Pennsylvania
Department of
Environmental Protection

December 24, 2024

VIA EMAIL

Kimberly Kaal, Environmental Manager
Shell Chemical Appalachia LLC
Shell Polymers Monaca
300 Frankfort Road
Monaca, PA 15061

Re: Technical Deficiency Letter
Plan Approval PA-04-00740D
Shell Chemical Appalachia, LLC
Shell Polymers Monaca Site
Potter and Center Townships
Beaver County

Dear Kimberly Kaal:

On September 13, 2024, the Department received a plan approval application (PA-04-00740D) from Shell Chemical Appalachia, LLC (Shell) for the existing ethylene and polyethylene production facility known as the Shell Polymers Monaca (SPM) Site located in Potter and Center Townships, Beaver County.

The Department reviewed your plan approval application for administrative completeness and determined that the application is administratively complete on October 10, 2024. After further review, the Department has determined that the application is technically incomplete. Per 25 Pa. Code §127.12(a)(2), an application for approval shall contain information that is requested by the Department and is necessary to perform a thorough evaluation of the air contamination aspects of the source.

Within **thirty (30) days** of receipt of this notice, the Department requests that you provide the following:

1. Source by source change in potential emissions comparing PA-04-00740C with the proposed potential emissions.

2. Source by source change in potential emissions comparing PA-04-00740C with the proposed potential emissions related to nonattainment new source review and prevention of significant deterioration for all air contamination sources and air cleaning devices affected by:

a. Plan approval reconciliations; and
b. Wastewater treatment plant (WWTP) permanent controls project.

3. Revised analysis of 25 Pa. Code Chapter 127 Subchapter E requirements including, but not limited to:

   a. A revised analysis of the Lowest Achievable Emission Rate (LAER) under 25 Pa. Code §127.205(1) for all air contamination sources and air cleaning devices associated with the plan approval reconciliations;
   b. Source of the required emission offsets in accordance with 25 Pa. Code §127.205(4), §127.206, §127.208, and §127.210; and
   c. A new alternatives analysis as required under 25 Pa. Code §127.205(5) for the plan approval reconciliations and WWTP permanent controls project.

   The original project exceeded the major source thresholds and was subject to NNSR review, the original project retrospectively including the reconciliations exceeds the major source thresholds and is subject to NNSR review, and the reconciliations alone constitute a significant increase >40 tpy for NOx at an existing major facility, subject to NNSR review.

4. Revised Best Available Technology (BAT) analysis for all air contamination sources associated with the plan approval reconciliations in accordance with 25 Pa. Code § 127.1 and 25 Pa. Code § 121.1.

5. Revised Best Available Control Technology analysis per the requirements of 40 CFR Part § 52.21 for CO, NOx (NO_2), PM (filterable only), PM_{10}, and GHGs emissions from air contamination sources and air cleaning devices associated with the plan approval reconciliations.

   The original project exceeded the major source thresholds, the original project retrospectively including the reconciliations exceeds the major source thresholds, and the reconciliations alone constitute a significant increase >40 tpy for NOx and >75,000 tpy CO_2e at an existing major facility, subject to 40 CFR Part § 52.21.

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*.

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.

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;
    b. MPGF Ethylene Tank Header – 40 CFR Part 60 Subpart Kb and 40 CFR Part 63 Subpart YY; and
    c. MPGF PE Units 1/2 Episodic Vent Header – 40 CFR Part 63 Subparts CC, YY, and FFFF.

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

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

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

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

<u>Calculations</u>

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]"

    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 CH_4+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 CH_4+NG. Provide justification for the % of heat input from CH_4+NG.

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;
   ii. Provide the reason for change in calculation methodology; and
   iii. Provide what, if any, regulatory implications result due to the change.

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.

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

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.

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
   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.

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).

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

a. For Generator 3 – Lift Station, CO, NOx, VOC, and CO_2 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 CO_2 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.

