Shell Chemical Appalachia LLC
300 Frankfort Rd
Monaca, PA 15061

March 25, 2025

Henry F. Bonifacio, Air Quality Program Specialist
Stephen J. Steirer, Air Quality Engineer
Pennsylvania Department of Environmental Protection
Bureau of Air Quality
P.O. Box 8468
Harrisburg, PA 17105-8468

Re: Shell Chemical Appalachia LLC
Shell Polymers Monaca
Application for Plan Approval 04-00740D - WWTP Permanent Controls Project, EMACT Project, and Plan Approval Reconciliations
PSD Air Quality Analyses and Inhalation Risk Assessment Response to Technical Review Comments

Dear Mr. Bonifacio and Steirer:

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 20, 2024, DEP provided Shell with a technical review comments letter for the referenced plan approval application, which included itemized requests for additional information for the PSD Air Quality Analyses (Enclosure 1, Comment #s 1-34) and Inhalation Risk Assessment (Enclosure 2, Comment #s 1-48). Shell is submitting this response to address each of the technical review comments and has organized this response by enclosure (Enclosure 1 – PSD Air Quality Analyses DEP Technical Review Comments and Shell's Responses and Enclosure 2 – Inhalation Risk Assessment DEP Technical Review Comments and Shell's Responses) consistent with the December 20, 2004 letter. Following DEP's review and approval of the attached responses, Shell will submit updated PSD Air Quality Analyses and Inhalation Risk Assessments reports and associated modeling files and figures.

If you have any questions regarding this response, please contact me at (724) 709-2467 or kimberly.kaal@shell.com.

Sincerely,

Kimberly Kaal

Kimberly Kaal
SPM Environmental Manager

CC:

Mark Gorog, DEP/SWRO/Air Quality
Sheri Guerrieri, DEP/SWRO/Air Quality/New Source Review
Alexander Sandy, DEP/SWRO/Air Quality/New Source Review
Lauren Camarda, DEP/SWRO/Communications
Emily Green, DEP/SWRO/Environmental Justice
Michelle Homan, DEP/Environmental Toxicology
Nicholas Lazor, DEP/BAQ/Director
Viren Trivedi, DEP/BAQ/Permits
Sean Wenrich, DEP/BAQ/Permits/New Source Review
Andrew Fleck, DEP/BAQ/Permits/Air Quality Modeling and Risk Assessment
Martin Padilla, Shell Polymers Monaca HSSE Manager
Alan Binder, Shell Sr. Environmental Engineer - Air Quality
Laura Sabolyk, Shell Senior Regulatory Advisor
Michael Carbon, Landau Associates Senior Principal
Aubrey Jones, Landau Associates Principal

Enclosures: Enclosure 1 – PSD Air Quality Analyses
Enclosure 2 – Inhalation Risk Assessment
Attachment A – TEGF A and TEGF B EMACT Project SIL Rate Calculation

ENCLOSURE 1

Appendix D-1

Air Dispersion Modeling and Class II Visibility Analysis for Shell Polymers Monaca in Beaver County Pennsylvania

1.0 Introduction and Summary of Results

1. *On Page 1-2, there is a statement that reads "[t]he analyses were conducted to ensure that the EMACT Project and Plan Approval Reconciliations and WWTP Permanent Controls Project do not cause or contribute to air pollution in excess of a NAAQS or PSD Increment." Shell should clarify that the set of emissions evaluated for the EMACT Project differed from that of the Plan Approval Reconciliations and WWTP Project and a different set of air quality standards (i.e., NAAQS and PSD Increments) applies to each evaluation/air quality analysis. Therefore, the DEP suggests rephrasing the statement referenced above as follows: "The analyses were conducted to ensure that the EMACT Project does not cause or contribute to air pollution in excess of a NAAQS or PSD Increment and to ensure that the Plan Approval Reconciliations and WWTP Permanent Controls Project, in conjunction with the EMACT Project, do not change the overall results of the previous air quality analyses, which demonstrate compliance with the applicable NAAQS and PSD Increment standards."*

   Response: As requested, Shell will incorporate the suggested text revisions into the revised modeling submittal.

2. *On Page 1-3, Shell stated that the analysis in the modeling report "conforms with the modeling protocol submitted on June 5, 2024, and approved by the PADEP on June 6, 2024." However, the scope of the said modeling protocol was for the EMACT Project only and did not include the Plan Approval Reconciliations and WWTP Project. This clarification should be included in the affected paragraph.*

   Response: As requested, Shell will add this clarification on the modeling protocol in the revised submittal.

1.1 Modeling Revisions

3. *The U.S. Environmental Protection Agency (EPA) released v24142 of AERMOD, AERMAP, AERMET, and AERSURFACE on November 20. 2024. Subsequently, EPA released a recompiled 64-bit AERMOD executable on December 4, 2024. If re-execution of AERMOD is warranted in responding to these comments, the latest versions of AERMOD and its associated programs should be used. See Comments #9 and #13.*

   Response: Because revised modeling is required to address updates to buildings layouts, source parameters and emission rates, the updated versions of AERMOD, AERMAP, AERMET, and AERSURFACE will be used in the revised modeling analyses.

4.0 Model Selection and Model Input

4. *This section has two pages of 4-1 and two pages of 4-2.*

Response: As requested, Shell will correct these page numbers in the revised modeling submittal.

4.3 Source and Monitoring Data

Good Engineering Practice Stack Height Analysis

5. *There were three (3) two-tiered structures that were modeled as six (6) single-tiered structures, with each tier defined as a separate single-tiered building. BPIPPRM calculates building downwash parameters for each tier, i.e., "first half" of BPIPPRM calculations, and, if there are more than one building/structure, for combined tiers of sufficiently close structures, i.e., "second half" of BPIPPRM calculations. The final building downwash parameters would be from the "half" with the highest wake effect heights (see Page 74 of the EPA's "User's Guide to the Building Profile Input Program"). Defining each tier of a multi-tiered structure as a separate structure instead of as a tier of the multi-tiered structure would influence the calculation of building downwash parameters during the "second half" of BPIPPRM. Therefore, pursuant to the EPA's "User's Guide to the Building Profile Input Program", the DEP recommends that each tier of a given building be defined as a tier of that building. The pair of single-tiered structures that should have been defined as part of two-tiered structures are the following:*

    a. *PE12 & PE121 – PE12 is higher than but within PE121.*

    b. *PERAIL & PESILOR – PESILOR is higher than but in the middle of PERAIL.*

    c. *PE3TNK & PE3 Tier 1 – i.e., PE3TNK is higher than but within PE3 Tier 1. Please take note of the comment that PE3 Tier 1 (i.e., building PE3) be defined as a multi-tiered structure. See Comment #30 for details.*

    Response: As requested, Shell will make appropriate changes to the building files to define the structures as a tier of a multi-tiered buildings consistent with EPA's "User's Guide to the Building Profile Input Program".

6. *Based on the BPIPPRM input file provided, two circular structures (PEREACT1, PEREACT2) were inside and lower than PE121. If this were the case, i.e., inside a much larger and higher structure, there would have been no need to define these circular structures in the BPIPPRM input file. Please confirm the parameters/information for the two circular tiers – e.g., wrong locations (not inside PE121), wrong height (to represent tanks or stacks on top of PE121), etc. In addition, as discussed in Comment #5, PE121 should have been defined as part of a two-tiered structure.*

    Response: As part of the revised modeling analyses, Shell will update the PEREACT1 and PEREACT2 structures location to be outside the PE121 structure to reflect their actual locations. In addition, the PESURGE1 and PESURGE2 circular structures

adjacent to the PE121 building will be removed as PESURGE1 and PESURGE2 and associated stairways and scaffolding structures comprise the 117 meter tall portion of PE12.

Monitor Data Usage

7. *For Table 1 on Page 4-9:*

    a. *As indicated in the footnote of the equivalent table in the modeling protocol approved on June 6, 2024, the values for PM2.5 in Table 1 are design values and not maximum monitored values.*

    b. *For the EMACT Project, SIL analyses were conducted for CO, NO2, and PM2.5. Therefore, in the footnote, rephrase "less than the PM2.5 SILs" to "less than the CO, NO2, and PM2.5 SILs.*

    Response: As requested, Shell will incorporate these footnote revisions in the updated modeling submittal.

8. *For Beaver Falls 1-hour NO2 concentration measurements, Hour 01 has no data because of scheduled daily calibration implemented by the DEP on all its monitors. For documentation purposes, please describe the data substitution applied for Hour 01.*

    Response: To account for the missing data for Hour 01, the following data substitution was used:

    - If Hour 00 and 02 have data, the average of the two values is substituted for the Hour 01 missing value.
    - If either Hour 00 or 02 is missing, Hour 01 is marked as missing.

    Using this substitution methodology, Hour 01 has a similar data completeness rate as the other hours in the dataset. This will be documented in the updated modeling submittal.

4.4 Receptor Data

9. *If re-execution of AERMOD is warranted in responding to these comments (see Comment #3), the receptor elevations and hill height scales should be calculated using the latest version of AERMAP.*

    Response: As described above in response to Comment #3, Shell will use the new version of AERMAP in the updated modeling analyses.

4.5 Meteorological Data

Data Selection and Representativeness

10. *Aside from the runs that used ZORAD (Default Method for Determining Roughness Length), AERSURFACE modeling files provided also included a run that used the option ZOEFF*

(Experimental Method for Determining Roughness Length). Figures 10 and 11 of the PSD modeling report were based on runs that used ZORAD only. If the run that used ZOEFF was used in the analysis, the modeling report should document the details and the results. If it was not used, the associated modeling files in the submission should be removed.

Response: The AERMOD modeling analyses submitted in the application for Plan Approval 04-00740D were performed using ZORAD meteorological files. The ZOEFF files were inadvertently included in the modeling files and will be removed in the updated modeling submittal.

Data Processing

11. *The first paragraph on Page 4-18 should indicate that the Beaver Valley meteorological data were processed under the ONSITE pathway in AERMET Stage 1.*

    Response: As requested, Shell will add documentation describing that the Beaver Valley meteorological data was processed under the ONSITE pathway in AERMET Stage 1 in the updated modeling submittal.

