Shell Chemical Appalachia LLC
300 Frankfort Rd
Monaca, PA 15061

January 23, 2025

Alexander Sandy
Air Quality Engineering Specialist
Pennsylvania Department of Environmental Protection
Bureau of Air Quality - Southwest Regional Office
400 Waterfront Drive
Pittsburgh, PA 15222-4745

Re: Shell Chemical Appalachia LLC
Shell Polymers Monaca
Potter and Center Townships, Beaver County
Initial Response to Plan Approval Application Technical Deficiency Letter

Dear Mr. Sandy:

On September 13, 2024, Shell Chemical Appalachia LLC ("Shell") submitted a plan approval application to the Pennsylvania Department of Environmental Protection (DEP) proposing the Wastewater Treatment Plant (WWTP) Permanent Controls Project and Ethylene Maximum Achievable Control Technology (EMACT) Project at Shell Polymers Monaca ("SPM"), as well as Plan Approval Reconciliations for SPM's current plan approval. On December 24, 2024, DEP provided Shell with a technical deficiency letter for the referenced plan approval application, which included itemized requests for additional information and requested Shell to provide the additional information within 30 days of receipt of the letter. Shell is submitting this initial response to DEP's December 24, 2024 technical deficiency letter to respond to Request Nos. 6-16 in the letter. Due to the additional effort required to provide complete responses to Request Nos. 1-5 and 17-21 in the letter, and as discussed and agreed to by DEP, Shell will provide updates weekly to communicate completed responses to the remaining requests. These weekly updates will also provide DEP with an updated schedule as the development of the responses progresses.

Below are Shell's responses to Request Nos. 6-16 as they are presented in DEP's December 24, 2024 technical deficiency letter.

6. *Group Name: G02 – Cogeneration Units – The definition of shutdown in reference to the NOx emissions from the combustion turbines with duct burners is proposed to be revised as follows:*

   For purposes of determining compliance with these NOx limits, shutdown is defined as beginning when the ~~SCR catalyst bed drops below its design operating temperature~~ ***combustion turbine is transitioned out of low NOx firing mode*** *and ending upon*

removing all fuel from the turbine. Each shutdown event shall not exceed 30 minutes in duration.

Define low NOx firing mode.

Response: Shell proposes to define "low NOx firing mode" for the Cogen Units as follows: *Low NOx firing mode is a lean premixed mode where air and fuel are mixed before entering the turbine combustor (versus the diffusion mode where fuel and air are injected into the combustor separately).*

7. *Provide an expanded regulatory applicability analysis of the impact of 40 CFR Part 63 Subpart YY and method(s) of compliance beyond meeting 800 Btu/scf for TEGF A and TEGF B including, but not limited to:*

Response: Please see Attachment 1 herein for the expanded 40 CFR 63 Subpart YY regulatory applicability analysis for the TEGF A and TEGF B.

a. *Describe any additional equipment required or changes to existing equipment to comply with the new requirement(s);*

Response: Shell made changes to process control logic at SPM to be able to automatically send tail gas to the TEGF A and TEGF B for supplemental gas purposes to meet the 40 CFR 63 Subpart YY requirement to operate the pressure-assisted multi-point flares with a net heating value of flare combustion zone gas (NHV_{CZ}) of 800 Btu/scf or greater. Additionally, pilots were added to 6 of the 11 stages of each flare to meet the requirement to have at least two pilots on each stage of burners. Further, thermocouples were added in association with the additional pilots to meet the requirement to have a thermocouple or other equivalent device to detect the presence of pilot flame(s) on each stage of burners.

b. *Date of applicability of new requirements; and*

Response: July 6, 2023.

c. *Date compliance with the new requirements was achieved.*

Response: The TEGF A and TEGF B achieved compliance with applicable 40 CFR 63 Subpart YY pressure-assisted multi-point flare requirements except for the following by July 6, 2023.

- The TEGF A and TEGF B achieved compliance with the requirement to operate with an NHV_{CZ} at or above 800 Btu/scf on February 6, 2024.
- The TEGF A achieved compliance with the requirement to have at least two pilots on each stage of burners on June 19, 2024.
- The TEGF A achieved compliance with the requirement to have a thermocouple or other equivalent device to detect the presence of pilot flame(s) on each stage of burners on June 19, 2024.
- The TEGF B achieved compliance with the requirement to have at least two pilots on each stage of burners on June 28, 2024.

- The TEGF B achieved compliance with the requirement to have a thermocouple or other equivalent device to detect the presence of pilot flame(s) on each stage of burners on June 28, 2024.

8. *Provide Federal regulation applicability determinations for the following MPGF Headers:*

   a. *MPGF CVTO Trip Header – 40 CFR Part 63 Subparts CC, FFFF, YY, and SS;*

   Response: Please see Attachment 2 herein for the MPGF CVTO Trip Header 40 CFR 63 Subparts CC, FFFF, YY, and SS regulatory applicability.

   b. *MPGF Ethylene Tank Header – 40 CFR Part 60 Subpart Kb and 40 CFR Part 63 Subpart YY; and*

   Response: Please see Attachment 3 herein for the MPGF Ethylene Tank Header 40 CFR 60 Subpart Kb and 40 CFR 63 Subpart YY regulatory applicability.

   c. *MPGF PE Units 1/2 Episodic Vent Header – 40 CFR Part 63 Subparts CC, YY, and FFFF.*

   Response: Please see Attachment 4 herein for the PE Units 1/2 Episodic Vent Header 40 CFR 63 Subparts CC, YY, and FFFF regulatory applicability.

9. *Provide proposed Source IDs for the MPGF CVTO Trip Header, MPGF Ethylene Tank Header, and MPGF PE Units 1/2 Episodic Vent Header.*

   Response: Please see below.

   - MPGF CVTO Trip Header Source ID = 207
   - MPGF Ethylene Tank Header Source ID = 208
   - MPGF PE Units 1/2 Episodic Vent Header Source ID = 209

10. *Provide proposed site-specific plan approval conditions for the WWTP, Source ID 502, under 25 Pa. Code § 127.12b.*

    Response: Shell proposes the following plan approval conditions for the WWTP (Source ID 502).

    - The Settlement Drum, Dissolved Nitrogen Flotation (DNF) Unit #1, DNF Unit #2, Float/Sludge Drum, and above-ground piping must meet the control standards in 40 CFR §61.343 through §61.347, as applicable.
    - The Steam Stripper must meet the treatment processes control standards in 40 CFR §61.348, as applicable.

11. *Provide the capacity of the spent caustic storage tank(s), Source ID 402.*

    Response: 345,273 gallons.

12. *For Source ID 405, Storage Tanks (MISC Pressurized/Refrigerated), provide:*

    a. *Capacity of the Refrigerated Ethylene Storage Tank as part of Source ID 405;*

    Response: 7,925,160 gallons.

b. *Consideration of the Refrigerated Ethylene Storage Tank being delineated as a stand-alone source rather than part of Source ID 405, Storage Tanks (MISC Pressurized/Refrigerated); and*

Response: Shell proposes to identify the Refrigerated Ethylene Storage Tank as a stand-alone source with a Source ID of 410. Therefore, the source description for Source ID 405 will change to "Storage Tanks (Misc Pressurized)" after removing the Refrigerated Ethylene Storage Tank from the source.

c. *Clarification of the storage tanks included with Source ID 405 (e.g. number of tanks and their capacities, material stored, etc.).*

Response: Please see below for the storage tanks that will be covered by Source ID 405 after identifying the Refrigerated Ethylene Storage Tank (Source ID 410) as a stand-alone source, as discussed in the response above.

- 1 pressurized spherical vessel for ethylene storage that has a 1,912,077-gallon capacity.
- 2 pressurized spherical vessels for C3+ storage that have a 607,596-gallon capacity each.
- 1 pressurized horizontal vessel for C3 refrigerant storage that has a 79,252-gallon capacity.
- 1 pressurized spherical vessel for butene storage that has a 317,006-gallon capacity.
- 2 pressurized horizontal vessels for isopentane storage that have a 158,503-gallon capacity each.
- 1 pressurized horizontal vessel for isobutane storage that has a 52,834-gallon capacity.
- 1 pressurized horizontal vessel for PE3 heavies storage that has a 52,834-gallon capacity.
- 1 pressurized horizontal vessel for dimethyl disulfide storage that has a 8,189-gallon capacity.
- 1 pressurized horizontal vessel for wash oil storage that has a 33,343-gallon capacity.

13. *Source IDs 031 through 037: Ethane Cracking Furnaces #1 through #7:*

a. *Provide further explanation of the first bullet item, specifically the underlined text below: "The furnace's potential to emit calculation was reconciled so that the molecular hydrogen contained in the tail gas combusted in the furnace during the furnace's long- term normal operation mode is <u>no longer estimated to result in CO and VOC emissions from the furnace</u>. (Page 1-11) [emphasis added]"*

Response: The heat input associated with the combustion of molecular hydrogen that is contained in the tail gas that is combusted in the ethane cracking furnaces is

currently included in the furnaces' CO and VOC potential to emit calculations (e.g., 620 MMBtu/hr total furnace heat input when including the heat input associated with the combustion of molecular hydrogen that is contained in the tail gas that is combusted in the furnace x 0.035 lb CO/MMBtu x 7,509 hr/yr of long- term normal operation x (1 ton / 2,000 lb) = 81.47 tpy CO). However, molecular hydrogen does not contain carbon; therefore, molecular hydrogen does not result in CO or VOC emissions when it is combusted. As a result, the heat input associated with the combustion of molecular hydrogen that is contained in the tail gas that is combusted in the furnaces is no longer proposed to be included in the furnaces' CO and VOC potential to emit calculations (e.g., 336.2 MMBtu/hr total furnace heat input when excluding the heat input associated with the combustion of molecular hydrogen that is contained in the tail gas that is combusted in the furnace x 0.035 lb CO/MMBtu x 7,509 hr/yr of long- term normal operation x (1 ton / 2,000 lb) = 44.18 tpy CO).

b. *The heat input of each ethane cracking furnace in the application for PA-04-00740A was 320 MMBtu/hr based on 620 MMBtu/hr and 51.7% of heat input from CH4+NG. The heat input in the application for PA-04-00740D has been revised to 336.2 MMBtu/hr based on 620 MMBtu/hr and 54.2% of heat input from CH4+NG. Provide justification for the % of heat input from CH4+NG.*

Response: Shell proposes using an additional amount of tail gas as supplemental gas at SPM's flares. As such, a smaller amount of tail gas will be available to be blended into the tail gas/natural gas fuel gas stream that is combusted in the ethane cracking furnaces. Therefore, to maintain the necessary heat input to the furnaces, Shell estimated that an additional 3.76 tph of natural gas must be added to the tail gas/natural gas fuel gas stream, which resulted in the referenced increase in the percentage of heat input from CH4+NG for the fuel gas stream. Please see Attachment 5 herein for the calculation supporting the percentage of heat input from CH4+NG for the blended tail gas/natural gas fuel gas stream.

c. *The furnaces' sulfuric acid emission factor was reconciled to use the molecular weight of sulfuric acid rather than sulfur trioxide. This same change has been made for multiple other sources as well.*

   i. *Provide the rationale as to why the molecular weight of sulfur trioxide was previously used;*

      Response: The molecular weight of sulfur trioxide was incorrectly used instead of the molecular weight of sulfuric acid to calculate the mass emission rate of sulfuric acid.

   ii. *Provide the reason for change in calculation methodology; and*

      Response: Shell is proposing to correctly use the molecular weight of sulfuric acid instead of the molecular weight of sulfur trioxide to calculate the mass emission rate of sulfuric acid.

   iii. *Provide what, if any, regulatory implications result due to the change.*

Response: The use of the molecular weight of sulfuric acid instead of the molecular weight of sulfur trioxide to calculate the mass emission rate of sulfuric acid does not have any regulatory implications. Consistent with the previous sulfuric acid mist PSD applicability determinations made for the initial construction of SPM, PSD review is not required for sulfuric acid mist when correctly using the molecular weight of sulfuric acid to calculate the mass emission rate of sulfuric acid.

d. *The furnace's CO_2 and methane emission factors for certain operating modes were reconciled to properly account for the amount of molecular hydrogen contained in the tail gas combusted in the furnace. Provide the derivation of the amount of molecular hydrogen contained in the tail gas combusted.*

Response: The amount of molecular hydrogen contained in the tail gas combusted in the ethane cracking furnaces (79 mole % molecular hydrogen) is based on material balance data for SPM's ethylene manufacturing unit. This 79 mole % molecular hydrogen content is a conservative estimate because it accounts for a slightly greater amount of methane in the tail gas than is normally observed. The furnaces' CO_2 emission factor was mistakenly referenced in the plan approval application as being reconciled to properly account for the amount of molecular hydrogen contained in the tail gas combusted in the furnaces. However, the furnaces' methane emission factor for natural gas firing modes previously reduced the natural gas combustion methane emission factor by improperly accounting for the amount of molecular hydrogen contained in the tail gas combusted in the furnaces. Shell proposed to correct the methane emission factor for natural gas firing modes to equal the natural gas combustion methane emission factor.

e. *Condensable particulate matter emissions are not included in the particulate matter PTE. Provide the condensable particulate matter PTE from the ethane cracking furnaces.*

Response: SPM's ethylene manufacturing unit vendor provided PM emissions data for the ethane cracking furnaces, which Shell conservatively estimated to equal $PM_{10}/PM_{2.5}$ emissions. Shell converted the non-decoking operations PM emissions data to a 0.005 lb $PM_{10}/PM_{2.5}$/MMBtu emission factor. As an additional level of conservatism, Shell estimated this emission factor represents both filterable and condensable $PM_{10}/PM_{2.5}$. The filterable portion of the 0.005 lb $PM_{10}/PM_{2.5}$/MMBtu emission factor was estimated to equal the filterable $PM_{10}/PM_{2.5}$ emission factor of 0.00186 lb/MMBtu from AP-42, Section 1.4, Table 1.4-2. Therefore, the condensable portion of the emission factor equals 0.00314 lb/MMBtu, the difference between the 0.005 lb $PM_{10}/PM_{2.5}$/MMBtu emission factor and the 0.00186 lb $PM_{10}/PM_{2.5}$ (filterable)/MMBtu emission factor.

For decoking operations, Shell converted the decoking operations PM emissions data to a 0.0103 lb $PM_{10}/PM_{2.5}$/MMBtu emission factor. Shell estimated this

emission factor represents both filterable and condensable $PM_{10}/PM_{2.5}$. Because an increased amount of filterable PM may be present during decoking operations compared to non-decoking operations, the condensable portion of the 0.0103 lb $PM_{10}/PM_{2.5}$/MMBtu emission factor was set equal to the 0.00314 lb $PM_{10}/PM_{2.5}$ (condensable)/MMBtu emission factor estimated for non-decoking operations, resulting in the filterable portion of the emission factor being equal to 0.00716 lb/MMBtu, which is the difference between the 0.0103 lb $PM_{10}/PM_{2.5}$/MMBtu emission factor and the 0.00314 lb $PM_{10}/PM_{2.5}$ (condensable)/MMBtu emission factor. Please see Attachment 6 herein for the revised Ethane Cracking Furnaces #1 through #7 potential to emit calculation that now documents the furnaces' condensable particulate matter potential to emit rates.

14. *Source IDs 101 through 103: Combustion Turbine/Duct Burner Unit #1 through #3:*

    a. *The Cogen Unit's potential to emit calculation was revised by Shell so that the oxidation catalyst destruction efficiency used for organic HAP emission rates calculated using AP- 42, Section 3.1, Table 3.1-3 emission factors is 30% rather than 90%. Provide justification for the proposed destruction efficiency and demonstrate that it meets BAT.*

    Response: As indicated in the September 13, 2024, plan approval application, Shell proposed to reduce the oxidation catalyst destruction efficiency used for organic HAP emission rates calculated using AP-42, Section 3.1, Table 3.1-3 emission factors from 90% to 30% due to the very low concentrations (parts per billion by volume on a dry basis (ppbvd) @ 15% oxygen levels) of these organic HAPs at the inlet to the oxidation catalyst. In fact, it appears the 90% CO destruction efficiency guaranteed for the oxidation catalysts equipped on the Cogen Units was mistakenly used for the oxidation catalysts' organic HAP destruction efficiency instead of the 30% VOC destruction efficiency guaranteed for the oxidation catalysts, which results in the VOC LAER limitation of 1.0 ppmvd @ 15% oxygen that is applicable to the Cogen Units. An oxidation catalyst represents BAT for the Cogen Units' organic HAP emissions, and this determination is supported by the extremely low ppbvd organic HAP emissions levels estimated to exit the oxidation catalysts equipped on the Cogen Units, as well as the fact that an oxidation catalyst represents LAER for the Cogen Units' VOC emissions, which are partially comprised of the Cogen Units' organic HAP emissions.

    b. *The Cogen Unit's potential to emit calculations are based on 8,753 hours per year of normal operation and 7 hours per year of startup.*

        i. *Provide the duration of and PTE from shutdown; and*

        Response: The reference to only startup in the potential to emit calculation should be startup and shutdown such that the 7 hours per year cover both startup and shutdown operations. Additionally, the 276 lb/hr CO emission rate indicated in the potential to emit calculation applies to both startup and shutdown operations. Similarly, the 113 lb/hr NOx emission rate indicated in the potential to emit calculation applies to both startup and

shutdown operations. In fact, PA-04-00740C currently documents these CO and NOx emission rate limitations apply during startup and shutdown operations. Specifically, PA-04-00740C, Section E, Condition #005 for Cogeneration Units (Group Name G02) states "CO emissions from the combustion turbines with duct burners shall not exceed the following: […] 276 lb/hr from each turbine/duct burner during periods of startup or shutdown. […]" Similarly, PA-04-00740C, Section E, Condition #003 for Cogeneration Units (Group Name G02) states "NOx emissions from the combustion turbines with duct burners shall not exceed the following: […] 113 lb/hr from each turbine/duct burner during periods of startup or shutdown. […]." Please see Attachment 7 herein for the revised Combustion Turbine/Duct Burner Unit #1 through #3 potential to emit calculation that now references 7 hours of startup and shutdown.

ii. *Provide justification for 7 hours per year of startup as the emission estimates indicate that each unit is not shutdown once reaching normal operation.*

Response: As discussed in the response above, the reference to only startup in the potential to emit calculation should be startup and shutdown such that the 7 hours per year cover both startup and shutdown operations. Please see Attachment 7 herein for the revised Combustion Turbine/Duct Burner Unit #1 through #3 potential to emit calculation that now references 7 hours of startup and shutdown.

15. *Source ID 104: Cogeneration Plant Cooling Tower:*

a. *The cooling tower's potential to emit calculation was reconciled by increasing the cooling tower's cooling water recirculation rate in the calculation so that the recirculation rate more accurately represents the level required by SPM's Cogen Units. Provide the basis and justification for the proposed recirculation rate (e.g. design basis, actual measurement, or other method).*

Response: The proposed cooling water recirculation rate of 120,000 gallons per minute (gpm) is based on an actual measurement. A maximum recirculation rate measurement of 116,200 gpm was adjusted slightly upward to 120,000 gpm to account for variability in Cogeneration Plant operations and ambient conditions. The proposed cooling water recirculation rate is necessary to maintain Cogen Unit temperatures at appropriate levels.

16. *Source ID 107: Natural Gas-Fired Emergency Generator Engines (2):*

a. *For Generator 3 – Lift Station, CO, NOx, VOC, and CO2 emission factors have been revised by Shell to be on a lb/bhp-hr unit basis rather than a lb/MMBtu. Similarly, Generator 4 – Lift Station, the engine's CO and CO2 emission factors have been revised by Shell to be on a lb/bhp-hr unit basis rather than a lb/MMBtu. Conversely, for Generator 4, the engine's NOx emission factor has been revised by Shell to be on a lb/MMBtu unit basis.*

i. *Explain the discrepancy between the emission factor units, particularly NOx, which has been revised from lb/MMBtu to lb/bhp-hr for Generator 3 and revised to lb/MMBtu for Generator 4.*

Response: For Generator 3, DEP established a NOx BACT/LAER g/bhp-hr unit basis limit and a VOC LAER g/bhp-hr unit basis limit. Therefore, it is not necessary to derive lb/MMBtu unit basis NOx and VOC emission factors from these limits using a generic engine's thermal-to- mechanical energy efficiency conversion factor to calculate NOx and VOC potential to emit rates for the engine. Instead, it is preferred to simply convert the engine's g/bhp-hr NOx BACT/LAER and VOC LAER limits to lb/bhp-hr NOx and VOC emission factors to calculate NOx and VOC potential to emit rates for the engine. Alternatively, DEP established a NOx + VOC LAER limit for Generator 4 that is on a g/bhp-hr unit basis. However, the VOC emission factor used to calculate engine's VOC potential to emit rate is on a lb/MMBtu basis (AP-42, Table 3.2-2). Therefore, the engine's NOx + VOC LAER limit must be converted from a g/bhp-hr unit basis to a lb/MMBtu unit basis using a thermal-to-mechanical energy efficiency conversion factor that is specific to the engine from which the engine's lb/MMBtu unit basis VOC emission factor is subtracted to calculate a lb/MMBtu unit basis NOx emission factor for the engine, which is then used to calculate the engine's NOx potential to emit rate.

If you have any questions regarding this initial response to the December 24, 2024 technical deficiency letter, please contact Kimberly Kaal at kimberly.kaal@shell.com.

