel-fired and diesel-fired combustion source PM emissions will all be PM_{10} or smaller.

The applicant has conducted a LAER analysis for NO_x, VOC, and $PM_{2.5}$ following a 3 step analysis summarized as follows:

1. Identify existing permit limits and SIP limits.
2. Identify existing permit limits and SIP limits that have been achieved in practice.
3. Identify LAER based on the most stringent limit that has been achieved in practice.

This analysis approach will satisfy the definition of LAER under 25 Pa. Code §121.1, which is the more stringent of:

[7]U.S. Environmental Protection Agency, EPA-457/B-11-001, *PSD and Title V Permitting Guidance for Greenhouse Gases*, March 2011, p. 12.

1. 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.
2. The most stringent emission limitation which is achieved in practice by the class or category of source.

BACT and LAER must also be at least as stringent as any NSPS that is applicable to that source. LAER for NO_x is considered to be at least as stringent as BACT for NO_2 for each of these proposed air contamination sources.

Remaining pollutants including SOx and HAP are subject to best available technology (BAT).

Emergency Generators

The applicant has proposed to install two (2) diesel-fired engines (103 bhp and 67 bhp) and three (3) natural gas-fired engines (158 bhp, 50 bhp, and 113 bhp) that were not included in the previous authorization. The four originally proposed diesel-fired emergency generators are also being removed from PA-04-00740A. This application had originally proposed the installation of four natural gas-fired engines; however, one of the engines was removed from the site on July 17, 2020.

Diesel-Fired Internal Combustion Engines[8]

LAER for control of NO_x and VOC has been determined to be the use of certified engines, design of engines to include turbocharger and an intercooler/aftercooler, good combustion practices and proper operation and maintenance including certification to applicable federal emission standards. The following NOx and VOC limits have been determined to comply with LAER:

- Parking Garage 103 bhp Emergency Generator: 2.37 g/hp-hr of NOx + VOC
- Telecom Hut & Tower 67 bhp Emergency Generator: 2.83 g/hp-hr of NOx + VOC

The proposed limits are more stringent than the 3.0 g/hp-hr of NOx + VOC limit for the 103 bhp emergency generator and the 3.5 g/hp-hr of NOx + VOC limit for the 67 bhp emergency generator for which the proposed engines are subject to under 40 CFR Part 60 Subpart IIII. The proposed emission limits are also found to be more stringent than NOx and VOC limits found in State Implementation Plans. The proposed emission limits are also found to be equivalent to or more stringent than NOx and VOC limits found in U.S. EPA's RBLC database for small emergency diesel engines. As shown in Table 4-2 of the plan approval application, there are three instances of emergency engines with NOx + VOC emissions limits that are more stringent than the proposed limit of 2.83 g/hp-hr for the Telecom Hut & Tower 67 bhp Emergency Generator. These three engines, which each have NOx + VOC emissions limits of 2.7 g/hp-hr are much larger (*i.e.,* 460 bhp) versus the proposed Telecom Hut and Tower Emergency Generator's engine of 67 bhp. The NSPS standards provide for a higher emission standard for smaller engines such as the Telecom Hut & Tower Emergency Generator's engine. As a result, these three larger engines were considered to be in a different class of category than the proposed engine and were removed from consideration.

[8] See Application pages 4-1 – 4-18.

Add-on controls including Selective Catalytic Reduction (SCR) for the control of NOx emissions, and oxidation catalyst for the control of VOC emissions were evaluated and were found to be technically infeasible considering the limited and unpredictable operating hours for emergency engines. Emergency engines are on standby and are not continuously running. To ensure engines are kept in good working order, they are operated for short and infrequent periods of time (less than one hour per week). The short duration of the engine's operation does not provide adequate time for an SCR or oxidation catalyst to reach the required operating temperature where emissions reductions can be achieved.

LAER for control of $PM_{2.5}$ and BACT for control of PM and PM_{10} has been determined to be the use of certified engines, design of engines to include turbocharger and an intercooler/aftercooler, good combustion practices and proper operation and maintenance including certification to applicable federal emission standards and the use of ultra-low sulfur diesel fuel. The following $PM_{2.5}$/PM_{10}/PM limits have been determined to comply with LAER/BACT:

- Parking Garage 103 bhp Emergency Generator: 0.06 g/hp-hr $PM_{2.5}$/PM_{10}/PM
- Telecom Hut & Tower 67 bhp Emergency Generator: 0.22 g/hp-hr $PM_{2.5}$/PM_{10}/PM

The proposed limits are more stringent than the PM limit of 0.22 g/hp-hr for the 103 bhp emergency generator and 0.30 g/hp-hr for the 67 bhp emergency generator for which the proposed diesel-fired emergency engines are subject to under 40 CFR Part 60 Subpart IIII. The proposed emission limits are also found to be more stringent than $PM_{2.5}$ limits found in State Implementation Plans. The proposed emission limits are also found to be equivalent to or more stringent than $PM_{2.5}$/PM_{10}/PM limits found in U.S. EPA's RBLC database for small emergency diesel engines. As shown in Table 4-4 of the plan approval application, there are emergency engines with $PM_{2.5}$ emissions limits that are more stringent than the proposed limit of 0.22 g/hp-hr for the Telecom Hut & Tower 67 bhp Emergency Generator. However, these engines are much larger than the proposed Telecom Hut & Tower Emergency Generator's engine. The NSPS standards provide for a higher emission standard for smaller engines such as the Telecom Hut & Tower Emergency Generator's engine. As a result, these three larger engines were considered to be in a different class of category than the proposed engine and were removed from consideration.

BACT for control of CO has been determined to be the use of certified engines, design of engines to include turbocharger and an intercooler/aftercooler, good combustion practices and proper operation and maintenance including certification to applicable federal emission standards. The following CO limits have been determined to comply with BACT:

- Parking Garage 103 bhp Emergency Generator: 0.5 g/hp-hr of CO
- Telecom Hut & Tower 67 bhp Emergency Generator: 0.67 g/hp-hr of CO

The proposed limits are more stringent than the CO limit of 3.7 g/hp-hr for which the proposed diesel-fired emergency engines are subject to under 40 CFR Part 60 Subpart IIII. The proposed emission limits are also found to be consistent with CO limits found in U.S. EPA's RBLC database for small emergency diesel engines and recently issued plan approvals for similar sources in Pennsylvania.

Add-on controls that are applied to the control of CO from other types of combustion sources such as larger engines, boilers, and turbines such as oxidation catalyst were evaluated and were found to be technically infeasible considering the limited and unpredictable operating hours for emergency engines. Emergency engines are on standby and are not continuously running. To ensure engines are kept in good working order, they are operated for short and infrequent periods of time (less than one hour per week). The short duration of the engine's operation does not provide adequate time for an oxidation catalyst to reach the required operating temperature where emissions reductions can be achieved.

BACT for control of GHGs has been determined to be combined emissions of CO_2e from the two proposed diesel emergency generators shall not exceed 10 tons per year on a 12-month rolling average basis using 40 CFR 98 Subpart C emission factors. No applicable GHG federal emission standards exist for emergency generators and there are no feasible control technologies.

Small Natural Gas Engines[9]

LAER for control of NO_x and VOC has been determined to be the use of certified engines, good combustion practices and proper operation and maintenance including certification to applicable federal emission standards. The following NOx and VOC limits have been determined to comply with LAER:

- Intermediate Lift Station Sanitary Water Pump (158 bhp): 2.0 g/hp-hr NOx; 1.0 g/hp-hr VOC
- Lift Station A Sanitary Water Pump (50 bhp): 5.39 g/bhp-hr NOx+VOC
- PGT Shell Office Building (113 bhp): 5.76 g/hp-hr g/bhp-hr NOx+VOC

The proposed limits are at least as stringent as the 10.0 g/hp-hr of NOx + NMHC limit for the engines <130 HP and the 2.0 g/hp-hr of NOx and 1.0 g/hp-hr of VOC limit for the engines >130 HP for which the proposed engines are subject to under 40 CFR Part 60 Subpart JJJJ. The proposed emission limits are also found to be more stringent than NO_x and VOC limits found in State Implementation Plans. The proposed emission limits are also found to be equivalent to or more stringent than NOx and VOC limits found in U.S. EPA's RBLC database for small natural gas fired emergency engines. The most stringent NOx and VOC limits in the RBLC are the same as the NSPS Subpart JJJJ standards.

Add-on controls including Selective Catalytic Reduction (SCR) for the control of NOx emissions, and oxidation catalyst for the control of VOC emissions were evaluated and were found to be technically infeasible considering the limited and unpredictable operating hours for emergency engines. Emergency engines are on standby and are not continuously running. To ensure engines are kept in good working order, they are operated for short and infrequent periods of time (less than one hour per week). The short duration of the engine's operation does not provide adequate time for an SCR or oxidation catalyst to reach the required operating temperature where emissions reductions can be achieved. This is consistent with the findings in the RBLC database.

LAER for control of $PM_{2.5}$ and BACT for control of PM and PM_{10} has been determined to be the use of low carbon/clean fuel (natural gas), good combustion practices and proper operation and maintenance including compliance with NSPS Subpart JJJJ. The $PM_{2.5}/PM_{10}$/PM limit of 0.0194

[9] See Application pages 4-18 – 4-33.

lb/MMBtu for all of the natural gas emergency engines has been determined to comply with LAER/BACT.

40 CFR 60 Subpart JJJJ does not establish emission standards for $PM_{2.5}/PM_{10}/PM$. A review was completed of states and agencies most likely to have the most stringent emissions limits contained in the SIP and none of the SIPs that were reviewed included a $PM_{2.5}$ emissions requirement for small natural gas engines in emergency service. A review of the RBLC showed more stringent $PM_{2.5}$ emission limits; however, it is not possible to determine if this more stringent $PM_{2.5}$ limit has been achieved in practice because no $PM_{2.5}$ testing was required in these permits.

BACT for control of CO has been determined to be the use of low carbon/clean fuel (natural gas), good combustion practices and proper operation and maintenance including compliance with NSPS Subpart JJJJ. The following CO limits have been determined to comply with BACT:

- Intermediate Lift Station Sanitary Water Pump (158 bhp): 4.0 g/hp-hr CO
- Lift Station A Sanitary Water Pump (50 bhp): 387 g/bhp-hr CO
- PGT Shell Office Building (113 bhp): 387 g/bhp-hr CO

The proposed limits are equivalent to the CO limits of 40 CFR Part 60 Subpart JJJJ. The proposed emission limits are also found to be equivalent to or more stringent than CO limits found in U.S. EPA's RBLC database for small natural gas fired emergency engines.

Add-on controls that are applied to the control of CO from other types of combustion sources such as larger engines, boilers, and turbines such as oxidation catalyst were evaluated and were found to be technically infeasible considering the limited and unpredictable operating hours for emergency engines. Emergency engines are on standby and are not continuously running. To ensure engines are kept in good working order, they are operated for short and infrequent periods of time (less than one hour per week). The short duration of the engine's operation does not provide adequate time for an oxidation catalyst to reach the required operating temperature where emissions reductions can be achieved.

BACT for control of GHGs has been determined to be combined emissions of CO_2e from the proposed natural gas fired emergency engines shall not exceed 43.4 tons per year on a 12-month rolling average basis using 40 CFR 98 Subpart C emission factors. No applicable GHG federal emission standards exist for emergency generators and there are no feasible control technologies.

OTHER EQUIPMENT ADDITIONS – BAT

Per 25 Pa. Code 127.12(a)(5), applicants must show that emissions from a new source will be the minimum attainable through use of the BAT. For sources subject to BACT or LAER requirements, 25 Pa. Code 127.205(7) specifies that the Department may determine that BAT requirements are equivalent to BACT and LAER determined under the new source review program. These sources will meet BAT requirements by meeting the LAER/BACT requirements determined in PA-04-00740A.

Additional Diesel Storage Tanks

The applicant has proposed to install two (2) emergency engine diesel storage tanks (133 gallons and 140 gallons) and two (2) 18,000 gallon diesel fuel storage tanks to provide fuel for the permanent on-site fleet of vehicles, temporary and portable diesel-fueled equipment, and mobile refueling. The four emergency generator diesel storage tanks included in PA-04-00740A are being removed as part of this application. Consistent with the LAER requirements established in Condition #001 of PA-04-00740A Section D Source ID: 406, the two (2) 18,000-gallon diesel fuel storage tank vents will be controlled by carbon canisters designed to reduce VOC emissions by a minimum of 95%.