12. *Page 4-18 should state that AERMET Stage 2 was executed using the adjust u* option for documentation purposes. See language in the modeling protocol approved on June 6, 2024.*

    Response: As requested, Shell will add documentation describing that AERMET Stage 2 was executed using the adjust u* option in the updated modeling submittal consistent with the approved modeling protocol.

13. *If re-execution of AERMOD is warranted in responding to these comments (see Comment #3), the latest version of AERMET should be used. The DEP has reprocessed the meteorological dataset using the latest versions of AERMET and AERSURFACE and, if appropriate, will share the meteorological files with Shell.*

    Response: As described above in response to Comment #3, Shell will use the new version of AERMET in the updated modeling analyses.

5.2 Turbine Load/Operating Conditions

14. *On Page 5-2, it stated that the "emissions and flows for the other loads and operating modes were scaled from the 100% load condition." In the table for Turbine Load Analysis on Page A-6, the footnote stated that "Emissions are approximately linear with load. Flow and Velocity are not." Without any other details, it is not clear how the flow/velocity values for the other load conditions (45%, 75%) were scaled from the 100% load condition. Note that preliminary evaluations on turbine load and operating conditions were not discussed in the modeling protocol for the EMACT Project approved on June 6, 2024. For documentation purposes, please describe the scaling done for the flow/velocity values used in modeling the lower turbine load conditions.*

    Response: The flow rates used for the load condition modeling analysis were scaled based on proprietary information provided by GE for the Frame 6B combustion turbines.

Specifically, the 75 percent load flow rate (i.e., 297,771 cfm) is 80 percent of the 100 percent load flow rate and the 45 percent load flow rate (i.e., 223,406) is 60 percent of the 100 percent load flow rate.

15. *The three combustion turbines are equipped with CEMS to measure CO and NOx. Using CEMS data and other required/available monitoring (e.g., load operating level), please confirm and/or demonstrate that the assumption that emissions are "approximately linear with load" is true. Note that under Plan Approval 04-00740A, the combustion turbines are subject to a different CO emission limit during startup and shutdown periods, which are both defined in the plan approval in terms of baseload operating level – i.e., startup begins when the combustion turbine reaches 55% of its baseload operating level while shutdown begins when the combustion turbine drops below 55% of its base load operating level. Thus, it is assumed that for compliance purposes, operating levels of the combustion turbines are being monitored and recorded.*

Response: As shown in Figure 1 below, the three combustion turbines 2023 and 2024 CEMS data indicates that the actual lb/hr emission rates for NOx are linear between the 75 percent load and 100 percent load consistent with the load analysis modeled emission rates. Additionally, as shown Figure 2 below, 2023 and 2024 CEMS data indicate that the CO emissions at 75 percent load and 100 percent load are essentially equivalent and do not increase with load as initially anticipated. Finally, as shown in Figures 1 and 2, the combustion turbines rarely run in startup or shutdown mode (i.e., 45 percent load) and are only permitted to operate for 7 hours per year, thus limited data is available at the 45% load rate.

Figure 1. NOx CEMS Data from Cogens 1, 2, and 3 from 2023 and 2024

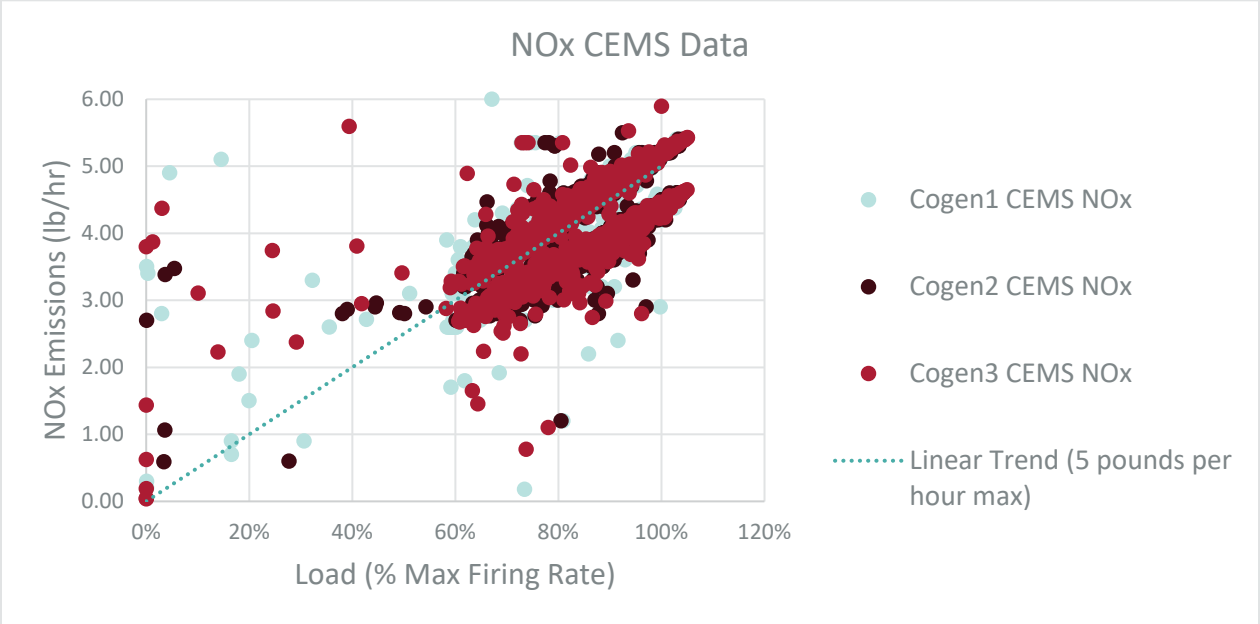
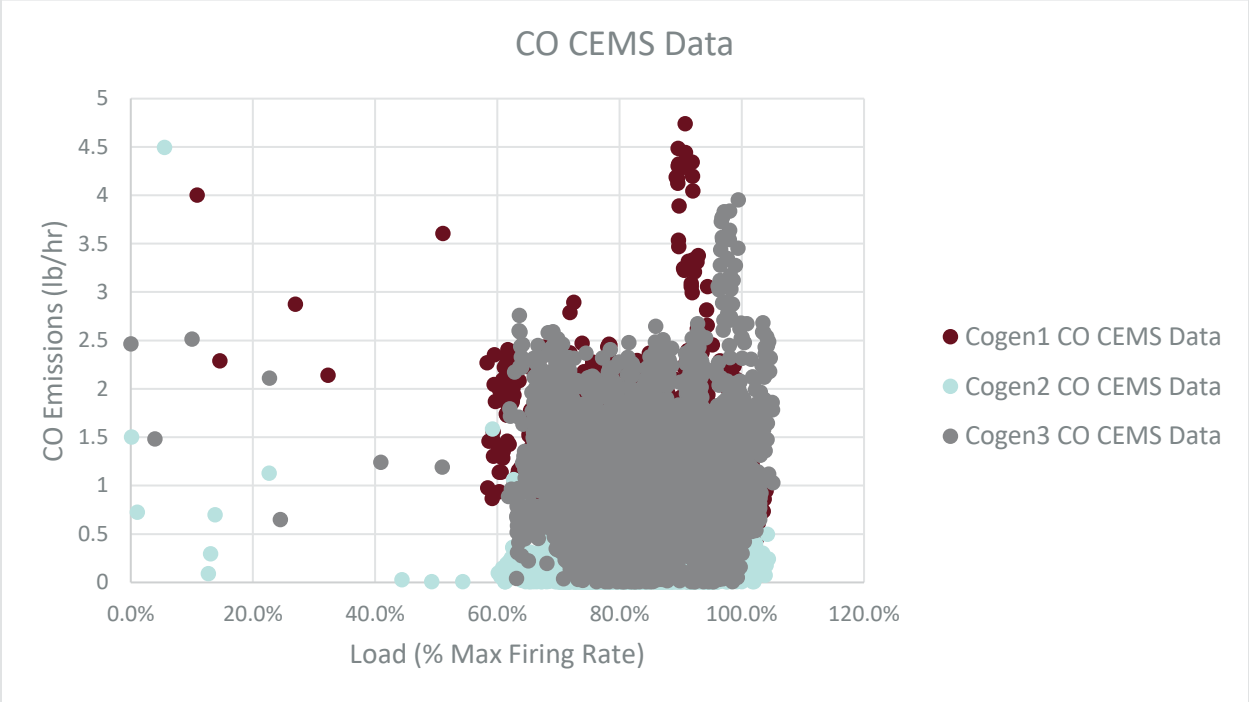


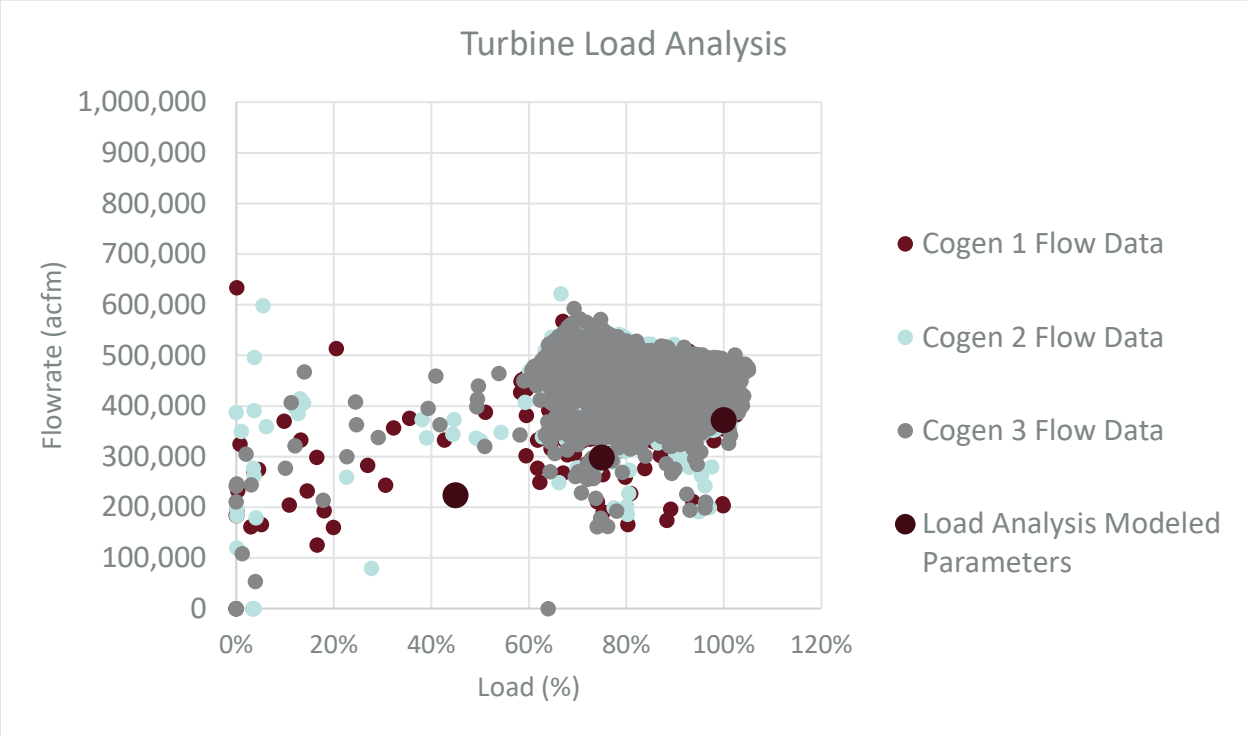
Figure 2. CO CEMS Data from Cogens 1, 2, and 3 from 2023 and 2024