Sincerely,

Kimberly Kaal

Kimberly Kaal
SPM Environmental Manager

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

Enclosures

Attachment 1

Request No. 7 Information

7. **Provide an expanded regulatory applicability analysis of the impact of 40 CFR Part 63 Subpart YY and method(s) of compliance beyond meeting 800 Btu/scf for TEGF A and TEGF B including, but not limited to:**

    a. **Describe any additional equipment required or changes to existing equipment to comply with the new requirement(s);**
    b. **Date of applicability of new requirements; and**
    c. **Date compliance with the new requirements was achieved.**

The ethylene production category regulatory requirements in 40 CFR 63 Subpart YY (National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards) were revised and made final on July 20, 2020. The revised rule included new requirements for flares, storage tanks, and process vents. These requirements had a final effective date of July 6, 2023.

The TEGFs control ethylene process vents from an ethylene production unit and are regulated under EMACT in 40 CFR 63.1103(e)(4). The TEGFs were re-classified to "pressure-assisted multi-point" flares in January 2024 from the original determination and permitting of the TEGFs as non-assisted flares. This was detailed in the January 31, 2024, EMACT semi-annual report. The two main regulatory changes with the re-classification were the higher NHVcz limit of 800 Btu/scf and having at least two pilots and thermocouples on each stage of the flares. To meet these requirements, process control logic changes were made to allow an increased amount of tail gas to be routed to the TEGFs as supplemental gas to increase the heat content to meet the new NHVcz limit. Additionally, pilots and thermocouples were added to 6 of the 11 stages of each flare to meet the dual pilot and pilot flame detection monitoring requirements.

The citations from the rule and the referenced citations are included in a table below with applicability designations and comments. As previously discussed, the compliance date for the EMACT requirements was July 6, 2023. Compliance with the NHVcz requirement for both TEGFs was achieved on February 6, 2024, with implementation of the process control logic changes. Compliance with the minimum two available pilots per stage and pilot flame detection monitoring requirements was achieved following completion of the TEGF repairs on June 19, 2024, for TEGF A and June 28, 2024, for TEGF B.

Table 7: TEGFs 40 CFR 63 Subpart YY Expanded Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
40 CFR 63 Subpart YY - EMACT		
40 CFR 63.1103(e)(4)	Beginning no later than the compliance dates specified in § 63.1102(c), if a steam-assisted, air-assisted, non-assisted, or pressure-assisted multi-point flare is used as a control device for an emission point subject to the requirements in Table 7 to this section, then the owner or operator must meet the applicable requirements for flares as specified in §§ 63.670 and 63.671 of subpart CC, including the provisions in Tables 12 and 13 to subpart CC of this part, except as specified in paragraphs (e)(4)(i) through (xiv) of this section. This requirement also applies to any flare using fuel gas from a fuel gas system, of which 50 percent or more of the fuel gas is derived from an ethylene production unit, being used to control an emission point subject to the requirements in Table 7 of this section. For purposes of compliance with this paragraph, the following terms are defined in § 63.641 of subpart CC: Assist air, assist steam, center steam, combustion zone, combustion zone gas, flare, flare purge gas, flare supplemental gas, flare sweep gas, flare vent gas, lower steam, net heating value, perimeter assist air, pilot gas, premix assist air, total steam, and upper steam.	Applicable.
40 CFR 63.1103(e)(4)(i)	The owner or operator may elect to comply with the alternative means of emissions limitation requirements specified in of § 63.670(r) of subpart CC in lieu of the requirements in § 63.670(d) through (f) of subpart CC, as applicable. However, instead of complying with § 63.670(r)(3) of subpart CC, the owner or operator must submit the alternative means of emissions limitation request following the requirements in § 63.1113.	Not Currently Applicable. SPM is not currently using an AMEL.
40 CFR 63.1103(e)(4)(ii)	Instead of complying with § 63.670(o)(2)(i) of subpart CC, the owner or operator must develop and implement the flare management plan no later than the compliance dates specified in § 63.1102(c).	Applicable. FMP completed and submitted before compliance date.
40 CFR 63.1103(e)(4)(iii)	Instead of complying with § 63.670(o)(2)(iii) of subpart CC, if required to develop a flare management plan and submit it to the Administrator, then the owner or operator must also submit all versions of the plan in portable document format (PDF) to the EPA following the procedure specified in § 63.9(k), except any medium submitted through U.S. mail must be sent to the attention of the Ethylene Production Sector Lead.	Applicable. Complete.
40 CFR 63.1103(e)(4)(iv)	Section 63.670(o)(3)(ii) of subpart CC and all references to § 63.670(o)(3)(ii) of subpart CC do not apply. Instead, the owner or operator must comply with the maximum flare tip velocity operating limit at all times.	Applicable – Exempted. TEGFs are exempt from the flare tip velocity requirements.
40 CFR 63.1103(e)(4)(v)	Substitute “ethylene production unit” for each occurrence of “petroleum refinery.”	Applicable.
40 CFR 63.1103(e)(4)(vi)	Each occurrence of “refinery” does not apply.	Applicable.
40 CFR 63.1103(e)(4)(vii)	Except as specified in paragraph (e)(4)(vii)(G) of this section, if a pressure-assisted multi-point flare is used as a control device for an emission point subject to the requirements in Table 7 to this section, then the owner or operator must comply with the requirements specified in paragraphs (e)(4)(vii)(A) through (F) of this section.	Applicable. TEGFs were designated as pressure-assisted multi-point flares in January 2024.
40 CFR 63.1103(e)(4)(vii)(A)	The owner or operator is not required to comply with the flare tip velocity requirements in § 63.670(d) and (k) of subpart CC;	Applicable. The TEGFs are pressure-assisted and not required to comply with the flare tip velocity requirements.
40 CFR 63.1103(e)(4)(vii)(B)	The owner or operator must comply with the NHVcz requirements in § 63.670(e)(2) of subpart CC;	Applicable. Pressure-assisted flares are required to meet an NHVcz of 800 Btu/scf.

Table 7: TEGFs 40 CFR 63 Subpart YY Expanded Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
40 CFR 63.1103(e)(4)(vii)(C)	The owner or operator must determine the 15-minute block average NHVvg using only the direct calculation method specified in § 63.670(l)(5)(ii) of subpart CC;	Applicable. SPM uses direct calculation method.
40 CFR 63.1103(e)(4)(vii)(D)	Instead of complying with § 63.670(b) and (g) of subpart CC, if a pressure-assisted multi-point flare uses cross-lighting on a stage of burners rather than having an individual pilot flame on each burner, the owner or operator must operate each stage of the pressure-assisted multi-point flare with a flame present at all times when regulated material is routed to that stage of burners. Each stage of burners that cross-lights in the pressure-assisted multi-point flare must have at least two pilots with at least one continuously lit and capable of igniting all regulated material that is routed to that stage of burners. Each 15-minute block during which there is at least one minute where no pilot flame is present on a stage of burners when regulated material is routed to that stage is a deviation of the standard. Deviations in different 15-minute blocks from the same event are considered separate deviations. The pilot flame(s) on each stage of burners that use cross-lighting must be continuously monitored by a thermocouple or any other equivalent device used to detect the presence of a flame;	Applicable. Pilots and thermocouples were added in June 2024 on the stages which did not have two pilots. Six (6) pilots were added per TEGF. Pilots were added to Stages 2, 3, 4, 5, 8, and 9 of each TEGF.
40 CFR 63.1103(e)(4)(vii)(E)	Unless the owner or operator of a pressure-assisted multi-point flare chooses to conduct a cross-light performance demonstration as specified in this paragraph, the owner or operator must ensure that if a stage of burners on the flare uses cross-lighting, that the distance between any two burners in series on that stage is no more than 6 feet when measured from the center of one burner to the next burner. A distance greater than 6 feet between any two burners in series may be used provided the owner or operator conducts a performance demonstration that confirms the pressure-assisted multi-point flare will cross-light a minimum of three burners and the spacing between the burners and location of the pilot flame must be representative of the projected installation. The compliance demonstration must be approved by the permitting authority and a copy of this approval must be maintained onsite. The compliance demonstration report must include: A protocol describing the test methodology used, associated test method QA/QC parameters, the waste gas composition and NHVcz of the gas tested, the velocity of the waste gas tested, the pressure-assisted multi-point flare burner tip pressure, the time, length, and duration of the test, records of whether a successful cross-light was observed over all of the burners and the length of time it took for the burners to cross-light, records of maintaining a stable flame after a successful cross-light and the duration for which this was observed, records of any smoking events during the cross-light, waste gas temperature, meteorological conditions (*e.g.,* ambient temperature, barometric pressure, wind speed and direction, and relative humidity), and whether there were any observed flare flameouts; and	Not applicable. The TEGFs' burners are less than 6 feet apart.
40 CFR 63.1103(e)(4)(vii)(F)	The owner or operator of a pressure-assisted multi-point flare must install and operate pressure monitor(s) on the main flare header, as well as a valve position indicator monitoring system for each staging valve to ensure that the flare operates within the proper range of conditions as specified by the manufacturer. The pressure monitor must meet the requirements in Table 13 to subpart CC of this part.	Applicable. Valve position indicators and pressure monitors were installed during construction of the TEGFs and present before July 2023 effective date.
40 CFR 63.1103(e)(4)(vii)(G)	If a pressure-assisted multi-point flare is operating under the requirements of an approved alternative means of emission limitations, the owner or operator shall either continue to comply with the terms of the alternative means of emission limitations or comply with the provisions in paragraphs (e)(4)(vii)(A) through (F) of this section.	Not applicable. SPM is not currently using an AMEL.
40 CFR 63.1103(e)(4)(viii)	If an owner or operator chooses to determine compositional analysis for net heating value with a continuous process mass spectrometer, the owner or operator must comply with the requirements specified in paragraphs (e)(4)(viii)(A) through (G).	Not applicable. Mass spectrometer not used.
40 CFR 63.1103(e)(4)(ix)	An owner or operator using a gas chromatograph or mass spectrometer for compositional analysis for net heating value may choose to use the CE of NHV measured versus the cylinder tag value NHV as the measure of agreement	Applicable.

Table 7: TEGFs 40 CFR 63 Subpart YY Expanded Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
	for daily calibration and quarterly audits in lieu of determining the compound-specific CE. The CE for NHV at any calibration level must not differ by more than 10 percent from the certified cylinder gas value.	
40 CFR 63.1103(e)(4)(x)	Instead of complying with § 63.670(p) of subpart CC, the owner or operator must keep the flare monitoring records specified in § 63.1109(e).	Applicable.
40 CFR 63.1103(e)(4)(xi)	Instead of complying with § 63.670(q) of subpart CC, the owner or operator must comply with the reporting requirements specified in § 63.1110(d) and (e)(4).	Applicable.
40 CFR 63.1103(e)(4)(xii)	When determining compliance with the pilot flame requirements specified in § 63.670(b) and (g), substitute "pilot flame or flare flame" for each occurrence of "pilot flame."	Applicable.
40 CFR 63.1103(e)(4)(xiii)	When determining compliance with the flare tip velocity and combustion zone operating limits specified in § 63.670(d) and (e), the requirement effectively applies starting with the 15-minute block that includes a full 15 minutes of the flaring event. The owner or operator is required to demonstrate compliance with the velocity and NHVcz requirements starting with the block that contains the fifteenth minute of a flaring event. The owner or operator is not required to demonstrate compliance for the previous 15-minute block in which the event started and contained only a fraction of flow.	Applicable.
40 CFR 63.1103(e)(4)(xiv)	In lieu of meeting the requirements in §§ 63.670 and 63.671 of subpart CC, an owner or operator may submit a request to the Administrator for approval of an alternative test method in accordance with § 63.7(f). The alternative test method must be able to demonstrate on an ongoing basis at least once every 15-minutes that the flare meets 96.5% combustion efficiency and provide a description of the alternative recordkeeping and reporting that would be associated with the alternative test method. The alternative test method request may also include a request to use the alternative test method in lieu of the pilot or flare flame monitoring requirements of 63.670(g).	Not Currently Applicable. SPM is not currently using an AMEL.
40 CFR 63.1109(e)	Ethylene production flare records. For each flare subject to the requirements in § 63.1103(e)(4), owners or operators must keep records specified in paragraphs (e)(1) through (15) of this section in lieu of the information required in § 63.998(a)(1) of subpart SS.	Applicable.
40 CFR 63.1110(e)(4)	For each flare subject to the requirements in § 63.1103(e)(4), the Periodic Report shall include the items specified in paragraphs (e)(4)(i) through (vi) of this section in lieu of the information required in § 63.999(c)(3) of subpart SS.	Applicable.
40 CFR 63 Subpart CC – Refinery MACT (by reference only)		
40 CFR 63.670(a)	Reserved	--
40 CFR 63.670(b)	Pilot flame presence. The owner or operator shall operate each flare with a pilot flame present on an individual burner or stage of burners at all times when regulated material is routed to the flare. Each 15-minute block during which there is at least one minute where no pilot flame on an individual burner or stage of burners is present when regulated material is routed to the flare is a deviation of the standard. Deviations in different 15-minute blocks from the same event are considered separate deviations. The owner or operator shall monitor for the presence of a pilot flame on an individual burner or stage of burners as specified in paragraph (g) of this section. Beginning on April 4, 2024, pressure-assisted flares using stages of burners that cross-light must also comply with paragraphs (b)(1) and (2) of this section.	Not Applicable. Comply with 40 CFR 63.1103(e)(4)(vii)(D).
40 CFR 63.670(b)(1)	Each stage of burners that cross-lights in the pressure-assisted flare must have at least two pilots with at least one continuously lit and capable of igniting all regulated material that is routed to that stage of burners.	Not Applicable. Comply with 40 CFR 63.1103(e)(4)(vii)(D).
40 CFR 63.670(b)(2)	Unless the owner or operator of a pressure-assisted flare chooses to conduct a cross-light performance demonstration as specified in this paragraph, the owner or operator must ensure that if a stage of burners on the flare uses cross-lighting, that the distance between any two burners in series on that stage is no more than 6 feet when measured	Not Applicable. Comply with 40 CFR 63.1103(e)(4)(vii)(E).

Table 7: TEGFs 40 CFR 63 Subpart YY Expanded Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
	from the center of one burner to the next burner. A distance greater than 6 feet between any two burners in series may be used provided the owner or operator complies with the requirements in paragraphs (b)(2)(i) through (iii).	
40 CFR 63.670(c)	Visible emissions. The owner or operator shall specify the smokeless design capacity of each flare and operate with no visible emissions, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours, when regulated material is routed to the flare and the flare vent gas flow rate is less than the smokeless design capacity of the flare. The owner or operator shall monitor for visible emissions from the flare as specified in paragraph (h) of this section.	Applicable.
40 CFR 63.670(d)	Flare tip velocity. Except as provided in paragraph (d)(3) of this section for pressure-assisted flares, for each flare, the owner or operator shall comply with either paragraph (d)(1) or (2) of this section, provided the appropriate monitoring systems are in-place, whenever regulated material is routed to the flare for at least 15-minutes and the flare vent gas flow rate is less than the smokeless design capacity of the flare.	Not Applicable. See 40 CFR 63.1103(e)(4)(vii)(A).
40 CFR 63.670(e)	Combustion zone operating limits. The owner or operator shall operate the flare to maintain the net heating value of flare combustion zone gas (NHVcz) at or above the applicable limits in paragraphs (e)(1) and (2) of this section determined on a 15-minute block period basis when regulated material is routed to the flare for at least 15-minutes. The owner or operator shall monitor and calculate NHVcz as specified in paragraph (m) of this section.	Applicable.
40 CFR 63.670(e)(1)	For all flares other than pressure-assisted flares, 270 British thermal units per standard cubic feet (Btu/scf).	Not Applicable. TEGFs were designated as pressure-assisted multi-point flares in January 2024.
40 CFR 63.670(e)(2)	Beginning on April 4, 2024, for each pressure-assisted flare, 800 Btu/scf.	Applicable. TEGFs were designated as pressure-assisted multi-point flares in January 2024.
40 CFR 63.670(f)	Dilution operating limits for flares with perimeter assist air. Except as provided in paragraph (f)(1) of this section, for each flare actively receiving perimeter assist air, the owner or operator shall operate the flare to maintain the net heating value dilution parameter (NHVdil) at or above 22 British thermal units per square foot (Btu/ft2) determined on a 15-minute block period basis when regulated material is being routed to the flare for at least 15-minutes. The owner or operator shall monitor and calculate NHVdil as specified in paragraph (n) of this section.	Not Applicable. TEGFs do not have assist air.
40 CFR 63.670(g)	Pilot flame monitoring. The owner or operator shall continuously monitor the presence of the pilot flame(s) using a device (including, but not limited to, a thermocouple, ultraviolet beam sensor, or infrared sensor) capable of detecting that the pilot flame(s) is present.	Not Applicable. Comply with 40 CFR 63.1103(e)(4)(vii)(D).
40 CFR 63.670(h)	Visible emissions monitoring. The owner or operator shall conduct an initial visible emissions demonstration using an observation period of 2 hours using Method 22 at 40 CFR part 60, appendix A-7. The initial visible emissions demonstration should be conducted the first time regulated materials are routed to the flare. Subsequent visible emissions observations must be conducted using either the methods in paragraph (h)(1) of this section or, alternatively, the methods in paragraph (h)(2) of this section. The owner or operator must record and report any instances where visible emissions are observed for more than 5 minutes during any 2 consecutive hours as specified in § 63.655(g)(11)(ii).	Applicable.
40 CFR 63.670(h)(1)	At least once per day for each day regulated material is routed to the flare, conduct visible emissions observations using an observation period of 5 minutes using Method 22 at 40 CFR part 60, appendix A-7. If at any time the owner or operator sees visible emissions while regulated material is routed to the flare, even if the minimum required daily visible emission monitoring has already been performed, the owner or operator shall immediately begin an	Applicable. SPM uses video surveillance per 40 CFR 63.670(h)(2) as a primary compliance method but may use

Table 7: TEGFs 40 CFR 63 Subpart YY Expanded Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
	observation period of 5 minutes using Method 22 at 40 CFR part 60, appendix A-7. If visible emissions are observed for more than one continuous minute during any 5-minute observation period, the observation period using Method 22 at 40 CFR part 60, appendix A-7 must be extended to 2 hours or until 5-minutes of visible emissions are observed. Daily 5-minute Method 22 observations are not required to be conducted for days the flare does not receive any regulated material.	Method 22 observations if video is unavailable.
40 CFR 63.670(h)(2)	Use a video surveillance camera to continuously record (at least one frame every 15 seconds with time and date stamps) images of the flare flame and a reasonable distance above the flare flame at an angle suitable for visual emissions observations. The owner or operator must provide real-time video surveillance camera output to the control room or other continuously manned location where the camera images may be viewed at any time.	Applicable.
40 CFR 63.670(i)	Flare vent gas, steam assist and air assist flow rate monitoring. 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 header or headers that feed the flare as well as any flare supplemental gas used. Different flow monitoring methods may be used to measure different gaseous streams that make up the flare vent gas provided that the flow rates of all gas streams that contribute to the flare vent gas are determined. If assist air or assist steam is used, the owner or operator shall install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist air and/or assist steam used with the flare. If pre-mix assist air and perimeter assist are both used, the owner or operator shall install, operate, calibrate, and maintain a monitoring system capable of separately measuring, calculating, and recording the volumetric flow rate of premix assist air and perimeter assist air used with the flare. Flow monitoring system requirements and acceptable alternatives are provided in paragraphs (i)(1) through (6) of this section.	Applicable. Pressure and temperature monitors were added to the individual TEGF headers to ensure proper compensation to each flare as of July 25, 2024.
40 CFR 63.670(i)(1)	The flow rate monitoring systems must be able to correct for the temperature and pressure of the system and output parameters in standard conditions (*i.e.,* a temperature of 20 °C (68 °F) and a pressure of 1 atmosphere).	Applicable.
40 CFR 63.670(i)(2)	Mass flow monitors may be used for determining volumetric flow rate of flare vent gas provided the molecular weight of the flare vent gas is determined using compositional analysis as specified in paragraph (j) of this section so that the mass flow rate can be converted to volumetric flow at standard conditions.	Applicable.
40 CFR 63.670(i)(3)	Mass flow monitors may be used for determining volumetric flow rate of assist air or assist steam. Use equation in paragraph (i)(2) of this section to convert mass flow rates to volumetric flow rates. Use a molecular weight of 18 pounds per pound-mole for assist steam and use a molecular weight of 29 pounds per pound-mole for assist air.	Applicable.
40 CFR 63.670(i)(4)	Continuous pressure/temperature monitoring system(s) and appropriate engineering calculations may be used in lieu of a continuous volumetric flow monitoring systems provided the molecular weight of the gas is known. For assist steam, use a molecular weight of 18 pounds per pound-mole. For assist air, use a molecular weight of 29 pounds per pound-mole. For flare vent gas, molecular weight must be determined using compositional analysis as specified in paragraph (j) of this section.	Applicable.
40 CFR 63.670(i)(5)	Continuously monitoring fan speed or power and using fan curves is an acceptable method for continuously monitoring assist air flow rates.	Not Applicable. TEGFs are not air-assisted.
40 CFR 63.670(i)(6)	For perimeter assist air intentionally entrained in lower and/or upper steam, the monitored steam flow rate and the maximum design air-to-steam volumetric flow ratio of the entrainment system may be used to determine the assist air flow rate.	Not Applicable. TEGFs are not air-assisted.
40 CFR 63.670(j)	Flare vent gas composition monitoring. The owner or operator shall determine the concentration of individual components in the flare vent gas using either the methods provided in paragraph (j)(1) or (2) of this section, to assess compliance with the operating limits in paragraph (e) of this section and, if applicable, paragraphs (d) and (f) of this section. Alternatively, the owner or operator may elect to directly monitor the net heating value of the flare vent gas	Applicable.