On May 28, 2020, Shell submitted an update to the PA-04-00740C application addressing the practicality of controlling the proposed diesel fuel storage tanks on emergency backup generators. This submittal requested that the proposed emergency engine diesel fuel storage tanks not be required to be controlled by carbon canisters. PA-04-00740A requires diesel fuel storage tank vents (Source ID 406) be controlled by carbon canisters designed to reduce VOCs by a minimum of 95%. The storage tanks provided in PA-04-00740A application are larger, standalone above ground storage tanks. The two proposed storage tanks are integrated into emergency backup gensets in enclosed containers that would require physical modification which was never intended by the manufacturer. The proposed storage tanks are smaller at 133 gallons and 140 gallons than those proposed in the application for PA-04-00740A at 10,000 gallons (5 tanks) and 1,849 gallons (2 tanks). Based on the small capacity of the proposed tanks, fuel type and usage for emergency backup generators, the resulting uncontrolled VOC emissions from the proposed diesel fuel storage tanks are expected to be negligible (<0.0001 tpy). The Department received an email from Shell on June 29, 2020, showing the difference in emissions by not controlling the storage tanks with carbon cannisters is 0.094 pounds per year (<0.0001 tpy) VOC. The Department agrees that this is acceptable.

Transfer Talc via Railcar

The original design in PA-04-00740A provided that talc, which is used as a comonomer in the polyethylene polymerization process, would be delivered to the site via trucks. The proposed changes will allow talc to also be delivered to the site via railcar. Once onsite, talc will be offloaded to a truck and then transported across the site to the already approved talc storage bins. Talc will be moved through pneumatic transfer and all transfer points will be controlled by fabric filter. The original 2015 emissions estimate basis for talc transfer to surge bins was based on 24 hours/day, 333 days/yr operation of both surge bins; however, transfer can only occur to one bin at a time. The 2015 estimate is high by a factor of two and the emissions associated with transfer from railcar to truck are already accounted for.

Consistent with PA-04-00740A, particulate matter from this pneumatic transfer operation's vents will be equipped with and controlled by fabric, sintered metal, or HEPA filters and that the filters be designed to achieve a particulate loading of 0.005 gr/dscf at the outlet.

Polyethylene Unit 3 Intermittent Particulate Vents

Additional intermittent particulate matter vents associated with Polyethylene Unit No. 3 were not included as part of the 2015 plan approval application but were determined after issuance of PA-04-00740A during a final accounting of vents that may contain particulate matter. Consistent with the LAER requirements established in PA-04-00740A, particulate matter from these

intermittent vents will be equipped with and controlled by fabric, sintered metal, or HEPA filters designed to achieve a particulate loading of 0.005 gr/dscf at the outlet.

This application is also requesting that Polyethylene Manufacturing Lines Source ID 202 of PA-04-00740A be updated to account for higher level control of the catalyst activation vents than other particulate vents that are part of this Source ID. Catalyst activation vents will be controlled by an internal cartridge filter, followed by knockout pot, and finally an external HEPA filter. Specifically, Shell is requesting that a new condition be added limiting PM (filterable) emissions from catalyst activation vents to not exceed 0.002 gr/dscf.

LPG Loading

Emissions associated with the loading of LPG materials other than C3+ were not included as part of the 2015 PA-04-00740A application. In addition, the calculations estimating the emissions from the loading of C3+ and other LPG materials were overestimated in the PA-04-00740A application. The emissions factor used assumed emissions from bleeder valves which are not present in Shell's loading configuration. Consistent with the LAER requirements established in PA-04-00740A, VOC emissions will be controlled by the use of pressurized transfer with vapor balance and low leak couplings.

With this application, Shell is requesting that Liquid Loadout (C3+) Source ID 304 Condition #001 contained in PA-04-00740A be updated to account for C3+ refrigerant, butene, hexene, isopentane, and isobutane loading. The storage requirements of these LPG materials are already accounted for in Section D. Source ID 405.

Methanol System

The three proposed methanol vessels (36,000 gal, 6,450 gal, and 67,200 gallons) will be maintained under positive pressure with no emissions. Methanol is used in closed-loop heat transfer systems within the ethane cracking units, controlled by the flare system in case of abnormal or upset operations, consumed and broken down into non-methanol components by the cracking process, removed and treated by process water, or removed as a product component.

The equipment components associated with this system will have the potential for fugitive emissions; however, these equipment components have already been accounted for in the 2015 plan approval application. Emergency relief vents for the pressurized methanol vessels will be routed to the high pressure system. Consistent with LAER requirements established in PA-04-00740A Section C Condition #026, VOC emissions will be minimized by following the sitewide Leak Detection and Repair (LDAR) work practice requirements.

Ethane Cracking Furnaces

Following the issuance of PA-04-00740A, to support the detailed design and future operation of the facility, detailed process models were developed for each of the manufacturing processes including the ethane cracking furnaces. The ethane cracking furnace process model was used to simulate operation of all seven furnaces in the permitted operating modes. Based on the simulation results, Shell is requesting that conditions in PA-04-00740A regarding NOx emission limitations, furnace operating mode definitions, and furnace operating mode limitations be updated with conditions that more accurately represent anticipated furnace operations. These

changes do not result in an increase in potential emissions. The proposed conditions will more accurately represent the furnace's operations within one of the defined modes.

The requested changes are described below:

1. **Operate no more than two furnaces in decoking mode and no more than two furnaces with greater than 6.2 lb/hr NOx**.

The proposed changes allow two furnaces to be decoked simultaneously, no more than two furnaces to emit NOx at greater than 6.20 pounds per hour, and reduce allowable NOx emission from the furnaces during hot steam standby, feed in, feed out, and decoking from 9.30 lb/hr to 6.20 lb/hr. The proposed changes are consistent with the NOx LAER lb/mmBtu requirements as determined in PA-04-00740A of 0.01 lb/mmBtu (12-month) and 0.015 lb/mmBtu (1-hour).

LAER for control of NO_x has been determined in PA-04-00740A to be installation and operation of current generation low-NO_x burners (LNB) and SCR. Consistent with PA-04-00740A, the following NO_x limits have been determined to comply with LAER in this case:

- 0.010 lb/MMBtu from each furnace on a 12-month rolling average during normal operating mode.
- 0.015 lb/MMBtu from each furnace on a 1-hour average during normal operating mode.
- 6.20 lb/hr from each furnace during periods of decoking, hot steam standby, feed in, or feed out.
- 31.1 lb/hr from each furnace during periods of startup and shutdown.
- 181.3 tons from all furnaces combined in any consecutive 12-month period

The only change regarding NOx limits above from PA-04-00740A is the reduction in NOx from each furnace during periods of decoking, hot steam standby, feed in, or feed out from 9.30 lb/hr to 6.20 lb/hr. All other NOx limits from the ethane cracking furnaces remain unchanged from PA-04-00740A.

2. Use of SCR stable operating temperature for startup and shutdown

The definitions for Startup and Shutdown operating mode in PA-04-00740A are as follows:

- Startup – Beginning when fuel is introduced to the furnace and ending when the SCR catalyst bed reaches its design operating temperature.
- Shutdown – Beginning when the SCR catalyst bed drops below its design operating temperature and ending upon removing all fuel from the furnace.

Shell is requesting that the Startup and Shutdown operating mode definitions be updated as follows:

- Startup – Beginning when fuel is introduced to the furnace and ending when the SCR catalyst bed reaches its stable operating temperature. Stable operating temperature is achieved when the furnace coil outlet temperature (COT) reaches 750°C.

- 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.

The proposed changes to the furnace operating mode definitions for "startup" and "shutdown" is consistent with the underlying precedent used in PA-04-00740A to define the ethane cracking furnace NOx LAER limits. The proposed change accomplishes the same objective as the condition in PA-04-00740A, requiring ammonia to be injected upstream of the SCR catalyst when the catalyst is within its stable operating window. Stable operating window of the SCR catalyst is reached when the coil outlet temperature (COT) reaches 750°C allowing for control of the operating temperature and beginning Hot Steam Standby operating mode. Consistent with the LAER precedent in PA-04-00740A, startup and shutdown will not exceed 24 hours in duration and furnace firing rate will not exceed 25% of the maximum allowable firing rate during startup or shutdown.

3. Use of furnace coil outlet temperature and feed rate to define Hot Steam Standby, Feed In, Feed Out, and Normal operating mode

The definitions for Hot Steam Standby, Feed In, Feed Out, and Normal operating mode in PA-04-00740A are as follows:

- Hot Steam Standby – When the furnace is firing at or below 50% of the maximum allowable firing-and no hydrocarbon feed is being charged to the furnace, and not operating in startup or shutdown mode.
- Feed In – Beginning when hydrocarbon feed is introduced to the furnace and ending when the furnace reaches 70% of the maximum allowable firing rate.
- Normal – When the furnace is firing at or above 70% of the maximum allowable firing rate with hydrocarbon feed being charged to the furnace.
- Feed Out – Beginning when the furnace drops below 70% of its maximum allowable firing rate and ending when hydrocarbon feed is isolated from the furnace.

Shell is requesting that the Hot Steam Standby, Feed In, Feed Out, and Normal operating mode definitions be updated as follows:

- Hot Steam Standby – When the furnace COT is greater than or equal to 750°C and no hydrocarbon feed is being charged to the furnace, and not operating in decoking, startup, or shutdown mode.
- Feed In – Beginning when hydrocarbon feed is introduced to the furnace and ending when the hydrocarbon feed reaches 43 metric tons per hour.
- Normal – When the furnace is at or above a hydrocarbon feed rate of 43 metric tons per hour.
- Feed Out – Beginning when the furnace drops below hydrocarbon feed rate of 43 metric tons per hour and ending when hydrocarbon feed is isolated from the furnace.

The proposed changes redefine Hot Steam Standby based on the furnace's COT rather than a percentage of the maximum firing rate, and Feed In and Feed Out based on the ethane feed rate of a furnace rather than the maximum design heat input rate. Based on the simulation modeling, the furnace's heat input rate will be between 100 and 200 MMBtu/hr during Hot Steam Standby when the COT is greater than 750°C. The definition of Hot Steam Standby operating made in

PA-04-00740 requires a furnace to be firing at a rate below 50% of the furnace's maximum design heat input, or 310 MMBtu/hr. The simulation shows that the heat input rate will be below the 50% maximum firing rate criterion when the COT is greater than 750°C.

Based on the simulation modeling, when a furnace is operating at a minimum normal ethane rate of 43 metric tons per hour the heat input rate will be 344 MMBtu/hr. The firing rate of a furnace at 70% of its maximum design heat input is 434 MMBtu/hr. This shows that the heat input rate and associated emissions when operating with the proposed ethane feed rate of 43 metric tons per hour will be less than the 70% maximum firing rate requirement in PA-04-00740 for Feed In and Feed Out.

EQUIPMENT CHANGES – REMOVED OR DOWNSIZED

Firewater Pump Engines

One firewater pump engine will be removed as part of this application. The remaining two engines will be downsized from 700 to 488 bhp. Consistent with LAER/BACT requirements established in PA-04-00740A, the fire pump engines will be subject to NSPS Subpart IIII Table 4 emission limits. Normal (non-emergency) operation of these engines will be limited to 100 hours per year or less. Diesel fuel sulfur content will be limited to a maximum of 15 ppm. In addition, one firewater pump engine diesel storage tank will also be removed.

Spent Caustic Vent Thermal Incinerator

The spent caustic thermal incinerator is designed to control VOC emissions from the spent caustic oxidizer stripper, and tank emissions from the spent caustic, flow equalization, and recovered oil tanks. With this application the capacity of the Spent Caustic Vent Thermal Incinerator is being updated from 8 metric tons/hr to 2.5 metric tons/hr. The heat input remains unchanged at 10.7 MMBtu/hr. The spent caustic vent thermal incinerator will comply with the LAER/BACT requirements established in PA-04-00740A.

Process Cooling Tower

The process cooling tower is a 26 cell counter-flow mechanical draft cooling tower that supplies cooling water to process units and the cogeneration plant. With this application Shell is requesting that the process cooling water tower rate be updated from 305 MMgal/min to 295.9 MMgal/min. LAER for control of VOC, and BAT for control of HAP from the process cooling tower has been determined in PA-04-00740A to be limitation of the cooling water VOC content and implementation of LDAR on the heat exchange system. LAER for control of $PM_{2.5}$, and BACT for control of PM and PM_{10}, has been determined in PA-04-00740A to be installation and operation of high efficiency drift eliminators.

Road Length Update

The emissions estimates for transport truck road emissions in PA-04-00740A were based on a road length of 0.967 miles. With this application, the road length is being updated to 0.49 miles in length.