16. *In Shell's quarterly CEMS report (e.g., Year 2022, Quarter 3), CO and NOx emissions are reported in terms of 'ppm' and 'lbs/hr'. Having emissions being reported in terms of 'lbs/hr' would indicate that stack volumetric flow rate is being monitored. If the flow/velocity values for the other load conditions (45%, 75%) in the turbine load analysis were not based on measured values, please confirm and/or demonstrate that the scaling applied for flow/velocity at the other load conditions would agree with the trend/relationship based on measurements. As stated in Comment #15, it is assumed that operating levels of the combustion turbines are being monitored and recorded.*

Response: Actual flow/velocity for the three combustion turbines is not directly measured but is calculated using F-Factor consistent with Method 19 as allowed under 40 CFR 60 NSPS KKKK. As shown in Figure 3 below the estimated actual flow rates for 2023 and 2024 between the 75 percent load and 100 percent load are equivalent across the two loads. It should be noted that the actual flow rates are approximately 30% greater at 75% load and approximately 12% greater at the 100% load than the modeled flow rates. Because the actual flow rates are higher than those used in the load analysis and the fact that emissions of CO are essentially equal at the two 75% and 100% loads, the previous combustion turbine load analysis is considered conservative and over-predicts impacts of the combustion turbines at the different operating rates. Thus, Shell proposes to retain the current load analysis.

Figure 3. Outlet Flowrate Data from Cogens 1, 2, and 3 from 2023 and 2024



5.4 Significant Impact Analysis

17. *For Table 4 on Page 5-5:*

    a. *Please include/define the PSD Class II significant impact levels for PM10.*

    b. *For footnote 'a', please change 'Table 4' (which is for PSD Class II SILs) to 'Table 6' (which is for NAAQS). The affected statements should reference the Beaver Falls background values (Table 1) and the NAAQS (Table 6). Please see equivalent table in the modeling protocol approved on June 6, 2024.*

    Response: As requested, Shell will include additional documentation for the PSD Class II significant impact levels for PM10 and correct the table numbers and associated references in the revised modeling submittal.

18. *Please incorporate a table summarizing the emission rates, i.e., emission rates due to the EMACT Project, for NOx, CO, and PM2.5 used in the EMACT Project SIL analysis and provide details on their calculations, i.e., emission factor, heat input, etc.*

    Also, please address the difference in heat input settings used in calculating NOx and CO emissions rates for TEGF A and TEGF B in the SIL analyses. Based on the review of emission rates in the modeling input files, maximum short-term heat inputs estimated from the hourly NOx and CO emission rates, i.e., emission rate increases for NOx and CO, respectively, due to

the EMACT Project, used in the SIL analyses differed from each other. Utilizing the emission factors on PDF Page 739 of the Plan Approval Application, the hourly NOx emission rate used in the 1-hr NO2 SIL analysis has an equivalent heat input of 1,715 MMBtu/hr per flare whereas the hourly CO emission rate used in the 1-hr/8-hr CO SIL analysis has a lower equivalent heat input at 528 MMBtu/hr per flare. In contrast, the hourly NOx and CO emission rates for TEGF A and TEGF B in the NAAQS analyses were both calculated using the same maximum short-term heat input setting, i.e., 3,900 MMBtu/hr per flare.

Response: Please see Attachment A herein for a table summarizing the calculation of the EMACT Project NOx, CO, and PM2.5 SIL analysis emission rates that will be used in the revised EMACT Project SIL analysis modeling. The TEGF A and TEGF B heat inputs used to calculate the EMACT Project NOx, CO, and PM2.5 SIL analysis emission rates are documented in this table. In the previous EMACT Project CO SIL analysis, the CO emission rate for each of the TEGFs was incorrectly calculated using a heat input of 528 MMBtu/hr for each TEGF. As indicated in the table in Attachment A, the same short-term heat input of 343.09 MMBtu/hr will be used for each of the TEGFs to calculate the short-term NOx, CO, and PM2.5 emission rates, respectively, that will be input in the revised EMACT Project SIL analysis modeling.

19. *The same hourly NOx, CO, and PM10 emission rate values for TEGF A and TEGF B were used by Shell in the Plan Approval Reconciliation and WWTP Project SIL analysis and cumulative analyses (NAAQS and/or Increment). However, according to Page 5-1 of Appendix D-1 of the Plan Approval Application, SIL analysis for the Plan Approval Reconciliation and WWTP Project were based on "proposed facility-wide potential emissions minus the emissions increases associated with the EMACT Project" while the corresponding cumulative analysis "also includes the emissions increases associated with the EMACT Project."*

    a. *Please explain why the hourly NOx and CO emission rates for TEGF A and TEGF B for the SIL analysis were based on the maximum short-term heat input of 3,900 MMBtu/hr per flare, which is the setting used in calculating the flares' hourly NOx and CO emission rates for the NAAQS analysis. Based on the discussion included in Comment #18, the maximum short-term heat input increase due to the EMACT Project is the 1,715 MMBtu/hr per flare value as estimated from the NOx emission rate (or 528 MMBtu/hr if estimated from the CO emission rate). This would imply that the maximum short-term heat input prior to the EMACT Project is not 3,900 MMBtu/hr per flare and estimated to be approximately 2,185 and 3,372 MMBtu/hr per flare if based on NOx and CO emission rates, respectively. It should be noted that in the 2020 revised PSD modeling, the maximum short-term heat input of 1,363 MMBtu/hr per flare was documented and used.*

    b. *Similarly, please explain why the same PM10 emission rate was used for the SIL analysis and cumulative analyses (NAAQS, Increment) for 24-hr PM10. According to Note [A] on PDF Page 739 of the Plan Approval Application, the PM10 maximum emission rate was based on a maximum 24-hr average from actual process data. The*

DEP assumes that the actual process data does not yet reflect emissions from the combustion of supplemental gas.

Response: a. The Plan Approval Reconciliation and WWTP Project short-term SIL analysis and cumulative analyses use the short-term potentials to emit of relevant pollutants from the TEGF A and TEGF B because these retrospective air quality analyses are for a new stationary source (SPM). The short-term heat input of 3,900 MMBtu/hr per TEGF is based on the heat input during SU/SD operations, which may not require elevated supplemental gas combustion at the TEGFs due to the high heat content of the waste gas streams that can be routed to the flares during SU/SD operations. Therefore, the 3,900 MMBtu/hr heat input per TEGF is considered the short-term potential heat input irrespective of the EMACT Project. Alternatively, the short-term maximum total supplemental gas heat input accounted for in the EMACT Project analysis is for venting scenarios that do require elevated amounts of supplemental gas to maintain compliance with EMACT NHVcz requirements.

b. The TEGF A and TEGF B heat inputs during the referenced 24-hour period did not include the combustion of supplemental gas. Therefore, the same PM10 emission rate was appropriately used for the SIL analysis and cumulative analyses for 24-hr PM10.

5.7 NO2 Analyses

20. *According to the modeling report (Page 5-8) and the modeling protocol approved on June 6, 2024, 100% NOx to NO2 conversion was conservatively assumed in assessing compliance with the annual NO2 NAAQS (and increment). However, based on AERMOD input files provided, the Tier 3 PVMRM (Plume Volume Molar Ratio Method) was applied instead for the annual NO2 NAAQS analysis.*

    Response: As requested, Shell will update the modeling report to document the specific NOx conversion to NO2 methodology used in the modeling analyses. Specifically, Shell will update the modeling report to document that the PVMRM methodology is used to assess compliance with the 1-hour and annual NO2 NAAQS, 100% conversion of NOx to NO2 methodology is used for the increment modeling, and ARM2 methodology is used for Class I annual and Class II 1-hour and annual SIL.

5.8 NAAQS Analysis and Increment Analysis

21. *The hourly NOx emission rate used for TEGF A, TEGF B, and HP Elevated flare in the cumulative analysis was based on a maximum short-term heat input rating of 3,900 lb/MMBtu per flare (i.e., anticipated rate from various SU/SD events) and was then scaled based on the assumption that turnaround SU/SD events are expected to occur less than once every five years (see Comment 23). The resulting hourly NOx emission rate (6.6829 g/s) has an equivalent maximum short-term heat input of 780 MMBtu/hr per flare. Please confirm from process data that the actual individual short-term/hourly heat inputs, except during the 'various SU/SD events', for the three flares plus the equivalent heat inputs for the estimated individual amount/s of supplemental gas needed would not exceed the 780 MMBtu/hr value.*

If the equivalent heat input in calculating the NOx emission rate increase due to the EMACT Project would be 528 MMBtu/hr instead of 1,715 MMBtu/hr (see Comments #18 and #19), the 780 MMBtu/hr value should be lowered to 542 MMBtu/hr.

Response: Measured data has not indicated a maximum short-term heat input (including supplemental gas) greater than 780 MMBtu/hr per flare during non-SU/SD operating scenarios. As discussed in the response above for Comment #19, the TEGF A, TEGF B, and HP Elevated flare heat inputs used in the short-term cumulative analyses do not require adjustment due to the EMACT Project.