Table 7: TEGFs 40 CFR 63 Subpart YY Expanded Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
	following the methods provided in paragraphs (j)(3) of this section and, if desired, may directly measure the hydrogen concentration in the flare vent gas following the methods provided in paragraphs (j)(4) of this section. The owner or operator may elect to use different monitoring methods for different gaseous streams that make up the flare vent gas using different methods provided the composition or net heating value of all gas streams that contribute to the flare vent gas are determined.	
40 CFR 63.670(j)(1)	Except as provided in paragraphs (j)(5) and (6) of this section, the owner or operator shall install, operate, calibrate, and maintain a monitoring system capable of continuously measuring (i.e., at least once every 15-minutes), calculating, and recording the individual component concentrations present in the flare vent gas.	Applicable.
40 CFR 63.670(j)(2)	Except as provided in paragraphs (j)(5) and (6) of this section, the owner or operator shall install, operate, and maintain a grab sampling system capable of collecting an evacuated canister sample for subsequent compositional analysis at least once every eight hours while there is flow of regulated material to the flare. Subsequent compositional analysis of the samples must be performed according to Method 18 of 40 CFR part 60, appendix A-6, ASTM D6420-99 (Reapproved 2010), ASTM D1945-03 (Reapproved 2010), ASTM D1945-14 or ASTM UOP539-12 (all incorporated by reference—see § 63.14).	Not applicable. SPM does not employ this option.
40 CFR 63.670(j)(3)	Except as provided in paragraphs (j)(5) and (6) of this section, the owner or operator shall install, operate, calibrate, and maintain a calorimeter capable of continuously measuring, calculating, and recording NHVvg at standard conditions.	Applicable. SPM is switching to a calorimeter plus H2 analyzer for calculation of NHVvg with expected start February 2025. This does not affect the current GC used as the CPMS.
40 CFR 63.670(j)(4)	If the owner or operator uses a continuous net heating value monitor according to paragraph (j)(3) of this section, the owner or operator may, at their discretion, install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the hydrogen concentration in the flare vent gas.	Applicable. SPM is switching to a calorimeter plus H2 analyzer for calculation of NHVvg with expected start February 2025. This does not affect the current GC used as the CPMS.
40 CFR 63.670(j)(5)	Direct compositional or net heating value monitoring is not required for purchased (“pipeline quality”) natural gas streams. The net heating value of purchased natural gas streams may be determined using annual or more frequent grab sampling at any one representative location. Alternatively, the net heating value of any purchased natural gas stream can be assumed to be 920 Btu/scf.	Applicable.
40 CFR 63.670(j)(6)	Direct compositional or net heating value monitoring is not required for gas streams that have been demonstrated to have consistent composition (or a fixed minimum net heating value) according to the methods in paragraphs (j)(6)(i) through (iii) of this section.	Not Applicable. SPM does not use this exemption for any streams other than purchased natural gas as allowed above.
40 CFR 63.670(k)	Calculation methods for cumulative flow rates and determining compliance with Vtip operating limits. The owner or operator shall determine Vtip on a 15-minute block average basis according to §63.670(k)(1)-(3), as applicable.	Not applicable. TEGFs are not applicable to the tip velocity requirements.
40 CFR 63.670(l)	Calculation methods for determining flare vent gas net heating value. The owner or operator shall determine the net heating value of the flare vent gas (NHVvg) based on the composition monitoring data on a 15-minute block average basis according to §63.670(l)(1)-(7), as applicable.	Applicable. Calculation methodologies.

Table 7: TEGFs 40 CFR 63 Subpart YY Expanded Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
40 CFR 63.670(m)	Calculation methods for determining combustion zone net heating value. The owner or operator shall determine the net heating value of the combustion zone gas (NHVcz) as specified in paragraph (m)(1) or (2) of this section, as applicable.	Applicable. Calculation methodologies.
40 CFR 63.670(n)	Calculation methods for determining the net heating value dilution parameter. The owner or operator shall determine the net heating value dilution parameter (NHVdil) as specified in paragraph (n)(1) or (2) of this section, as applicable.	Not Applicable. TEGFs are not air-assisted.
40 CFR 63.670(o)	Emergency flaring provisions. The owner or operator of a flare that has the potential to operate above its smokeless capacity under any circumstance shall comply with the provisions in paragraphs (o)(1) through (7) of this section.	Applicable.
40 CFR 63.670(o)(1)	Develop a flare management plan to minimize flaring during periods of startup, shutdown, or emergency releases. The flare management plan must include the information described in paragraphs (o)(1)(i) through (vii) of this section.	Applicable but follow dates and instructions in 40 CFR 63.1103(e)(4)(ii)-(iii).
40 CFR 63.670(o)(2)	Each owner or operator required to develop and implement a written flare management plan as described in paragraph (o)(1) of this section must submit the plan to the Administrator as described in paragraphs (o)(2)(i) through (iii) of this section.	Applicable but follow dates and instructions in 40 CFR 63.1103(e)(4)(ii)-(iii).
40 CFR 63.670(o)(3)	The owner or operator of a flare subject to this subpart shall conduct a root cause analysis and a corrective action analysis for each flow event that contains regulated material and that meets either the criteria in paragraph (o)(3)(i) or (ii) of this section.	Applicable.
40 CFR 63.670(o)(3)(i)	The vent gas flow rate exceeds the smokeless capacity of the flare based on a 15-minute block average and visible emissions are present from the flare for more than 5 minutes during any 2 consecutive hours during the release event.	Applicable.
40 CFR 63.670(o)(3)(ii)	The vent gas flow rate exceeds the smokeless capacity of the flare and the 15-minute block average flare tip velocity exceeds the maximum flare tip velocity determined using the methods in paragraph (d)(2) of this section.	Not Applicable. See 40 CFR 63.1103(e)(4)(iv).
40 CFR 63.670(o)(4)	A root cause analysis and corrective action analysis must be completed as soon as possible, but no later than 45 days after a flare flow event meeting the criteria in paragraph (o)(3)(i) or (ii) of this section. Special circumstances affecting the number of root cause analyses and/or corrective action analyses are provided in paragraphs (o)(4)(i) through (v) of this section.	Applicable.
40 CFR 63.670(o)(5)	Each owner or operator of a flare required to conduct a root cause analysis and corrective action analysis as specified in paragraphs (o)(3) and (4) of this section shall implement the corrective action(s) identified in the corrective action analysis in accordance with the applicable requirements in paragraphs (o)(5)(i) through (iii) of this section.	Applicable.
40 CFR 63.670(o)(6)	The owner or operator shall determine the total number of events for which a root cause and corrective action analyses was required during the calendar year for each affected flare separately for events meeting the criteria in paragraph (o)(3)(i) of this section and those meeting the criteria in paragraph (o)(3)(ii) of this section. For the purpose of this requirement, a single root cause analysis conducted for an event that met both of the criteria in paragraphs (o)(3)(i) and (ii) of this section would be counted as an event under each of the separate criteria counts for that flare. Additionally, if a single root cause analysis was conducted for an event that caused multiple flares to meet the criteria in paragraph (o)(3)(i) or (ii) of this section, that event would count as an event for each of the flares for each criteria in paragraph (o)(3) of this section that was met during that event. Prior to June 3, 2024, the owner or operator shall also determine the total number of events for which a root cause and correct action analyses was required and the analyses concluded that the root cause was a force majeure event, as defined in this subpart.	Applicable.
40 CFR 63.670(o)(7)	The following events would be a violation of this emergency flaring work practice standard.	Applicable.

Table 7: TEGFs 40 CFR 63 Subpart YY Expanded Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
	(i) Any flow event for which a root cause analysis was required and the root cause was determined to be operator error or poor maintenance. (ii) Prior to June 3, 2024, two visible emissions exceedance events meeting the criteria in paragraph (o)(3)(i) of this section that were not caused by a force majeure event from a single flare in a 3 calendar year period for the same root cause for the same equipment. On and after June 3, 2024, two visible emissions exceedance events meeting the criteria in paragraph (o)(3)(i) of this section from a single flare in a 3 calendar year period for the same root cause for the same equipment. (iii) Prior to June 3, 2024, two flare tip velocity exceedance events meeting the criteria in paragraph (o)(3)(ii) of this section that were not caused by a force majeure event from a single flare in a 3 calendar year period for the same root cause for the same equipment. On and after June 3, 2024, two flare tip velocity exceedance events meeting the criteria in paragraph (o)(3)(ii) of this section from a single flare in a 3 calendar year period for the same root cause for the same equipment. (iv) Prior to June 3, 2024, three visible emissions exceedance events meeting the criteria in paragraph (o)(3)(i) of this section that were not caused by a force majeure event from a single flare in a 3 calendar year period for any reason. On and after June 3, 2024, three visible emissions exceedance events meeting the criteria in paragraph (o)(3)(i) of this section from a single flare in a 3 calendar year period for any reason. (v) Prior to June 3, 2024, three flare tip velocity exceedance events meeting the criteria in paragraph (o)(3)(ii) of this section that were not caused by a force majeure event from a single flare in a 3 calendar year period for any reason. On and after June 3, 2024, three flare tip velocity exceedance events meeting the criteria in paragraph (o)(3)(ii) of this section from a single flare in a 3 calendar year period for any reason.	
40 CFR 63.670(p)	Flare monitoring records. The owner or operator shall keep the records specified in § 63.655(i)(9).	Not Applicable. Comply with 40 CFR 63.1109(e).
40 CFR 63.670(q)	Reporting. The owner or operator shall comply with the reporting requirements specified in § 63.655(g)(11).	Not Applicable. Comply with 40 CFR 63.1110(e)(4).
40 CFR 63.670(r)	Alternative means of emissions limitation. An owner or operator may request approval from the Administrator for site-specific operating limits that shall apply specifically to a selected flare. Site-specific operating limits include alternative threshold values for the parameters specified in paragraphs (d) through (f) of this section as well as threshold values for operating parameters other than those specified in paragraphs (d) through (f) of this section. The owner or operator must demonstrate that the flare achieves 96.5 percent combustion efficiency (or 98 percent destruction efficiency) using the site-specific operating limits based on a performance evaluation as described in paragraph (r)(1) of this section. The request shall include information as described in paragraph (r)(2) of this section. The request shall be submitted and followed as described in paragraph (r)(3) of this section.	Not Applicable. See 40 CFR 63.1103 (e)(4)(i).
40 CFR 63.671(a)	Operation of CPMS. For each CPMS installed to comply with applicable provisions in § 63.670, the owner or operator shall install, operate, calibrate, and maintain the CPMS as specified in paragraphs (a)(1) through (8) of this section.	Applicable.
40 CFR 63.671(b)	CPMS monitoring plan. The owner or operator shall develop and implement a CPMS quality control program documented in a CPMS monitoring plan that covers each flare subject to the provisions in § 63.670 and each CPMS installed to comply with applicable provisions in § 63.670. The owner or operator shall have the CPMS monitoring plan readily available on-site at all times and shall submit a copy of the CPMS monitoring plan to the Administrator upon request by the Administrator. The CPMS monitoring plan must contain the information listed in paragraphs (b)(1) through (5) of this section.	Applicable.

Table 7: TEGFs 40 CFR 63 Subpart YY Expanded Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
40 CFR 63.671(c)	Out-of-control periods. For each CPMS installed to comply with applicable provisions in § 63.670 except for CPMS installed for pilot flame monitoring, the owner or operator shall comply with the out-of-control procedures described in paragraphs (c)(1) and (2) of this section.	Applicable.
40 CFR 63.671(d)	The owner or operator shall reduce data from a CPMS installed to comply with applicable provisions in § 63.670 as specified in paragraphs (d)(1) through (3) of this section.	Applicable.
40 CFR 63.671(e)	Additional requirements for gas chromatographs. For monitors used to determine compositional analysis for net heating value per § 63.670(j)(1) that include a gas chromatograph, the gas chromatograph must also meet the requirements of paragraphs (e)(1) through (4) of this section.	Applicable for Current GC. SPM is switching to a calorimeter plus H2 analyzer for calculation of NHVvg.
40 CFR 63.671(f)	Additional requirements for continuous process mass spectrometers. Beginning on April 4, 2024, for continuous process mass spectrometers used to determine compositional analysis for net heating value per § 63.670(j)(1) without the use of gas chromatography, the continuous process mass spectrometer must also meet the requirements of paragraphs (f)(1) through (7) of this section.	Not applicable. Mass spectrometer not used.

Attachment 2

Request No. 8.a Information

8. Provide Federal regulation applicability determinations for the following MPGF Headers:

a. MPGF CVTO Trip Header – 40 CFR Part 63 Subparts CC, FFFF, YY, and SS

Applicable:

- 40 CFR 63 Subpart YY (EMACT): The MPGF CVTO Trip Header (during CVTO downtime) controls vents from storage vessels and transfer racks subject to the control standards of the EMACT. The EMACT flare control device requirements incorporate by reference the flare control device and flare monitoring system requirements in 40 CFR 63 Subpart CC as outlined in Table 8a.
- 40 CFR 63 Subpart FFFF (MON): The MPGF CVTO Trip Header (during CVTO downtime) controls process vents subject to the control standards of the MON. The MON flare control device requirements incorporate by reference the flare control device and flare monitoring system requirements in 40 CFR 63 Subpart CC as outlined in Table 8a.
- 40 CFR 63 Subpart CC (Refinery MACT): The Refinery MACT flare control device and flare monitoring system requirements are incorporated by reference into the EMACT and MON. The Refinery MACT is not applicable as the site is not a petroleum refinery. The Refinery MACT flare control device and flare monitoring system requirements are applicable by reference only as outlined in Table 8a.

No Applicable Requirements:

- 40 CFR 60 Subpart DDD (Polymers Manufacturing – NSPS DDD): The MPGF CVTO Trip Header controls equipment subject to both the MON and NSPS DDD. As provided in 63.2535(h) of the MON, miscellaneous chemical manufacturing process units (MCPU) which are subject to the provisions in NSPS DDD and the MON may elect to apply the MON to all such equipment in the MCPU. Additionally, if an MCPU subject to the provisions of the MON has equipment to which the MON does not apply but which is subject to a standard in NSPS DDD, then the MCPU may elect to comply with the requirements for Group 1 process vents in the MON for such equipment. The site has elected to comply with the MON for all equipment in the MCPU subject to both the MON and NSPS DDD. The site has further chosen to comply with the Group 1 process vent provisions of the MON for all equipment in the MCPU which is not subject to the MON but is subject to NSPS DDD. This constitutes compliance with NSPS DDD.
- 40 CFR Part 60 Subpart A 60.18 and Part 63 Subpart A 63.11: The [General] control device and work practice requirements for flares in Subpart A no longer apply to the MPGF CVTO Trip Header. As provided in 63.1100(g)(7) in the EMACT and 63.2535(m)(1) in the MON,

the MPGF CVTO Trip Header is only required to comply with the revised flare control device requirements in the EMACT as of July 6, 2023, and the MON as of August 12, 2023.

Not Applicable:

- 40 CFR 63 Subpart SS (CVS and Control Device Standards): The Control Device Standards in Subpart SS no longer apply to the MPGF CVTO Trip Header. Regarding control device requirements, the MPGF CVTO Trip header is only required to comply with the revised flare control device requirements in the EMACT as of July 6, 2023, and the MON as of August 12, 2023.

Table 8a: MPGF CVTO Trip Header – 40 CFR 63 Subparts YY, FFFF, and CC (by reference) Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
40 CFR 63 Subpart YY – EMACT		
40 CFR 63.1103(e)(4)	Beginning no later than the compliance dates specified in § 63.1102(c), if a steam-assisted, air-assisted, non-assisted, or pressure-assisted multi-point flare is used as a control device for an emission point subject to the requirements in Table 7 to this section, then the owner or operator must meet the applicable requirements for flares as specified in §§ 63.670 and 63.671 of subpart CC, including the provisions in Tables 12 and 13 to subpart CC of this part, except as specified in paragraphs (e)(4)(i) through (xiv) of this section. This requirement also applies to any flare using fuel gas from a fuel gas system, of which 50 percent or more of the fuel gas is derived from an ethylene production unit, being used to control an emission point subject to the requirements in Table 7 of this section. For purposes of compliance with this paragraph, the following terms are defined in § 63.641 of subpart CC: Assist air, assist steam, center steam, combustion zone, combustion zone gas, flare, flare purge gas, flare supplemental gas, flare sweep gas, flare vent gas, lower steam, net heating value, perimeter assist air, pilot gas, premix assist air, total steam, and upper steam.	Applicable. Comply with 40 CFR 63.670 and 63.671 except as specified in 63.1103(e)(4)(i)-(xiv).
40 CFR 63.1103(e)(4)(i)	The owner or operator may elect to comply with the alternative means of emissions limitation requirements specified in of § 63.670(r) of subpart CC in lieu of the requirements in § 63.670(d) through (f) of subpart CC, as applicable. However, instead of complying with § 63.670(r)(3) of subpart CC, the owner or operator must submit the alternative means of emissions limitation request following the requirements in § 63.1113.	Not Currently Applicable. SPM is not currently using an AMEL.
40 CFR 63.1103(e)(4)(ii)	Instead of complying with § 63.670(o)(2)(i) of subpart CC, the owner or operator must develop and implement the flare management plan no later than the compliance dates specified in § 63.1102(c).	Applicable. FMP completed and submitted before compliance date.
40 CFR 63.1103(e)(4)(iii)	Instead of complying with § 63.670(o)(2)(iii) of subpart CC, if required to develop a flare management plan and submit it to the Administrator, then the owner or operator must also submit all versions of the plan in portable document format (PDF) to the EPA following the procedure specified in § 63.9(k), except any medium submitted through U.S. mail must be sent to the attention of the Ethylene Production Sector Lead.	Applicable. Complete.
40 CFR 63.1103(e)(4)(iv)	Section 63.670(o)(3)(ii) of subpart CC and all references to § 63.670(o)(3)(ii) of subpart CC do not apply. Instead, the owner or operator must comply with the maximum flare tip velocity operating limit at all times.	Applicable.
40 CFR 63.1103(e)(4)(v)	Substitute “ethylene production unit” for each occurrence of “petroleum refinery.”	Applicable.
40 CFR 63.1103(e)(4)(vi)	Each occurrence of “refinery” does not apply.	Applicable.
40 CFR 63.1103(e)(4)(vii)	Except as specified in paragraph (e)(4)(vii)(G) of this section, if a pressure-assisted multi-point flare is used as a control device for an emission point subject to the requirements in Table 7 to this section, then the owner or operator must comply with the requirements specified in paragraphs (e)(4)(vii)(A) through (F).	Not Applicable. MPGF headers are perimeter air-assisted.
40 CFR 63.1103(e)(4)(viii)	If an owner or operator chooses to determine compositional analysis for net heating value with a continuous process mass spectrometer, the owner or operator must comply with the requirements specified in paragraphs (e)(4)(viii)(A) through (G).	Not applicable. Mass spectrometer not used.
40 CFR 63.1103(e)(4)(ix)	An owner or operator using a gas chromatograph or mass spectrometer for compositional analysis for net heating value may choose to use the CE of NHV measured versus the cylinder tag value NHV as the measure of agreement for daily calibration and quarterly audits in lieu of determining the compound-specific CE. The CE for NHV at any calibration level must not differ by more than 10 percent from the certified cylinder gas value.	Applicable. SPM is switching to a calorimeter plus H2 by GC for calculation of NHVvg with expected start February 2025. This does not affect the current GC used as the CPMS.