INCREASED EQUIPMENT CAPACITIES

Combustion Turbine/Cogeneration Units

With this application Shell is requesting changes to the three Cogen Units to include a change in combustion turbine heat input from 475 to 481.4 MMBtu/hr each and an increase in each duct burner heat input from 189 to 234 MMBtu/hr. Final firing rate of the combustion turbines and duct burners was updated after issuance of PA-04-00740A. Operation of equipment associated with steam production was optimized to produce more steam and consequent electricity generation for plant use and for sale to the electric grid. The site steam balance was updated to reflect the production and needs for steam and electricity for the site, resulting in this additional capacity for generation. Increased heat input is physically being accomplished by firing additional natural gas fuel by the cogeneration units as part of the final site design. Operation of the cogen units will comply with the LAER/BACT/BAT requirements established in PA-04-00740A.

LAER for control of NO_x has been determined in PA-04-00740A to be installation and operation of current generation dry-low-NO_x (DLN) combustors, and SCR. Good combustion practices, proper operation and maintenance, and minimization of startup and shutdown events will also be required. Consistent with PA-04-00740A, the following NO_x limits have been determined to comply with LAER in this case:

- 2 ppmvd @ 15% O_2 on a 1-hour average, excluding startup and shutdown.
- 113 lb/hr during startup and shutdown.
- 70.4 tons from all turbines and duct burners combined in any consecutive 12-month period.

Short term NOx limits remain unchanged from PA-04-00740A. The ton per year limit has increased from 65.4 tons to 70.4 tons to account for the increase in heat input of the combustion turbines and duct burners.

BAT for control of NH_3 has been determined in PA-04-00740A to be proper design, operation, and maintenance of the SCR control devices for the minimization of ammonia slip in conjunction with maximization of NO_x reduction to meet the proposed NO_x LAER limit. Consistent with PA-04-00740A, the following NH_3 limit remains unchanged from PA-04-00740A and has been determined as representative of the application of BAT in this case:

- 5 ppmvd at 15% O_2.

LAER for control of VOC, and BAT for control of HAP has been determined in PA-04-00740A to be installation and operation of oxidation catalysts, good combustion practices, and proper operation and maintenance. Consistent with PA-04-00740A, the following VOC limit remains unchanged from PA-04-00740A and has been determined to comply with LAER in this case:

- 1 ppmvd @ 15% O_2 on a 1-hour average.

LAER for control of $PM_{2.5}$, BACT for control of PM and PM_{10}, and BAT for control of SO_x has been determined in PA-04-00740A to be combustion of a low ash and low sulfur fuel.

Consistent with PA-04-00740A, the following particulate matter and sulfur content limits remain unchanged from PA-04-00740A and have been determined to comply with LAER in this case:

- 0.0066 lb/MMBtu
- Fuel gas sulfur content shall not exceed 0.5 grains per 100 dscf.

BACT for control of CO has been determined in PA-04-00740A to be installation and operation of oxidation catalysts, good combustion practices, and proper operation and maintenance. Consistent with PA-04-00740A, the following CO limits have been determined to comply with BACT in this case:

- 2 ppmvd @ 15% O_2 on a 1-hour average, excluding startup and shutdown.
- 276 lb/hr during startup and shutdown.
- 45.0 tons from all turbines and duct burners combined in any consecutive 12-month period.

Short term CO limits remain unchanged from PA-04-00740A. The ton per year limit has increased from 42.0 tons to 45.0 tons to account for the increase in heat input of the combustion turbines and duct burners.

BACT for control of GHG (CO_2e) has been determined in PA-04-00740A to be low carbon fuel, energy efficiency measures, and proper operation and maintenance. Consistent with PA-04-00740A, the following CO_2e limit has been determined to comply with BACT in this case:

- 1,030 lbs CO_2e/MWh from all turbines and duct burners combined on a 30-day rolling average.
- 1,100,762 tons of CO_2e from all turbines and duct burners combined in any consecutive 12-month period.

To account for the increase in heat input of the combustion turbines and duct burners, the ton per year limit from PA-04-00740A has increased from 340,558 tons of CO_2e from each cogen unit to 1,100,762 tons of CO_2e from all units combined (366,920 tons of CO_2e from each unit).

Cogen Cooling Tower

The Cogen Cooling Tower is a 6 cell counter-flow mechanical draft cooling tower that supplies water to the cogeneration units. With this application Shell is requesting that the cogeneration plant cooling water tower rate be updated from 4,440,000 gallons per hour (74,000 gal/min) to 4,443,360 gallons per hour (74,056 gal/min). LAER for control of $PM_{2.5}$, and BACT for control of PM and PM_{10}, has been determined in PA-04-00740A to be installation and operation of high efficiency drift eliminators.

Flare Gas Composition Changes & Sweep Gas Rate Decreases

Changes to the flares to be constructed to control VOC emissions from the proposed plant include changes to the flare gas composition and decreases in the sweep gas rates. Flare gas composition changes include higher than originally projected concentrations of VOC, and lower concentrations of non-VOC (nitrogen, methane, etc.) from some vent streams. Additionally,

licensor data has indicated some intermittent vent frequencies to be higher than the preliminary design. These changes result in an increase in VOC emissions from the flares.

The LP System consists of an LP Thermal Incinerator and a Multipoint Ground Flare (MPGF). The rated capacity of the Thermal Incinerator is 10 metric tons/hr. The MPGF is sized with three independent headers with capacities of 32 metric tons/hr, 27 metric tons/hr, and 15 metric tons/hr. Organic vapors recovered from initial filling, de-inertization, and upsets of the refrigerated ethylene storage tank; as well as low pressure upsets of the polyethylene manufacturing process will be controlled by the MPGF. It will also serve as backup to the LP incinerator in case of emergency. As part of this application, the emissions rate from the LP Thermal Incinerator and MP Ground Flare are being updated to account for changes in gas composition of the flared gas and the sweep gas rate. The LP Thermal Incinerator and MPGF will comply with the LAER/BACT/BAT requirements established in PA-04-00740A.

The HP Header System consists of one elevated flare with a relieving capacity of 1,350 metric tons/hr and two totally enclosed ground flares, each rated for 150 metric tons/hr. Organic vapors recovered from intermittent polyethylene manufacturing process vents, compressor seal vents, and ethylene manufacturing startup/shutdown/maintenance/upsets will be controlled by the HP enclosed ground flares with the HP elevated flare only used as a backup in case of emergency. As part of this application, the emissions rate from the HP flare system is being updated to account for changes in the composition of the flared gas and the sweep gas rate. The HP Header System will comply with the LAER/BACT/BAT requirements already established in PA-04-00740A.

PE Pellet Handling, Storage, and Loadout

Final capacity and pellet handling rates for rail and truck handling and loadout were updated after issuance of PA-04-00740A. The deduster vent (elutriator wash air) was removed but pellet dedusting is still integral to the pellet handling process. This volumetric flow has been distributed to the railcar and truck handling source categories and dust collectors for purposes of calculating potential emissions. Pellet handling rates and updated pellet/air ratios for the railcar and truck handling and loadout source categories were determined during development of final design and updated for these source categories. These updates include additional volumetric air flow from the former deduster vent and also a lower density of pellets for loadout displacement.

LAER for control of $PM_{2.5}$, and BACT for control of PM and PM_{10}, has been established in PA-04-00740A to be enclosed handling and transfer with emission points controlled by fabric filters with maximum outlet filterable particulate matter emission rate of 0.005 gr/dscf. This source still meets BAT/LAER at the time of this new authorization.

Organic Liquid Loading

With this application Shell is requesting that the emissions estimates from Organic Liquid Loading be updated to include an increase in pyrolysis fuel oil loading from 1.5 MMgal/yr to 5.3 MMgal/yr and a decrease in light gasoline loading rate from 8.0 MMgal/yr to 6.0 MMgal/yr. Vapors from Pyrolysis Fuel Oil and Light Gasoline loading will be controlled by the Low Pressure Thermal Incinerator. LAER for control of VOC, and BAT for control of HAP has been established in PA-04-00740A to be submerged loading with vapor capture and low-leak disconnect couplings, and routing to the LP incinerator with a minimum VOC control efficiency of 99.9%. This source still meets BAT/LAER at the time of this new authorization.

Recovered Oil and Flow Equalization and Removal Tank

With this application, the recovered oil tank and flow equalization and removal tank capacities will increase from 24,000 gal to 521,000 gal and 742,000 gal to 878,000 gal, respectively. Final capacity of the recovered oil and flow equalization and removal tanks was updated after issuance of PA-04-00740A. Additional storage capacity was updated during development of the final design to allow greater operational flexibility within the wastewater treatment plant area. There is no expected increase of wastewater and recovered oil flow or recovery rates associated with this change. These emissions are accounted for in the controlled emissions estimates from the Spent Caustic Vent Thermal Incinerator and this change does not result in a quantifiable increase in VOC emissions.

LAER for control of VOC, and BAT for control of HAP has been established in PA-04-00740A to be internal floating roofs (IFR) and vapor capture and routing to the spent caustic vent incinerator with a minimum VOC control efficiency of 99%. This source still meets BAT/LAER at the time of this new authorization.

Department Initiated Changes

In addition to the above requested changes, the performance testing requirement will be updated based on the current standard condition which is detailed in the Special Conditions section of this memo. Protocol submittal will be required at least 60 days prior to testing.

The annual emission reporting, initial operating permit inspection, and Title V Operating Permit requirements will be updated to remain consistent with PA-04-00740B. These updates are detailed in the Special Conditions section of this memo.

To confirm the results of the Risk Assessment Analysis, HAP testing on the ethane cracking furnaces, spent caustic vent incinerator, low pressure thermal incinerator, combustion turbines, and catalyst activation vents have been added to the plan approval for the primary risk contributors identified in the inhalation risk assessment.

EMISSIONS & CONTROLS

Emission calculations were performed for the above described changes. Detailed emission calculations are included in Appendix B of the plan approval application and Enclosure 4 of the April 2020 update to the February 14, 2020, Plan Approval Application.

Emission calculations were updated by the applicant for the natural gas-fired emergency generator engines, diesel-fired emergency generator engines, and fire pump engines based upon applicable LAER and BACT emission limits, federal emission standards and limitations, manufacturer's emissions data, mass balance, AP-42 Chapters 3.2 and 3.3, and 40 CFR Part 98 Subpart C emission factors. Total sulfur content of diesel fuel may not exceed 15 ppm. Non-emergency operation of each of these engines may not exceed 100 hours annually.

I have made some corrections to the fire pump engines emission calculations by calculating PTE based on manufacturer's emissions data for VOC, NO_x, CO, and PM.

Table 5: Natural Gas Fired Emergency Generator Engines PTE

Air Contaminant	158 hp Engine		50 hp Engine		113 hp Engine	
	Emission Rate (lb/hr)	Emission Rate (tpy)[a]	Emission Rate (lb/hr)	Emission Rate (tpy)[a]	Emission Rate (lb/hr)	Emission Rate (tpy)[a]
NO_x	0.89	0.04	0.59	0.03	1.24	0.06
CO	0.32	0.02	2.87	0.14	5.09	0.25
PM	0.01	0.001	<0.001	<0.001	<0.001	<0.001
PM_{10}	0.03	0.001	0.004	<0.001	0.01	<0.001
$PM_{2.5}$	0.03	0.001	0.004	<0.001	0.01	<0.001
SO_x	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
VOC	0.45	0.02	0.04	0.002	0.09	0.004
HAP	0.04	0.002	0.03	0.001	0.05	0.003
CO_2e	279	14	74	4	144	7

[a] Calculated at 100 hrs/yr/engine.

Table 6: Diesel Fired Emergency Generator Engines and Fire Pump Engines PTE

Air Contaminant	103 hp Engine		67 hp Engine		Fire Pump Engines[a]	
	Emission Rate (lb/hr)	Emission Rate[b] (tpy)	Emission Rate (lb/hr)	Emission Rate[b] (tpy)	Single Emission Rate (lb/hr)	Combined Emission Rate[b] (tpy)
NO_x	0.53	0.03	0.41	0.02	2.76	0.28
CO	0.59	0.03	0.38	0.02	0.72	0.07
PM	0.01	0.001	0.03	0.002	0.09	0.02
PM_{10}	0.01	0.001	0.03	0.002	0.08	0.02
$PM_{2.5}$	0.01	0.001	0.03	0.002	0.08	0.02
SO_x	0.001	<0.001	<0.001	<0.001	0.005	<0.001
VOC	0.009	<0.001	0.01	0.001	0.09	0.01
HAP	0.003	<0.001	0.002	<0.001	0.005	<0.001
CO_2e	118	6	77	4	559	56

[a] Two diesel-fired fire pump engines rated at 488 bhp each.
[b] Calculated at 100 hrs/yr/engine.

Emission calculations were updated by the applicant for storage tanks not controlled by a common control device based upon EPA TANKS 4.09 for working and breathing losses. Flashing losses are expected to be negligible because these liquids will not be transferred under pressure and not undergo a large pressure drop when entering the storage tanks. These tanks include all diesel fuel storage tanks and spent caustic storage tanks. All of the diesel tanks except for the two (2) Generator Diesel Storage Tanks will be controlled at an estimated 95% by carbon canisters. HAP emissions have been conservatively set equal to VOC emissions.