22. *For Note [A] of the Flare Emission Calculation Notes on PDF Page 739 of the Plan Approval Application, please include the date of the 'approved modeling protocol' associated with 1-hr maximum NOx emission rate being divided by 5, i.e., because turnaround SU/SD events are expected to occur less than once every five years. This is to clarify that this calculation approach was not discussed in the modeling protocol for the EMACT Project recently approved by DEP on June 6, 2024. If the discussion in the March 1, 2011, EPA guidance ("Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard"), which was cited in the June 6, 2024, modeling protocol, would be the basis, dividing the 1-hour maximum NOx rate by 5 would be equivalent to having SU/SD events 1,752 hours per year (8,760 hours). The DEP notes that this is a conservative assumption.*

    Response: As requested, Shell will update the Note [A] to include the additional information requested in Comment #22 in the revised modeling submittal.

23. *For the PTE calculations for PE Units 1 and 2 Process Vent PM10 emissions, the table on PDF Page 724 of the Plan Approval Application used the terminology "Total per Line". This could be interpreted such that the two lines would have the same PM10 emission rates in the AERMOD runs. Based on the review of AERMOD input files, each of this line was modeled as having two emissions components, one modeled as a point source and the other modeled as a volume source. For their emissions components modeled as point sources, PEU1 and PEU2 have the same 24-hr emission rate and annual emission rate. However, for their emissions components modeled as volume sources, PEU1 has a higher 24-hr emission rate and a lower annual emission rate than those for PEU2.*

    Response: As accurately stated in comment # 23, Shell represented emissions from PEU1 and PEU2 as two volume sources and a two point sources. The PEU1 point source represented emissions from the Catalyst Vent Filter Vent (PE Unit 1: S-240901) and the PEU2 point source represented emissions from Catalyst Vent Filter Vent (PE Unit 2: S-340901). The PEU1 volume source includes emissions from following PEU1 equipment: Granular Resin Surge Hoper Filter Vent, Bag Dump Station/Dump Hopper Filter Vent, Talc Surge Bin Filter Vent, Mixier Feed Hopper Filter Vent, Pellet Dryer Vent, Additive Surge Bin Filter Vent, Solid Additive/Talc Feeder Filter Vent, Pellet Surge Hoper Filter Vent, Seed Resing Storage Bin Filter Vent, Catalyst Hold Tank Filter Vent and the shared PEU1 and PEU2 Vacuum Cleaning System Filter Vent. PEU2 volume source includes the following PEU2 equipment: Granular Resin Surge Hoper Filter Vent, Bag Dump Station/Dump Hopper Filter Vent, Talc Surge Bin

Filter Vent, Mixier Feed Hopper Filter Vent, Pellet Dryer Vent, Additive Surge Bin Filter Vent, Solid Additive/Talc Feeder Filter Vent, Pellet Surge Hoper Filter Vent, Seed Resing Storage Bin Filter Vent, Catalyst Hold Tank Filter Vent and the shared PEU1 and PEU2 Talc Storage Silo Filter Vent. The emissions from these two volume sources are not equal as the shared PEU1 and PEU2 Talc Storage Silo Filter Vent emissions are based on flow rate of 10,422.5 acfm and hours of operation of 2,920 hours per year, while the shared PEU1 and PEU2 Vacuum Cleaning System Filter Vent emissions are based on flow of 25,772 acfm and 26 hours per year. Thus, the difference in flow rates and operating hours accounts for the difference in max hourly emission rate and annual emission rates between the two PEU1 and PUE2 volume sources.

6.2 Furnace Mode and Worst-Case Operating Condition Results

24. *On Pages 6-1 and 6-5, the results of the worst-case furnace analysis, which were conducted on 1-hour, 8-hour, and 24-hour basis, were applied only to CO and NO2 – i.e., for PM10, all seven furnaces have the same PM10 emission rates in the cumulative analyses. CO and NO2 both do not have 24-hour standards. Please consider removing reference for "24-hour" in the discussion on Page 6-1 and in Table 10 on Page 6-5.*

Response: As recommended Shell will remove the reference to 24-hour basis on Page 6-1 and in Table 10 on page 6-5.

6.3 Secondary PM2.5 Analysis Results

25. *In Table 11 on Page 6-5:*

    a. *Please revise to include the values for '24-hour and Annual Modeled Impact from Hypothetical Source' for Class I areas, as was done for Class II areas. Shell may consider having separate tables for Class II and Class I data (e.g., Table 11a, Table 11b).*

    b. *Please correct footnote 'b', which states that the hypothetical source used is in Allegheny County, PA. As mentioned in Section 6.3 of the modeling report, and as checked by the DEP using data downloaded from the EPA's MERPs View Qlik, "[t]he results were calculated from the highest modeled concentrations from the 500 tpy sources in the Northeast and Ohio Valley climate zones."*

Response: As recommended Shell will include separate tables for Class I and II data and correct footnote "b" in the revised modeling submittal.

6.4 EMACT Project Significant Impact Analysis Results

26. *For Table 12 on Page 6-6, revise the 'Maximum Modeled Impact' for PM2.5, 24-hr Avg Period. Based on SUM files provided, the highest value should be 0.021 µg/m3, and not 0.020 µg/m3.*

Response: As requested, Shell will correct the value listed in Table 12 on page 6-6.

7.0 Class II Visibility Analysis

27. *On Page 7-3, it stated that the dispersion condition of F stability and 2-m/s wind speed were used for Level-2 VISCREEN screening. However, based on the Iowa DNR Screening Tool provided (i.e., with screenshot on Page 7-6), the worst-case dispersion condition, which was identified using the 1% cumulative frequency criterion, using the 1987 – 1991 KPIT ISC meteorological dataset had F stability and 1-m/s wind speed. This is the dispersion condition highlighted in the resulting run using the Iowa DNR Screening Tool.*

    The DEP understands that the combination of F stability and 1-m/s wind speed is the default setting in the Level-1 VISCREEN screening. Given that the identified worst-case dispersion condition from actual measurements also had F stability and 1-m/s wind speed, Level-1 and Level-2 VISCREEN screening were basically the same in this case. Please provide documentation and/or guidance to support not using the combination of F stability and 1-m/s wind speed for Level-2 VISCREEN screening even if meteorological data analysis indicates it is the actual worst-case dispersion condition. Otherwise, the DEP recommends that Shell follow the steps below to determine if there will be potential visibility impairments (at Raccoon Creek State Park).

    a. *Step #1: Level-2 VISCREEN screening with refined settings instead of using default values. For details, see the EPA's "Workbook for Plume Visual Impact Screening and Analysis" (EPA-454/R-92-023) – e.g., Page 41. If potential visibility impairments are indicated, or if skipping this step, proceed to either Step #2 or Step #3.*

    b. *Step #2: Level-2 VISCREEN screening using a most recent meteorological data. The challenge with this is the processing of the current meteorological data format into the ISC format – i.e., different parameters for atmospheric stability. If potential visibility impairments are indicated, proceed to Step #3*

    c. *Step #3: Level-3 analysis (i.e., estimate frequency distributions of dispersion conditions and plume visual impacts, etc.). Please see Chapter 5 of the EPA's "Workbook for Plume Visual Impact Screening and Analysis." Recommended model for Level-3 analysis is PLUVUE II (a more sophisticated plume visibility model). There is also an optional use of VISCREEN for Level-3 analysis.*

    Response: Shell agrees that the Level-2 VISCREEN should have used a F stability and 1 -m/s wind speed. However, as discussed in the FLAG 2010 Guidance[1], the VISCREEN model conservatively assumes that multiple emission sources with significantly different exhaust plume heights will have overlapping plumes resulting in a combined impact on visibility. The FLAG 2010 Guidance further states that in specific instances where sources have significantly different exhaust plume heights, they should be treated separately as the visibility impacts from the plumes would not

[1] Flag 2010 Guidance, page 39 (https://www.fws.gov/guidance/sites/guidance/files/documents/FLAG%20Air%20Quality%20Phase%201%20report.pdf)

overlap. Using the Briggs plume rise calculation[2], Shell calculated plume heights for all sources included in the Level-1 VISCREEN analysis. The table below summarizes the estimated plume heights for sources at the facility. Based on these calculations the three high pressure flares (i.e. HP Ground Flare #1, HP Ground Flare #2, and HP Elevated Flare) have estimated plume heights ranging from 4,886 meters to 4,955 meters, while the remaining sources have drastically lower plume heights with a maximum being 1,100 meters and an average plume height of less than 275 meters. The plume heights from the three high pressure flares are approximately 4.5 times greater than the next highest plume height (Cooling Towers) and over 18 times higher than the average plume height of the other emission sources. As such, Shell's revised Level-1 VISCREEN analysis will consist of two separate analyses, one for the three high pressure flares and a second for the rest of the emission sources which were conservatively grouped together. Consistent with the FLAG 2010 Guidance because the probability of these plumes overlapping from a visibility perspective is extremely unlikely, the two sets of results will be reported and compared to the visibility screening criteria.

Source Category	***Plume Height (m)***
HP Flares	*4,886 - 4,955*
Cooling Towers	*1,013 - 1,100*
Combustion Turbines/Duct Burners	*943*
Continuous Vent Thermal Oxidizer	*810*
Ethane Cracking Furnaces	*495 - 539*
Spent Caustic Vent Incinerator	*142*
Pellet Dryer Vent	*137*
Filter Vents	*18 - 75*
Fire Water Pumps	*65*
Multipoint Ground Flare	*39*
Emergency Generators	*7 - 21*
Rail to Truck Talc Transfer	*4*

[2] EPA Workbook for Estimating Visibility Impairment (EPA-450/4-80-031), Section 4.1.1.

Attachment A

Modeled Source Input Data

28. *Attachment A is not mentioned in the modeling report. Please cite Attachment A under the appropriate section/s of the modeling report.*

    Response: As requested, Shell will add appropriate references to Attachment A in the updated modeling report.