Table 8a: MPGF CVTO Trip Header – 40 CFR 63 Subparts YY, FFFF, and CC (by reference) Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
40 CFR 63.1103(e)(4)(x)	Instead of complying with § 63.670(p) of subpart CC, the owner or operator must keep the flare monitoring records specified in § 63.1109(e).	Applicable.
40 CFR 63.1103(e)(4)(xi)	Instead of complying with § 63.670(q) of subpart CC, the owner or operator must comply with the reporting requirements specified in § 63.1110(d) and (e)(4).	Applicable.
40 CFR 63.1103(e)(4)(xii)	When determining compliance with the pilot flame requirements specified in § 63.670(b) and (g), substitute "pilot flame or flare flame" for each occurrence of "pilot flame."	Applicable.
40 CFR 63.1103(e)(4)(xiii)	When determining compliance with the flare tip velocity and combustion zone operating limits specified in § 63.670(d) and (e), the requirement effectively applies starting with the 15-minute block that includes a full 15 minutes of the flaring event. The owner or operator is required to demonstrate compliance with the velocity and NHVcz requirements starting with the block that contains the fifteenth minute of a flaring event. The owner or operator is not required to demonstrate compliance for the previous 15-minute block in which the event started and contained only a fraction of flow.	Applicable.
40 CFR 63.1103(e)(4)(xiv)	In lieu of meeting the requirements in §§ 63.670 and 63.671 of subpart CC, an owner or operator may submit a request to the Administrator for approval of an alternative test method in accordance with § 63.7(f). The alternative test method must be able to demonstrate on an ongoing basis at least once every 15-minutes that the flare meets 96.5% combustion efficiency and provide a description of the alternative recordkeeping and reporting that would be associated with the alternative test method. The alternative test method request may also include a request to use the alternative test method in lieu of the pilot or flare flame monitoring requirements of 63.670(g).	Not Currently Applicable. SPM is not currently using an AMEL.
40 CFR 63.1109(e)	Ethylene production flare records. For each flare subject to the requirements in § 63.1103(e)(4), owners or operators must keep records specified in paragraphs (e)(1) through (15) of this section in lieu of the information required in § 63.998(a)(1) of subpart SS.	Applicable.
40 CFR 63.1110(e)(4)	For each flare subject to the requirements in § 63.1103(e)(4), the Periodic Report shall include the items specified in paragraphs (e)(4)(i) through (vi) of this section in lieu of the information required in § 63.999(c)(3) of subpart SS.	Applicable.
40 CFR 63 Subpart FFFF – MON		
40 CFR 63.2535(h)	Compliance with 40 CFR part 60, subpart DDD, III, NNN, or RRR. After the compliance dates specified in § 63.2445, if you have an MCPU that contains equipment subject to the provisions of this subpart that are also subject to the provisions of 40 CFR part 60, subpart DDD, III, NNN, or RRR, you may elect to apply this subpart to all such equipment in the MCPU. If an MCPU subject to the provisions of this subpart has equipment to which this subpart does not apply but which is subject to a standard in 40 CFR part 60, subpart DDD, III, NNN, or RRR, you may elect to comply with the requirements for Group 1 process vents in this subpart for such equipment. If you elect any of these methods of compliance, you must consider all total organic compounds, minus methane and ethane, in such equipment for purposes of compliance with this subpart, as if they were organic HAP. Compliance with the provisions of this subpart, in the manner described in this paragraph (h), will constitute compliance with 40 CFR part 60, subpart DDD, III, NNN, or RRR, as applicable.	Applicable. PE units have equipment subject to both NSPS DDD and MON. Comply with requirements of MON in lieu of NSPS DDD.
40 CFR 63.2450(e)(5)	For any flare that is used to reduce organic HAP emissions from an MCPU, you may elect to comply with the requirements in this paragraph in lieu of the requirements of § 63.982(b) and the requirements referenced therein. However, beginning no later than the compliance dates specified in § 63.2445(g), paragraphs (e)(2) and (f) of this section no longer apply to flares that control ethylene oxide emissions from affected sources in ethylene oxide service as defined in § 63.2550 and flares used to control emissions from MCPUs that produce olefins or polyolefins. Instead, if you reduce organic HAP emissions by venting emissions through a closed-vent system to a steam-assisted, air-assisted, non-assisted, or pressure-assisted multi-point flare that controls ethylene oxide	Applicable. PE units are MCPUs which produce polyethylene. Comply with 40 CFR 63.670 and 63.671 except as specified in 63.2450(e)(5)(i)-(xii).

Table 8a: MPGF CVTO Trip Header – 40 CFR 63 Subparts YY, FFFF, and CC (by reference) Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
	emissions from affected sources in ethylene oxide service as defined in § 63.2550 or is used to control emissions from an MCPU that produces olefins or polyolefins, then you must meet the applicable requirements for flares as specified in §§ 63.670 and 63.671 of subpart CC, including the provisions in Tables 12 and 13 to subpart CC of this part, except as specified in paragraphs (e)(5)(i) through (xiii) of this section. This requirement in this paragraph (e)(5) also applies to any flare using fuel gas from a fuel gas system, of which 50 percent or more of the fuel gas is derived from an MCPU that has processes and/or equipment in ethylene oxide service or that produces olefins or polyolefins, as determined on an annual average basis. For purposes of compliance with this paragraph (e)(5), the following terms are defined in § 63.641 of subpart CC: Assist air, assist steam, center steam, combustion zone, combustion zone gas, flare, flare purge gas, flare supplemental gas, flare sweep gas, flare vent gas, lower steam, net heating value, perimeter assist air, pilot gas, premix assist air, total steam, and upper steam. Also, for purposes of compliance with this paragraph (e)(5), "MCPUs that produces olefins or polyolefins" includes only those MCPUs that manufacture ethylene, propylene, polyethylene, and/or polypropylene as a product. By-products and impurities as defined in § 63.101, as well as wastes and trace contaminants, are not considered products.	
40 CFR 63.2450(e)(5)(i)	When determining compliance with the pilot flame requirements specified in § 63.670(b) and (g), substitute "pilot flame or flare flame" for each occurrence of "pilot flame."	Applicable.
40 CFR 63.2450(e)(5)(ii)	When determining compliance with the flare tip velocity and combustion zone operating limits specified in § 63.670(d) and (e), the requirement effectively applies starting with the 15-minute block that includes a full 15 minutes of the flaring event. You are required to demonstrate compliance with the velocity and NHVcz requirements starting with the block that contains the fifteenth minute of a flaring event. You are not required to demonstrate compliance for the previous 15-minute block in which the event started and contained only a fraction of flow.	Applicable.
40 CFR 63.2450(e)(5)(iii)	Instead of complying with paragraph (o)(2)(i) of § 63.670 of subpart CC, you must develop and implement the flare management plan no later than the compliance dates specified in § 63.2445(g).	Applicable. FMP completed and submitted before compliance date.
40 CFR 63.2450(e)(5)(iv)	Instead of complying with paragraph (o)(2)(iii) of § 63.670 of subpart CC, if required to develop a flare management plan and submit it to the Administrator, then you must also submit all versions of the plan in portable document format (PDF) to the EPA following the procedure specified in § 63.9(k), except any medium submitted through mail must be sent to the attention of the Miscellaneous Organic Chemical Manufacturing Sector Lead.	Applicable. Complete.
40 CFR 63.2450(e)(5)(v)	Section 63.670(o)(3)(ii) of subpart CC and all references to § 63.670(o)(3)(ii) of subpart CC do not apply. Instead, the owner or operator must comply with the maximum flare tip velocity operating limit at all times.	Applicable.
40 CFR 63.2450(e)(5)(vi)	Substitute "MCPU" for each occurrence of "petroleum refinery."	Applicable.
40 CFR 63.2450(e)(5)(vii)	Each occurrence of "refinery" does not apply.	Applicable.
40 CFR 63.2450(e)(5)(viii)	If a pressure-assisted multi-point flare is used as a control device, then you must meet the conditions in 63.2450(e)(5)(viii)(A)-(G).	Not Applicable. The MPGF headers are perimeter air-assisted.
40 CFR 63.2450(e)(5)(ix)	If you choose to determine compositional analysis for net heating value with a continuous process mass spectrometer, then you must comply with the requirements specified in paragraphs (e)(5)(ix)(A) through (G) of this section.	Not applicable. Mass spectrometer not used.

Table 8a: MPGF CVTO Trip Header – 40 CFR 63 Subparts YY, FFFF, and CC (by reference) Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
40 CFR 63.2450(e)(5)(x)	If you use a gas chromatograph or mass spectrometer for compositional analysis for net heating value, then you may choose to use the CE of NHVmeasured versus the cylinder tag value NHV as the measure of agreement for daily calibration and quarterly audits in lieu of determining the compound-specific CE. The CE for NHV at any calibration level must not differ by more than 10 percent from the certified cylinder gas value. The CE for must be calculated using Equation 2 to this paragraph (e)(5)(x).	Applicable. SPM is switching to a calorimeter plus H2 by GC for calculation of NHVvg with expected start February 2025. This does not affect the current GC used as the CPMS.
40 CFR 63.2450(e)(5)(xi)	Instead of complying with paragraph (q) of § 63.670 of subpart CC, you must comply with the reporting requirements specified in § 63.2520(d)(3) and (e)(11).	Applicable.
40 CFR 63.2450(e)(5)(xii)	Instead of complying with paragraph (p) of § 63.670 of subpart CC, you must keep the flare monitoring records specified in § 63.2525(m).	Applicable.
40 CFR 63.2450(e)(5)(xiii)	You may elect to comply with the alternative means of emissions limitation requirements specified in paragraph (r) of § 63.670 of subpart CC in lieu of the requirements in paragraphs (d) through (f) of § 63.670 of subpart CC, as applicable. However, instead of complying with paragraph (r)(3)(iii) of § 63.670 of subpart CC, you must also submit the alternative means of emissions limitation request to the following address: U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Sector Policies and Programs Division, U.S. EPA Mailroom (C404-02), Attention: Miscellaneous Organic Chemical Manufacturing Sector Lead, 4930 Old Page Rd., Durham, NC 27703.	Not Currently Applicable. SPM is not currently using an AMEL.
40 CFR 63.2520(d)(3)	For flares subject to the requirements of § 63.2450(e)(5), you must also submit the information in this paragraph (d)(3) in a supplement to the Notification of Compliance Status within 150 days after the first applicable compliance date for flare monitoring. In lieu of the information required in § 63.987(b) of subpart SS, the supplement to the Notification of Compliance Status must include flare design (e.g., steam-assisted, air-assisted, non-assisted, or pressure-assisted multi-point); all visible emission readings, heat content determinations, flow rate measurements, and exit velocity determinations made during the initial visible emissions demonstration required by § 63.670(h) of subpart CC, as applicable; and all periods during the compliance determination when the pilot flame or flare flame is absent.	Applicable.
40 CFR 63.2520(e)(11)	For each flare subject to the requirements in § 63.2450(e)(5), the compliance report must include the items specified in paragraphs (e)(11)(i) through (vi) of this section in lieu of the information required in § 63.999(c)(3) of subpart SS.	Applicable.
40 CFR 63.2525(m)	For each flare subject to the requirements in § 63.2450(e)(5), you must keep records specified in paragraphs (m)(1) through (14) of this section in lieu of the information required in § 63.998(a)(1) of subpart SS.	Applicable.
40 CFR 63 Subpart CC – Refinery MACT (by reference only)		
40 CFR 63.670(a)	Reserved	--
40 CFR 63.670(b)	Pilot flame presence. The owner or operator shall operate each flare with a pilot flame present on an individual burner or stage of burners at all times when regulated material is routed to the flare. Each 15-minute block during which there is at least one minute where no pilot flame on an individual burner or stage of burners is present when regulated material is routed to the flare is a deviation of the standard. Deviations in different 15-minute blocks from the same event are considered separate deviations. The owner or operator shall monitor for the presence of a pilot flame on an individual burner or stage of burners as specified in paragraph (g) of this section. Beginning on April 4, 2024, pressure-assisted flares using stages of burners that cross-light must also comply with paragraphs (b)(1) and (2) of this section.	Applicable. Substitute “pilot flame or flare flame” for each occurrence of “pilot flame” as specified in 40 CFR 63.1103(e)(5)(xii) and 40 CFR 63.2450(e)(5)(i).
40 CFR 63.670(b)(1)	Each stage of burners that cross-lights in the pressure-assisted flare must have at least two pilots with at least one continuously lit and capable of igniting all regulated material that is routed to that stage of burners.	Not Applicable. MPGF is not pressure-assisted.

Table 8a: MPGF CVTO Trip Header – 40 CFR 63 Subparts YY, FFFF, and CC (by reference) Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
40 CFR 63.670(b)(2)	Unless the owner or operator of a pressure-assisted flare chooses to conduct a cross-light performance demonstration as specified in this paragraph, the owner or operator must ensure that if a stage of burners on the flare uses cross-lighting, that the distance between any two burners in series on that stage is no more than 6 feet when measured from the center of one burner to the next burner. A distance greater than 6 feet between any two burners in series may be used provided the owner or operator complies with the requirements in paragraphs (b)(2)(i) through (iii).	Not Applicable. MPGF is not pressure-assisted.
40 CFR 63.670(c)	Visible emissions. The owner or operator shall specify the smokeless design capacity of each flare and operate with no visible emissions, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours, when regulated material is routed to the flare and the flare vent gas flow rate is less than the smokeless design capacity of the flare. The owner or operator shall monitor for visible emissions from the flare as specified in paragraph (h) of this section.	Applicable.
40 CFR 63.670(d)	Flare tip velocity. Except as provided in paragraph (d)(3) of this section for pressure-assisted flares, for each flare, the owner or operator shall comply with either paragraph (d)(1) or (2) of this section, provided the appropriate monitoring systems are in-place, whenever regulated material is routed to the flare for at least 15-minutes and the flare vent gas flow rate is less than the smokeless design capacity of the flare.	Applicable. Additional clarification provided in 40 CFR 63.2450(e)(5)(iii).
40 CFR 63.670(e)	Combustion zone operating limits. The owner or operator shall operate the flare to maintain the net heating value of flare combustion zone gas (NHVcz) at or above the applicable limits in paragraphs (e)(1) and (2) of this section determined on a 15-minute block period basis when regulated material is routed to the flare for at least 15-minutes. The owner or operator shall monitor and calculate NHVcz as specified in paragraph (m) of this section.	Applicable. Additional clarification provided in 40 CFR 63.2450(e)(5)(iii).
40 CFR 63.670(e)(1)	For all flares other than pressure-assisted flares, 270 British thermal units per standard cubic feet (Btu/scf).	Applicable. MPGFs are perimeter air-assisted.
40 CFR 63.670(e)(2)	Beginning on April 4, 2024, for each pressure-assisted flare, 800 Btu/scf.	Not Applicable. MPGFs are not pressure-assisted
40 CFR 63.670(f)	Dilution operating limits for flares with perimeter assist air. Except as provided in paragraph (f)(1) of this section, for each flare actively receiving perimeter assist air, the owner or operator shall operate the flare to maintain the net heating value dilution parameter (NHVdil) at or above 22 British thermal units per square foot (Btu/ft2) determined on a 15-minute block period basis when regulated material is being routed to the flare for at least 15-minutes. The owner or operator shall monitor and calculate NHVdil as specified in paragraph (n) of this section.	Applicable. MPGFs are perimeter air-assisted.
40 CFR 63.670(g)	Pilot flame monitoring. The owner or operator shall continuously monitor the presence of the pilot flame(s) using a device (including, but not limited to, a thermocouple, ultraviolet beam sensor, or infrared sensor) capable of detecting that the pilot flame(s) is present.	Applicable.
40 CFR 63.670(h)	Visible emissions monitoring. The owner or operator shall conduct an initial visible emissions demonstration using an observation period of 2 hours using Method 22 at 40 CFR part 60, appendix A-7. The initial visible emissions demonstration should be conducted the first time regulated materials are routed to the flare. Subsequent visible emissions observations must be conducted using either the methods in paragraph (h)(1) of this section or, alternatively, the methods in paragraph (h)(2) of this section. The owner or operator must record and report any instances where visible emissions are observed for more than 5 minutes during any 2 consecutive hours as specified in § 63.655(g)(11)(ii).	Applicable.
40 CFR 63.670(h)(1)	At least once per day for each day regulated material is routed to the flare, conduct visible emissions observations using an observation period of 5 minutes using Method 22 at 40 CFR part 60, appendix A-7. If at any time the owner or operator sees visible emissions while regulated material is routed to the flare, even if the minimum required daily visible emission monitoring has already been performed, the owner or operator shall immediately	Applicable. SPM uses video surveillance per 40 CFR 63.670(h)(2) as a primary compliance

Table 8a: MPGF CVTO Trip Header – 40 CFR 63 Subparts YY, FFFF, and CC (by reference) Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
	begin an observation period of 5 minutes using Method 22 at 40 CFR part 60, appendix A-7. If visible emissions are observed for more than one continuous minute during any 5-minute observation period, the observation period using Method 22 at 40 CFR part 60, appendix A-7 must be extended to 2 hours or until 5-minutes of visible emissions are observed. Daily 5-minute Method 22 observations are not required to be conducted for days the flare does not receive any regulated material.	method but may use Method 22 observations if video is unavailable.
40 CFR 63.670(h)(2)	Use a video surveillance camera to continuously record (at least one frame every 15 seconds with time and date stamps) images of the flare flame and a reasonable distance above the flare flame at an angle suitable for visual emissions observations. The owner or operator must provide real-time video surveillance camera output to the control room or other continuously manned location where the camera images may be viewed at any time.	Applicable.
40 CFR 63.670(i)	Flare vent gas, steam assist and air assist flow rate monitoring. 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 header or headers that feed the flare as well as any flare supplemental gas used. Different flow monitoring methods may be used to measure different gaseous streams that make up the flare vent gas provided that the flow rates of all gas streams that contribute to the flare vent gas are determined. If assist air or assist steam is used, the owner or operator shall install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist air and/or assist steam used with the flare. If pre-mix assist air and perimeter assist are both used, the owner or operator shall install, operate, calibrate, and maintain a monitoring system capable of separately measuring, calculating, and recording the volumetric flow rate of premix assist air and perimeter assist air used with the flare. Flow monitoring system requirements and acceptable alternatives are provided in paragraphs (i)(1) through (6) of this section.	Applicable.
40 CFR 63.670(i)(1)	The flow rate monitoring systems must be able to correct for the temperature and pressure of the system and output parameters in standard conditions (*i.e.,* a temperature of 20 °C (68 °F) and a pressure of 1 atmosphere).	Applicable.
40 CFR 63.670(i)(2)	Mass flow monitors may be used for determining volumetric flow rate of flare vent gas provided the molecular weight of the flare vent gas is determined using compositional analysis as specified in paragraph (j) of this section so that the mass flow rate can be converted to volumetric flow at standard conditions.	Applicable.
40 CFR 63.670(i)(3)	Mass flow monitors may be used for determining volumetric flow rate of assist air or assist steam. Use equation in paragraph (i)(2) of this section to convert mass flow rates to volumetric flow rates. Use a molecular weight of 18 pounds per pound-mole for assist steam and use a molecular weight of 29 pounds per pound-mole for assist air.	Applicable.
40 CFR 63.670(i)(4)	Continuous pressure/temperature monitoring system(s) and appropriate engineering calculations may be used in lieu of a continuous volumetric flow monitoring systems provided the molecular weight of the gas is known. For assist steam, use a molecular weight of 18 pounds per pound-mole. For assist air, use a molecular weight of 29 pounds per pound-mole. For flare vent gas, molecular weight must be determined using compositional analysis as specified in paragraph (j) of this section.	Applicable.
40 CFR 63.670(i)(5)	Continuously monitoring fan speed or power and using fan curves is an acceptable method for continuously monitoring assist air flow rates.	Applicable.
40 CFR 63.670(i)(6)	For perimeter assist air intentionally entrained in lower and/or upper steam, the monitored steam flow rate and the maximum design air-to-steam volumetric flow ratio of the entrainment system may be used to determine the assist air flow rate.	Not Applicable. MPGFs are perimeter air-assisted but do not have any steam (lower or upper).
40 CFR 63.670(j)	Flare vent gas composition monitoring. The owner or operator shall determine the concentration of individual components in the flare vent gas using either the methods provided in paragraph (j)(1) or (2) of this section, to assess compliance with the operating limits in paragraph (e) of this section and, if applicable, paragraphs (d) and	Applicable.

Table 8a: MPGF CVTO Trip Header – 40 CFR 63 Subparts YY, FFFF, and CC (by reference) Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
	(f) of this section. Alternatively, the owner or operator may elect to directly monitor the net heating value of the flare vent gas following the methods provided in paragraphs (j)(3) of this section and, if desired, may directly measure the hydrogen concentration in the flare vent gas following the methods provided in paragraphs (j)(4) of this section. The owner or operator may elect to use different monitoring methods for different gaseous streams that make up the flare vent gas using different methods provided the composition or net heating value of all gas streams that contribute to the flare vent gas are determined.	
40 CFR 63.670(j)(1)	Except as provided in paragraphs (j)(5) and (6) of this section, the owner or operator shall install, operate, calibrate, and maintain a monitoring system capable of continuously measuring (i.e., at least once every 15-minutes), calculating, and recording the individual component concentrations present in the flare vent gas.	Applicable.
40 CFR 63.670(j)(2)	Except as provided in paragraphs (j)(5) and (6) of this section, the owner or operator shall install, operate, and maintain a grab sampling system capable of collecting an evacuated canister sample for subsequent compositional analysis at least once every eight hours while there is flow of regulated material to the flare. Subsequent compositional analysis of the samples must be performed according to Method 18 of 40 CFR part 60, appendix A-6, ASTM D6420-99 (Reapproved 2010), ASTM D1945-03 (Reapproved 2010), ASTM D1945-14 or ASTM UOP539-12 (all incorporated by reference—see § 63.14).	Not applicable. SPM does not employ this option.
40 CFR 63.670(j)(3)	Except as provided in paragraphs (j)(5) and (6) of this section, the owner or operator shall install, operate, calibrate, and maintain a calorimeter capable of continuously measuring, calculating, and recording NHVvg at standard conditions.	Applicable. SPM is switching to a calorimeter plus H2 by GC for calculation of NHVvg with expected start February 2025. This does not affect the current GC used as the CPMS.
40 CFR 63.670(j)(4)	If the owner or operator uses a continuous net heating value monitor according to paragraph (j)(3) of this section, the owner or operator may, at their discretion, install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the hydrogen concentration in the flare vent gas.	Applicable. SPM is switching to a calorimeter plus H2 by GC for calculation of NHVvg with expected start February 2025. This does not affect the current GC used as the CPMS.
40 CFR 63.670(j)(5)	Direct compositional or net heating value monitoring is not required for purchased (“pipeline quality”) natural gas streams. The net heating value of purchased natural gas streams may be determined using annual or more frequent grab sampling at any one representative location. Alternatively, the net heating value of any purchased natural gas stream can be assumed to be 920 Btu/scf.	Applicable.
40 CFR 63.670(j)(6)	Direct compositional or net heating value monitoring is not required for gas streams that have been demonstrated to have consistent composition (or a fixed minimum net heating value) according to the methods in paragraphs (j)(6)(i) through (iii) of this section.	Not Applicable.
40 CFR 63.670(k)	Calculation methods for cumulative flow rates and determining compliance with Vtip operating limits. The owner or operator shall determine Vtip on a 15-minute block average basis according to §63.670(k)(1)-(3), as applicable.	Applicable.
40 CFR 63.670(l)	Calculation methods for determining flare vent gas net heating value. The owner or operator shall determine the net heating value of the flare vent gas (NHVvg) based on the composition monitoring data on a 15-minute block average basis according to §63.670(l)(1)-(7), as applicable..	Applicable. Calculation methodologies.