Table 7: Diesel Fuel and Spent Caustic Storage Tanks PTE

Storage Tank	Capacity (gallons)	Max Throughput (gal/yr)	VOC (tpy)	HAP (tpy)
Locomotive Diesel	10,000	412,000	0.00	0.00
Generator Diesel (2)	140	2,000	0.00	0.00
Vehicle Diesel (2)	18,000	100,000	0.00	0.00
Fire Water Pump Diesel (2)	1,849	7,200	0.00	0.00
Spent Caustic	237,755	26,151,000	0.01	0.01
Unoxidized Spent Caustic	2,279,805	26,151,000	0.01	0.01
Total	-	-	0.02	0.02

Emission calculations for the polyethylene manufacturing process vents were updated to include polyethylene unit 3 intermittent particulate vents. Each emission point (excluding the pellet dryer vents) will be controlled by a fabric filter with an outlet emission rate not to exceed 0.005 gr/dscf. Pellet dryer vents are expected to be high in moisture content and uncontrolled with an outlet emission rate not to exceed 0.01 gr/dscf. Process vent particulate matter emissions will be filterable and have been assumed to be 100% $PM_{2.5}$ as a worst case scenario. All calculations were found to be acceptable.

Table 8: Polyethylene Units Process Vents PTE

Source	PM	PM_{10}	$PM_{2.5}$
	Emission Rate (tpy)	Emission Rate (tpy)	Emission Rate (tpy)
PE Units 1 & 2 Process Vents	2.17	2.17	2.17
PE Unit 3 Process Vents	1.50	1.50	1.50
Total	3.67	3.67	3.67

Emission calculations for fugitive losses from C+ liquid loading have been updated to include the loading of LPG materials other than C3+ (*i.e.,* butene, hexene, isobutane, isopentane, and C3+ refrigerant) that were identified as part of the original 2015 Plan Approval Application as stored materials but not loaded. VOC emissions have been updated based on vendor provided emission factors for liquid loss from Shell's dry disconnect couplings.

Emission calculations for fugitive losses from light gasoline and pyrolysis fuel oil have been updated to include an increase in pyrolysis fuel oil loading from 1.5 MMgal/yr to 5.3 MMgal/yr and a decrease in light gasoline loading rate from 8.0 MMgal/yr to 6.0 MMgal/yr. Vapors from pyrolysis fuel oil and light gasoline loading are controlled by the low pressure thermal incinerator. Control efficiency of the incinerator will be a minimum of 99.9%. Losses are assumed to be both 100% VOC and organic HAP.

Emission calculations for fugitive losses from recovered oil and coke residue/tar remain unchanged from the original plan approval application (PA-04-00740A).

Table 9: Liquid Loadout PTE

Source	VOC	HAP
	Emission Rate (tpy)	Emission Rate (tpy)
C_3+	0.01	-
Recovered Oil	0.10	0.10
Coke Residue and Tar	0.37	0.37
Pyrolysis Fuel Oil	0.03	0.03
Light Gasoline	0.02	0.02
Total	0.53	0.52

Emission calculations were carried out by the applicant for the spent caustic vent incinerator based upon AP-42 Chapters 1.4 & 13.5 emission factors, mass balance and design parameters, and 40 CFR Part 98 Subpart C emission factors. Emission calculations for the spent caustic vent incinerator remain unchanged from the original 2015 plan approval application. The only change to this unit is the capacity will be reduced from 8 to 2.5 metric tons per hour. Heat input of the incinerator will remain unchanged at 10.7 MMBtu/hr. All calculations were found to be acceptable.

Table 10: Spent Caustic Vent Incinerator PTE

Air Contaminant	Emission Rate (lb/hr)	Emission Rate (tpy)
NO_x	0.73	3.19
CO	0.88	3.87
PM (Filterable)	0.02	0.09
PM_{10}	0.08	0.35
$PM_{2.5}$	0.08	0.35
SO_x	0.94	4.13
VOC	0.32	1.42
Benzene	0.11	0.48
HAP	0.32	1.42
CO_2e	1,340	5,870

Emission calculations were updated by the applicant for the process and cogen cooling towers based upon tower design specifications, and mass balance calculations in conjunction with LAER and BACT emission limits. A worst case annual operating time of 8,760 hours at the maximum designed cooling water flow rates is assumed for each tower. Maximum water flow through the process and cogen cooling towers has been updated to 17.8 MMgal/hr and 4.45 MMgal/hr respectively. Each cooling tower will be equipped with high efficiency drift eliminators designed to limit water loss from the towers to 0.0005% or less of the total circulated water. It is then assumed that any solids in the drift loss will become PM emissions based upon the TDS limit of 2,000 ppmw. PM_{10} and $PM_{2.5}$ fractions of the total particulate are estimated using the Reisman & Frisbie method at 63.5 and 0.21 wt% of the total PM emissions respectively. VOC emissions from the process cooling tower will be minimized through maximization of process heat recovery and implementation of an LDAR program for the cooling

water heat exchanger. VOC content of the cooling water will be limited to not exceed 0.5 lb/MMgal of circulated water. All calculations were found to be acceptable.

Table 11: Cooling Towers PTE

Air Contaminant	Process Cooling Tower		Cogen Cooling Tower	
	Emission Rate (lb/hr)	Emission Rate (tpy)	Emission Rate (lb/hr)	Emission Rate (tpy)
PM	1.48	6.49	0.37	1.62
PM_{10}	0.94	4.12	0.24	1.03
$PM_{2.5}$	0.003	0.013	0.001	0.003
VOC	8.88	38.88	-	-
HAP	0.89	3.89	-	-

Emission calculations were updated by the applicant for finished polyethylene pellet blending, handling, storage, and loading based upon designed bin vent filter outlet emission rates and total volume of air flow through each step. Each emission point will be controlled by a bin vent filter with an outlet emission rate not to exceed 0.005 gr/dscf and air flow rates are determined based upon the maximum short term, and annual average production rates. Blending rate has decreased from 3,000,000 metric tons per year to 2,400,000 metric tons per year and the exhaust rate has increased slightly. Railcar and truck handling and storage rates have also increased and have been estimated at 100% and 43% of total production also with a 10 to 1 pellet to air mass ratio representing forced air flow. Railcar and truck loadout have also increased and been estimated at 100% and 43% of total production but with a 1 to 1 pellet to air volume ratio (displacement air). This results a conservatively higher total PTE from these activities because only 100% of the product will be available for loadout.

Table 12: Polyethylene Pellet Blending, Handling, Storage, and Loading PTE

Source	PM	PM_{10}	$PM_{2.5}$
	Emission Rate (tpy)	Emission Rate (tpy)	Emission Rate (tpy)
Blending Silos	3.52	1.20	1.20
Railcar Handling & Storage	2.83	0.96	0.96
Truck Handling & Storage	1.96	0.67	0.67
Railcar Loading	0.04	0.04	0.04
Truck Loading	0.02	0.02	0.02
Total	8.37	2.89	2.89

Emission calculations were updated by the applicant for the natural gas-fired combustion turbines with natural gas- and tail gas-fired duct burners based upon LAER and BACT emission limits, mass balance, AP-42 Chapters 1.4 and 3.1 emission factors, and 40 CFR Part 98 Subpart C emission factors. Changes to the three Cogen Units include a change in combustion turbine heat input from 475 to 481.4 MMBtu/hr each and an increase in each duct burner heat input from 189 to 234 MMBtu/hr. A worst case annual operation time of 8,760 hours is assumed for each of

the 3 turbines and duct burners including up to 7 hours of startup and shutdown events where applicable.

NO_x emissions will be controlled by low-NO_x burners and SCR capable of achieving an outlet emission rate of 2 ppmvd @ 15% O_2 on a 1-hour average, which is considered LAER for these turbines. The highest short term emission rate of 113 lb/hr is expected only during startup events at the point when the exhaust temperature is just below the SCR's effective operating temperature range. Aqueous ammonia or urea will be injected upstream of the SCR control device and ammonia slip shall not exceed 5 ppmvd @ 3% O_2.

CO, VOC, and organic HAP emissions will be controlled by oxidation catalysts capable of achieving an outlet emission rate of 2 ppmvd @ 15% O_2 on a 1-hour average for CO, and 1 ppmvd @ 15% O_2 (as propane) on a 1-hour average for VOC. These rates are considered representative of BACT and LAER respectively. The highest short term CO emission rate of 276 lb/hr is expected only during startup events at the point when the exhaust temperature is just below the oxidation catalyst's effective operating temperature range. A minimum control efficiency of 90% due to the oxidation catalyst has been applied to the AP-42 organic HAP emission factors.

PM, PM_{10}, $PM_{2.5}$, and CO_2e emissions will be controlled by good combustion practices with emission rates representative of BACT and LAER where applicable. PM_{10} and $PM_{2.5}$ emissions are considered equivalent for these sources due to combustion of gaseous fuel. Although some excess tail gas may be combusted as fuel by the duct burners, no modifications were made to the emission factors from 40 CFR Part 98 Subpart C. Firing only natural gas is expected to be the normal mode of operation and assuming all natural gas results in a more conservative PTE.

NO_x and CO rates will be monitored by CEMs while other pollutant rates will be demonstrated by source testing. All calculations were found to be acceptable.

Table 13: GE Frame 6B Combustion Turbines with Duct Burners PTE[a]

Air Contaminant	Single Unit Normal Emission Rate[b] (lb/hr)	Single Unit Annual Emission Rate[c] (tpy)	Combined Annual Emission Rate[d] (tpy)
NO_x	5.35	23.4	70.3
CO	3.20	15.0	45.0
PM (Filterable)	1.33	5.8	17.5
PM_{10}	4.72	20.7	62.0
$PM_{2.5}$	4.72	20.7	62.0
SO_x	1.05	4.61	13.82
VOC	2.52	11.03	33.10
Formaldehyde	0.05	0.22	0.67
Toluene	0.01	0.04	0.12
HAP (Total)	0.07	0.32	0.97
Ammonia	4.86	21.31	63.92
CO_2e	83,772	366,921	1,100,762

[a] Three turbines rated at 481.4 MMBtu/hr each with three duct burners rated at 234 MMBtu/hr each.

[b] Normal operation is expected for 8,753 hours per year.

[c] Annual PTE for a single turbine/duct burner over all operational modes for 8,760 hours per year.

[d] Annual PTE for all three turbines/duct burners combined over all operational modes for 8,760 hours per year.

Emission calculations were updated by the applicant for the MPGF, HP enclosed ground flares, and HP elevated flare based upon expected maximum vent rates to the flares, the VOC destruction efficiency of the flares, AP-42 Chapters 1.4 & 13.5 emission factors, and 40 CFR Part 98 Subpart C emission factors. Changes to the MPGF, HP enclosed ground flares, and HP elevated flare include changes in the composition of the flared gas and the sweep gas rate. Organic vapors recovered from intermittent polyethylene manufacturing process vents, compressor seal vents, and ethylene manufacturing startup/shutdown/maintenance/upsets will be controlled by the HP enclosed ground flares with the HP elevated flare only used as a backup in case of emergency. Organic vapors recovered from initial filling, de-inertization, and upsets of the refrigerated ethylene storage tank; as well as low pressure upsets of the polyethylene manufacturing process will be controlled by the MPGF. It will also serve as backup to the LP incinerator in case of emergency. Annual operation of these flares includes continuous pilot lights and sweep gas, worst case expected vent rates, and worst case projected startup/shutdown events. VOC PTE from the MPGF and HP elevated flare is comparatively low because those units function primarily as backup units with natural gas as the only normal combustion gas. The designed annual average VOC flow to the HP enclosed ground flares is 1.23 metric tons per hour and minimum designed control efficiency for the flares is 98% consistent with LAER, NSPS Part 60 Subpart DDD, and NESHAP Part 63 Subpart YY. All calculations were found to be acceptable.

Table 14: MPGF, HP Ground Flares, HP Elevated Flare PTE

Air Contaminant	MPGF[a] Emission Rate (tpy)	HP Ground Flares[b] Emission Rate (tpy)	HP Elevated Flare[c] Emission Rate (tpy)
NO_x	1.76	39.2	0.33
CO	9.55	213.5	1.81
PM (Filterable)	0.04	1.07	0.01
PM_{10}	0.19	4.30	0.04
$PM_{2.5}$	0.19	4.30	0.04
SO_x	0.04	0.85	0.01
VOC	0.10	237.1	0.03
Hexane	0.03	1.02	0.01
HAP	0.04	1.07	0.01
CO_2e	3,141	76,124	572

[a] One multipoint ground flare rated at 100 MMBtu/hr with 1.0 MMBtu/hr pilot gas and sweep gas.