29. *Unless each cooling tower exhausts through one of its two cells at a time only, the 16 cooling towers (13 Process Cooling Towers, 3 Cogeneration Plant Cooling Towers) should be modeled as 32 emission points, i.e., two emission points per cooling tower, instead of 16 emission points. If each cooling tower exhausts through one of its two cells at a time only, please state this fact in the document.*

    Response: To more accurately reflect actual cooling tower configurations, Shell will update the modeling analyses to separate cooling tower emission so that each cell has its own emission source (i.e., 26 Process Cooling Towers, 6 Cogeneration Plant Cooling Towers).

30. *Based on their modeled stack heights (ranging from 17.53 to 42.67 m) and locations, most of the emission points for PE Unit 3 Process Vent are within and lower than a building named PE3, which has a building height of 45.72 m. This indicates that either the emission points and/or the building were not properly defined in the model.*

    a. *Confirm the stack heights and locations of the affected emission points, i.e., Model IDs AFEEDA, AFEEDB, AFEEDC, AFEEDD, AUSA, AUSB, AUSC, AUSD, EXTRUD, FIBC, and PELTDRY.*

    b. *Define building PE3 in BPIPPRM as a multi-tiered structure (i.e., several tier heights) instead of a single-tiered structure (i.e., one building height only). Also, please take note that PE3TNK should be part of or combined with building PE3. See Comment #5 for details.*

    Response: The emission points for PE Unit 3 Process Vent are not located within and lower than the PE3 building as depicted in the modeling analysis. Shell will make appropriate updates to the PE3 building and PE Unit 3 Process Vent emission sources in the updated modeling submittal. Specifically, PE3 will be set up as a multi-tiered structure that incorporates PE3TNK and additional tiers and the locations of the emission points for PE Unit 3 Process Vent will be revised to reflect actual exhaust locations.

31. *On Page A-2, for the table with heading 'Effective Release Heights and Diameters for Flares', the equations for flare's effective diameter and effective height in the footnotes are from SCREEN3. However, the equations used should be from AERSCREEN as documented in Section 4.3 of the modeling report and of the approved June 6, 2024, modeling protocol.*

Response: As requested, Shell will update the footnote to match AERSCREEN flare formulas used in the calculations in the updated modeling submittal.

32. *On Page A-5, for table (Non-Road Volume Source Parameter Calculations):*

    a. *Please confirm the release height and initial dispersion coefficients for PEU2. Values for these parameters in this table and table 'Modeled Volume Source Parameters' (Page A-3) differ. The values used in the modeling input files agree with those in table 'Modeled Volume Source Parameters' where PEU2 has the same values as PEU1.*

    b. *PEU3 should be removed from this table for non-road volume sources. Based on the review of AERMOD modeling input files and tables in Appendix B (Potential to Emit Calculations), all emission points of PEU3 were modeled as point sources.*

    c. *For footnotes #2 and #3 of this table, change 'Table 3-1' to 'Table 3-3'.*

    Response: The PEU2 source parameters on Page A-3 should match the PEU1 source parameters. The updates noted in 32.b and 32.c will be included in the revised submission.

33. *On Page A-5, for the table with heading 'Truck Roadway Volume Source Parameter Calculation', 5 steps were shown for calculation of volume source parameters used in modeling emissions from truck roadway. However, as described in the modeling report, under 4.3 Source and Monitoring Data, Volume Sources (and also in the approved June 6, 2024, modeling protocol for the EMACT Project), there are 6 steps in the calculation. Missing in the table on Page A-5 was the calculation of the number of volume sources to be modeled. Please provide the calculation of the number of volume sources representing the truck roadway.*

    In addition, please confirm and/or clarify the deviation from the documented procedure in calculating the number of volume sources. The September 22, 2020, review memo for Plan Approval 04-00740C documented that the road length was updated from 0.967 mile to 0.49 mile (2,587 feet). Following the steps described under 4.3 Source and Monitoring Data, Volume Sources, there should be 57 or 58 volume sources representing the roadways. However, based on the table on Pages A-3 to A-4, there were 39 volume sources modeled representing the roadways, i.e., 26 for 'Plant Roadways (Transport Trucks)', 13 for 'Plant Roadways (Talc Transport via Trucks)'. These were also the number of volume sources representing the roadways in the 2020 revised PSD modeling.

    Response: Shell is proposing to update the emissions from the haul roads to match actual operations on-site. Specifically, Shell is proposing the following changes. See below Figure 4 and 5.

    - The talc road length used in the PTE is 9.17 miles (48,418 feet). However, there is significant overlap in this truck pathway because the talc trucks drive to the weigh station near the entrance over the same road way three separate times. Thus, the volume sources will be spread across 2.75 miles (14,570 feet) of onsite

roadway representing the actual path traveled. There will be 324 volume sources to represent the talc roads. Please see Figure 4 for Talc Road Path (in green).

Figure 4. Talc Truck On-site Roadways

- The pellet transport truck road length used in the PTE is 1.02 miles (5,386 feet). The on-site pellet transport truck road length is 0.49 miles (2,587 feet). The number of volume sources associated with the transport truck traffic is 47.

Figure 5. Transport Truck On-site Roadway

On Table A-5, the steps should be the following. The report will be updated to match the volume source calculation guideline from the Haul Road Workgroup. It should be noted that the updated volume source estimation above follows the guidelines below:

- Step 1: The adjusted width of the “road” was calculated as the actual road width plus 6 meters. The additional width represents turbulence caused by the vehicle as it moves along the road.
- Step 2: The number of volume sources was calculated by dividing the length of the road by the adjusted width. This was the maximum number of volume sources modeled.
- Step 3: The height of the volume was set equal to 1.7 times the height of the vehicle generating the emissions.
- Step 4: The initial horizontal sigma for each volume was calculated by dividing the adjusted width by 2.15.

- Step 5: The initial vertical sigma was calculated by dividing the height of the volume determined in Step 3 by 2.15.
- Step 6: The release point height was calculated as the height of the volume determined in Step 3 divided by two. This point is in the center of the volume.

Appendix D-2

Additional Impacts Analysis: Potential Growth Impacts and Potential Impairment to Soils and Vegetation from the Proposed EMACT Project and Plan Approval Reconciliations and WWTP Permanent Controls Project at Shell Polymers Monaca in Beaver County, Pennsylvania

34. *Beryllium, which is one of the HAPs emitted from Shell, is one of the direct acting pollutants listed in the EPA's "A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals." Shell should add a short discussion regarding beryllium based on their modeled results, e.g., modeled maximum annual concentration of 6.014E-7 µg/m^3, which is lower than the screening concentration of 0.01 µg/m^3 from Table 1 of the EPA document.*

    Response: As requested, Shell will incorporate discussions in the Additional Impacts Analysis to address Beryllium emission impacts in the updated modeling submittal.

ENCLOSURE 2

Appendix D-3A

Emission Estimates for the Inhalation Risk Assessment for Shell Polymers Monaca Shell Chemical Appalachia LLC Beaver County, Pennsylvania

Notes:

Page numbers listed in the Comments 1 through 18 below for Appendix D-3A are the page numbers of the Plan Approval Application's PDF document, which contains 1,032 pages.

The "Chronic IHRA Emissions" spreadsheet within the "Step 2 Cancer Risk and Chronic HQ 2024-0913.xlsx" Excel workbook is referred to as the C-Spreadsheet in the comments below.

The "Acute IHRA Emissions" spreadsheet in the "Step 2 Acute HQ 2024-0913.xlsx" Excel workbook is referred to as the A-Spreadsheet in the comments below.

1. *Table 1 lists a total of 58 emitted chemicals of potential concern (COPC) identified by Shell (from EPA's AP-42 Compilation of Air Pollutant Emission Factors and other references) based on the current air emission sources. The DEP reviewed the AP-42 Emission Factors (Sections 1.4, 3.1, 3.2, and 3.3) that were used in the Plan Approval and determined a total of 83 COPCs (ammonia is not in the AP-42 Sections but is included in the 83). The difference in the number of COPCs could be that a different version of AP-42 Section 3.2 was used by Shell. The difference in the number of COPCs is addressed in Comment #8 below. The additional COPC should be added to Appendix B (Potential to Emit Calculations) of the plan approval application, C-Spreadsheet, A-Spreadsheet, and Appendices D-3A and D3-C.*

   Response: As requested, Shell will add identified AP-42 Section 3.2 COPCs (see below) to additional plan approval application, spreadsheets, and appendices in the revised submission. Shell has calculated the emissions using the AP-42 Section 3.2 emission factors and provided them in updated Appendix B.

- *Acenaphthene*
- *Acenaphthylene*
- *Benzo(b)fluoranthene*
- *Benzo(e)pyrene*
- *Benzo(g,h,i)perylene*
- *Butane*
- *Butyr/Isobutyraldehyde*
- *Carbon Tetrachloride*
- *Chlorobenzene*
- *Chloroethane*
- *Chrysene*
- *Cyclopentane*
- *1,1-Dichloroethane*
- *1,2-Dichloroethane*
- *1,2-Dichloropropane*
- *1,3-Dichloropropene*
- *Ethane*
- *Ethylene Dibromide*
- *Fluoranthene*
- *Fluorene*
- *Methylcyclohexane*
- *Methylene Chloride*
- *n-Nonane*
- *n-Octane*

- *Phenanthrene*
- *Perchloroethylene*
- *1,1,2,2-Tetrachloroethane*
- *1,1,2-Trichloroethane*
- *1,2,3-Trimethylbenzene*
- *1,2,4-Trimethylbenzene*
- *1,3,5-Trimethylbenzene*
- *2,2,4-Trimethylpentane*
- *Vinyl Chloride*

2. *There appears to be an estimated 67 air emission sources on the C-Spreadsheet and A-spreadsheet. There appears to be an estimated 50 air emission sources on Table 2 and Table 3. The number of sources in Table 2 should equal the number of sources on the C-Spreadsheet and the plan approval application (Appendix B). If some of the fugitive sources from the C-spreadsheet were combined into one source on Table 2, then please provide an itemized list of sources, to include lb/hr emissions, for each combined source in Table 2. The source numbers should also be added to each source name on the C-Spreadsheet. Likewise, the number of sources in Table 3 should equal the number of sources on the A-Spreadsheet and the plan approval application (Appendix B). If some of the fugitive sources from the A-spreadsheet were combined into one source on Table 3, then please provide an itemized list of sources, including the lb/hr emissions, for each combined source in Table 3. The source numbers should also be added to each source name on the A-Spreadsheet.*

   Response: As requested, Shell will update Table 2 and Table 3 to minimize confusion due to combining fugitive emission sources within the tables. Specifically, Shell will present the complete itemized list of emission sources in Table 2 and 3 in the revised modeling submittal. Total EC Fugitives consist of emissions from Ethane Cracking, Fuel Gas and Regeneration System, Wash Water System, Cracked Gas Compression, Caustic Wash, Gas Redistillation, C2/C3 Separation, C2 Hydrogenation, C1/C2 Separation, Spent Caustic Treatment, Flare Condensate, and 590 (Model IDs ECFUG1 through ECFUG12). Total OSBL Fugitives consist of emission from Recovered Oil and Truck Loadout, Rail for C3+, Diesel Tanks, C3+, 236LR, 646, 642, and Flare Header Segments 1 through 7 (Model IDs OSBLFUG1 through OSBLFUG14). The individual emission rate for each component will be added to Table 2 and 3.