Table 8a: MPGF CVTO Trip Header – 40 CFR 63 Subparts YY, FFFF, and CC (by reference) Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
40 CFR 63.670(m)	Calculation methods for determining combustion zone net heating value. The owner or operator shall determine the net heating value of the combustion zone gas (NHVcz) as specified in paragraph (m)(1) or (2) of this section, as applicable.	Applicable. Calculation methodologies.
40 CFR 63.670(n)	Calculation methods for determining the net heating value dilution parameter. The owner or operator shall determine the net heating value dilution parameter (NHVdil) as specified in paragraph (n)(1) or (2) of this section, as applicable.	Applicable. MPGFs are perimeter air-assisted.
40 CFR 63.670(o)	Emergency flaring provisions. The owner or operator of a flare that has the potential to operate above its smokeless capacity under any circumstance shall comply with the provisions in paragraphs (o)(1) through (7) of this section.	Applicable.
40 CFR 63.670(o)(1)	Develop a flare management plan to minimize flaring during periods of startup, shutdown, or emergency releases. The flare management plan must include the information described in paragraphs (o)(1)(i) through (vii) of this section.	Applicable but follow dates and instructions in 40 CFR 63.1103(e)(4)(ii)-(iii) and 63.2450(e)(5)(iii)-(iv).
40 CFR 63.670(o)(2)	Each owner or operator required to develop and implement a written flare management plan as described in paragraph (o)(1) of this section must submit the plan to the Administrator as described in paragraphs (o)(2)(i) through (iii) of this section.	Applicable but follow dates and instructions in 40 CFR 63.1103(e)(4)(ii)-(iii) and 63.2450(e)(5)(iii)-(iv).
40 CFR 63.670(o)(3)	The owner or operator of a flare subject to this subpart shall conduct a root cause analysis and a corrective action analysis for each flow event that contains regulated material and that meets either the criteria in paragraph (o)(3)(i) or (ii) of this section.	Applicable.
40 CFR 63.670(o)(3)(i)	The vent gas flow rate exceeds the smokeless capacity of the flare based on a 15-minute block average and visible emissions are present from the flare for more than 5 minutes during any 2 consecutive hours during the release event.	Applicable.
40 CFR 63.670(o)(3)(ii)	The vent gas flow rate exceeds the smokeless capacity of the flare and the 15-minute block average flare tip velocity exceeds the maximum flare tip velocity determined using the methods in paragraph (d)(2) of this section.	Applicable – Comply with maximum flare tip velocity operating limit at all times. See 40 CFR 63.1103(e)(4)(iv) and 63.2450(e)(5)(v).
40 CFR 63.670(o)(4)	A root cause analysis and corrective action analysis must be completed as soon as possible, but no later than 45 days after a flare flow event meeting the criteria in paragraph (o)(3)(i) or (ii) of this section. Special circumstances affecting the number of root cause analyses and/or corrective action analyses are provided in paragraphs (o)(4)(i) through (v) of this section.	Applicable.
40 CFR 63.670(o)(5)	Each owner or operator of a flare required to conduct a root cause analysis and corrective action analysis as specified in paragraphs (o)(3) and (4) of this section shall implement the corrective action(s) identified in the corrective action analysis in accordance with the applicable requirements in paragraphs (o)(5)(i) through (iii) of this section.	Applicable.
40 CFR 63.670(o)(6)	The owner or operator shall determine the total number of events for which a root cause and corrective action analyses was required during the calendar year for each affected flare separately for events meeting the criteria in paragraph (o)(3)(i) of this section and those meeting the criteria in paragraph (o)(3)(ii) of this section. For the purpose of this requirement, a single root cause analysis conducted for an event that met both of the criteria in paragraphs (o)(3)(i) and (ii) of this section would be counted as an event under each of the separate criteria counts for that flare. Additionally, if a single root cause analysis was conducted for an event that caused multiple flares to meet the criteria in paragraph (o)(3)(i) or (ii) of this section, that event would count as an event for each of the flares for each criteria in paragraph (o)(3) of this section that was met during that event. Prior to June 3, 2024, the owner or operator shall also determine the total number of events for which a root cause and correct action	Applicable.

Table 8a: MPGF CVTO Trip Header – 40 CFR 63 Subparts YY, FFFF, and CC (by reference) Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
	analyses was required and the analyses concluded that the root cause was a force majeure event, as defined in this subpart.	
40 CFR 63.670(o)(7)	The following events would be a violation of this emergency flaring work practice standard. (i) Any flow event for which a root cause analysis was required and the root cause was determined to be operator error or poor maintenance. (ii) Prior to June 3, 2024, two visible emissions exceedance events meeting the criteria in paragraph (o)(3)(i) of this section that were not caused by a force majeure event from a single flare in a 3 calendar year period for the same root cause for the same equipment. On and after June 3, 2024, two visible emissions exceedance events meeting the criteria in paragraph (o)(3)(i) of this section from a single flare in a 3 calendar year period for the same root cause for the same equipment. (iii) Prior to June 3, 2024, two flare tip velocity exceedance events meeting the criteria in paragraph (o)(3)(ii) of this section that were not caused by a force majeure event from a single flare in a 3 calendar year period for the same root cause for the same equipment. On and after June 3, 2024, two flare tip velocity exceedance events meeting the criteria in paragraph (o)(3)(ii) of this section from a single flare in a 3 calendar year period for the same root cause for the same equipment. (iv) Prior to June 3, 2024, three visible emissions exceedance events meeting the criteria in paragraph (o)(3)(i) of this section that were not caused by a force majeure event from a single flare in a 3 calendar year period for any reason. On and after June 3, 2024, three visible emissions exceedance events meeting the criteria in paragraph (o)(3)(i) of this section from a single flare in a 3 calendar year period for any reason. (v) Prior to June 3, 2024, three flare tip velocity exceedance events meeting the criteria in paragraph (o)(3)(ii) of this section that were not caused by a force majeure event from a single flare in a 3 calendar year period for any reason. On and after June 3, 2024, three flare tip velocity exceedance events meeting the criteria in paragraph (o)(3)(ii) of this section from a single flare in a 3 calendar year period for any reason.	Applicable.
40 CFR 63.670(p)	Flare monitoring records. The owner or operator shall keep the records specified in § 63.655(i)(9).	Not Applicable. Comply with 40 CFR 63.1109(e) and 63.2450(e)(5)(xii).
40 CFR 63.670(q)	Reporting. The owner or operator shall comply with the reporting requirements specified in § 63.655(g)(11).	Not Applicable. Comply with 40 CFR 63.1110(e)(4) and 63.2450(e)(5)(xi)
40 CFR 63.670(r)	Alternative means of emissions limitation. An owner or operator may request approval from the Administrator for site-specific operating limits that shall apply specifically to a selected flare. Site-specific operating limits include alternative threshold values for the parameters specified in paragraphs (d) through (f) of this section as well as threshold values for operating parameters other than those specified in paragraphs (d) through (f) of this section. The owner or operator must demonstrate that the flare achieves 96.5 percent combustion efficiency (or 98 percent destruction efficiency) using the site-specific operating limits based on a performance evaluation as described in paragraph (r)(1) of this section. The request shall include information as described in paragraph (r)(2) of this section. The request shall be submitted and followed as described in paragraph (r)(3) of this section.	Not Applicable. See 40 CFR 63.1103 (e)(4)(i) and 63.2450(e)(5)(xiii).
40 CFR 63.671(a)	Operation of CPMS. For each CPMS installed to comply with applicable provisions in § 63.670, the owner or operator shall install, operate, calibrate, and maintain the CPMS as specified in paragraphs (a)(1) through (8) of this section.	Applicable.
40 CFR 63.671(b)	CPMS monitoring plan. The owner or operator shall develop and implement a CPMS quality control program documented in a CPMS monitoring plan that covers each flare subject to the provisions in § 63.670 and each	Applicable.

Table 8a: MPGF CVTO Trip Header – 40 CFR 63 Subparts YY, FFFF, and CC (by reference) Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
	CPMS installed to comply with applicable provisions in § 63.670. The owner or operator shall have the CPMS monitoring plan readily available on-site at all times and shall submit a copy of the CPMS monitoring plan to the Administrator upon request by the Administrator. The CPMS monitoring plan must contain the information listed in paragraphs (b)(1) through (5) of this section.	
40 CFR 63.671(c)	Out-of-control periods. For each CPMS installed to comply with applicable provisions in § 63.670 except for CPMS installed for pilot flame monitoring, the owner or operator shall comply with the out-of-control procedures described in paragraphs (c)(1) and (2) of this section.	Applicable.
40 CFR 63.671(d)	The owner or operator shall reduce data from a CPMS installed to comply with applicable provisions in § 63.670 as specified in paragraphs (d)(1) through (3) of this section.	Applicable.
40 CFR 63.671(e)	Additional requirements for gas chromatographs. For monitors used to determine compositional analysis for net heating value per § 63.670(j)(1) that include a gas chromatograph, the gas chromatograph must also meet the requirements of paragraphs (e)(1) through (4) of this section.	Applicable for Current GC and planned replacement GC H2 component. SPM is switching to a calorimeter plus H2 by GC for calculation of NHVvg.
40 CFR 63.671(f)	Additional requirements for continuous process mass spectrometers. Beginning on April 4, 2024, for continuous process mass spectrometers used to determine compositional analysis for net heating value per § 63.670(j)(1) without the use of gas chromatography, the continuous process mass spectrometer must also meet the requirements of paragraphs (f)(1) through (7) of this section.	Not applicable. Mass spectrometer not used.

Attachment 3

Request No. 8.b Information

8. Provide Federal regulation applicability determinations for the following MPGF Headers:

b. MPGF Ethylene Tank Header – 40 CFR Part 60 Subpart Kb and 40 CFR Part 63 Subpart YY

Applicable:

- 40 CFR 60 Subpart Kb (NSPS Kb): The MPGF Ethylene Tank Header controls vapors from the Refrigerated Ethylene Storage Tank which is an affected facility under NSPS Kb. NSPS Kb requires the tank to be equipped with a closed vent system and control device. These requirements are outlined in Table 8b.
- 40 CFR 60 Subpart A (General Provisions): As referenced in NSPS Kb, the general control device and work practice requirements in the General Provisions are applicable to the MPGF Ethylene Tank Header as outlined in Table 8b.

Not Applicable:

- 40 CFR 63 Subpart YY (EMACT): The MPGF Ethylene Tank Header controls vapors from the Refrigerated Ethylene Storage Tank which does not contain any organic HAP and is thus not an emission point requiring control as defined under the EMACT [40 CFR 63.1103(e)(1)(i)(A)].
- 40 CFR 63 Subpart FFFF (MON): The MPGF Ethylene Tank Header controls vapors from the Refrigerated Ethylene Storage Tank which is part of an ethylene production unit and which does not contain any organic HAP and thus cannot be an affected source under the MON [40 CFR 63.2435(b)(3)].
- 40 CFR 63 Subpart EEEE (OLD MACT): The MPGF Ethylene Tank Header controls vapors from the Refrigerated Ethylene Storage Tank which is part of an ethylene production unit and which does not contain any organic HAP and thus cannot be an affected source under the OLD MACT [40 CFR 63.2338(c)(1)].

Table 8b: MPGF Ethylene Tank Header – 40 CFR 60 Subpart Kb and A Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
40 CFR 60 Subpart Kb		
40 CFR 60.112b(b)	The owner or operator of each storage vessel with a design capacity greater than or equal to 75 m^3 which contains a VOL that, as stored, has a maximum true vapor pressure greater than or equal to 76.6 kPa shall equip each storage vessel with one of the following:	Applicable to the Refrigerated Ethylene Storage Tank.
40 CFR 60.112b(b)(1)	A closed vent system and control device as specified in § 60.112b(a)(3).	Applicable to the Refrigerated Ethylene Storage Tank which is routed to the MPGF Ethylene Tank Header via a closed vent system.
40 CFR 60.112b(b)(2)	A system equivalent to that described in paragraph (b)(1) as provided in § 60.114b of this subpart.	Not Applicable. SPM does not use an equivalent.
40 CFR 60.112b(a)(3)	A closed vent system and control device meeting the following specifications:	Applicable to the Refrigerated Ethylene Storage Tank which is routed to the MPGF Ethylene Tank Header via a closed vent system.
40 CFR 60.112b(a)(3)(i)	The closed vent system shall be designed to collect all VOC vapors and gases discharged from the storage vessel and operated with no detectable emissions as indicated by an instrument reading of less than 500 ppm above background and visual inspections, as determined in part 60, subpart VV, § 60.485(b).	Applicable to the closed vent system.
40 CFR 60.112b(a)(3)(ii)	The control device shall be designed and operated to reduce inlet VOC emissions by 95 percent or greater. If a flare is used as the control device, it shall meet the specifications described in the general control device requirements (§ 60.18) of the General Provisions.	Applicable to the MPGF Ethylene Tank Header.
40 CFR 60 Subpart A		
40 CFR 60.18(a)(1)	This section contains requirements for control devices used to comply with applicable subparts of 40 CFR parts 60 and 61. The requirements are placed here for administrative convenience and apply only to facilities covered by subparts referring to this section.	Applicable.
40 CFR 60.18(a)(2)	This section also contains requirements for an alternative work practice used to identify leaking equipment. This alternative work practice is placed here for administrative convenience and is available to all subparts in 40 CFR parts 60, 61, 63, and 65 that require monitoring of equipment with a 40 CFR part 60, appendix A-7, Method 21 monitor.	Not Applicable for MPGF Ethylene Tank Header.
40 CFR 60.18(b)	Flares. Paragraphs (c) through (f) apply to flares.	Applicable.
40 CFR 60.18(c)(1)	Flares shall be designed for and operated with no visible emissions as determined by the methods specified in paragraph (f), except for periods not to exceed a total of 5 minutes during any 2 consecutive hours.	Applicable.
40 CFR 60.18(c)(2)	Flares shall be operated with a flame present at all times, as determined by the methods specified in paragraph (f).	Applicable.
40 CFR 60.18(c)(3)	An owner/operator has the choice of adhering to either the heat content specifications in paragraph (c)(3)(ii) of this section and the maximum tip velocity specifications in paragraph (c)(4) of this section, or adhering to the requirements in paragraph (c)(3)(i) of this section.	Applicable. Comply with (c)(3)(ii) and (c)(4).
40 CFR 60.18(c)(3)(i)(A)	Flares shall be used that have a diameter of 3 inches or greater, are nonassisted, have a hydrogen content of 8.0 percent (by volume), or greater, and are designed for and operated with an exit velocity less than 37.2 m/sec (122 ft/sec) and less than the velocity, V_{max}, as determined by the specified equation: $V_{max} = (X_{H2} - K_1) * K_2$.	Not applicable to MPGF.
40 CFR 60.18(c)(3)(i)(B)	The actual exit velocity of a flare shall be determined by the method specified in paragraph (f)(4) of this section.	Applicable.
40 CFR 60.18(c)(3)(ii)	Flares shall be used only with the net heating value of the gas being combusted being 11.2 MJ/scm (300 Btu/scf) or greater if the flare is steam-assisted or air-assisted; or with the net heating value of the gas being combusted being	Applicable.

Table 8b: MPGF Ethylene Tank Header – 40 CFR 60 Subpart Kb and A Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
	7.45 MJ/scm (200 Btu/scf) or greater if the flare is nonassisted. The net heating value of the gas being combusted shall be determined by the methods specified in paragraph (f)(3) of this section.	
40 CFR 60.18(c)(4)(i)	Steam-assisted and nonassisted flares shall be designed for and operated with an exit velocity, as determined by the methods specified in paragraph (f)(4) of this section, less than 18.3 m/sec (60 ft/sec), except as provided in paragraphs (c)(4) (ii) and (iii) of this section.	Applicable. MPGF does not use premix air and is considered nonassisted.
40 CFR 60.18(c)(4)(ii)	Steam-assisted and nonassisted flares designed for and operated with an exit velocity, as determined by the methods specified in paragraph (f)(4), equal to or greater than 18.3 m/sec (60 ft/sec) but less than 122 m/sec (400 ft/sec) are allowed if the net heating value of the gas being combusted is greater than 37.3 MJ/scm (1,000 Btu/scf).	Applicable. MPGF does not use premix air and is considered nonassisted.
40 CFR 60.18(c)(4)(iii)	Steam-assisted and nonassisted flares designed for and operated with an exit velocity, as determined by the methods specified in paragraph (f)(4), less than the velocity, Vmax, as determined by the method specified in paragraph (f)(5), and less than 122 m/sec (400 ft/sec) are allowed.	Applicable. MPGF does not use premix air and is considered nonassisted.
40 CFR 60.18(c)(5)	Air-assisted flares shall be designed and operated with an exit velocity less than the velocity, Vmax, as determined by the method specified in paragraph (f)(6).	Not applicable. MPGF does not use premix air and is considered nonassisted.
40 CFR 60.18(c)(6)	Flares used to comply with this section shall be steam-assisted, air-assisted, or nonassisted.	Not applicable. MPGF does not use premix air and is considered nonassisted.
40 CFR 60.18(d)	Owners or operators of flares used to comply with the provisions of this subpart shall monitor these control devices to ensure that they are operated and maintained in conformance with their designs. Applicable subparts will provide provisions stating how owners or operators of flares shall monitor these control devices.	Applicable.
40 CFR 60.18(e)	Flares used to comply with provisions of this subpart shall be operated at all times when emissions may be vented to them.	Applicable.
40 CFR 60.18(f)(1)	Method 22 of appendix A to this part shall be used to determine the compliance of flares with the visible emission provisions of this subpart. The observation period is 2 hours and shall be used according to Method 22.	Applicable.
40 CFR 60.18(f)(2)	The presence of a flare pilot flame shall be monitored using a thermocouple or any other equivalent device to detect the presence of a flame.	Applicable.
40 CFR 60.18(f)(3)	The net heating value of the gas being combusted in a flare shall be calculated using the specified equation.	Applicable.
40 CFR 60.18(f)(4)	The actual exit velocity of a flare shall be determined by dividing the volumetric flowrate (in units of standard temperature and pressure), as determined by Reference Methods 2, 2A, 2C, or 2D as appropriate; by the unobstructed (free) cross sectional area of the flare tip.	Applicable.
40 CFR 60.18(f)(5)	The maximum permitted velocity, Vmax, for flares complying with paragraph (c)(4)(iii) shall be determined by the specified equation: $Log_{10}(V_{max}) = (H_T + 28.8)/31.7$.	Applicable.
40 CFR 60.18(f)(6)	The maximum permitted velocity, V_{max}, for air-assisted flares shall be determined by the specified equation: $V_{max} = 8.706 + 0.7084 (H_T)$.	Not applicable. MPGF does not use premix air and is considered nonassisted

Attachment 4

Request No. 8.c Information

8. Provide Federal regulation applicability determinations for the following MPGF Headers:

c. MPGF PE Units 1/2 Episodic Vent Header – 40 CFR Part 63 Subparts CC, YY, and FFFF

Applicable:

- 40 CFR 63 Subpart FFFF (MON): Under §63.2535(h) of the MON, SPM has elected to follow the overlap provisions and subject PE Units 1 and 2 to requirements of the MON. The MPGF PE Units 1/2 Episodic Vent Header controls process vents subject to the control standards of the MON. The MON flare control device requirements incorporate by reference the flare control device and flare monitoring system requirements in 40 CFR 63 Subpart CC as outlined in Table 8c.
- 40 CFR 63 Subpart CC (Refinery MACT): The Refinery MACT flare control device and flare monitoring system requirements are incorporated by reference into the MON. The Refinery MACT is not applicable as the site is not a petroleum refinery. The Refinery MACT flare control device and flare monitoring system requirements are applicable by reference only as outlined in Table 8c.

No Applicable Requirements:

- 40 CFR 60 Subpart DDD (Polymers Manufacturing – NSPS DDD): The MPGF PE Units 1/2 Episodic Vent Header controls equipment subject to both the MON and NSPS DDD. As provided in 63.2535(h) of the MON, miscellaneous chemical manufacturing process units (MCPU) which are subject to the provisions in NSPS DDD and the MON may elect to apply the MON to all such equipment in the MCPU. Additionally, if an MCPU subject to the provisions of the MON has equipment to which the MON does not apply but which is subject to a standard in NSPS DDD, then the MCPU may elect to comply with the requirements for Group 1 process vents in the MON for such equipment. The site has elected to comply with the MON for all equipment in the MCPU subject to both the MON and NSPS DDD. The site has further chosen to comply with the Group 1 process vent provisions of the MON for all equipment in the MCPU which is not subject to the MON but is subject to NSPS DDD. This constitutes compliance with NSPS DDD.
- 40 CFR Part 60 Subpart A 60.18 and Part 63 Subpart A 63.11: The [General] control device and work practice requirements for flares in Subpart A no longer apply to the MPGF PE Units 1/2 Episodic Vent Header. As provided in 63.2535(m)(1) in the MON, the MPGF PE Units 1/2 Episodic Vent Header is only required to comply with the revised flare control device requirements in the MON as of August 12, 2023.