[b] Two enclosed ground flares with a combined rating of 2,725 MMBtu/hr with 1.0 MMBtu/hr pilot gas and sweep gas.

[c] One steam-assisted backup elevated flare rated at 1,350 metric tons/hr with 1.0 MMBtu/hr pilot gas.

Emission calculations were updated by the applicant for the LP incinerator to account for changes in the design heat input rate, changes to the composition of the gas controlled by the LPTI and sweep gas rate changes. Emissions were estimated based on the expected maximum vent rates to the control devices, the design VOC destruction efficiency of the controls, AP-42 Chapters 1.4 & 13.5 emission factors, and 40 CFR Part 98 Subpart C emission factors. A worst case operating time of 8,760 hours at the maximum designed heat input of 107 MMBtu/hr is assumed. Organic vapors recovered from continuous polyethylene manufacturing process vents, pyrolysis fuel oil and light gasoline storage tanks and loading, and hexene storage tanks will be

controlled by this device. Minimum designed control efficiency is 99.9% for these high VOC concentration streams. SO_2 PTE is negligible because minimal natural gas assist will be necessary. PM_{10} and $PM_{2.5}$ emissions are considered equivalent for this source due to combustion of gaseous fuel. All calculations were found to be acceptable.

Table 15: LP Incinerator PTE

Air Contaminant	Emission Rate (lb/hr)	Emission Rate (tpy)
NO_x	7.26	31.8
CO	8.79	38.5
PM (Filterable)	0.20	0.89
PM_{10}	0.80	3.48
$PM_{2.5}$	0.80	3.48
SO_x	0.00	0.00
VOC	3.75	16.42
Hexane	0.19	0.83
HAP	0.20	0.87
CO_2e	15,584	68,260

Emission calculations were updated by the applicant for fugitive dust emissions from facility roadway vehicle traffic based upon AP-42 Chapter 13.2.1 emission factors for paved roadways. With this application, the road length is being updated from 0.967 miles to 0.49 miles in length. All calculations were found to be acceptable.

Table 16: Paved Roadway Vehicle Traffic PTE

Source	PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Paved Roadways	0.23	0.05	0.01

Table 17 below summarizes the change in emissions for sources affected by the as-built changes in PA-04-00740A.

Table 17: Change in Emissions By Source Category

Emission Source	NOx (tpy)	CO (tpy)	PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	SO_X (tpy)	VOC (tpy)	HAP (tpy)	CO_2e (tpy)
Emergency Generators & Fire Pump Engines	(12.44)[a]	(7.46)[a]	(0.43)[a]	(0.42)[a]	(0.39)[a]	(0.01)[a]	(0.68)[a]	(0.01)[a]	(1,181)[a]
PE Units Process Vents	-	-	0.57	0.57	0.57	-	-	-	-
Diesel Fuel and Spent Caustic Storage Tanks	-	-	-	-	-	-	0	0	-
Liquid Loadout	-	-	-	-	-	-	(17.28)[a]	0.01	-
Spent Caustic Vent Incinerator	0	0	0	0	0	0	0	0	0
Cooling Towers	-	-	(0.19)[a]	(0.12)[a]	0	-	(1.22)[a]	(0.12)[a]	-
PE Pellet Blending, Handling, Storage, & Loading	-	-	2.28	1.83	1.83	-	-	-	-
Combustion Turbines	4.9	3	1.24	4.43	4.43	0.98	2.38	0.07	79,087
MPGF, HP Ground Flares, HP Elevated Flare	(2.29)[a]	(12.34)[a]	(0.08)[a]	(0.24)[a]	(0.24) [a]	(0.04)[a]	9.96	(0.07)[a]	(1,248)[a]
LP Incinerator	(9.9)[a]	(12.0)[a]	(0.25)[a]	(1.09)[a]	(1.09)[a]	0	0.96	(0.29)[a]	(21,322)[a]
Vehicle Traffic	-	-	(0.29)[a]	(0.06)[a]	(0.02)[a]	-	-	-	-

[a] Parenthetical values represent a decrease in emissions comparing Plan Approval PA-04-00740C to PA-04-00740A.

Table 18 below summarizes the revised facility-wide potential emissions to account for the above described changes. Table 18 also shows the change in emissions resulting from the as-built changes when compared to the facility-wide potential emissions of Plan Approval PA- 04-00740A.

Table 18: Facility-Wide PTE and Emission Changes

Air Contaminant	Final Emission Rate[a] (tpy)	Previous Emission Rate[b] (tpy)	Change in Emissions[c] (tpy)
NO_x	328.5	348	(19.5)[d]
CO	983.7	1,012	(28.3)[d]
PM (filterable)	74.3	71	3.3
PM_{10}	168.9	164	4.9
$PM_{2.5}$	163.7	159	4.7
SO_x	22.4	21	1.4
VOC	516.2	522	(5.8)[d]
HAP	32.0	30.5	1.5
Ammonia	154	152	2
CO_2e	2,303,645	2,248,293	55,352

[a] This column shows total facility-wide emissions including the as-built changes of Plan Approval PA-04-00740C.
[b] This column shows total facility-wide emissions from Plan Approval PA-04-00740A.
[c] This column shows the change in emissions resulting from the as-built changes of Plan Approval PA-04-00740C.
[d] Parenthetical values represent a decrease in emissions comparing Plan Approval PA-04-00740C to PA-04-00740A.

PSD Modeling

Due to the proposed changes and additional sources described above, refined air dispersion modeling was performed for the pollutants which exceed the PSD thresholds including NO_2, CO, and PM_{10}; and the analyses were submitted with the plan approval application in order to demonstrate that Shell does not cause or contribute to air pollution in violation of any NAAQS or PSD increments. Input emission rates and stack parameters were found to be consistent with other submitted plan approval application materials. This modeling was evaluated by the Department's Division of Air Resource Management, Air Quality Modeling Section. The Department's technical review concludes that Shell's revised air quality analyses continue to satisfy the requirements of the PSD regulations. See the "Summary of Air Quality Analyses for Prevention of Significant Deterioration" from Andrew W. Fleck, Environmental Group Manager, dated September 21, 2020, included in Appendix A of this review memorandum. According to the Department's determination, Shell's source impact analyses demonstrate that the Shell Facility's emissions will not cause or contribute to air pollution in violation of the NAAQS for CO, NO_2, or PM_{10}. Additionally, Shell's source impact analyses demonstrate that the Shell Facility's emissions would not cause or contribute to air pollution in violation of the Class II or Class I PSD increments for NO_2 or PM_{10}.

In accordance with 40 CFR § 52.21(l), Shell's estimates of ambient concentrations are based on applicable air quality models, data bases, and other requirements specified in the EPA's *Guideline on Air Quality Models* as well as the EPA's relevant air quality modeling policy and guidance.

In accordance with 40 CFR § 52.21(m), Shell provided an analysis of existing ambient air quality in the area that the Shell Facility would affect which included existing representative ambient monitoring data for CO, NO_2, and PM_{10}.

In accordance with 40 CFR § 52.21(n), Shell provided all information necessary to perform the air quality analyses required by the PSD regulations, including all dispersion modeling data necessary to estimate the air quality impacts of the Shell Facility's emissions.

In accordance with 40 CFR § 52.21(o), Shell provided additional impact analyses of the impairment to visibility, soils, and vegetation that would occur as a result of the Shell Facility and general commercial, residential, industrial, and other growth associated with the Shell Facility.

As stated above, in accordance with 40 CFR § 52.21(p), written notice of the revisions to the Shell Facility have been provided to the FLMs of nearby federal Class I areas as well as initial screening calculations to demonstrate that the Shell Facility's emissions would not adversely impact AQRVs and visibility in nearby federal Class I areas. On April 30, 2020, and April 1, 2020, the Department received notification from the Forest Service and National Park Service, respectively, that no further Class I analysis will be requested at this time

Risk Assessment Modeling

In February 2020, the Department received an inhalation risk assessment. This report was prepared for Shell by RTP Environmental Associates to support Shell's plan approval application. Subsequently, on September 3, 2020, the Department received a revised risk

assessment report. This assessment has been submitted in order to evaluate potential cancer and noncancer inhalation risks from Shell's air emissions. The DEP's Air Quality Modeling Section performed an independent air quality analysis for a risk assessment on the facility. The DEP's Air Toxics and Risk Assessment Section performed an independent risk assessment and found no unacceptable risks from the operations. Modeling results and data received with this submittal were sent to both the Department's Air Toxics and Risk Assessment Section; and Air Quality Modeling Section and reviewed by Craig Evans, Environmental Group Manager; and Andrew Fleck, Environmental Group Manager.

Input emission rates are found to be acceptable and consistent with other submitted plan approval application materials. This is a facility-specific assessment and does not include any other source emission data. Emission rates of compounds of potential concern (COPC) have been modeled to derive exposure concentrations. The highest modeled exposure concentrations were then multiplied or divided by compound-specific unit risk factors or reference concentrations, respectively. Chronic risks for each COPC were then summed and compared against the Department's benchmark excess lifetime cancer risk and health index (HI) values. Acute risks for each COPC were compared against the Department's benchmark hazard quotient (HQ) value. Results of the modeling show that worst case chronic cancer, chronic noncancer, and acute noncancer risks do not exceed the Department's benchmarks.

The Department's technical review concludes that Shell's inhalation risk assessment was conducted according to the Department-approved protocol and is acceptable. Furthermore, the Department's independent inhalation risk assessment concludes that chronic cancer and noncancer risks as well as acute noncancer risks do not exceed the Department's benchmarks. The Air Toxics and Risk Assessment Section's "As Built Air Quality Modeling and Inhalation Risk Evaluation" is included in Appendix A of this review memorandum.

RECOMMENDATIONS

Shell Chemical Appalachia LLC has shown that emissions due to "as-built" changes in design and construction will be minimized through the use of appropriate BAT, BACT, and LAER in this application for a petrochemicals complex to be located in Potter and Center Townships, Beaver County. Shell has also demonstrated that the proposed facility will not cause or contribute to air pollution in violation of the NAAQS, will not impair visibility, soils, and vegetation, will not adversely affect AQRV, including visibility, in federal Class I areas, and chronic cancer and noncancer risks as well as acute noncancer risks will not exceed the Department's benchmarks. I recommend issuance of a Plan Approval with an expiration date of April 28, 2021 subject to the standard conditions in Section B of all plan approvals along with the following modified/additional special conditions. Other conditions included in PA-04-00740A will remain unchanged.

Modified/New Special Conditions

SECTION C. Site Level Requirements

RESTRICTIONS

#006 Emissions from the Facility shall not exceed the following in any consecutive 12-month period [25 Pa. Code §127.12b]:

Air Contaminant	Emission Rate (tpy)
NO_x	~~348~~ **328.5**
CO	~~1,012~~ **983.7**
PM (filterable)	~~71~~ **74.3**
PM_{10}	~~164~~ **168.9**
$PM_{2.5}$	~~159~~ **164**
SO_x	~~21~~ **22.4**
VOC	~~522~~ **516.2**
VOC (ERC)[a]	~~620~~ **612**
HAP	~~30.5~~ **32.0**
Ammonia	~~152~~ **154**
CO_2e[b]	~~2,248,293~~ **2,304,499**

[a] This limit is included to ensure that the proper amount of VOC ERCs had been secured by the applicant in accordance with the VOC offset ratios for flue and fugitive emissions under 25 Pa. Code §127.210. Compliance with this limit will be determined by actual VOC emissions at the Facility and the following equation:

VOC (ERC) = 1.15*∑(flue VOC emissions) + 1.3*∑(fugitive VOC emissions) *(Eq. 1)*

Where:

Flue VOC emissions are actual emissions from the ethane cracking furnaces, combustion turbines/duct burners, incinerators, flares, engines, miscellaneous storage tanks, and polyethylene pellet residual VOC.

Fugitive VOC emissions are actual emissions from liquid loadout, component leaks, the process cooling tower, and wastewater treatment plant.

[b] This limit includes 854 tpy CO_2e from SF_6-Insulated High Voltage Equipment included in PA-04-00740B.