Related to Ethane Cracking Furnaces / Source IDs 031 – 037 on Page 711:

3. *The following annual PTE T/yr emission rates appear to not be equivalent to the annual lb/hr emission rates in Table 2 and the C-spreadsheet: barium, benzene, cadmium, chromium, copper, dichlorobenzene, formaldehyde, hexane, lead, manganese. molybdenum, naphthalene, nickel, toluene, vanadium, and zinc. Likewise, the following hourly PTE lb/hr emission rates appear to not be equivalent to the hourly lb/hr emission rates in Table 3 and the A-spreadsheet: barium, benzo(a)anthracene, benzene, butane, ethane, formaldehyde, hexane, nickel, naphthalene pentane, propane, toluene, vanadium, and zinc. These emission rates should be presented in a consistent manner.*

   Response: Shell will confirm the values and make sure they match in the revised submission. The identified PTE for the pollutants listed were rounded to the hundredths or

thousandths place, and the emission rates in Table 2 and 3 and the associated spreadsheets are listed in scientific notation, which resulted in the discrepancy between the tables.

4. *EPA AP-42, Chapter 1.4 (Natural Gas Combustion) was used to identify the COPCs and emission factors. The following COPCs are listed in Table 1.4-3 of AP-42: acenaphthylene, butane, and ethane. However, acenaphthylene, which is a COPC, is not included in Page 711 but is listed in Table 2, Table 3, the C-Spreadsheet, and the A-spreadsheet, but with no associated emission rate. Butane and ethane are included in Page 711 but not listed in Table 2, the C-Spreadsheet, Table 3, and the A-spreadsheet.*

   Response: As requested, Shell will add acenaphthylene, butane, and ethane to the spreadsheets and tables to correct this oversight in the revised modeling submittal.

5. *The annual PTE emission rate for ammonia is listed as 10.45 T/yr. The DEP calculated: (3.80E-03 lb/MMBtu)*(336.2 MMBtu/hr)*(8,760 hr/2,000 hr) = 5.60 T/yr, which is equivalent to an annual emission rate of 1.28E+00 lb/hr. Table 2 and the C-Spreadsheet list the annual emission rate as 2.39E+00 lb/hr. Likewise, the hourly PTE emission rate for ammonia is listed as 2.39 lb/hr. The DEP calculated: (3.80E-03 lb/MMBtu)*(336.2 MMBtu/hr) = 1.28E+00 lb/hr. Table 3 and the A-Spreadsheet list the annual emission rate as 2.39E+00 lb/hr.*

   Response: Ammonia emission calculations were done using normal operation heat input of 620 MMBtu/hour. This is the worst-case scenario for ammonia and thus no changes to ammonia modeled emissions rates are warranted.

Related to Turbine Duct Burners / Source IDs 101-103 on Pages 712-713:

6. *Annual PTE emission rate calculations for lead are listed in Page 712; however, lead emission rates are not included in Table 2 and the C-Spreadsheet. Likewise, hourly PTE emission rate calculations for lead are listed in Page 712; however, lead emission rates are not included in Table 3 and the A-Spreadsheet.*

   Response: As requested, Shell will correct this oversight and add lead to Tables 2 and 3 and to the C-Spreadsheets in the revised submission.

7. *The annual PTE T/yr emission rates for most COPCs appear to not be equivalent to the annual lb/hr emission rates in Table 2 and the C-spreadsheet. Likewise, the hourly PTE lb/hr emission rates for most COPCs appear to not be equivalent to the hourly lb/hr emission rates in Table 3 and the A-spreadsheet. These emission rates should be presented in a consistent manner.*

   Response: Shell will confirm the values and make sure they match in the revised submission. The identified PTE for the pollutants listed were rounded to the hundredths or thousandths place, and the emission rates in Table 2 and 3 and the associated spreadsheets are listed in scientific notation, which resulted in the discrepancy between the tables.

Related to Natural Gas Emergency Generator Engines / Source ID 107 on Page 723:

8. *EPA AP-42, Chapter 3.2 (Natural Gas-fired Reciprocating Engines) was used to identify the COPCs and emission factors. The following COPCs are listed in Table 3.2-2 of AP-42; however, the following COPCs were not listed in Table 2, the C-Spreadsheet, Table 3, and the A-spreadsheet.*

    - *Acenaphthene*
    - *Acenaphthylene*
    - *Benzo(b)fluoranthene*
    - *Benzo(e)pyrene*
    - *Benzo(g,h,i)perylene*
    - *Butane*
    - *Butyr/Isobutyraldehyde*
    - *Carbon Tetrachloride*
    - *Chlorobenzene*
    - *Chloroethane*
    - *Chrysene*
    - *Cyclopentane*
    - *1,1-Dichloroethane*
    - *1,2-Dichloroethane*
    - *1,2-Dichloropropane*
    - *1,3-Dichloropropene*
    - *Ethane*
    - *Ethylene Dibromide*
    - *Fluoranthene*
    - *Fluorene*
    - *Methylcyclohexane*
    - *Methylene Chloride*
    - *n-Nonane*
    - *n-Octane*
    - *Phenanthrene*
    - *Perchloroethylene*
    - *1,1,2,2-Tetrachloroethane*
    - *1,1,2-Trichloroethane*
    - *1,2,3-Trimethylbenzene*
    - *1,2,4-Trimethylbenzene*
    - *1,3,5-Trimethylbenzene*
    - *2,2,4-Trimethylpentane*
    - *Vinyl Chloride*

    Response: Shell will update the PTE for the tables to be consistent across the HRA in the revised submission. Emissions of these pollutants will be added to the risk calculations.

Related to Continuous Vent Thermal Oxidizer / Source ID C204A on Page 731:

9. *EPA AP-42, Chapter 1.4 (Natural Gas Combustion) was used to identify the COPCs and emission factors. The following COPCs are listed in Table 1.4-3 of AP-42: acenaphthylene, butane, and ethane. However, these COPCs are not included in Page 731, Table 2, the C-Spreadsheet, Table 3, and the A-spreadsheet.*

    Response: As addressed in Comment #4, Shell will add acenaphthylene, butane, and ethane to the spreadsheets and tables in the revised submission.

Related to MPGFs (CVTO, Ethylene Tank, PE Units) / Source ID C204B on Pages 733-738:

10. *EPA AP-42, Chapter 1.4 (Natural Gas Combustion) was used to identify the COPCs and emission factors. The following COPCs are listed in Table 1.4-3 of AP-42: acenaphthylene, butane, and*

ethane. However, these COPCs are not included in Pages 733-738, Table 2, the C-Spreadsheet, Table 3, and the A-spreadsheet.

Response: As addressed in Comment #4, Shell will add acenaphthylene, butane, and ethane to the spreadsheets and tables in the revised submission.

Related to TEGF A, TEGF B, & HP EF / Source IDs C205A, C205B, and C205C on Page 740:

11. *These three flares are summed together in the annual average T/yr emissions rate column, however, Table 2 and the C-Spreadsheet list separate emission rates for each flare. Please explain how the three values on Table 2 and the C-Spreadsheet were derived from the combined annual average T/yr emission rate on Page 740. Each flare's calculated annual average emission should be added to Page 740 to demonstrate that the calculated emissions are equivalent to the Table 2 and C-Spreadsheet lb/hr emissions.*

    Response: Shell will add individual annual average emission rates to the spreadsheets and tables in the revised submissions. The annual emission rates were calculated using the assumption that each flare would operate at the average annual heat input (418.2 MMBtu/hour) for 8,760 hours per year. The average annual heat input is based on actual process data and includes flaring events associated with reasonably anticipated maintenance events and PE Unit releases. Emissions from the three units were assumed to be evenly distributed across the three flares.

12. *EPA AP-42, Chapter 1.4 (Natural Gas Combustion) was used to identify the COPCs and emission factors. The following COPCs are listed in Table 1.4-3 of AP-42: acenaphthylene, butane, and ethane. However, these COPCs are not included in Page 740, Table 2, the C-Spreadsheet, Table 3, and the A-spreadsheet.*

    Response: As addressed in Comment #4, Shell will add acenaphthylene, butane, and ethane to the spreadsheets and tables in the revised submission.

Related to Spent Caustic Thermal Oxidizer / Source ID C206 on Page 742:

13. *EPA AP-42, Chapter 1.4 (Natural Gas Combustion) was used to identify the COPCs and emission factors. The following COPCs are listed in Tables 1.4-2 and 1.4-3 of AP-42: butane, ethane, and lead. However, these COPCs are not included in Page 742, Table 2, the C-Spreadsheet, Table 3, and the A-Spreadsheet. Acenaphthylene is listed in Table 1.4-3 of AP-42 and on Page 742 without the AP-42 emission factor. The AP-42 lb/h emission should be included in the total lb/hr emission for acenaphthylene on Page 742, Table 2, C-Spreadsheet, Table 3, and the A-Spreadsheet.*

    Response: As addressed in Comment #4, Shell will add acenaphthylene, butane, and ethane to the spreadsheets and tables in the revised submission.

Related to Liquid Loadout (Recovered Oil) / Source ID 302 on Page 746:

14. *A total annual PTE HAPs emission rate of 0.10 T/yr is listed (as 100% of the total VOC emissions); however, there are no emission calculations for each HAP and it is unclear how these emissions relate to Table 2 and the C-spreadsheet. Additionally, there is no hourly PTE HAPs emission rate*

and no emission calculations for each HAP and it is unclear how these emissions relate to Table 3 and the A-spreadsheet. There are HAPs listed on the C-Spreadsheet and A-Spreadsheet under "Recovered Oil & Truck Loadout". Are these two sources the same?