Not Applicable:

- 40 CFR 63 Subpart YY (EMACT): The MPGF PE Units 1/2 Episodic Vent Header does not control any regulated sources under the EMACT and is not applicable to the control device standards in the EMACT.
- 40 CFR 63 Subpart SS (CVS and Control Device Standards): The CVS and Control Device Standards in Subpart SS no longer apply to the MPGF PE Units 1/2 Episodic Vent Header. The MPGF PE Units 1/2 Episodic Vent Header is only required to comply with the revised flare control device requirements in the MON as of August 12, 2023.

Table 8c: MPGF PE Units 1/2 Episodic Vent Header – 40 CFR 63 Subparts FFFF and CC (by reference) Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
40 CFR 63 Subpart FFFF – MON		
40 CFR 63.2535(h)	Compliance with 40 CFR part 60, subpart DDD, III, NNN, or RRR. After the compliance dates specified in § 63.2445, if you have an MCPU that contains equipment subject to the provisions of this subpart that are also subject to the provisions of 40 CFR part 60, subpart DDD, III, NNN, or RRR, you may elect to apply this subpart to all such equipment in the MCPU. If an MCPU subject to the provisions of this subpart has equipment to which this subpart does not apply but which is subject to a standard in 40 CFR part 60, subpart DDD, III, NNN, or RRR, you may elect to comply with the requirements for Group 1 process vents in this subpart for such equipment. If you elect any of these methods of compliance, you must consider all total organic compounds, minus methane and ethane, in such equipment for purposes of compliance with this subpart, as if they were organic HAP. Compliance with the provisions of this subpart, in the manner described in this paragraph (h), will constitute compliance with 40 CFR part 60, subpart DDD, III, NNN, or RRR, as applicable.	Applicable. PE units have equipment subject to both NSPS DDD and MON. Comply with requirements of MON in lieu of NSPS DDD.
40 CFR 63.2450(e)(5)	For any flare that is used to reduce organic HAP emissions from an MCPU, you may elect to comply with the requirements in this paragraph in lieu of the requirements of § 63.982(b) and the requirements referenced therein. However, beginning no later than the compliance dates specified in § 63.2445(g), paragraphs (e)(2) and (f) of this section no longer apply to flares that control ethylene oxide emissions from affected sources in ethylene oxide service as defined in § 63.2550 and flares used to control emissions from MCPUs that produce olefins or polyolefins. Instead, if you reduce organic HAP emissions by venting emissions through a closed-vent system to a steam-assisted, air-assisted, non-assisted, or pressure-assisted multi-point flare that controls ethylene oxide emissions from affected sources in ethylene oxide service as defined in § 63.2550 or is used to control emissions from an MCPU that produces olefins or polyolefins, then you must meet the applicable requirements for flares as specified in §§ 63.670 and 63.671 of subpart CC, including the provisions in Tables 12 and 13 to subpart CC of this part, except as specified in paragraphs (e)(5)(i) through (xiii) of this section. This requirement in this paragraph (e)(5) also applies to any flare using fuel gas from a fuel gas system, of which 50 percent or more of the fuel gas is derived from an MCPU that has processes and/or equipment in ethylene oxide service or that produces olefins or polyolefins, as determined on an annual average basis. For purposes of compliance with this paragraph (e)(5), the following terms are defined in § 63.641 of subpart CC: Assist air, assist steam, center steam, combustion zone, combustion zone gas, flare, flare purge gas, flare supplemental gas, flare sweep gas, flare vent gas, lower steam, net heating value, perimeter assist air, pilot gas, premix assist air, total steam, and upper steam. Also, for purposes of compliance with this paragraph (e)(5), "MCPUs that produces olefins or polyolefins" includes only those MCPUs that manufacture ethylene, propylene, polyethylene, and/or polypropylene as a product. By-products and impurities as defined in § 63.101, as well as wastes and trace contaminants, are not considered products.	Applicable. PE units are MCPUs which produce polyethylene. Comply with 40 CFR 63.670 and 63.671 except as specified in 63.2450(e)(5)(i)-(xii).
40 CFR 63.2450(e)(5)(i)	When determining compliance with the pilot flame requirements specified in § 63.670(b) and (g), substitute "pilot flame or flare flame" for each occurrence of "pilot flame."	Applicable.
40 CFR 63.2450(e)(5)(ii)	When determining compliance with the flare tip velocity and combustion zone operating limits specified in § 63.670(d) and (e), the requirement effectively applies starting with the 15-minute block that includes a full 15 minutes of the flaring event. You are required to demonstrate compliance with the velocity and NHVcz requirements starting with the block that contains the fifteenth minute of a flaring event. You are not required to demonstrate compliance for the previous 15-minute block in which the event started and contained only a fraction of flow.	Applicable.
40 CFR 63.2450(e)(5)(iii)	Instead of complying with paragraph (o)(2)(i) of § 63.670 of subpart CC, you must develop and implement the flare management plan no later than the compliance dates specified in § 63.2445(g).	Applicable. FMP completed and submitted before compliance date.

Table 8c: MPGF PE Units 1/2 Episodic Vent Header – 40 CFR 63 Subparts FFFF and CC (by reference) Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
40 CFR 63.2450(e)(5)(iv)	Instead of complying with paragraph (o)(2)(iii) of § 63.670 of subpart CC, if required to develop a flare management plan and submit it to the Administrator, then you must also submit all versions of the plan in portable document format (PDF) to the EPA following the procedure specified in § 63.9(k), except any medium submitted through mail must be sent to the attention of the Miscellaneous Organic Chemical Manufacturing Sector Lead.	Applicable. Complete.
40 CFR 63.2450(e)(5)(v)	Section 63.670(o)(3)(ii) of subpart CC and all references to § 63.670(o)(3)(ii) of subpart CC do not apply. Instead, the owner or operator must comply with the maximum flare tip velocity operating limit at all times.	Applicable.
40 CFR 63.2450(e)(5)(vi)	Substitute "MCPU" for each occurrence of "petroleum refinery."	Applicable.
40 CFR 63.2450(e)(5)(vii)	Each occurrence of "refinery" does not apply.	Applicable.
40 CFR 63.2450(e)(5)(viii)	If a pressure-assisted multi-point flare is used as a control device, then you must meet the conditions in 63.2450(e)(5)(viii)(A)-(G).	Not Applicable. The MPGF headers are perimeter air-assisted.
40 CFR 63.2450(e)(5)(ix)	If you choose to determine compositional analysis for net heating value with a continuous process mass spectrometer, then you must comply with the requirements specified in paragraphs (e)(5)(ix)(A) through (G) of this section.	Not applicable. Mass spectrometer not used.
40 CFR 63.2450(e)(5)(x)	If you use a gas chromatograph or mass spectrometer for compositional analysis for net heating value, then you may choose to use the CE of NHVmeasured versus the cylinder tag value NHV as the measure of agreement for daily calibration and quarterly audits in lieu of determining the compound-specific CE. The CE for NHV at any calibration level must not differ by more than 10 percent from the certified cylinder gas value. The CE for must be calculated using Equation 2 to this paragraph (e)(5)(x).	Applicable. SPM is switching to a calorimeter plus H2 by GC for calculation of NHVvg with expected start February 2025. This does not affect the current GC used as the CPMS.
40 CFR 63.2450(e)(5)(xi)	Instead of complying with paragraph (q) of § 63.670 of subpart CC, you must comply with the reporting requirements specified in § 63.2520(d)(3) and (e)(11).	Applicable.
40 CFR 63.2450(e)(5)(xii)	Instead of complying with paragraph (p) of § 63.670 of subpart CC, you must keep the flare monitoring records specified in § 63.2525(m).	Applicable.
40 CFR 63.2450(e)(5)(xiii)	You may elect to comply with the alternative means of emissions limitation requirements specified in paragraph (r) of § 63.670 of subpart CC in lieu of the requirements in paragraphs (d) through (f) of § 63.670 of subpart CC, as applicable. However, instead of complying with paragraph (r)(3)(iii) of § 63.670 of subpart CC, you must also submit the alternative means of emissions limitation request to the following address: U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Sector Policies and Programs Division, U.S. EPA Mailroom (C404-02), Attention: Miscellaneous Organic Chemical Manufacturing Sector Lead, 4930 Old Page Rd., Durham, NC 27703.	Not Currently Applicable. SPM is not currently using an AMEL.
40 CFR 63.2520(d)(3)	For flares subject to the requirements of § 63.2450(e)(5), you must also submit the information in this paragraph (d)(3) in a supplement to the Notification of Compliance Status within 150 days after the first applicable compliance date for flare monitoring. In lieu of the information required in § 63.987(b) of subpart SS, the supplement to the Notification of Compliance Status must include flare design (e.g., steam-assisted, air-assisted, non-assisted, or pressure-assisted multi-point); all visible emission readings, heat content determinations, flow rate measurements, and exit velocity determinations made during the initial visible emissions demonstration required by § 63.670(h) of subpart CC, as applicable; and all periods during the compliance determination when the pilot flame or flare flame is absent.	Applicable.

Table 8c: MPGF PE Units 1/2 Episodic Vent Header – 40 CFR 63 Subparts FFFF and CC (by reference) Applicability		
Citation	**Regulatory Text**	**Applicability and Comments**
40 CFR 63.2520(e)(11)	For each flare subject to the requirements in § 63.2450(e)(5), the compliance report must include the items specified in paragraphs (e)(11)(i) through (vi) of this section in lieu of the information required in § 63.999(c)(3) of subpart SS.	Applicable.
40 CFR 63.2525(m)	For each flare subject to the requirements in § 63.2450(e)(5), you must keep records specified in paragraphs (m)(1) through (14) of this section in lieu of the information required in § 63.998(a)(1) of subpart SS.	Applicable.
40 CFR 63 Subpart CC – Refinery MACT (by reference only)		
40 CFR 63.670(a)	Reserved	--
40 CFR 63.670(b)	Pilot flame presence. The owner or operator shall operate each flare with a pilot flame present on an individual burner or stage of burners at all times when regulated material is routed to the flare. Each 15-minute block during which there is at least one minute where no pilot flame on an individual burner or stage of burners is present when regulated material is routed to the flare is a deviation of the standard. Deviations in different 15-minute blocks from the same event are considered separate deviations. The owner or operator shall monitor for the presence of a pilot flame on an individual burner or stage of burners as specified in paragraph (g) of this section. Beginning on April 4, 2024, pressure-assisted flares using stages of burners that cross-light must also comply with paragraphs (b)(1) and (2) of this section.	Applicable. Substitute "pilot flame or flare flame" for each occurrence of "pilot flame" as specified in 40 CFR 63.2450(e)(5)(i).
40 CFR 63.670(b)(1)	Each stage of burners that cross-lights in the pressure-assisted flare must have at least two pilots with at least one continuously lit and capable of igniting all regulated material that is routed to that stage of burners.	Not Applicable. MPGF is not pressure-assisted.
40 CFR 63.670(b)(2)	Unless the owner or operator of a pressure-assisted flare chooses to conduct a cross-light performance demonstration as specified in this paragraph, the owner or operator must ensure that if a stage of burners on the flare uses cross-lighting, that the distance between any two burners in series on that stage is no more than 6 feet when measured from the center of one burner to the next burner. A distance greater than 6 feet between any two burners in series may be used provided the owner or operator complies with the requirements in paragraphs (b)(2)(i) through (iii).	Not Applicable. MPGF is not pressure-assisted.
40 CFR 63.670(c)	Visible emissions. The owner or operator shall specify the smokeless design capacity of each flare and operate with no visible emissions, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours, when regulated material is routed to the flare and the flare vent gas flow rate is less than the smokeless design capacity of the flare. The owner or operator shall monitor for visible emissions from the flare as specified in paragraph (h) of this section.	Applicable.
40 CFR 63.670(d)	Flare tip velocity. Except as provided in paragraph (d)(3) of this section for pressure-assisted flares, for each flare, the owner or operator shall comply with either paragraph (d)(1) or (2) of this section, provided the appropriate monitoring systems are in-place, whenever regulated material is routed to the flare for at least 15-minutes and the flare vent gas flow rate is less than the smokeless design capacity of the flare.	Applicable. Additional clarification provided in 40 CFR 63.2450(e)(5)(iii).
40 CFR 63.670(e)	Combustion zone operating limits. The owner or operator shall operate the flare to maintain the net heating value of flare combustion zone gas (NHVcz) at or above the applicable limits in paragraphs (e)(1) and (2) of this section determined on a 15-minute block period basis when regulated material is routed to the flare for at least 15-minutes. The owner or operator shall monitor and calculate NHVcz as specified in paragraph (m) of this section.	Applicable. Additional clarification provided in 40 CFR 63.2450(e)(5)(iii).
40 CFR 63.670(e)(1)	For all flares other than pressure-assisted flares, 270 British thermal units per standard cubic feet (Btu/scf).	Applicable. MPGFs are perimeter air-assisted.
40 CFR 63.670(e)(2)	Beginning on April 4, 2024, for each pressure-assisted flare, 800 Btu/scf.	Not Applicable. MPGFs are not pressure-assisted
40 CFR 63.670(f)	Dilution operating limits for flares with perimeter assist air. Except as provided in paragraph (f)(1) of this section, for each flare actively receiving perimeter assist air, the owner or operator shall operate the flare to maintain the net heating value dilution parameter (NHVdil) at or above 22 British thermal units per square foot (Btu/ft2) determined	Applicable. MPGFs are perimeter air-assisted.

Table 8c: MPGF PE Units 1/2 Episodic Vent Header – 40 CFR 63 Subparts FFFF and CC (by reference) Applicability		
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	on a 15-minute block period basis when regulated material is being routed to the flare for at least 15-minutes. The owner or operator shall monitor and calculate NHVdil as specified in paragraph (n) of this section.	
40 CFR 63.670(g)	Pilot flame monitoring. The owner or operator shall continuously monitor the presence of the pilot flame(s) using a device (including, but not limited to, a thermocouple, ultraviolet beam sensor, or infrared sensor) capable of detecting that the pilot flame(s) is present.	Applicable.
40 CFR 63.670(h)	Visible emissions monitoring. The owner or operator shall conduct an initial visible emissions demonstration using an observation period of 2 hours using Method 22 at 40 CFR part 60, appendix A-7. The initial visible emissions demonstration should be conducted the first time regulated materials are routed to the flare. Subsequent visible emissions observations must be conducted using either the methods in paragraph (h)(1) of this section or, alternatively, the methods in paragraph (h)(2) of this section. The owner or operator must record and report any instances where visible emissions are observed for more than 5 minutes during any 2 consecutive hours as specified in § 63.655(g)(11)(ii).	Applicable.
40 CFR 63.670(h)(1)	At least once per day for each day regulated material is routed to the flare, conduct visible emissions observations using an observation period of 5 minutes using Method 22 at 40 CFR part 60, appendix A-7. If at any time the owner or operator sees visible emissions while regulated material is routed to the flare, even if the minimum required daily visible emission monitoring has already been performed, the owner or operator shall immediately begin an observation period of 5 minutes using Method 22 at 40 CFR part 60, appendix A-7. If visible emissions are observed for more than one continuous minute during any 5-minute observation period, the observation period using Method 22 at 40 CFR part 60, appendix A-7 must be extended to 2 hours or until 5-minutes of visible emissions are observed. Daily 5-minute Method 22 observations are not required to be conducted for days the flare does not receive any regulated material.	Applicable. SPM uses video surveillance per 40 CFR 63.670(h)(2) as a primary compliance method but may use Method 22 observations if video is unavailable.
40 CFR 63.670(h)(2)	Use a video surveillance camera to continuously record (at least one frame every 15 seconds with time and date stamps) images of the flare flame and a reasonable distance above the flare flame at an angle suitable for visual emissions observations. The owner or operator must provide real-time video surveillance camera output to the control room or other continuously manned location where the camera images may be viewed at any time.	Applicable.
40 CFR 63.670(i)	Flare vent gas, steam assist and air assist flow rate monitoring. 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 header or headers that feed the flare as well as any flare supplemental gas used. Different flow monitoring methods may be used to measure different gaseous streams that make up the flare vent gas provided that the flow rates of all gas streams that contribute to the flare vent gas are determined. If assist air or assist steam is used, the owner or operator shall install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of assist air and/or assist steam used with the flare. If pre-mix assist air and perimeter assist are both used, the owner or operator shall install, operate, calibrate, and maintain a monitoring system capable of separately measuring, calculating, and recording the volumetric flow rate of premix assist air and perimeter assist air used with the flare. Flow monitoring system requirements and acceptable alternatives are provided in paragraphs (i)(1) through (6) of this section.	Applicable.
40 CFR 63.670(i)(1)	The flow rate monitoring systems must be able to correct for the temperature and pressure of the system and output parameters in standard conditions (*i.e.,* a temperature of 20 °C (68 °F) and a pressure of 1 atmosphere).	Applicable.
40 CFR 63.670(i)(2)	Mass flow monitors may be used for determining volumetric flow rate of flare vent gas provided the molecular weight of the flare vent gas is determined using compositional analysis as specified in paragraph (j) of this section so that the mass flow rate can be converted to volumetric flow at standard conditions.	Applicable.

Table 8c: MPGF PE Units 1/2 Episodic Vent Header – 40 CFR 63 Subparts FFFF and CC (by reference) Applicability		
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40 CFR 63.670(i)(3)	Mass flow monitors may be used for determining volumetric flow rate of assist air or assist steam. Use equation in paragraph (i)(2) of this section to convert mass flow rates to volumetric flow rates. Use a molecular weight of 18 pounds per pound-mole for assist steam and use a molecular weight of 29 pounds per pound-mole for assist air.	Applicable.
40 CFR 63.670(i)(4)	Continuous pressure/temperature monitoring system(s) and appropriate engineering calculations may be used in lieu of a continuous volumetric flow monitoring systems provided the molecular weight of the gas is known. For assist steam, use a molecular weight of 18 pounds per pound-mole. For assist air, use a molecular weight of 29 pounds per pound-mole. For flare vent gas, molecular weight must be determined using compositional analysis as specified in paragraph (j) of this section.	Applicable.
40 CFR 63.670(i)(5)	Continuously monitoring fan speed or power and using fan curves is an acceptable method for continuously monitoring assist air flow rates.	Applicable.
40 CFR 63.670(i)(6)	For perimeter assist air intentionally entrained in lower and/or upper steam, the monitored steam flow rate and the maximum design air-to-steam volumetric flow ratio of the entrainment system may be used to determine the assist air flow rate.	Not Applicable. MPGFs are perimeter air-assisted but do not have any steam (lower or upper).
40 CFR 63.670(j)	Flare vent gas composition monitoring. The owner or operator shall determine the concentration of individual components in the flare vent gas using either the methods provided in paragraph (j)(1) or (2) of this section, to assess compliance with the operating limits in paragraph (e) of this section and, if applicable, paragraphs (d) and (f) of this section. Alternatively, the owner or operator may elect to directly monitor the net heating value of the flare vent gas following the methods provided in paragraphs (j)(3) of this section and, if desired, may directly measure the hydrogen concentration in the flare vent gas following the methods provided in paragraphs (j)(4) of this section. The owner or operator may elect to use different monitoring methods for different gaseous streams that make up the flare vent gas using different methods provided the composition or net heating value of all gas streams that contribute to the flare vent gas are determined.	Applicable.
40 CFR 63.670(j)(1)	Except as provided in paragraphs (j)(5) and (6) of this section, the owner or operator shall install, operate, calibrate, and maintain a monitoring system capable of continuously measuring (i.e., at least once every 15-minutes), calculating, and recording the individual component concentrations present in the flare vent gas.	Applicable.
40 CFR 63.670(j)(2)	Except as provided in paragraphs (j)(5) and (6) of this section, the owner or operator shall install, operate, and maintain a grab sampling system capable of collecting an evacuated canister sample for subsequent compositional analysis at least once every eight hours while there is flow of regulated material to the flare. Subsequent compositional analysis of the samples must be performed according to Method 18 of 40 CFR part 60, appendix A-6, ASTM D6420-99 (Reapproved 2010), ASTM D1945-03 (Reapproved 2010), ASTM D1945-14 or ASTM UOP539-12 (all incorporated by reference—see § 63.14).	Not applicable. SPM does not employ this option.
40 CFR 63.670(j)(3)	Except as provided in paragraphs (j)(5) and (6) of this section, the owner or operator shall install, operate, calibrate, and maintain a calorimeter capable of continuously measuring, calculating, and recording NHVvg at standard conditions.	Applicable. SPM is switching to a calorimeter plus H2 by GC for calculation of NHVvg with expected start February 2025. This does not affect the current GC used as the CPMS.
40 CFR 63.670(j)(4)	If the owner or operator uses a continuous net heating value monitor according to paragraph (j)(3) of this section, the owner or operator may, at their discretion, install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the hydrogen concentration in the flare vent gas.	Applicable. SPM is switching to a calorimeter plus H2 by GC for calculation of NHVvg with expected start February 2025. This

