Additional DEP Technical Review Comments on PSD Air Quality Analyses
Additional DEP Technical Review Comment on Inhalation Risk Assessment (Modeling Portion)
Shell Chemical Appalachia LLC
Application for Plan Approval 04-00740D
WWTP Permanent Controls Project, EMACT Project, and Plan Approval Reconciliations
Shell Polymers Monaca Site, Center and Potter Townships, Beaver County
July 7, 2025

Appendix D-1
Air Dispersion Modeling and Class II Visibility Analysis for Shell Polymers Monaca, Beaver County, Pennsylvania

4.3 Source and Monitoring Data

Point Sources and Flares

1. Based on Shell's revised calculation, the effective stack height and stack diameter for the multipoint ground flare (Source ID MPFLARE) are 4.46 and 0.27 m, respectively. The 4.46-m effective stack height and the 0.27-m effective stack diameter were used in the NAAQS analysis; however, in both SIL and Increment analyses, the previous 4.54-m effective stack height and 0.28-m effective stack diameter were used instead. For the SIL analysis, use of incorrect stack parameters could affect the receptors that would be used for cumulative analyses, i.e., receptors modeled to have significant impacts (> SILs).

Good Engineering Practice Stack Height Analysis

2. In response to Comment #30 in the DEP's December 20, 2024, technical comments, Shell redefined building PE3 as a multi-tiered structure. After this revision, sources AFEEDA, AFEEDB, AFEEDC, AFEEDD, EXTRUD, AUSA, AUSB, AUSC, AUSD, FIBC, and PELTDRY are no longer within nor lower than building PE3. The first 9 sources mentioned were also reclassified as horizontal point sources (POINTHOR keyword, instead of POINT keyword). However, two other existing sources are now within and lower than the redefined building. These are sources CAA and CAB, with 23.87-m stack heights, that are located within building PE3A (i.e., PE3A's Tier 2, which has a 29.2851-m building height).

4.4 Receptor Data

3. In the previous AERMAP run, Shell used six (6) NED files that extended more than 20 km beyond the modeling domain used in AERMOD. In the latest AERMAP run, however, Shell used only one (1) NED file that extended beyond the modeling domain by approximately 2 to 4 km. In specifying NED files to use, Section 2.1.2 of the EPA's "User's Guide for the AERMOD Terrain Preprocessor (AERMAP)" (EPA-454/B-24-008, November 2024) states that, "*Significant terrain elevations include all the terrain that is at or above a 10% slope from each and every receptor. Additional DEM files or increasing the extent of the NED file(s) may be needed to perform these calculations. It is up to the user to assure all such terrain nodes are covered.*" Use of the six (6) NED files would ensure that all significant terrain elevations, i.e., at or above the 10% elevation slope, would be considered in calculating hill height scales. If using several NED files, use of the DOMAINXY keyword under the Control pathway will lessen simulation time.

The DEP is sharing its AERMAP run based on the six (6) NED files, as used by Shell in its previous AERMAP run, and, by using the DOMAINXY keyword, based on the domain for calculating hill height scales that extends approximately 10 km beyond the modeling domain used in AERMOD.

4.5 Meteorological Data

Data Selection and Representativeness

4. Figures 9 and 10 include albedo, Bowen Ratio, and surface roughness for the Beaver Valley meteorological site but not for Shell Polymers Monaca (SPM). For the purpose of demonstrating data representativeness of the Beaver Valley meteorological data, please include the surface characteristics values calculated for SPM in the figures. The surface characteristics for SPM were included in the corresponding figures in the September 13, 2024, submission.

The DEP is sharing its AERSURFACE runs for SPM and the corresponding Excel workbook containing the surface characteristics comparison charts for Beaver Valley and SPM.

5.8 NAAQS Analysis and Increment Analyses

5. In response to Comment #22 in the DEP's December 20, 2024, technical comments, Shell stated that it will update the Note [A] on PDF Page 739 of the Plan Approval Application to include the additional information requested. However, the requested information, i.e., date of the 'approved modeling protocol' associated with 1-hr maximum NOx emission rate being divided by 5, was not included in the revised Appendix B shared with DEP SWRO. If the date of the 'approved modeling protocol' cannot be confirmed, an alternative is to just cite the previous PSD modeling approved by the DEP, i.e., 2020 submission.

6.4 EMACT Project Significant Impact Analysis Results

6. In Table 14, the maximum modeled impact for 24-hr PM2.5 is the maximum 5-year average concentration (i.e., 0.014 $\mu g/m^3$). However, as stated in 5.4 Significant Impact Analyses, Shell decided to use the maximum impacts from across the 5 years (i.e., 0.022 $\mu g/m^3$) for both NAAQS and PSD SILs.

6.6 NAAQS Analysis Results

7. In Table 16, total concentration for 1-hr CO should be 5,718 $\mu g/m^3$, and not 5,728 $\mu g/m^3$.

7.0 Class II Visibility Analysis

8. Please provide the details for the calculations of plume heights summarized in Table 18 to support the visibility conducted, i.e., separate VISCREEN analysis for the flares.

In absence of information (which was requested by the DEP in its December 20, 2024, comments), the DEP, as part of its review, tried to verify the plume heights summarized in Table

18 using the Briggs plume rise equation, based on the approach taken by Shell, and using SCREEN3, which is an EPA's screening tool that has the capability to output/print its calculated plume rise values. In using the Briggs plume rise equation, the average wind speed *u* was set at 1 m/s (i.e., VISCREEN worst-case wind speed) and the ambient temperature was set at 288.15 K (i.e., lowest stack temperature among Shell's sources). In running SCREEN3, the stability was set to neutral conditions to correspond to the Briggs plume rise equation, which is for neutral plume rise. Most of the plume heights calculated using the Briggs plume rise equation and modeled using SCREEN3 were within range of or higher (i.e., for the ground flares and elevated flares, plume heights obtained by the DEP would support Shell's approach of conducting separate VISCREEN analysis for the flares) than Shell's plume rise values except for the plume heights for cooling towers. For the cooling towers, Shell's values ranged from 1,013 to 1,100 m whereas plume heights estimated by the DEP ranged from 410 to 450 m using the Briggs plume rise equation and approximately 28 m using SCREEN3.

Attachment A
Modeled Source Input Data

9. On Page A-15 of Attachment A, please correct the following information in the "Non-Road Volume Source Parameter Calculations" table. These corrections were part of the DEP's December 20, 2024, comments: PEU2 source parameters should match PEU1 source parameters; remove PEU3 since all its emission points are modeled as point sources (no PEU3 in the modeling input file); and in the footnote, change Table 3-1 to Table 3-3.

Appendix D-2
Additional Impacts Analysis: Potential Growth Impacts and Impairment to Soils and Vegetation for Shell Polymers Monaca, Beaver County, Pennsylvania

10. In Section 2.3 Potential Impairment of Vegetation, Subsection E. Potential Phytotoxic NOx Effects, please confirm if the 4.78 $\mu g/m^3$ value for NOx concentration should be 5.311 $\mu g/m^3$ – i.e., the 4.78 $\mu g/m^3$ to be adjusted by the NO_2/NOx ratio (0.9) used in the PVMRM. Please refer to and confirm the derivation of the previous value (i.e., 3.59 $\mu g/m^3$).

Appendix D-3B
Dispersion Modeling Analysis for the Inhalation Risk Assessment for Shell Polymers Monaca, Beaver County, Pennsylvania

11. The following comments (comment #'s) on PSD modeling also apply to the dispersion modeling for inhalation risk assessment: Comments #1, #2, #3, and #4 (i.e., Figures 11 and 12 of Appendix D-3B).