Response: The Liquid Loadout (Recovered Oil) – Source ID 302 is not the same as the Recovered Oil and Truck Loadout source (Modeled ID OSBLFUG1). The HAPs from the Liquid Loadout were inadvertently not modeled in the IHRA but will be included in the updated modeling analyses. The HAPs modeled as OSBLFUG1 (Recovered Oil and Truck Loadout) are site-specific speciated HAPs from components (i.e., valves, pipes, etc), consistent with the 2020 Inhalation Risk Assessment.

Related to C3+ Railcar Loading and C3 Railcar Unloading / Source ID 304 on Page 748:

15. *Annual PTE emission rates of 1,3-butadiene, benzene, and toluene are not listed in Page 748. It is unclear how this emission source relates to Table 2 and the "Rail for C3+" emission source on the C-Spreadsheet, assuming this is the same emission source. Additionally, hourly PTE emission rates of 1,3-butadiene, benzene, and toluene are listed in Page 748. However, it is unclear how this emission source relates to Table 3 and the "Rail for C3+" emission source on the A-Spreadsheet, assuming this is the same emission source.*

Response: "C3+ Railcar Loading and C3+ Railcar Unloading" (Source ID 304) is not the same as "Rail for C3+" (Model ID OSBLFUG2). The HAPs from the C3+ Railcar Loading and C3+ Railcar Unloading were inadvertently not modeled in the IHRA but will be included in the updated modeling analysis. The HAPs modeled as OSBLFUG2 (Rail for C3+) are speciated HAPs from components (i.e., valves, pipes, etc). Shell did not identify any HAPs from the components associated with Rail for C3+.

Related to Storage Tanks Diesel Fuel / Source ID 406 on Page 749:

16. *A total annual PTE HAPs emission rate of 4.25E-04 T/yr is listed (as 100% of the total VOC emissions); however, there are no emission calculations for each HAP and it is unclear how these emissions relate to Table 2 and the C-spreadsheet. Additionally, there is no hourly PTE HAPs emission rate and no emission calculations for each HAP and it is unclear how these emissions relate to Table 3 and the A-spreadsheet.*

Response: The speciated HAP PTE were calculated using factors from the Journal of Environmental Monitoring[3]. These are currently not included in the HRA model due to the de minimis nature of the emissions. The calculated emissions of biphenyl, naphthalene, toluene, and ethyl benzene are all less than 2E-06 pounds per hour.

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3 https://www.researchgate.net/publication/7572042_The_organic_composition_of_diesel_particulate_matter_diesel_fuel_and_engine_oil_of_a_non-road_diesel_generator

Related to Equipment Components (OSBL) / Source ID 501 on Pages 750-760:

17. *It is unclear how these emission sources and annual PTE HAPs emission rates relate to Table 2 and the C-Spreadsheet. Additionally, there are no hourly PTE HAPs emission rates included in Pages 750-760 and it is unclear how these emission sources relate to Table 3 and the A-Spreadsheet.*

    Response: Speciated emissions from the LDAR system were used for emissions from the components in the Inhalation Health Risk Assessment. Shell and PaDEP agreed to use the actual leak rates for the 2020 Health Risk Assessment, and that methodology was used in this HRA. The site specific leak rates used in the modeling are calculated using component counts, SOCMI emission factors, and actual stream speciation.

Related to the remaining emission sources:

18. *The following emission sources and associated emission rates are listed in the C-Spreadsheet and A-spreadsheet; however, it is unclear how these emission sources relate to the emission sources listed in Appendix B (Potential to Emit Calculations) of the plan approval application, Table 2, and Table 3.*

    - *PE Blending Silos – (Source ID 301, Model ID PEBLD)*
    - *Ethane Cracking – Ethane Cracking Fugitive (source ID 501, Model ID ECFUG1)*
    - *Fuel Gas and Regeneration System – Ethane Cracking Fugitive (source ID 501, Model ID ECFUG2)*
    - *Wash Water System– Ethane Cracking Fugitive (source ID 501, Model ID ECFUG3)*
    - *Cracked Gas Compression– Ethane Cracking Fugitive (source ID 501, Model ID ECFUG4)*
    - *Caustic Wash– Ethane Cracking Fugitive (source ID 501, Model ID ECFUG5)*
    - *Gas Redistillation– Ethane Cracking Fugitive (source ID 501, Model ID ECFUG6)*
    - *C2/C3 Separation– Ethane Cracking Fugitive (source ID 501, Model ID ECFUG7)*
    - *C2 Hydrogenation– Ethane Cracking Fugitive (source ID 501, Model ID ECFUG8)*
    - *C1/C2 Separation– Ethane Cracking Fugitive (source ID 501, Model ID ECFUG9)*
    - *Spent Caustic Treatment– Ethane Cracking Fugitive (source ID 501, Model ID ECFUG10)*
    - *Flare Condensate– Ethane Cracking Fugitive (source ID 501, Model ID ECFUG11)*
    - *590– Ethane Cracking Fugitive (source ID 501, Model ID ECFUG12)*
    - *236LR – OBSL Components Fugitive (Source ID 501, Model ID OSBLFUG5)*
    - *646– OBSL Components Fugitive (Source ID 501, Model ID OSBLFUG6)*
    - *642– OBSL Components Fugitive (Source ID 501, Model ID OSBLFUG7)*
    - *Flare Header Segment 1– OBSL Components Fugitive (Source ID 501, Model ID OSBLFUG8)*
    - *Flare Header Segment 2– OBSL Components Fugitive (Source ID 501, Model ID OSBLFUG9)*
    - *Flare Header Segment 3– OBSL Components Fugitive (Source ID 501, Model ID OSBLFUG10)*
    - *Flare Header Segment 4– OBSL Components Fugitive (Source ID 501, Model ID OSBLFUG11)*

- *Flare Header Segment 5– OBSL Components Fugitive (Source ID 501, Model ID OSBLFUG12)*
- *Flare Header Segment 6– OBSL Components Fugitive (Source ID 501, Model ID OSBLFUG13)*
- *Flare Header Segment 7– OBSL Components Fugitive (Source ID 501, Model ID OSBLFUG14)*
- *C3+ – OBSL Components Fugitive (Source ID 501, Model ID OSBLFUG4)*

Response: Shell will clarify the sources identified in the spreadsheets and the tables in the revised submission. The list above includes a crosswalk with the source ID from the emissions inventory with the model ID from the health risk assessment. In Table 2 and 3, these components were combined into two categories: EC Fugitives and OSBL Fugitives. Speciated site-specific emissions from the LDAR system (as described in Comment #17) were used for the Inhalation Health Risk Assessment, consistent with the 2020 Inhalation Risk Assessment.

Appendix D-3B

Dispersion Modeling Analysis for the Inhalation Risk Assessment for Shell Polymers Monaca
Beaver County, Pennsylvania

4.2 Model Control Options and Land Use

19. *The EPA released v24142 of AERMOD, AERMAP, AERMET, and AERSURFACE on November 20. 2024. Subsequently, EPA released a recompiled 64-bit AERMOD executable on December 4, 2024. If re-execution of AERMOD is warranted in responding to these comments, the latest versions of AERMOD and its associated programs should be used. See Comment #3 in Enclosure 1, above.*

    Response: As discussed previously in response to Comment #3 of Enclosure 1, Shell will use the new version of AERMOD and associated programs in the updated modeling analyses.

20. *On Page 7, change 'subsection 7.2.3(c)' to 'subsection 7.2.1.1'. See the PSD modeling report.4.3 Source Data.*

    Response: As requested, Shell will update subsection references numbers in the updated modeling submittal.

Point Sources

21. *The comment on the PSD modeling related to Process Cooling Towers also applies to the dispersion modeling for the inhalation risk assessment. For details, see Comment #29 in Enclosure 1, above.*

    Response: See response to Comment #29 of Enclosure 1.

Fugitive Emissions from Tanks and Equipment Leaks

22. *On Page 13, change 'Table 3-1' to 'Table 3-3' for the equations of volume sources' initial dispersion coefficients in the AERMOD user's guide.*

    Response: As requested, Shell will update the table number in the updated modeling submittal.

23. *For Table 2 (SPM Non-Road Volume Source Parameter Calculations) on Pages 14 and 15:*

    a. *Model IDs PERC, PETK, PEU1, and PEU2 were not defined in the AERMOD modeling input files for both chronic and acute risk assessments. If HAPs are emitted from these sources or through these emission points modeled as volume sources, they should be modeled. If not, then they can be removed from Table 2.*

    b. *Please remove PEU3 from this table. All emission points from PEU3 are modeled as point sources. For details, see Comment #32 in Enclosure 1.*

    c. *Footnotes #2, #3, #5: Change 'Table 3-1' to 'Table 3-3'.*

    d. *Footnote #4: This no longer applies. Based on the 2020 Risk Assessment Modeling Report, this footnote was for the multipoint ground flare (MPGF), which was modeled as a volume source at the time. The MPGF is now modeled as a point source as discussed in the modeling protocol approved by the DEP on June 6, 2024. Please remove the footnote and revise the table as appropriate (i.e., Footnote column).*

    Response: These updates will be included in the revised modeling submittal. Specifically, Shell will remove PERC, PETK, PEU1 and PEU2 from Table 2, because they are not a source of HAPs. PEU3 will be removed from Table 2 because it is modeled as a point source, not a volume source. Footnotes #2, #3, #4, and #5 will be updated to reflect the requested edits.

Turbine Load/Operating Conditions

24. *The three comments on the PSD modeling related to combustion turbine load analysis also apply to the dispersion modeling for the inhalation risk assessment. For details, see Comments #14 through #16 in Enclosure 1, above.*

    Response: See detailed responses to Comments #14 - #16 of Enclosure 1.

Good Engineering Practice Stack Height Analysis

25. *The two BPIPPRM-related comments on the PSD modeling also apply to the dispersion modeling for the inhalation risk assessment. For details, see Comments #5 and #6 in Enclosure 1, above.*

    Response: See detailed responses to Comments #5 and #6 of Enclosure 1.