Table 8c: MPGF PE Units 1/2 Episodic Vent Header – 40 CFR 63 Subparts FFFF and CC (by reference) Applicability		
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		does not affect the current GC used as the CPMS.
40 CFR 63.670(j)(5)	Direct compositional or net heating value monitoring is not required for purchased ("pipeline quality") natural gas streams. The net heating value of purchased natural gas streams may be determined using annual or more frequent grab sampling at any one representative location. Alternatively, the net heating value of any purchased natural gas stream can be assumed to be 920 Btu/scf.	Applicable.
40 CFR 63.670(j)(6)	Direct compositional or net heating value monitoring is not required for gas streams that have been demonstrated to have consistent composition (or a fixed minimum net heating value) according to the methods in paragraphs (j)(6)(i) through (iii) of this section.	Not Applicable. SPM does not use this exemption for any streams other than purchased natural gas as allowed above.
40 CFR 63.670(k)	Calculation methods for cumulative flow rates and determining compliance with Vtip operating limits. The owner or operator shall determine Vtip on a 15-minute block average basis according to §63.670(k)(1)-(3), as applicable.	Applicable.
40 CFR 63.670(l)	Calculation methods for determining flare vent gas net heating value. The owner or operator shall determine the net heating value of the flare vent gas (NHVvg) based on the composition monitoring data on a 15-minute block average basis according to §63.670(l)(1)-(7), as applicable..	Applicable. Calculation methodologies.
40 CFR 63.670(m)	Calculation methods for determining combustion zone net heating value. The owner or operator shall determine the net heating value of the combustion zone gas (NHVcz) as specified in paragraph (m)(1) or (2) of this section, as applicable.	Applicable. Calculation methodologies.
40 CFR 63.670(n)	Calculation methods for determining the net heating value dilution parameter. The owner or operator shall determine the net heating value dilution parameter (NHVdil) as specified in paragraph (n)(1) or (2) of this section, as applicable.	Applicable. MPGFs are perimeter air-assisted.
40 CFR 63.670(o)	Emergency flaring provisions. The owner or operator of a flare that has the potential to operate above its smokeless capacity under any circumstance shall comply with the provisions in paragraphs (o)(1) through (7) of this section.	Applicable.
40 CFR 63.670(o)(1)	Develop a flare management plan to minimize flaring during periods of startup, shutdown, or emergency releases. The flare management plan must include the information described in paragraphs (o)(1)(i) through (vii) of this section.	Applicable but follow dates and instructions in 63.2450(e)(5)(iii)-(iv).
40 CFR 63.670(o)(2)	Each owner or operator required to develop and implement a written flare management plan as described in paragraph (o)(1) of this section must submit the plan to the Administrator as described in paragraphs (o)(2)(i) through (iii) of this section.	Applicable but follow dates and instructions in 63.2450(e)(5)(iii)-(iv).
40 CFR 63.670(o)(3)	The owner or operator of a flare subject to this subpart shall conduct a root cause analysis and a corrective action analysis for each flow event that contains regulated material and that meets either the criteria in paragraph (o)(3)(i) or (ii) of this section.	Applicable.
40 CFR 63.670(o)(3)(i)	The vent gas flow rate exceeds the smokeless capacity of the flare based on a 15-minute block average and visible emissions are present from the flare for more than 5 minutes during any 2 consecutive hours during the release event.	Applicable.
40 CFR 63.670(o)(3)(ii)	The vent gas flow rate exceeds the smokeless capacity of the flare and the 15-minute block average flare tip velocity exceeds the maximum flare tip velocity determined using the methods in paragraph (d)(2) of this section.	Applicable – Comply with maximum flare tip velocity operating limit at all times. See 40 CFR 63.2450(e)(5)(v).
40 CFR 63.670(o)(4)	A root cause analysis and corrective action analysis must be completed as soon as possible, but no later than 45 days after a flare flow event meeting the criteria in paragraph (o)(3)(i) or (ii) of this section. Special circumstances	Applicable.

Table 8c: MPGF PE Units 1/2 Episodic Vent Header – 40 CFR 63 Subparts FFFF and CC (by reference) Applicability		
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	affecting the number of root cause analyses and/or corrective action analyses are provided in paragraphs (o)(4)(i) through (v) of this section.	
40 CFR 63.670(o)(5)	Each owner or operator of a flare required to conduct a root cause analysis and corrective action analysis as specified in paragraphs (o)(3) and (4) of this section shall implement the corrective action(s) identified in the corrective action analysis in accordance with the applicable requirements in paragraphs (o)(5)(i) through (iii) of this section.	Applicable.
40 CFR 63.670(o)(6)	The owner or operator shall determine the total number of events for which a root cause and corrective action analyses was required during the calendar year for each affected flare separately for events meeting the criteria in paragraph (o)(3)(i) of this section and those meeting the criteria in paragraph (o)(3)(ii) of this section. For the purpose of this requirement, a single root cause analysis conducted for an event that met both of the criteria in paragraphs (o)(3)(i) and (ii) of this section would be counted as an event under each of the separate criteria counts for that flare. Additionally, if a single root cause analysis was conducted for an event that caused multiple flares to meet the criteria in paragraph (o)(3)(i) or (ii) of this section, that event would count as an event for each of the flares for each criteria in paragraph (o)(3) of this section that was met during that event. Prior to June 3, 2024, the owner or operator shall also determine the total number of events for which a root cause and correct action analyses was required and the analyses concluded that the root cause was a force majeure event, as defined in this subpart.	Applicable.
40 CFR 63.670(o)(7)	The following events would be a violation of this emergency flaring work practice standard. (i) Any flow event for which a root cause analysis was required and the root cause was determined to be operator error or poor maintenance. (ii) Prior to June 3, 2024, two visible emissions exceedance events meeting the criteria in paragraph (o)(3)(i) of this section that were not caused by a force majeure event from a single flare in a 3 calendar year period for the same root cause for the same equipment. On and after June 3, 2024, two visible emissions exceedance events meeting the criteria in paragraph (o)(3)(i) of this section from a single flare in a 3 calendar year period for the same root cause for the same equipment. (iii) Prior to June 3, 2024, two flare tip velocity exceedance events meeting the criteria in paragraph (o)(3)(ii) of this section that were not caused by a force majeure event from a single flare in a 3 calendar year period for the same root cause for the same equipment. On and after June 3, 2024, two flare tip velocity exceedance events meeting the criteria in paragraph (o)(3)(ii) of this section from a single flare in a 3 calendar year period for the same root cause for the same equipment. (iv) Prior to June 3, 2024, three visible emissions exceedance events meeting the criteria in paragraph (o)(3)(i) of this section that were not caused by a force majeure event from a single flare in a 3 calendar year period for any reason. On and after June 3, 2024, three visible emissions exceedance events meeting the criteria in paragraph (o)(3)(i) of this section from a single flare in a 3 calendar year period for any reason. (v) Prior to June 3, 2024, three flare tip velocity exceedance events meeting the criteria in paragraph (o)(3)(ii) of this section that were not caused by a force majeure event from a single flare in a 3 calendar year period for any reason. On and after June 3, 2024, three flare tip velocity exceedance events meeting the criteria in paragraph (o)(3)(ii) of this section from a single flare in a 3 calendar year period for any reason.	Applicable.
40 CFR 63.670(p)	Flare monitoring records. The owner or operator shall keep the records specified in § 63.655(i)(9).	Not Applicable. Comply with 40 CFR 63.2450(e)(5)(xii).
40 CFR 63.670(q)	Reporting. The owner or operator shall comply with the reporting requirements specified in § 63.655(g)(11).	Not Applicable. Comply with 40 CFR 63.2450(e)(5)(xi)

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Citation	**Regulatory Text**	**Applicability and Comments**
40 CFR 63.670(r)	Alternative means of emissions limitation. An owner or operator may request approval from the Administrator for site-specific operating limits that shall apply specifically to a selected flare. Site-specific operating limits include alternative threshold values for the parameters specified in paragraphs (d) through (f) of this section as well as threshold values for operating parameters other than those specified in paragraphs (d) through (f) of this section. The owner or operator must demonstrate that the flare achieves 96.5 percent combustion efficiency (or 98 percent destruction efficiency) using the site-specific operating limits based on a performance evaluation as described in paragraph (r)(1) of this section. The request shall include information as described in paragraph (r)(2) of this section. The request shall be submitted and followed as described in paragraph (r)(3) of this section.	Not Applicable. See 40 CFR 63.2450(e)(5)(xiii).
40 CFR 63.671(a)	Operation of CPMS. For each CPMS installed to comply with applicable provisions in § 63.670, the owner or operator shall install, operate, calibrate, and maintain the CPMS as specified in paragraphs (a)(1) through (8) of this section.	Applicable.
40 CFR 63.671(b)	CPMS monitoring plan. The owner or operator shall develop and implement a CPMS quality control program documented in a CPMS monitoring plan that covers each flare subject to the provisions in § 63.670 and each CPMS installed to comply with applicable provisions in § 63.670. The owner or operator shall have the CPMS monitoring plan readily available on-site at all times and shall submit a copy of the CPMS monitoring plan to the Administrator upon request by the Administrator. The CPMS monitoring plan must contain the information listed in paragraphs (b)(1) through (5) of this section.	Applicable.
40 CFR 63.671(c)	Out-of-control periods. For each CPMS installed to comply with applicable provisions in § 63.670 except for CPMS installed for pilot flame monitoring, the owner or operator shall comply with the out-of-control procedures described in paragraphs (c)(1) and (2) of this section.	Applicable.
40 CFR 63.671(d)	The owner or operator shall reduce data from a CPMS installed to comply with applicable provisions in § 63.670 as specified in paragraphs (d)(1) through (3) of this section.	Applicable.
40 CFR 63.671(e)	Additional requirements for gas chromatographs. For monitors used to determine compositional analysis for net heating value per § 63.670(j)(1) that include a gas chromatograph, the gas chromatograph must also meet the requirements of paragraphs (e)(1) through (4) of this section.	Applicable for Current GC and planned replacement GC H2 component. SPM is switching to a calorimeter plus H2 by GC for calculation of NHVvg.
40 CFR 63.671(f)	Additional requirements for continuous process mass spectrometers. Beginning on April 4, 2024, for continuous process mass spectrometers used to determine compositional analysis for net heating value per § 63.670(j)(1) without the use of gas chromatography, the continuous process mass spectrometer must also meet the requirements of paragraphs (f)(1) through (7) of this section.	Not applicable. Mass spectrometer not used.

Attachment 5

Request No. 13.b Information

Data	EU	Comments
Orignal:		
Design Heat Input per Furnace	620 MMBtu/hr	Design basis.
# of Furnaces at Design Heat Input	6 # Furnaces	Design basis.
Total Heat Input Demand from Furnaces	3720 MMBtu/hr	620 MMBtu/hr * 6 Furnaces at Design Heat Input
Natural Gas Addition to Fuel Gas Header per Original Design Premise	9.4 ton/hr	Orignal design natural gas addition based on material balances and design.
Natural Gas Higher Heating Value	23,000 BTU/lb	Based on original plan approval data
Heat Input from Natural Gas	432 MMBTU/hr	Orignal design natural gas addition * NG heating value
% of Total Heat Input from Natural Gas	11.6 %	Heat Input from NG / Total Heat Input
Heat Input from Tail Gas	3288 MMBtu/hr	Orignal design tail gas firing at furnaces
% of Total Input from Tail Gas	88.4 %	Heat Input from TG / Total Heat Input
% of H2 in Tail Gas	79 mol%	Based on design material balance
% of CH4 in Tail Gas	21 mol%	Based on design material balance
H2 HHV Heat Release in Tail Gas	54.7 %	See assessment of ECU Tail Gas HR rates at bottom.
CH4 HHV Heat Release in Tail Gas	45.3 %	See assessment of ECU Tail Gas HR rates at bottom.
Total Heat Input from H2	1,798 MMBtu/hr	Total HI from H2 = Total HI to Furances (3,720 MMBtu/hr) * % of Total HI from Tail Gas (83.7%) * % of Heat Release from H2 in TG (54.7%)
Individual Furnace Heat Input from H2	300 MMBtu/hr	Total Heat Input from H2 / 6 (# of furnaces at design heat input)
Total Heat Input from CH4 + NG	1,922 MMBtu/hr	Balance of total heat input not from H2 (total heat input - total heat input from H2)
Individual Furnace Heat Input from CH4 + NG	320 MMBtu/hr	Total Heat Input from CH4 + NG / 6 (# of furnaces at design heat input)
% of Total Heat Input from H2	**48.3 %**	**Original design % of heat input from H2**
% of Toal Heat Input from CH4 + NG	**51.7 %**	**Original design % of heat input from CH4 + NG**
Reconciliation:		
Design Heat Input per Furnace	620 MMBtu/hr	Design basis.
# of Furnaces at Design Heat Input	6 # Furnaces	Design basis.
Total Heat Input Demand from Furnaces	3720 MMBtu/hr	620 MMBtu/hr * 6 Furnaces at Design Heat Input
Natural Gas Addition to Fuel Gas Header per Original Design Premise	9.4 ton/hr	Orignal design natural gas addition based on material balances and design.
Tail Gas Needed for Supplemental Fuel Gas at Flares	173.14 MMBtu/hr	Based on TEGF calculations for annual average heat content requried to be added to meet NHVcz > 800 Btu/scf limit.
Additional Natural Gas Required to Offset Tail Gas to Flares	3.76 ton/hr	Additional natural gas for offset equals the Heat Input directed to flares (173 MMBtu/hr) converted to ton/hr using the HHV of Natural Gas (23,000 Btu/lb).
Total Natural Gas to Fuel Gas Header	13.16 ton/hr	Original design natural gas addition plus additional natural gas to offset supplemental tail gas to flares instead of furnaces.
Heat Input from Natural Gas	605.5 MMBTU/hr	Orignal design natural gas addition plus additional offset natural gas * NG heating value
% of Total Heat Input from Natural Gas	16.3 %	Heat Input from NG / Total Heat Input
Heat Input from Tail Gas	3114 MMBtu/hr	Orignal design tail gas firing at furnaces
% of Total Input from Tail Gas	83.7 %	Heat Input from TG / Total Heat Input
% of H2 in Tail Gas	79 mol%	Based on design material balance
% of CH4 in Tail Gas	21 mol%	Based on design material balance
H2 HHV Heat Release in Tail Gas	54.68 %	See assessment of ECU Tail Gas HR rates at bottom.
CH4 HHV Heat Release in Tail Gas	45.32 %	See assessment of ECU Tail Gas HR rates at bottom.
Total Heat Input from H2	1,703 MMBtu/hr	Total HI from H2 = Total HI to Furances (3,720 MMBtu/hr) * % of Total HI from Tail Gas (83.7%) * % of Heat Release from H2 in TG (54.7%)
Individual Furnace Heat Input from H2	284 MMBtu/hr	Total Heat Input from H2 / 6 (# of furnaces at design heat input)
Total Heat Input from CH4 + NG	2,017 MMBtu/hr	Balance of total heat input not from H2 (total heat input - total heat input from H2)
Individual Furnace Heat Input from CH4 + NG	336 MMBtu/hr	Total Heat Input from CH4 + NG / 6 (# of furnaces at design heat input)
% of Total Heat Input from H2	**45.8 %**	**Original design % of heat input from H2**
% of Toal Heat Input from CH4 + NG	**54.2 %**	**Original design % of heat input from CH4 + NG**

Assessment of ECU Tail Gas Heat Release Rates		
Constants		
H2 HHV =	61,000	Btu/lb
CH4 HHV =	23,900	Btu/lb
NG HHV =	23,000	Btu/lb
H2 LHV =	51,605	Btu/lb
CH4 LHV =	21,532	Btu/lb
NG LHV =	20,761	Btu/lb
H2 MW =	2.02	lb/lb mol
CH4 MW =	16.04	lb/lb mol
TG Composition		
H2 =	79%	mol. %
CH4 =	21%	mol. %
Calculations		
TG MW =	4.96	lb/lb mol
Basis =	1.00	lb TG
Basis =	0.20	lb mol TG/lb TG
H2 Mol in TG =	0.16	lb mol H2/lb TG
CH4 Mol in TG =	0.04	lb mol CH4/lb TG
H2 HHV in TG =	19579.32	Btu/lb TG
CH4 HHV in TG =	16228.76	Btu/lb TG
H2 LHV in TG =	16563.72	Btu/lb TG
CH4 LHV in TG =	14620.50	Btu/lb TG
H2 HHV Heat Release =	55%	% HR from H2
CH4 HHV Heat Release =	45%	% HR from CH4
H2 LHV Heat Release =	53%	% HR from H2
CH4 LHV Heat Release =	47%	% HR from CH4
Tail Gas HHV	35808.08	Btu/lb
Tail Gas Specific Volume	77.71	scf/lb TG
Tail Gas HHV	460.77	Btu/scf

Attachment 6

Request No. 13.e Information

Source IDs	=	***031 - 037***	***Ethane Cracking Furnaces #1 - #7***						
Furnace Operating Modes	**Total Heat Input MMBtu/hr**	**Heat Input From Carbon Compounds MMBtu/hr**	**Fuel Source**	**Event Frequency # per yr**	**Duration per Event hrs**	**Annual Event Duration hrs/yr**	**NOx Emissions lb/hr**	**PM10 Emissions lb/hr**	**CO Emissions lb/hr**
Normal Operation (ST)	620	-	TG	-	-	-	9.30	3.10	21.70
Normal Operation (LT)	620	336.2	TG	-	-	7,509	6.20	3.10	11.77
Decoking	180	-	TG	12	36	432	2.70	1.85	52.20
Feed In	277	-	NG	12	2	24	4.16	1.39	9.70
Feed Out	277	-	NG	12	2	24	4.16	1.39	9.70
Hot Steam Standby	173	-	NG	12	60	723	4.33	0.87	6.06
Startup	86.5	-	NG	1	24	24	15.57	0.43	25.09
Shutdown	86.5	-	NG	1	24	24	15.57	0.43	25.09
Annual Emissions =									
Decoking Cycle ST Rates =							4.33	1.85	52.20
Normal Ops ST Rates =							9.30	3.10	21.70
Normal Ops LT Rates =							6.20	3.10	11.77
Average Annual Rates =							5.91	2.83	13.35

Source IDs	=		***031 - 037***		***Ethane Cracking Furnaces #1 - #7***								
Furnace Operating Modes	**NOx EF lb/MMBtu**	**PM (filterable) EF lb/MMBtu**	**PM (condensable) EF lb/MMBtu**	**PM10/2.5 EF lb/MMBtu**	**CO EF lb/MMBtu**	**SO2 EF lb/MMBtu**	**VOC EF lb/MMBtu**	**CO2 EF lb/MMBtu**	**CH4 EF lb/MMBtu**	**N2O EF lb/MMBtu**	**CO2e EF lb/MMBtu**	**H2SO4 EF lb/MMBtu**	**Pb EF lb/MMBtu**
Normal Operation (ST)	0.015	0.00186	0.00314	0.005	0.035	0.0002	0.0019	63.4	0.0012	0.00022	63.5	1.2E-05	8.0E-08
Normal Operation (LT)	0.010	0.00186	0.00314	0.005	0.035	0.0002	0.0019	63.4	0.0012	0.00022	63.5	1.2E-05	8.0E-08
Decoking	0.015	0.00716	0.00314	0.0103	0.290	0.0002	0.0019	71.5	0.0012	0.00022	71.6	1.2E-05	8.0E-08
Feed In	0.015	0.00186	0.00314	0.005	0.035	0.0015	0.0019	117.0	0.0022	0.00022	117.1	7.2E-05	4.9E-07
Feed Out	0.015	0.00186	0.00314	0.005	0.035	0.0015	0.0019	117.0	0.0022	0.00022	117.1	7.2E-05	4.9E-07
Hot Steam Standby	0.025	0.00186	0.00314	0.005	0.035	0.0015	0.0019	117.0	0.0022	0.00022	117.1	7.2E-05	4.9E-07
Startup	0.180	0.00186	0.00314	0.005	0.290	0.0015	0.0019	117.0	0.0022	0.00022	117.1	7.2E-05	4.9E-07
Shutdown	0.180	0.00186	0.00314	0.005	0.290	0.0015	0.0019	117.0	0.0022	0.00022	117.1	7.2E-05	4.9E-07
Annual Emissions =													***PTE per furnace***
Decoking Cycle ST Rates =													
Normal Ops ST Rates =													
Normal Ops LT Rates =													
Average Annual Rates =													

Source IDs	=		***031 - 037***		***Ethane Cracking Furnaces #1 - #7***								
Furnace Operating Modes	**NOx Emissions T/yr**	**PM (filterable) Emissions T/yr**	**PM (condensable) Emissions T/yr**	**PM10/2.5 Emissions T/yr**	**CO Emissions T/yr**	**SO2 Emissions T/yr**	**VOC Emissions T/yr**	**CO2 Emissions T/yr**	**CH4 Emissions T/yr**	**N2O Emissions T/yr**	**CO2e Emissions T/yr**	**H2SO4 Emissions T/yr**	**Pb Emissions T/yr**
Normal Operation (ST)	-	-	-	-	-	-	-	-	-	-	-	-	-
Normal Operation (LT)	23.28	4.34	7.30	11.64	44.18	0.56	2.40	147,646	2.78	0.51	147,868	0.03	1.9E-04
Decoking	0.58	0.28	0.12	0.40	11.28	0.01	0.07	2,782	0.05	0.01	2,785	4.6E-04	3.1E-06
Feed In	0.05	0.01	0.01	0.02	0.12	0.005	0.01	389	0.01	0.001	389	2.4E-04	1.6E-06
Feed Out	0.05	0.01	0.01	0.02	0.12	0.005	0.01	389	0.01	0.001	389	2.4E-04	1.6E-06
Hot Steam Standby	1.56	0.12	0.20	0.31	2.19	0.09	0.12	7,316	0.14	0.01	7,323	0.005	3.1E-05
Startup	0.19	0.002	0.003	0.01	0.30	0.002	0.002	121	0.002	2.3E-04	122	7.5E-05	5.1E-07
Shutdown	0.19	0.002	0.003	0.01	0.30	0.002	0.002	121	0.002	2.3E-04	122	7.5E-05	5.1E-07
Annual Emissions =	25.90	4.75	7.65	12.40	58.47	0.67	2.61	158,764	2.99	0.54	158,998	0.03	2.2E-04
Decoking Cycle ST Rates =													
Normal Ops ST Rates =													
Normal Ops LT Rates =													
Average Annual Rates =													

Ethane Cracking Furnace Calculation Notes/Basis

General:

- Calculation is for 1 furnace.
- ST = short-term; this mode represents the possibility of reduced SCR performance due to short-term process fluctuations. No more than 2 furnaces expected to be in this mode at any one time.
- LT = long-term; this mode represents the average NOx limit achievable by the SCR system including short-term fluctuations.
- Furnace operating mode parameters are estimated based on 7 furnaces with 6 in normal operation at all times.
- Each furnace is assumed to require decoking a maximum of 12 times per year.
- Each furnace is assumed to undergo one startup/shutdown cycle per year.
- Heat input estimates for decoking-related operating modes are the average for an activity over the period (e.g., "Feed In" value is average of 160 MMBtu/hr at start and 395 MMBtu/hr at end of "Feed In").
- Heat Input From Carbon Compounds is used for Normal Operation (LT) CO emissions estimate and is based on 620 MMBtu/hr and 54.2% of heat input from CH4+NG.
- Annual Emissions (T/yr) = (Mode Heat Input - MMBtu/hr) x (Hours/Year in Mode) x (EF - lb/MMBtu) / (2,000 lb/T)
- Hourly Emissions (lb/hr) = (Mode Heat Input - MMBtu/hr) x (EF - lb/MMBtu)

BASIS OF EMISSION FACTORS:

NOx:

- Normal Operation: ST and LT rates based on LAER limits.
- Decoking, Feed In, Feed Out, Hot Standby and Shutdown: based on preliminary vendor data / expected SCR performance.
- Startup = SCR Offline.