17. Source ID C204A: CVTO

a. The thermal oxidizer's potential to emit calculation has been revised by Shell to include updates to vent stream flow rate and composition data based on a review of SPM's operating data.

i. Provide supporting information for the vent stream flow rate and composition data used for emissions from the CVTO.

b. The thermal oxidizer's [heat input: 196.7 MMBtu/hr] n-hexane emission factor has been updated by Shell to equal the n-hexane emission factor indicated for a flare in the Natural Gas Fired External Combustion Equipment table in the May 17, 2001, Ventura County Air Pollution Control District AB 2588 Combustion Emission Factors document [0.029 lb/MMscf] rather than the n-hexane emission factor documented in AP-42, Section 3.1, Table 3.1-3 [1.8 lb/MMscf].

i. Provide further justification for using the Ventura County Air Pollution Control District AB 2588 Combustion Emission Factors document as it results in a PTE decrease of n-hexane (a HAP) of approximately 1.5 tpy from the CVTO.

18. Source ID C204B: MPGF (formerly LP Multipoint Ground Flare (MPGF))

a. The flare's potential to emit calculation has been revised by Shell by using a 99% destruction efficiency for organic compounds containing 3 or fewer carbon atoms, which is consistent with EPA guidance.

i. Provide supporting information to justify the increased destruction efficiency of the MPGF;
ii. Provide verification that the minimum destruction efficiency is currently being met and the compliance method used; and
iii. Provide the method of compliance for the proposed increased destruction efficiency.

b. The flare's potential to emit calculation was revised by Shell to include updates to vent stream flow rate and composition data based on a review of SPM's operating data.

i. Provide supporting information for the vent stream flow rate and composition data used for emissions from the MPGF based on the vent streams from the MPGF CVTO Trip Header, MPGF PE Units 1/2 Episodic Vent Header, and MPGF Ethylene Tank Header.

d. The flare's [combined heat input: 6.9 MMBtu/hr CVTO Trip + 9.6 MMBtu/hr Ethylene Tank + 78.8 MMBtu/hr PE 1/2 = 95.3 MMBtu/hr] n-hexane emission factor has been updated by Shell to equal the n-hexane emission factor indicated for a flare in the Natural Gas Fired External Combustion Equipment table in the May 17, 2001, Ventura County Air Pollution Control District AB 2588 Combustion Emission Factors document [0.029 lb/MMscf] rather than the n-hexane emission factor documented in AP-42, Section 3.1, Table 3.1-3 [1.8 lb/MMscf].

    i. Provide further justification for using the Ventura County Air Pollution Control District AB 2588 Combustion Emission Factors document as it results in a PTE decrease of n-hexane (a HAP) of approximately one tpy from the MPGF.

19. Source IDs C205A, B, and C: TEGF A, TEGF B, and HP Elevated Flare

    a. Each of the flares' potential to emit calculation has been revised by Shell by using a 99% destruction efficiency for organic compounds containing 3 or fewer carbon atoms, which is consistent with EPA guidance.

        i. Provide supporting information to justify the increased destruction efficiency of the flares;
        ii. Provide verification that the minimum destruction efficiency is currently being met and the compliance method used; and
        iii. Provide the method of compliance for the proposed increased destruction efficiency.

    b. Each of the flares' potential to emit calculation were revised by Shell to include updates to vent stream flow rate and composition data based on a review of SPM's operating data.

        i. Provide supporting information for the vent stream flow rate and composition data used for emissions from the flares.

    c. The flares' [combined annual average heat input: 418.2 MMBtu/hr] n-hexane emission factor was updated to equal the n-hexane emission factor indicated for a flare in the Natural Gas Fired External Combustion Equipment table in the May 17, 2001, Ventura County Air Pollution Control District AB 2588 Combustion Emission Factors document [0.029 lb/MMscf] rather than the n-hexane emission factor documented in AP-42, Section 3.1, Table 3.1-3 [1.8 lb/MMscf].

        i. Provide further justification for using the Ventura County Air Pollution Control District AB 2588 Combustion Emission Factors document as it results in a PTE decrease of n-hexane (a HAP) of over two tpy from the flares.