#009 Performance testing shall be conducted as follows [25 Pa. Code §127.12b and §139.11]:

a. The Owner/Operator shall submit **two hard copies and one electronic copy** ~~three copies~~ of a pre-test protocol to the Department for review at least ~~45~~ **60** days prior to the performance of any EPA Reference Method stack test. The Owner/Operator shall submit ~~three copies~~ **two hard copies and one electronic copy** of a one-time protocol to the Department for review for the use of a portable analyzer and may repeat portable analyzer testing without additional protocol approvals provided that the same method and

equipment are used. All proposed performance test methods shall be identified in the pre-test protocol and approved by the Department prior to testing.

b. The Owner/Operator shall notify the Regional Air Quality Manager **and Division of Source Testing and Monitoring** at least 15 days prior to any performance test so that an observer may be present at the time of the test. This notification may be sent by email. **Notification shall not be made without prior receipt of a protocol acceptance letter from the Department.** ~~Notification shall also be sent to the Division of Source Testing and Monitoring. Performance testing shall not be conducted except in accordance with an approved protocol.~~

c. Pursuant to 40 CFR Part 60.8(a) and 40 CFR Part 63.9(h), a complete test report shall be submitted to the Department no later than 60 calendar days after completion of the on-site testing portion of an emission test program.

d. Pursuant to 40 CFR Part 61.13(f), a complete test report shall be submitted to the Department no later than 31 calendar days after completion of the on-site testing portion of an emission test program.

e. Pursuant to 25 Pa. Code Section 139.53(b) a complete test report shall include a summary of the emission results on the first page of the report indicating if each pollutant measured is within permitted limits and a statement of compliance or non-compliance with all applicable permit conditions. The summary results will include, at a minimum, the following information:

    1. A statement that the owner or operator has reviewed the report from the emissions testing body and agrees with the findings.
    2. Permit number(s) and condition(s) which are the basis for the evaluation.
    3. Summary of results with respect to each applicable permit condition.
    4. Statement of compliance or non-compliance with each applicable permit condition.

f. Pursuant to 25 Pa. Code § 139.3 all submittals shall meet all applicable requirements specified in the most current version of the Department's Source Testing Manual.

g. All testing shall be performed in accordance with the provisions of Chapter 139 of the Rules and Regulations of the Department of Environmental Protection.

h. Pursuant to 25 Pa. Code Section 139.53(a)(1) and 139.53(a)(3) 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. Alternatively, electronic copies may be provided on a CD along with hard copy submittals.** ~~submittals, besides notifications, shall be accomplished through PSIMS*Online available through https://www.depgreenport.state.pa.us/ecomm/Login.jsp when it becomes available. If internet submittal can not be accomplished, three copies of the submittal shall be sent to the Pennsylvania Department of Environmental Protection, Bureau of Air Quality, Division of Source Testing and Monitoring, 400 Market Street, 12th Floor Rachael~~

~~Carson State Office Building, Harrisburg, PA 17105-8468 with deadlines verified through document postmarks.~~

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

#013 The Owner/Operator shall maintain the following comprehensive and accurate records [25 Pa. Code §127.12b]:

a. Rolling 12-month totals of the hours of operation in each defined operating mode for each ethane cracking furnace and each combustion turbine.
b. Rolling 12-month totals for each diesel-fired emergency generator**, natural gas-fired emergency generator,** and fire pump engine of (and as defined in 40 CFR Part 60 Subpart IIII **and 40 CFR Part 60 Subpart JJJJ**):
   1) Hours of operation for maintenance, testing, or emergency demand response.
   2) Hours of operation in all non-emergency situations.
   3) Hours of operation.
c. Rolling 12-month totals (in MMscf) of tail gas and natural gas consumed by each ethane cracking furnace, combustion turbine, and duct burner.
d. Rolling 12-month totals (in MMscf) of gas combusted by the LP incinerator, MPGF, HP ground flares, emergency elevated flare, and Spent Caustic Vent incinerator.
e. Rolling 12-month totals (in metric tons) of produced ethylene and polyethylene.
f. Rolling 12-month totals (in gallons) of C_3+, coke residue/tar, recovered oil, pyrolysis fuel oil, and light gasoline loaded out from the Facility.
g. Rolling 12-month totals (in gallons) of methanol throughput.
h. Rolling 12-month totals of calculated VOC (ERC) emissions in accordance with Equation 1 specified in this Plan Approval.
i. Rolling 12-month averages of measured TDS from each cooling tower.
j. Records including a description of testing methods, results, all operating data collected during tests, and a copy of the calculations performed to determine compliance with emission standards for the ethane cracking furnaces, combustion turbines, and incinerators.
k. Copies of manufacturer's or EPC contractor's equipment design specifications necessary to determine compliance with required control efficiencies or outlet emission rates.
l. Copies of maintenance procedures and schedules for all air contamination sources and air cleaning devices authorized under this plan approval.
m. Records of any maintenance conducted on the air contamination sources and air cleaning devices authorized under this plan approval.
n. Records that diesel fuel's total sulfur content does not exceed 15 ppm, and that either cetane index is a minimum of 40 or aromatic content does not exceed 35 % by volume.
o. Records that each gaseous fuel's total sulfur content does not exceed 0.5 grains per 100 dscf. This may be demonstrated by a current, valid purchase contract, tariff sheet or transportation contract for the fuel; or fuel total sulfur content monitoring in accordance with 40 CFR §§60.4360 and 60.4370, applicable to the turbines.
p. Records of observations of visible stack emissions, fugitive emissions, and potentially objectionable odors including the date, time, name, and title of the observer, along with any corrective action taken as a result.

#019 Annual emission reporting shall be conducted as follows [25 Pa. Code §135.3]:

a. ~~The Owner/Operator shall submit by March 1 of each year, a source report for the preceding calendar year. The report shall include information for all previously reported sources, new sources which were first operated during the preceding calendar year, and sources modified during the same period which were not previously reported.~~ **In accordance with 25 Pa. Code §135.3, the permittee shall submit to the Department via AES*Online or AES*XML at www.depgreenport.state.pa.us/ by March 1 of each year, a facility inventory report for the preceding calendar year for all sources authorized under this plan approval. The inventory report shall include all emissions information for all sources operated during the preceding calendar year. Emissions data including, but not limited, to the following shall be reported: carbon monoxide (CO); oxides of nitrogen (NOx); particulate matter less than 10 micrometers in diameter (PM10); particulate matter less than 2.5 micrometers in diameter (PM2.5); sulfur dioxide (SO2); volatile organic compounds (VOC); total hazardous air pollutants (HAP); speciated HAP including, but not limited to, benzene, ethyl benzene, formaldehyde, nhexane, toluene, isomers and mixtures of xylenes, and 2,2,4-trimethylpentane; carbon dioxide (CO2); methane (CH4); and nitrous oxide (N2O).**

b. ~~A person who received initial notification by the Department that a source report is necessary shall submit an initial source report within 60 days after receiving the notification or by March 1 of the year following the year for which the report is required, whichever is later.~~

c. A source Owner/Operator may request an extension of time from the Department for the filing of a source report, and the Department may grant the extension for reasonable cause.

#020 The Facility is subject to New Source Performance Standards from 40 CFR Part 60 Subparts Kb, VV, VVa, DDD, NNN, RRR, IIII, **JJJJ,** ~~and~~ KKKK, **and TTTT**. In accordance with 40 CFR §§60.4, copies of all requests, reports, applications, submittals and other communications regarding affected sources shall be forwarded to both EPA and the Department at the addresses listed below unless otherwise noted.

Director
Air Protection Section
Mail Code 3AP00
U.S. EPA, Region III
1650 Arch Street
Philadelphia, PA 19103-2029

PADEP
Air Quality Program
400 Waterfront Drive
Pittsburgh, PA 15222-4745

#023 The Facility is subject to National Emission Standards for Hazardous Air Pollutants from 40 CFR Part 63 Subparts SS, UU, XX, YY, **EEEE,** FFFF, YYYY, and ZZZZ. In accordance with 40 CFR §63.13; copies of all requests, reports, applications, submittals and other communications regarding affected sources shall be forwarded to both EPA and the Department at the addresses listed below unless otherwise noted.

Director
Air Protection Section
Mail Code 3AP00

PADEP
Air Quality Program
400 Waterfront Drive

#030 This Plan Approval is **for "as-built" changes in design and construction** ~~to~~ and allow**s** 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. [25 Pa. Code §127.12b]

#031 Air contamination sources and air cleaning devices authorized to be installed at the Facility under this Plan Approval are as follows:

- Seven (7) tail gas- and natural gas-fired ethane cracking furnaces, 620 MMBtu/hr heat input rating each; equipped with low-NO_x burners and controlled by selective catalytic reduction (SCR).
- One (1) ethylene manufacturing line, 1,500,000 metric tons/yr; compressor seal vents and startup/shutdown/maintenance/upsets controlled by the high pressure header system (HP System).
- Two (2) gas phase polyethylene manufacturing lines, 550,000 metric tons/yr each; VOC emission points controlled by the low pressure header system (LP System) or HP System, PM emission points controlled by filters.
- One (1) slurry technology polyethylene manufacturing line, 500,000 metric tons/yr; VOC emission points controlled by the LP System or HP System, PM emission points controlled by filters.
- One (1) LP System; routed to the LP incinerator, 10 metric tons/hr capacity, with backup multipoint ground flare (MPGF), 74 metric tons/hr total capacity.
- One (1) HP System; routed to two (2) HP enclosed ground flares 150 metric tons/hr capacity each, with backup emergency elevated flare, 1,500 metric tons/hr capacity.
- Three (3) General Electric, Frame 6B, natural gas-fired combustion turbines, ~~40.6~~ **41.5** MW (~~475~~ **481.4** MMBtu/hr heat input rating) each, including natural gas- or tail gas-fired duct burners, ~~189~~ **234** MMBtu/hr heat input rating each; controlled by SCR and oxidation catalysts.
- ~~Four (4)~~ **Two (2)** diesel-fired emergency generator engines, ~~5,028~~ **67 bhp and 103 bhp** rating ~~each.~~
- ~~Three (3)~~ **Two (2)** diesel-fired fire pump engines, ~~700~~ **488** bhp rating each.
- **Three (3) natural gas-fired emergency generator engines, 50 bhp, 113 bhp, and 158 bhp rating**
- One (1) process cooling tower, ~~28~~ **26** cell counter-flow mechanical draft, ~~18.3~~ **17.8** MMgal/hr water flow capacity; controlled by drift eliminators.
- One (1) cogen cooling tower, 6 cell counter-flow mechanical draft, 4.44**3** MMgal/hr water flow capacity; controlled by drift eliminators.
- Polyethylene pellet blending, handling, storage, and loadout; controlled by fabric filters.
- Liquid loadout, coke residue/tar and recovered oil; controlled by vapor capture and routing back to the process or Spent Caustic Vent incinerator, and low-leak couplings.
- Liquid loadout, pyrolysis fuel oil and light gasoline; controlled by vapor capture and routing to the LP System, and low-leak couplings.
- Liquid loadout, C_3+, **butene, isopentane, isobutane, and C3+ refrigerant**; controlled by pressurized transfer with vapor balance and low-leak couplings.

- One (1) recovered oil, one (1) spent caustic, and two (2) equalization wastewater storage tanks, 23,775 to **878,000** ~~742,324~~ gallon capacities; controlled by internal floating roofs (IFR) and vapor capture routed to the Spent Caustic Vent incinerator, ~~8~~ **2.5** metric tons/hr capacity.
- One (1) light gasoline, and two (2) hexene storage tanks; 85,856 and 607,596 gallon capacities; controlled by IFR and vapor capture routed to the LP System.
- Two (2) pyrolysis fuel oil storage tanks; 85,856 gallon capacity; controlled by vapor capture routed to the LP System.
- Miscellaneous storage tanks, diesel fuel, 1,849 to ~~10,038~~ **18,000** gallon capacities; controlled by carbon canisters.
- **Miscellaneous storage tanks, diesel fuel, 133 to 140 gallon capacities.**
- **Pressurized methanol storage vessels (36,000 gallons, 6,450 gallons, and 67,200 gallons) and associated components; controlled by the HP System**
- Miscellaneous components in gas, light liquid, and heavy liquid service; controlled by leak detection and repair (LDAR).
- Wastewater treatment plant (WWTP).
- Plant roadways; controlled by paving and a road dust control plan including sweeping and watering (as necessary).

#033 Upon determination by the Owner/Operator that the source(s) covered by this Plan Approval **and Plan Approval PA-04-00740B** are in compliance with all operative conditions of the Plan Approval**s** the Owner/Operator shall contact the Department and schedule the Initial Operating Permit Inspection [25 Pa. Code §127.12b].

#034 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 Approval**s** the Owner/Operator shall submit a Title V Operating Permit application for this Facility [25 Pa. Code §127.12b].

#038 The Owner/Operator shall secure ~~400~~ **379** tons of NO_x, ~~620~~ **612** tons of VOC, and ~~159~~ **164** tons of $PM_{2.5}$ 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).

#043 The Owner/Operator has secured 34.10 tons of $PM_{2.5}$, 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 ~~3.78~~ **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 ~~30.32~~ **25.32** tons of PM2.5 ERCs and 197.6 tons of NOx ERCs remain secured by Shell but are not applied to this Plan Approval because they would exceed the total emissions offsetting requirement of this Plan Approval. Expiration of these ERCs remains April 26, 2024.