CO:

- Normal Operation, Feed In, Feed Out and Hot Steam Standby = BACT limit.
- Decoking, Startup, Shutdown: factors equivalent to lb/hr BACT limit for decoking.

SO2/H2SO4:

- All Modes: SO2 EF based on a natural gas sulfur content of 5,000 gr/MMSCF and an average natural gas firing rate equal to 16.3% of a furnace's heat input (remainder is Tail Gas).
- All Modes: Tail Gas fired in furnace does not contain any sulfur.
- All Modes: H2SO4-to-SO2 ratio is assumed equal to ratio for firing distillate oil (see AP-42, Table 1.3-1).

VOC

- All modes: VOC EF is equivalent to LAER limit at max firing rate.

PM/PM10/PM2.5:

- Normal Operation, Feed In, Feed Out, Hot Standby, Startup and Shutdown: EF based on preliminary vendor data.
- Decoking: based on preliminary vendor data; hourly emissions during decoking are estimated at 1.86 lb/hr; value shown is converted to lb/MMBtu for consistency with calculation methodology.

GHGs

- All modes except decoking: emissions factors for CO2, CH4, and N2O are from 40 CFR 98, Tables C-1 and C-2.
- Firing H2 does not produce any CO2 or CH4 emissions so CO2 and CH4 emissions factors are adjusted to account for Tail Gas H2 concentration of 45.8% where applicable.
- N2O emissions factor for NG used for both Tail Gas and Natural Gas firing.
- CO2e emissions during decoking include emissions from fuel combustion as well as emissions from coke burn-off. See 'Constants' sheet for coke burn-off emissions rate.

- CO2e emissions equal total of CO2, CH4, and N2O emissions adjusted for global warming potentials of 1, 25, and 298 respectively.

Lead

- All Modes: Pb EF based on AP-42 natural gas emissions factor (see Table 1.4-2) and an average natural gas firing rate of 16.3% of a furnace's heat input (remainder is Tail Gas).
- All Modes: Tail Gas fired in furnace does not contain any lead.

Source IDs =	***031 - 037***	***Ethane Cracking Furnaces #1 - #7***
Normal Operation (LT) Heat Input [HHV]=	620 MMBtu/hr	
Max CH4+NG Heat Input [HHV]=	336.2 MMBtu/hr	Based on 620 MMBtu/hr and 54.2% of heat input from CH4+NG.*
Annual Hours @ 100% Load =	8,760 hr/yr	Conservatively assumes continuous operation at 100% load
Hourly PTE (Ammonia) =	(Normal Operation (LT) Heat Input - MMBtu/hr) x (EF - lb/MMBtu)	
Annual PTE (Ammonia) =	(Normal Operation (LT) Heat Input - MMBtu/hr) x (EF - lb/MMBtu) x (Annual Hours @ 100% Load) / (2,000 lb/T)	
Hourly PTE =	(Max CH4+NG Heat Input - MMBtu/hr) x (EF - lb/MMBtu)	
Annual PTE =	(Max CH4+NG Heat Input - MMBtu/hr) x (EF - lb/MMBtu) x (Annual Hours @ 100% Load) / (2,000 lb/T)	

Pollutant	§112 HAP?	EF (lb/MMSCF)	EF (lb/MMBtu)	EF Source	Hourly PTE 1 Cracking Furnace (lb/hr)	Annual PTE 1 Cracking Furnace (T/yr)
Ammonia***	NO	-	0.0038	40 CFR 60, Method 19	2.39	10.45
2-Methylnaphthalene	YES	2.40E-05	2.35E-08	AP-42, Table 1.4-3	7.91E-06	3.46E-05
3-Methylcholanthrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.93E-07	2.60E-06
7,12-Dimethylbenz(a)anthracene	YES	<1.6E-05	<1.57E-08	AP-42, Table 1.4-3	5.27E-06	2.31E-05
Acenaphthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.93E-07	2.60E-06
Anthracene	YES	<2.4E-06	<2.35E-09	AP-42, Table 1.4-3	7.91E-07	3.46E-06
Benzo(a)anthracene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.93E-07	2.60E-06
Benzene	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-3	0.001	0.003
Benzo(a)pyrene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	3.96E-07	1.73E-06
Benzo(b)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.93E-07	2.60E-06
Benzo(g,h,i)perylene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	3.96E-07	1.73E-06
Benzo(k)fluoranthene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.93E-07	2.60E-06
Butane	NO	2.10E+00	2.06E-03	AP-42, Table 1.4-3	0.69	3.03
Chrysene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.93E-07	2.60E-06
Dibenzo(a,h)anthracene	YES	<1.2E-06	<1.18E-09	AP-42, Table 1.4-3	3.96E-07	1.73E-06
Dichlorobenzene	YES	1.20E-03	1.18E-06	AP-42, Table 1.4-3	3.96E-04	0.002
Ethane	NO	3.10E+00	3.04E-03	AP-42, Table 1.4-3	1.02	4.48
Fluoranthene	YES	3.00E-06	2.94E-09	AP-42, Table 1.4-3	9.89E-07	4.33E-06
Fluorene	YES	2.80E-06	2.75E-09	AP-42, Table 1.4-3	9.23E-07	4.04E-06
Formaldehyde	YES	7.50E-02	7.35E-05	AP-42, Table 1.4-3	0.02	0.11
Hexane	YES	-	4.07E-04	Stack Test Data	0.14	0.60
Indeno(1,2,3-cd)pyrene	YES	<1.8E-06	<1.76E-09	AP-42, Table 1.4-3	5.93E-07	2.60E-06
Naphthalene	YES	6.10E-04	5.98E-07	AP-42, Table 1.4-3	2.01E-04	0.001
Pentane	NO	2.60E+00	2.55E-03	AP-42, Table 1.4-3	0.86	3.75
Phenanthrene	YES	1.70E-05	1.67E-08	AP-42, Table 1.4-3	5.60E-06	2.45E-05
Propane	NO	1.60E+00	1.57E-03	AP-42, Table 1.4-3	0.53	2.31
Pyrene	YES	5.00E-06	4.90E-09	AP-42, Table 1.4-3	1.65E-06	7.22E-06
Toluene	YES	3.40E-03	3.33E-06	AP-42, Table 1.4-3	0.001	0.005
Arsenic	YES	2.00E-04	1.96E-07	AP-42, Table 1.4-4	6.59E-05	2.89E-04
Barium	NO	4.40E-03	4.31E-06	AP-42, Table 1.4-4	0.001	0.01
Beryllium	YES	<1.2E-05	<1.18E-08	AP-42, Table 1.4-4	3.96E-06	1.73E-05
Cadmium	YES	1.10E-03	1.08E-06	AP-42, Table 1.4-4	3.63E-04	0.002
Chromium**	YES	1.40E-03	1.37E-06	AP-42, Table 1.4-4	4.61E-04	0.002
Cobalt	YES	8.40E-05	8.24E-08	AP-42, Table 1.4-4	2.77E-05	1.21E-04
Copper	NO	8.50E-04	8.33E-07	AP-42, Table 1.4-4	2.80E-04	0.001
Lead	YES	5.00E-04	4.90E-07	AP-42, Table 1.4-2	1.65E-04	0.001
Manganese	YES	3.80E-04	3.73E-07	AP-42, Table 1.4-4	1.25E-04	0.001
Mercury	YES	2.60E-04	2.55E-07	AP-42, Table 1.4-4	8.57E-05	3.75E-04
Molybdenum	NO	1.10E-03	1.08E-06	AP-42, Table 1.4-4	3.63E-04	0.002
Nickel	YES	2.10E-03	2.06E-06	AP-42, Table 1.4-4	0.001	0.003
Selenium	YES	<2.4E-05	<2.35E-08	AP-42, Table 1.4-4	7.91E-06	3.46E-05
Vanadium	NO	2.30E-03	2.25E-06	AP-42, Table 1.4-4	0.001	0.003
Zinc	NO	2.90E-02	2.84E-05	AP-42, Table 1.4-4	0.01	0.04
Total §112 HAPs from 1 Cracking Furnace =					**0.17**	**0.73**
Total §112 HAPs from 7 Cracking Furnaces =					**1.16**	**5.09**

* No HAP emissions attributed to the combustion of H2 in the cracking furnaces.

**All the Chromium emitted from the cracking furnaces is conservatively assumed to be hexavalent.

*** Ammonia emission factor calculated per 40 CFR 60, Method 19 based on 10 ppmvd ammonia @ 3% O2 in cracking furnace exhaust.

Ammonia slip concentration	10	ppmvd @ 3% O2 in exhaust
Ammonia slip conc. at 0% O2	11.68	ppmvd @ 0% O2
Fd (natural gas)	8,710	dscf/MMBtu (Table 19-2, Appendix A-7 of 40 CFR 60)
Fd (H_2)	5,971	dscf/MMBtu
Fd (54.2% CH4+NG/45.8% H2)	7,456	dscf/MMBtu 54.2% of heat input from CH4+NG and 45.8% from H2.
Standard Molar Volume	385.33	scf/lbmole @ 1 atm and 68°F
Molecular Weight NH_3	17.03	lb/lbmole
Ammonia EF	0.0038	lb/MMBtu

Attachment 7

Request No. 14.b.i-ii Information

Source IDs =	101 - 103		Combustion Turbine/Duct Burner Units #1 - #3
Parameter	**Value**		**Source / Basis**
Calculation Inputs:			
Max Heat Input [HHV] =	715.4	MMBtu/hr	Total maximum heat input to each GE Frame 6B turbine/duct burner unit
Turbine/Duct Burner PM EF =	0.0019	lb/MMBtu	AP-42, Table 3.1-2a (filterable only)
Turbine/Duct Burner PM10 EF =	0.0066	lb/MMBtu	BACT limit
Turbine/Duct Burner PM2.5 EF =	0.0066	lb/MMBtu	LAER limit
Turbine/Duct Burner VOC EF =	0.0035	lb/MMBtu	Equivalent to LAER limit of 1 ppmvd @ 15% O2 as C3H8 at max load
Turbine/Duct Burner NOx EF =	0.0074	lb/MMBtu	Equivalent to LAER limit of 2 ppmvd @ 15% O2 as NO2 at max load
Turbine/Duct Burner SO2 EF =	0.0015	lb/MMBtu	Based on 0.5 grains S/100 dscf, the max. allowable sulfur content of natural gas fuel
Turbine/Duct Burner CO EF =	0.0045	lb/MMBtu	Equivalent to LAER limit of 2 ppmvd @ 15% O2 at max load
Turbine/Duct Burner CO2 EF =	117.0	lb/MMBtu	40 CFR 98, Table C-1 EF for natural gas
Turbine/Duct Burner N2O EF =	2.2E-04	lb/MMBtu	40 CFR 98, Table C-2 EF for natural gas
Turbine/Duct Burner CH4 EF =	2.2E-03	lb/MMBtu	40 CFR 98, Table C-2 EF for natural gas
Turbine/Duct Burner H2SO4 EF =	7.2E-05	lb/MMBtu	Based on SO3-to-SO2 emission factor ratio in AP-42, Table 1.3-1 for distillate oil combustion in boilers > 100 MMBtu/hr
Turbine/Duct Burner Pb EF =	4.9E-07	lb/MMBtu	AP-42, Table 1.4-2
Turbine/Duct Burner Fluoride EF =	0	lb/MMBtu	Not emitted
Startup/Shutdown NOx EF =	113	lb/hr	Design estimate
Startup/Shutdown CO EF =	276	lb/hr	Design estimate
Startup/Shutdown Hours =	7	hr/yr	Worst-case estimate
Annual Hours =	8,760	hr/yr	
Annual PTE Calculations (for 1 unit):			
PM Emissions =	5.95	T/yr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner PM EF) x (Annual Hours) / (2000 lb/T)
PM10 Emissions =	20.68	T/yr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner PM10 EF) x (Annual Hours) / (2000 lb/T)
PM2.5 Emissions =	20.68	T/yr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner PM2.5 EF) x (Annual Hours) / (2000 lb/T)
VOC Emissions =	11.03	T/yr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner VOC EF) x (Annual Hours) / (2000 lb/T)
NOx Emissions =	23.45	T/yr	= [(Max Heat Input [HHV]) x (Turbine/Duct Burner NOx EF) x (Annual Hours - Startup/Shutdown Hours) + (Startup/Shutdown NOx EF) x (Startup/Shutdown Hours)] / (2000 lb/T)
SO2 Emissions =	4.61	T/yr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner SO2 EF) x (Annual Hours) / (2000 lb/T)
CO Emissions =	15.00	T/yr	= [(Max Heat Input [HHV]) x (Turbine/Duct Burner CO EF) x (Annual Hours - Startup/Shutdown Hours) + (Startup/Shutdown CO EF) x (Startup/Shutdown Hours)] / (2000 lb/T)
CO2 Emissions =	366,542	T/yr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner CO2 EF) x (Annual Hours) / (2000 lb/T)
N2O Emissions =	0.69	T/yr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner N2O EF) x (Annual Hours) / (2000 lb/T)
CH4 Emissions =	6.91	T/yr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner CH4 EF) x (Annual Hours) / (2000 lb/T)
H2SO4 Emissions =	0.23	T/yr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner H2SO4 EF) x (Annual Hours) / (2000 lb/T)
Pb Emissions =	0.002	T/yr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner Pb EF) x (Annual Hours) / (2000 lb/T)
Fluoride Emissions =	0	T/yr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner Fluoride EF) x (Annual Hours) / (2000 lb/T)
CO2e Emissions =	366,921	T/yr	= Sum of CO2, N2O and CH4 emissions adjusted for NO2 and CH4 GWPs of 298 and 25
Short-Term PTE Calculations (for 1 unit):			
PM Emissions =	1.36	lb/hr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner PM EF)
PM10 Emissions =	4.72	lb/hr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner PM10 EF)
PM2.5 Emissions =	4.72	lb/hr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner PM2.5 EF)
VOC Emissions =	2.52	lb/hr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner VOC EF)
NOx Emissions =	5.35	lb/hr	= Annual Average Value for Modeling Purposes
SO2 Emissions =	1.05	lb/hr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner SO2 EF)
CO Emissions =	276	lb/hr	= Startup/Shutdown Max Rate for Modeling Purposes
CO2 Emissions =	83,685	lb/hr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner CO2 EF)
N2O Emissions =	0.16	lb/hr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner N2O EF)
CH4 Emissions =	1.58	lb/hr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner CH4 EF)
H2SO4 Emissions =	0.05	lb/hr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner H2SO4 EF)
Pb Emissions =	3.5E-04	lb/hr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner Pb EF)
Fluoride Emissions =	0	lb/hr	= (Max Heat Input [HHV]) x (Turbine/Duct Burner Fluoride EF)
CO2e Emissions =	83,772	lb/hr	= Sum of CO2, N2O and CH4 emissions adjusted for NO2 and CH4 GWPs of 298 and 25

Summary of Annual PTE Emission Rates:

		PTE Emission Rates (T/yr)									
		PM	**PM10**	**PM2.5**	**VOC**	**NOx**	**SO2**	**CO**	**H2SO4**	**Pb**	**CO2e**
1 Unit	=	5.95	20.68	20.68	11.03	23.45	4.61	15.00	0.23	0.002	366,921
3 Units	=	17.86	62.04	62.04	33.10	70.34	13.82	45.00	0.68	0.005	1,100,762

Source IDs =	***101 - 103***	***Combustion Turbine/Duct Burner Units #1 - #3***
Max Heat Input [HHV] :	715.4 MMBtu/hr	Total heat input for turbine and duct burners.*
Annual Hours @ 100% Load :	8,760 hr/yr	Conservatively assumes continuous operation at 100% load
Oxidation Catalyst DRE :	30%	http://jmsec.com/Library/Brochures/jm_sec_data_gas_turbine_033012m.pdf
Hourly PTE :	(Max Heat Input - MMBtu/hr) x (Controlled EF - lb/MMBtu) [Uncontrolled EF is used for Ammonia]	
Annual PTE :	(Max Heat Input - MMBtu/hr) x (Controlled EF - lb/MMBtu) x (Annual Hours @ 100% Load) / (2,000 lb/T) [Uncontrolled EF is used for Ammonia]	

Pollutant	§112 HAP?	Uncontrolled EF (lb/MMBtu)	Controlled** EF (lb/MMBtu)	EF Source	Hourly PTE 1 Unit (lb/hr)	Annual PTE 1 Unit (T/yr)
Ammonia*** :	NO	0.0068	-	40 CFR 60, Method 19	4.88	21.36
1,3-Butadiene :	YES	<4.30E-07	<3.01E-07	AP-42, Table 3.1-3	2.2E-04	9.4E-04
Acetaldehyde :	YES	4.00E-05	2.80E-05	AP-42, Table 3.1-3	0.02	0.09
Acrolein :	YES	6.40E-06	4.48E-06	AP-42, Table 3.1-3	0.003	0.01
Benzene :	YES	-	1.57E-06	11/2022 Stack Test Data	0.001	0.005
Ethylbenzene :	YES	3.20E-05	2.24E-05	AP-42, Table 3.1-3	0.02	0.07
Formaldehyde :	YES	-	2.30E-04	11/2022 Stack Test Data	0.16	0.72
Naphthalene :	YES	1.30E-06	9.09E-07	AP-42, Table 3.1-3	0.001	0.003
PAH :	YES	2.20E-06	1.54E-06	AP-42, Table 3.1-3	0.001	0.005
Propylene Oxide :	YES	<2.90E-05	<2.03E-05	AP-42, Table 3.1-3	0.01	0.06
Toluene :	YES	-	2.44E-04	11/2022 Stack Test Data	0.17	0.76
Xylenes :	YES	6.40E-05	4.48E-05	AP-42, Table 3.1-3	0.03	0.14
Total §112 HAPs from 1 Combustion Turbine/Duct Burner Unit =					**0.43**	**1.87**
Total §112 HAPs from 3 Combustion Turbine/Duct Burner Units =					**1.28**	**5.62**

* The HAP emissions from the duct burners were assumed to have the same profile as HAP emissions from the turbines.

** AP-42 emission factors adjusted for controlled emissions due to 30% DRE of oxidation catalyst.
Ref. http://jmsec.com/Library/Brochures/jm_sec_data_gas_turbine_033012m.pdf

*** Ammonia emission factor calculated per 40 CFR 60, Method 19 based on 5 ppmvd ammonia @ 15% O2 in unit exhaust.

Ammonia slip concentration :	5	ppmvd @ 15% O2 in exhaust
Ammonia slip conc. at 0% O2 :	17.71	ppmvd @ 0% O2
Fd (natural gas) :	8,710	dscf/MMBtu (Table 19-2, Appendix A-7 of 40 CFR 60)
Standard Molar Volume :	385.33	scf/lbmole @ 1 atm and 68°F
Molecular Weight NH_3 :	17.03	lb/lbmole
Ammonia EF :	0.0068	lb/MMBtu