20. Source ID C206: SCTO

    a. The thermal oxidizer's potential to emit calculation has been revised by Shell to use a 99.9% destruction efficiency for the VOC and organic HAP contained in the vent streams combusted in the thermal oxidizer rather than a 99% destruction efficiency for

those compounds to more accurately represent the designed VOC and organic HAP destruction efficiency of the thermal oxidizer.

i. Provide supporting information to justify the increased destruction efficiency of the SCTO.

b. The thermal oxidizer's potential to emit calculation has been revised by Shell to include the additional amount of supplemental fuel gas that has been estimated to be required to maintain the thermal oxidizer's temperature at a level necessary to ensure the minimum destruction efficiency required by applicable regulations and SPM's plan approval is achieved.

i. Provide verification that the minimum destruction efficiency is currently being met and the compliance method used; and
ii. Provide the method of compliance for the proposed increased destruction efficiency.

c. The thermal oxidizer's potential to emit calculation was reconciled to include updates to vent stream flow rates and compositions based on a review of operating data.

i. Provide supporting information for the vent stream flow rate and composition data used for emissions from the thermal oxidizer.

e. The thermal oxidizer's potential to emit calculation was updated to include the vent streams from the new Wastewater Treatment Vessels that are proposed to be installed in the WWTP in association with the WWTP Permanent Controls Project.

i. Provide supporting information for the vent stream (e.g. flow rate, composition, etc.) from the new Wastewater Treatment Vessels.

f. The thermal oxidizer's PM_{10} and $PM_{2.5}$ emission factors were reconciled to include the thermal oxidizer's sulfuric acid emission factor in each of the emission factors because the thermal oxidizer's sulfuric acid emissions represent condensable PM emissions.

i. Provide supporting information for including sulfuric acid emissions with PM_{10} and $PM_{2.5}$ while it is not included with the CVTO.

21. Source ID 502: Wastewater Treatment Plant

a. Provide a description of the assumptions made and all inputs used in the Toxchem model to estimate emissions from the WWTP at SPM;
b. Identify each individual emission point from the WWTP and the PTE from each individual emission point;
c. Identify which emission point(s) are captured and routed to the SCTO for control;
d. Provide the Biotreater Aeration Tanks' inlet concentrations based on actual sample data for the 1/10/23-3/31/24 time period, excluding ethylene manufacturing unit downtime or abnormal conditions, as indicated in Appendix B of the plan approval application;

e. Justification of why dry weather flow is considered worst-case conditions for the modeled emissions;
f. Verify which version of Toxchem was used to estimate emissions from the WWTP at SPM;
g. Verify if emission estimates account for emissions associated with petrochemical-based oil layers;
h. Provide a comparison of WWTP potential to emit using WATER9 vs. Toxchem;
i. Identify the design capacity of the WWTP in gallons per year; and
j. Identify the capacity of the settlement drum(s), two Dissolved Nitrogen Flotation (DNF) Units (DNF Unit #1 and DNF Unit #2), float/sludge drum, and Steam Stripper, including a reflux drum.

Please note that the Department's Bureau of Air Quality's Modeling and Risk Assessment Section is reviewing your PSD Modeling and Risk Assessment submissions on a parallel path. Comments on the PSD Modeling and Risk Assessment submissions have been provided under a separate cover.

Please provide the requested information within **thirty (30) days**. If you have questions about your application, please contact Alexander Sandy at 412.442.4028 or asandy@pa.gov and refer to Application No. PA-04-00740D, Authorization No. 1500641, to discuss your concerns or to schedule a meeting.

Sincerely,

Alexander Sandy
Air Quality Engineering Specialist
Air Quality Program

cc: PA-04-00740D (A. Sandy)
Operations (V. Shaffer)
Community Relations Coordinator (L. Camarda)
Environmental Justice (E. Green)
Regional Director (E. Gustafson)
BAQ Air Quality Modeling and Risk Assessment Section (A. Fleck)
BAQ Permits (V. Trivedi)
BAQ New Source Review (S. Wenrich)
BAQ Bureau Director (N. Lazor)
OnBase