SECTION D. Source Level Requirements (Cogeneration Plant Cooling Tower)

Source ID: 104
Source Name: COGENERATION PLANT COOLING TOWER

RESTRICTIONS

#002 Maximum designed water circulation rate through the cogen cooling tower shall not exceed ~~4,440,000~~ **4,443,360** gallons per hour.

SECTION D. Source Level Requirements (Diesel-Fired Emergency Generator Engines)

Source ID: 105
Source Name: **DIESEL-FIRED** EMERGENCY GENERATOR ENGINES ~~(4)~~ **(2)**

RESTRICTIONS

#001 **Non-emergency operation of each diesel-fired emergency generator engine shall not exceed 100 hours in any consecutive 12-month period.**

SECTION D. Source Level Plan Approval Requirements (Fire Pump Engines)

Source ID: 106
Source Name: FIRE PUMP ENGINES ~~(3)~~ **(2)**

SECTION D. Source Level Plan Approval Requirements (Natural Gas-Fired Emergency Generator Engines)

Source ID: **107 (NEW)**
Source Name: **NATURAL GAS-FIRED EMERGENCY GENERATOR ENGINES (3)**

RESTRICTIONS

#001 **Visible emissions from each natural gas-fired emergency generator engine shall not exceed the following:**

a. Equal to or greater than 10% for a period or periods aggregating more than three (3) minutes in any one (1) hour; and
b. Equal to or greater than 30% at any time.

#002 **Non-emergency operation of each natural gas-fired emergency generator engine shall not exceed 100 hours in any consecutive 12-month period.**

#003 **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)**

Engine Size	Emission standards (g/HP-hr)		
	NOx	VOC	CO
158 hp	2.0	1.0	4.0
113 hp	5.79[a]		387
50 HP	5.39[a]		387

[a] The emission standards are in terms of NO_X + VOC.

#004 Owners and operators of stationary SI ICE must operate and maintain stationary SI ICE that achieve the emission standards as required in §60.4233 over the entire life of the engine. [40 CFR §60.4234]

RECORDKEEPING REQUIREMENTS

#005 **The Owner/Operator of a stationary SI ICE shall comply with the applicable 40 CFR Part 60 Subpart JJJJ notification, reporting, and recordkeeping requirements [40 CFR §60.4245]:**

a) **Owners and operators of all stationary SI ICE must keep records of the information in paragraphs (a)(1) through (4) of this section.**
   (1) **All notifications submitted to comply with this subpart and all documentation supporting any notification.**
   (2) **Maintenance conducted on the engine.**
   (3) **If the stationary SI internal combustion engine is a certified engine, documentation from the manufacturer that the engine is certified to meet the emission standards and information as required in 40 CFR parts 90, 1048, 1054, and 1060, as applicable.**
   (4) **If the stationary SI internal combustion engine is not a certified engine or is a certified engine operating in a non-certified manner and subject to §60.4243(a)(2), documentation that the engine meets the emission standards.**
b) **N/A**
c) **N/A**
d) **N/A**
e) **N/A**

WORK PRACTICE REQUIREMENTS

#006 **The Owner/Operator of a stationary SI ICE subject to the emission standards specified in §60.4233(e) shall comply with the applicable 40 CFR Part 60 Subpart JJJJ compliance demonstration requirements [40 CFR §60.4243]:**

a) **If you are an owner or operator of a stationary SI internal combustion engine that is manufactured after July 1, 2008, and must comply with the emission standards specified in §60.4233(a) through (c), you must comply by purchasing an engine certified to the emission standards in §60.4231(a) through (c), as applicable, for the**

same engine class and maximum engine power. In addition, you must meet one of the requirements specified in (a)(1) and (2) of this section.

(1) If you operate and maintain the certified stationary SI internal combustion engine and control device according to the manufacturer's emission-related written instructions, you must keep records of conducted maintenance to demonstrate compliance, but no performance testing is required if you are an owner or operator. You must also meet the requirements as specified in 40 CFR part 1068, subparts A through D, as they apply to you. If you adjust engine settings according to and consistent with the manufacturer's instructions, your stationary SI internal combustion engine will not be considered out of compliance.

(2) If you do not operate and maintain the certified stationary SI internal combustion engine and control device according to the manufacturer's emission-related written instructions, your engine will be considered a non-certified engine, and you must demonstrate compliance according to (a)(2)(i) through (iii) of this section, as appropriate.

i. If you are an owner or operator of a stationary SI internal combustion engine less than 100 HP, you must keep a maintenance plan and records of conducted maintenance to demonstrate compliance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions, but no performance testing is required if you are an owner or operator.

ii. If you are an owner or operator of a stationary SI internal combustion engine greater than 500 HP, you must keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, you must conduct an initial performance test within 1 year of engine startup and conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first, thereafter to demonstrate compliance.

iii. N/A

b) If you are an owner or operator of a stationary SI internal combustion engine and must comply with the emission standards specified in §60.4233(d) or (e), you must demonstrate compliance according to one of the methods specified in paragraphs (b)(1) and (2) of this section.

(1) Purchasing an engine certified according to procedures specified in this subpart, for the same model year and demonstrating compliance according to one of the methods specified in paragraph (a) of this section.

(2) Purchasing a non-certified engine and demonstrating compliance with the emission standards specified in §60.4233(d) or (e) and according to the requirements specified in §60.4244, as applicable, and according to paragraphs (b)(2)(i) and (ii) of this section.

i. If you are an owner or operator of a stationary SI internal combustion engine greater than 25 HP and less than or equal to 500 HP, you must keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution

control practice for minimizing emissions. In addition, you must conduct an initial performance test to demonstrate compliance.

ii. N/A

c) N/A

d) If you own or operate an emergency stationary ICE, you must operate the emergency stationary ICE according to the requirements in paragraphs (d)(1) through (3) of this section. In order for the engine to be considered an emergency stationary ICE under this subpart, any operation other than emergency operation, maintenance and testing, emergency demand response, and operation in non-emergency situations for 50 hours per year, as described in paragraphs (d)(1) through (3) of this section, is prohibited. If you do not operate the engine according to the requirements in paragraphs (d)(1) through (3) of this section, the engine will not be considered an emergency engine under this subpart and must meet all requirements for non-emergency engines.

(1) There is no time limit on the use of emergency stationary ICE in emergency situations.

(2) You may operate your emergency stationary ICE for any combination of the purposes specified in paragraphs (d)(2)(i) through (iii) of this section for a maximum of 100 hours per calendar year. Any operation for non-emergency situations as allowed by paragraph (d)(3) of this section counts as part of the 100 hours per calendar year allowed by this paragraph (d)(2).

i. Emergency stationary ICE may be operated for maintenance checks and readiness testing, provided that the tests are recommended by federal, state or local government, the manufacturer, the vendor, the regional transmission organization or equivalent balancing authority and transmission operator, or the insurance company associated with the engine. The owner or operator may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner or operator maintains records indicating that federal, state, or local standards require maintenance and testing of emergency ICE beyond 100 hours per calendar year.

ii. Emergency stationary ICE may be operated for emergency demand response for periods in which the Reliability Coordinator under the North American Electric Reliability Corporation (NERC) Reliability Standard EOP-002-3, Capacity and Energy Emergencies (incorporated by reference, see §60.17), or other authorized entity as determined by the Reliability Coordinator, has declared an Energy Emergency Alert Level 2 as defined in the NERC Reliability Standard EOP-002-3.

iii. Emergency stationary ICE may be operated for periods where there is a deviation of voltage or frequency of 5 percent or greater below standard voltage or frequency.

(3) Emergency stationary ICE may be operated for up to 50 hours per calendar year in non-emergency situations. The 50 hours of operation in non-emergency situations are counted as part of the 100 hours per calendar year for maintenance and testing and emergency demand response provided in paragraph (d)(2) of this section. Except as provided in paragraph (d)(3)(i) of this section, the 50 hours per year for non-emergency situations cannot be used for peak shaving or non-emergency demand response, or to generate

income for a facility to an electric grid or otherwise supply power as part of a financial arrangement with another entity.

i. The 50 hours per year for non-emergency situations can be used to supply power as part of a financial arrangement with another entity if all of the following conditions are met:

(A) The engine is dispatched by the local balancing authority or local transmission and distribution system operator;

(B) The dispatch is intended to mitigate local transmission and/or distribution limitations so as to avert potential voltage collapse or line overloads that could lead to the interruption of power supply in a local area or region.

(C) The dispatch follows reliability, emergency operation or similar protocols that follow specific NERC, regional, state, public utility commission or local standards or guidelines.

(D) The power is provided only to the facility itself or to support the local transmission and distribution system.

(E) The owner or operator identifies and records the entity that dispatches the engine and the specific NERC, regional, state, public utility commission or local standards or guidelines that are being followed for dispatching the engine. The local balancing authority or local transmission and distribution system operator may keep these records on behalf of the engine owner or operator.

e) Owners and operators of stationary SI natural gas fired engines may operate their engines using propane for a maximum of 100 hours per year as an alternative fuel solely during emergency operations, but must keep records of such use. If propane is used for more than 100 hours per year in an engine that is not certified to the emission standards when using propane, the owners and operators are required to conduct a performance test to demonstrate compliance with the emission standards of §60.4233.

f) If you are an owner or operator of a stationary SI internal combustion engine that is less than or equal to 500 HP and you purchase a non-certified engine or you do not operate and maintain your certified stationary SI internal combustion engine and control device according to the manufacturer's written emission-related instructions, you are required to perform initial performance testing as indicated in this section, but you are not required to conduct subsequent performance testing unless the stationary engine is rebuilt or undergoes major repair or maintenance. A rebuilt stationary SI ICE means an engine that has been rebuilt as that term is defined in 40 CFR 94.11(a).

g) N/A

h) N/A

i) N/A

ADDITIONAL REQUIREMENTS

#007 **The natural gas-fired emergency generator engines, approved to be installed under this plan approval, are subject to the requirements under 40 CFR Part 60, Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines [40 CFR §60.4230].**

#008 **The Owner/Operator of an emergency stationary SI ICE shall comply with the applicable 40 CFR Part 60 Subpart JJJJ monitoring requirements [40 CFR §60.4237]:**

a) **N/A**
b) **Starting on January 1, 2011, if the emergency stationary SI internal combustion engine that is greater than or equal to 130 HP and less than 500 HP that was built on or after January 1, 2011, does not meet the standards applicable to non-emergency engines, the owner or operator must install a non-resettable hour meter.**
c) **If you are an owner or operator of an emergency stationary SI internal combustion engine that is less than 130 HP, was built on or after July 1, 2008, and does not meet the standards applicable to non-emergency engines, you must install a non-resettable hour meter upon startup of your emergency engine.**

#009 **The natural gas-fired emergency generator engines, approved to be installed under this plan approval, are subject to 40 CFR Part 63, Subpart ZZZZ – National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (RICE) [40 CFR §63.6585].**

#010 **The natural gas-fired emergency generator engines, approved to be installed under this plan approval, are new stationary RICE located at a major source. These emergency generator engines must meet the requirements of 40 CFR Part 63 Subpart ZZZZ by meeting the requirements of 40 CFR Part 60 Subpart JJJJ. No further requirements apply for the emergency generator engines under 40 CFR Part 63 Subpart ZZZZ [40 CFR §63.6590].**

SECTION D. Source Level Plan Approval Requirements (Polyethylene Manufacturing Lines)

Source ID: 202
Source Name: POLYETHYLENE MANUFACTURING LINES

RESTRICTIONS

#017 PM (filterable) emissions from polyethylene manufacturing line catalyst activation vents shall not exceed 0.002 gr/dscf [25 Pa. Code § 127.12b].

TESTING REQUIREMENTS

#004 The Owner/Operator shall perform chromium **and hexavalent chromium** emission testing upon each polyethylene manufacturing line chromium catalyst activation vent according to the requirements of 25 Pa. Code Chapter 139 and a Department-approved pre-test protocol. Initial performance testing is required within 180 days of startup of each polyethylene manufacturing line or on an alternative schedule as approved by the Department. Subsequent performance testing is required at minimum of once every 5 years thereafter. Extension to the initial and subsequent performance testing deadlines may be granted by the Department in writing in response to a written request from the Owner/Operator and upon a satisfactory showing that an extension is justified [25 Pa. Code § 127.12b].

#018 The Owner/Operator shall perform PM (filterable) emission testing upon each polyethylene manufacturing line 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 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 [25 Pa. Code § 127.12b].

SECTION D. Source Level Plan Approval Requirements (Process Cooling Tower)

Source ID: 203
Source Name: PROCESS COOLING TOWER

RESTRICTIONS

#003 Maximum designed water circulation rate through the process cooling tower shall not exceed ~~18,600,000~~ **17,800,000** gallons per hour.

SECTION D. Source Level Plan Approval Requirements (LP Header System)

Source ID: 204
Source Name: LOW PRESSURE (LP) HEADER SYSTEM

TESTING REQUIREMENTS

#005 The Owner/Operator shall perform NO_x, CO, PM_{10}, $PM_{2.5,}$ **and n-Hexane** emission testing upon the LP incinerator according to the requirements of 25 Pa. Code Chapter 139. Initial performance testing is required within 180 days of startup of the LP incinerator or on an alternative schedule as approved by the Department. Subsequent performance testing is required at minimum of once every 5 years thereafter. Extension to the initial and subsequent performance testing deadlines may be granted by the Department in writing in response to a written request from the Owner/Operator and upon a satisfactory showing that an extension is justified. EPA Reference Method performance testing shall be conducted for the initial and subsequent performance tests [25 Pa. Code § 127.12b].

MONITORING REQUIREMENTS

#016 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. [25 Pa. Code § 127.12b]

#017 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. [25 Pa. Code § 127.12b]

SECTION D. Source Level Plan Approval Requirements (HP Header System)

Source ID: 205
Source Name: HIGH PRESSURE (HP) HEADER SYSTEM

MONITORING REQUIREMENTS

#012 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 each flare as well as any flare supplemental gas used. [25 Pa. Code § 127.12b]

#013 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 each flare. [25 Pa. Code § 127.12b]

SECTION D. Source Level Plan Approval Requirements (Spent Caustic Vent Incinerator)

Source ID: 206
Source Name: SPENT CAUSTIC VENT HEADER SYSTEM

TESTING REQUIREMENTS

#004 The Owner/Operator shall perform NO_x, CO, PM_{10}, $PM_{2.5,}$ **and Benzene** emission testing upon the Spent Caustic Vent incinerator according to the requirements of 25 Pa. Code Chapter 139. Initial performance testing is required within 180 days of startup of 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 [25 Pa. Code § 127.12b].

SECTION D. Source Level Plan Approval Requirements (Liquid Loadout)

Source ID: 304
Source Name: LIQUID LOADOUT (C3+, **butene, isopentane, isobutane, C3+ refrigerant**)

WORK PRATICE REQUIREMENTS

#001 C3+ liquids, **C3+ refrigerant, butene, isopentane, and isobutane** shall be loaded out with vapor balance to pressurized storage tanks capable of maintaining working pressures sufficient at all times to prevent vapor or gas loss to the atmosphere and with no venting during loading operations.

SECTION D. Source Level Plan Approval Requirements (Storage Tanks)

Source ID: 405
Source Name: STORAGE TANKS (MISC PRESSURIZED/REFRIGERATED)

WORK PRATICE REQUIREMENTS

#001 Ethylene, C_3+, C_3+ refrigerant, butene, isopentane, isobutane, aqueous ammonia, ~~and~~ dimethyl disulfide, **and methanol** shall be stored in pressurized and/or refrigerated storage tanks with no uncontrolled vent directly to the atmosphere [25 Pa. Code §127.12b].

SECTION D. Source Level Plan Approval Requirements (Storage Tanks)

Source ID: 406
Source Name: STORAGE TANKS (DIESEL FUEL **> 150 GALLONS**)

SECTION D. Source Level Plan Approval Requirements (Storage Tanks)

Source ID: **408**
Source Name: **STORAGE TANKS (DIESEL FUEL < 150 GALLONS)**

SECTION D. Source Level Plan Approval Requirements

Source ID: **409**
Source Name: **METHANOL STORAGE VESSELS AND ASSOCIATED COMPONENTS**

TESTING REQUIREMENTS

#001 The Owner/Operator shall comply with the applicable performance testing and procedures specified in 40 CFR §63.2354 [40 CFR §63.2354].

MONITORING REQUIREMENTS

#002 The Owner/Operator shall comply with the applicable monitoring requirements specified in 40 CFR §63.2366 [40 CFR §63.2366].

RECORDKEEPING REQUIREMENTS

#003 The Owner/Operator shall comply with the applicable recordkeeping requirements specified in 40 CFR §63.2390 [40 CFR §63.2390].

REPORTING REQUIREMENTS

#004 The Owner/Operator shall comply with the applicable reporting requirements specified in 40 CFR §63.2386 [40 CFR §63.2386].

#005 The Owner/Operator shall comply with the applicable notification requirements specified in 40 CFR §63.2382 [40 CFR §63.2382].

WORK PRATICE REQUIREMENTS

#006 The Owner/Operator shall comply with the applicable emission limitations, operating limits, and work practice standards specified in 40 CFR §63.2346 [40 CFR §63.2346].

SECTION E
Group Name: G01
Group Description: Ethane Cracking Furnaces

RESTRICTIONS

#002 NO_x emissions from the ethane cracking furnaces shall not exceed the following [25 Pa. Code §127.12b]:

- 0.010 lb/MMBtu from each furnace on a 12-month rolling average~~, excluding periods of defined non-normal operating modes.~~ **during normal operating mode.**
- 0.015 lb/MMBtu from each furnace on a 1-hour average~~, excluding periods of defined non-normal operating modes.~~ **during normal operating mode.**
- ~~9.30~~ **6.20** lb/hr from each furnace during periods of decoking, hot steam standby, feed in, or feed out.
- 31.1 lb/hr from each furnace during periods of startup or shutdown.
- 181.3 tons from all furnaces combined in any consecutive 12-month period.

#008 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 [25 Pa. Code §127.12b]:

- Startup – Beginning when fuel is introduced to the furnace and ending when the SCR catalyst bed reaches its ~~design~~ **stable** operating temperature. **Stable operating temperature is achieved when the furnace coil outlet temperature (COT) reaches 750°C.**
- Hot Steam Standby – When the furnace ~~is firing at or below 50% of the maximum allowable firing rate~~ **COT is greater than or equal to 750°C** and no hydrocarbon feed is being charged to the furnace, and not operating in **decoking,** startup**,** or shutdown mode.
- Feed In – Beginning when hydrocarbon feed is introduced to the furnace and ending when the ~~furnace~~ **hydrocarbon feed** reaches ~~70% of the maximum allowable firing rate~~ **43 metric tons per hour**.
- Normal – When the furnace is ~~firing at or above 70% of the maximum allowable firing rate with hydrocarbon feed being charged to the furnace~~ **at or above a hydrocarbon feed rate of 43 metric tons per hour**.
- Feed Out – Beginning when the furnace drops below ~~70% of its maximum allowable firing rate~~ **a hydrocarbon feed rate of 43 metric tons per hour** and ending when hydrocarbon feed is isolated from the furnace.
- Shutdown – Beginning when the SCR catalyst bed drops below its ~~design~~ **stable** operating temperature and ending upon removing all fuel from the furnace. **Stable operating temperature is lost when the furnace COT drops below 750°C.**
- Decoking – Beginning when air is introduced to the furnace for the purpose of decoking and ending when decoking air is removed.

#009 ~~Only one~~ **No more than two** ethane cracking furnace**s** may be operating in decoking mode at any time, and no more than two furnaces may be operating ~~in a defined non-normal operating mode~~ **with NOx emissions greater than 6.20 lb/hr** at any time, except in cases where a furnace must be taken offline for unscheduled maintenance [25 Pa. Code §127.12b].

#019 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 [25 Pa. Code §127.12b].

TESTING REQUIREMENTS

#010 The Owner/Operator shall perform VOC, PM_{10}, $PM_{2.5}$, ~~and~~ NH_3**, 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 [25 Pa. Code § 127.12b].

SECTION E
Group Name: G02
Group Description: Cogeneration Units

RESTRICTIONS

#001 NO_x emissions from the combustion turbines with duct burners shall not exceed the following [25 Pa. Code §127.12b]:

- 2 ppmvd @ 15% O_2 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.
- ~~65.4~~ **70.4** tons from all turbines and duct burners combined in any consecutive 12-month period.

For purposes of determining compliance with these NO_x limits, startup is defined as beginning when fuel is introduced into the turbine and ending when the SCR catalyst bed reaches its design operating temperature.

For purposes of determining compliance with these NO_x limits, shutdown is defined as beginning when the SCR catalyst bed drops below its design operating temperature and ending upon removing all fuel from the turbine.

#003 CO emissions from the combustion turbines with duct burners shall not exceed the following [25 Pa. Code §127.12b]:

- 2 ppmvd @ 15% O_2 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.
- ~~42.0~~ **45.0** tons from all turbines and duct burners combined in any consecutive 12-month period.

For purposes of determining compliance with these CO limits, startup is defined as beginning upon commencement of ignition and ending when the combustion turbine reaches 55% of its baseload operating level.

For purposes of determining compliance with these CO limits, shutdown is defined as beginning when the combustion turbine drops below 55% of its baseload operating level and ending when fuel is cut to this unit. Each shutdown event shall not exceed 30 minutes in duration.

#005 GHG emissions from the combustion turbines with duct burners shall not exceed the following [25 Pa. Code §127.12b]:

- 1,030 lbs CO_2e/MWh from all turbines and duct burners combined on a 30-day rolling average.
- ~~340,558~~ **1,100,762** tons of CO_2e **from all turbines and duct burners combined** in any consecutive 12-month period.

Compliance with these limits may be determined through CO_2 calculations in accordance with 40 CFR Part 75 Appendix G and multiplied by a factor of 1.0010.

TESTING REQUIREMENTS

#011 The Owner/Operator shall perform VOC, PM_{10}, $PM_{2.5}$, HCHO, ~~and~~ NH_3, **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 [25 Pa. Code § 127.12b].

SECTION E
Group Name: G03
Group Description: Emergency Generator/Fire Pump Engines

RESTRICTIONS

#003 **The 103 bhp Parking Garage** ~~Each~~ diesel-fired emergency generator engine shall be certified to meet the following emission standard for NMHC + NO_x and Tier 2 Emission Standards for CO and PM [25 Pa. Code §127.12b]:

a) ~~4.6~~ **2.37** g/bhp-hr of NMHC + NO_x
b) ~~2.6~~ **0.50** g/bhp-hr of CO
c) ~~0.15~~ **0.06** g/bhp-hr of PM

The 67 bhp Telecom Hut & Tower diesel-fired emergency generator engine shall be certified to meet the following emission standard for NMHC + NO_x and Tier 2 Emission Standards for CO and PM:

a) **2.83 g/bhp-hr of NMHC + NO_x**
b) **0.67 g/bhp-hr of CO**
c) **0.22 g/bhp-hr of PM**

ADDITIONAL REQUIREMENTS

#012 The ~~four~~ **two** diesel-fired emergency generator engines and ~~three~~ **two** diesel-fired fire pump engines are subject to the requirements of 40 CFR Part 60 Subpart IIII - Standards of Performance for Stationary Compression Ignition Internal Combustion Engines [40 CFR §60.4200].

#015 The ~~four~~ **two** diesel-fired emergency generator engines and ~~three~~ **two** diesel-fired fire pump engines are subject to limited requirements of 40 CFR Part 63 Subpart ZZZZ – National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines [40 CFR §63.6585].

SECTION E
Group Name: G13 (NEW)
Group Description: NSPS Subpart TTTT

RESTRICTIONS

#001 The Owner/Operator shall comply with the applicable CO_2 limit in Table 2 to 40 CFR Part 60 Subpart TTTT. [40 CFR §60.5520]

MONITORING REQUIREMENTS

#002 The Owner/Operator shall comply with the applicable monitoring and data collection requirements specified in 40 CFR §60.5535 [40 CFR §60.5535].

#003 The Owner/Operator shall comply with the applicable compliance demonstration and excess emission determination requirements specified in 40 CFR §60.5540 [40 CFR §60.5540].

RECORDKEEPING REQUIREMENTS

#004 The Owner/Operator shall comply with the applicable recordkeeping requirements specified in 40 CFR §60.5560 [40 CFR §60.5560].

#005 The Owner/Operator shall comply with the applicable record form and retention requirements specified in 40 CFR §60.5565 [40 CFR §60.5565].

REPORTING REQUIREMENTS

#006 The Owner/Operator shall comply with the applicable notification requirements specified in 40 CFR §60.5550 [40 CFR §60.5550].

#007 The Owner/Operator shall comply with the applicable reporting requirements specified in 40 CFR §60.5555 [40 CFR §60.5555].

ADDITIONAL REQUIREMENTS

#008 The Owner/Operator shall comply with the applicable general requirements specified in 40 CFR §60.5525 [40 CFR §60.5525].

#009 The Owner/Operator shall comply with the applicable general provisions of 40 CFR Part 60 Subpart A specified in Table 3 to 40 CFR Part 60 Subpart TTTT [40 CFR §60.5570].