4.4 Receptor Data

26. *Based on the AERMAP and AERMOD input and output files provided, the modeling domain used for both chronic and acute exposure assessments extended up to ~5,000 meters from the facility*

fence. The information in Table 3 on Page 20, which stated that the modeling domain for the exposure assessments extended up to 10,000 meters from the facility, should be corrected.

Response: Shell will update the report text to match the modeled receptor grid.

4.5 Meteorological Data

Data Processing

27. *See equivalent comments on the PSD modeling report (i.e., Comments #11 and #12 in Enclosure 1, above) regarding Beaver Valley meteorological data processing in AERMET Stage 1 and using the adjust u* option in AERMET Stage 2.*

Response: See detailed responses to Comments #11 and #12 of Enclosure 1

4.6 Output Options

28. *There is no need to mention the excess lifetime cancer risk (ELCR) threshold (1:100,000 risk) in this subsection. Appendix D-3B is on the dispersion modeling for the inhalation risk assessment. Note that the cancer and noncancer risks thresholds are both documented in the separate appendix for risk characterization (Appendix D-3C, Inhalation Risk Assessment for Shell Polymers Monaca Shell Chemical Appalachia LLC Beaver County, Pennsylvania). This subsection could simply state that the ELCR was determined.*

Response: As recommended, Shell will update the report text to simply state that the ELCR was determined in the updated submittal.

Appendix D-3C

Inhalation Risk Assessment for Shell Polymers Monaca Shell Chemical Appalachia LLC Beaver County, Pennsylvania

Notes:

The following acronyms are used below: Health Risk Value (HRV), which is synonymous with Inhalation Unit Risk (IUR) and Reference Concentrations (RfCs), Chronic Cancer (CC), Chronic Noncancer (CNC), Acute Noncancer (ANC), Excess Lifetime Cancer Risk (ELCR), Hazard Quotient (HQ), Hazard Index (HI), Integrated Risk Information System (IRIS), California Environmental Protection Agency (CalEPA), American Conference of Governmental Industrial Hygienists (ACGIH), Provisional Peer- Reviewed Toxicity Values (PPRTV), and Agency for Toxic Substances and Disease Registry (ATSDR).

Shell's January 2015 protocol lists a hierarchy of reference sources that is used to identify the specific HRV for each emitted COPC. The DEP will accept a HRV that does not follow the hierarchy as long as the HRV used is more protective. Inconsistencies with the hierarchy are indicated in Comments #29 through #31 below.

29. *The following IUR values in the Chronic Cancer column in Table 1 should be replaced as shown below:*

Table 1 IUR

Arsenic 3.30E-03 µg/m3 from CalEPA	*Replace With: IRIS value of 4.30E-03 µg/m3*
Chloroform 5.30E-06 µg/m3 from CalEPA	*Replace With: IRIS value of 2.30E-05 µg/m3*
Formaldehyde 6.00E-06 µg/m3 from CalEPA	*Replace With: IRIS value of 1.10E-05 µg/m3*

Response: As requested, Shell will update the health risk assessment with the requested values.

30. *The following CNC RfC value in the Chronic Noncancer column in Table 1should be replaced as shown below:*

Table 1 RfC

Formaldehyde 9.00E-03 mg/m3 from CalEPA — *Replace With: IRIS value of 7.00E-03mg/m3*

Response: As requested, Shell will update the health risk assessment with the requested values.

31. *The following ANC RfC values in the Acute Noncancer column Table 1 should be replaced as shown below:*

Table 1 RfC	*Replace with:*
Beryllium 2.50E-04 mg/m3 PADEP	*ACGIH TWA calculated value of 7.50E-06 mg/m3*
Chromium 1.00E-02 mg/m3 PADEP	*ACGIH STEL calculated value of 1.25E-05 mg/m3*
Manganese 7.50E-02 mg/m3 PADEP	*ACGIH TWA calculated value of 3.00E-03 mg/m3*

The replacement values for the ANC RfC were calculated by using the following formulas:

*For Time Weighted Average (TWA) use: (3 * TWA / 20) = ANC RfC*

For Short-Term Exposure Limit (STEL) use: (STEL / 40) = ANC RfC

Response: As requested, Shell will update the health risk assessment with the requested values.

32. *The following COPCs are listed in Table 1 (Identified Compounds of Potential Concern) of Appendix D3-A; however, they were not included in Table 1 (Chronic and Acute Risk Factors for Inhalation Risk Assessment) in Appendix D-3C. These COPCs and the HRVs should be added to Table 1 of Appendix D3-C.*

COPC	*IUR*	*CNC RfC*	*ANC RfC*
Benzo(g,h,l)perylene	*NA*	*NA*	*NA*
Heptane	*NA*	*4.00E-01 mg/m3 (PPRTV)*	*5.12E+01(ACGIH)*
Propylene	*NA*	*3.00E+00 mg/m3 (CalEPA)*	*1.29E+02(ACGIH)*

Zinc	*NA*	*NA*	*NA*

Response: As requested, Shell will update the Table 1 in Appendix D-3C to include the additional COPCs.

33. *The chloroform CNC RfC listed in CalEPA is 3.00E-05 mg/m3. Shell referenced CalEPA in Table 1 but listed the RfC as 2.00E-05 mg/m3. The Chloroform CNC RfC value in Table 1 should be replaced with the CalEPA value of 3.00E-05 mg/m3.*

Response: Per email corresponded with Stephen Steirer, Air Quality Engineer, AQ Modeling and Risk Assessment Section on March 4, 2025, the correct value for chloroform referenced in Comment # 33 should have been 0.3 mg/m3. This value will be used in the updated health risk assessment.

34. *The chromium CNC RfC listed in IRIS is 3.00E-05 mg/m3. Shell referenced IRIS but listed the RfC as 1.00E-04 mg/m3. The CNC value was updated in August 2024. The chromium CNC RfC value in Table 1 should be updated with the new value of is 3.00E-05 mg/m3.*

Response: As requested, Shell will update the chromium CNC RfC value in Table 1 to 3.00E-05 mg/m3 in the updated modeling submittal.

35. *The chromium CC IUR listed in IRIS is 1.10E-02 µg/m3. Shell used a CC IUR of 8.40E-02 µg/m3. The chromium IUR in Table 1 should be replaced with the IRIS value of 1.10E-02 µg/m3.*

Response: As requested, Shell will update the chromium IUR in Table 1 IRIS value to 1.10E-02 µg/m3 in the updated modeling submittal.

36. *Ethylene oxide was listed as a COPC in Shell's January 2015 protocol and evaluated in Shell's January 2015 and March 2020 inhalation risk assessment submittals. There is no mention of ethylene oxide in this inhalation risk assessment. Please explain why ethylene oxide was excluded.*

Response: Ethylene oxide is not emitted by the facility and was removed from the emissions calculations and associated health risk assessment.

37. *Table 1 lists the hexane ANC RfC at 27.00 mg/m3. DEP calculated an ANC RfC of 26.4 mg/m3: ACGIH TWA = 50 ppm = 176.23 mg/m3, (3 * TWA / 20) = 26.4345 mg/m3. The hexane ANC RfC in Table 1 should be replaced with the value of 2.64E+00 mg/m3.*

Response: As requested, Shell will update the hexane ANC RfC in Table 1 value to 2.64E+01 mg/m3 in the updated modeling submittal.

38. *Table 1 lists the pentane ANC RfC at 180.00 mg/m3. DEP calculated an RfC of 265.58 mg/m3: CalEPA = 600 ppm = 1770.55 mg/m3, (3 * TWA / 20) = 265.58 mg/m3. The hexane ANC RfC in Table 1 should be replaced with the value of 2.66E+02 mg/m3.*

Response: As requested, Shell will update the hexane ANC RfC in Table 1 value to to be 2.66E+02 mg/m3 in the updated modeling submittal.

39. *The HRVs for Polycyclic Aromatic Hydrocarbons (PAH) are listed as an IUR of 7.10E-02 µg /m3 and an ANC RfC as 1.90E-02 mg/m3, however there is no reference listed for each COPC. The reference as to where the HRVs were obtained should be included in Table 1.*

Response: The PAH IUR value is based on the highest value out of the list of PAHs on the California ARB website (i.e., 7,12 dimethylbenz[a]anthracene). Based on email correspondence with Stephen Steirer, Air Quality Engineer, AQ Modeling and Risk Assessment Section on March 4, 2025, DEP requested the ANC RfC value be updated to match the OSHA TLV for benzo(a)pyrene of 0.2 mg/m3. The calculated RfC from this TLV is 3.00E-02 mg/m3 and will be used in the updated HRA analysis.

40. *The COPCs and their Chronic Cancer IURs listed in the table below were not included in Table 1. The COPCs and the IURs should be added to Table 1 and the COPCs and ELCR calculations should be added to Table 2.*

COPC	*IUR (µg/m^3)*	*Reference*
Carbon Tetrachloride	*6.00E-06*	*IRIS*
1,1-Dichloroethane	*1.60E-06*	*CalEPA*
1,2-Dichloroethane	*2.60E-05*	*IRIS*
1,2-Dichloropropane	*3.70E-06*	*PPRTV*
1,3-Dichloropropene	*4.00E-06*	*IRIS*
Ethylene Dibromide (1,2-Dibromethane)	*6.00E-04*	*IRIS*
Methylene Chloride (Dichloromethane)	*1.00E-08*	*IRIS*
1,1,2,2-Tetrachloroethane	*5.80E-05*	*CalEPA*
Tetrachloroethylene (Perchloroethylene)	*2.60E-07*	*IRIS*
1,1,2-Trichloroethane	*1.60E-05*	*IRIS*
Vinyl Chloride	*4.40E-06*	*IRIS*

Response: As requested, Shell will add the COPCs and the IURs to Table 1 and the COPCs and ELCR calculations to Table 2 in the updated modeling submittal.

41. *The COPCs and their CNC RfCs listed in the table below were not included in Table 1. The COPCs and the CNC RfCs should be added to Table 1 and the COPCs and CNC HQ and HI calculations should be added to Table 2.*

COPC	***CNC RfC (mg /m^3)***	***Reference***

Benzo(e)pyrene	*2.00E-06*	*PPRTV*
Carbon Tetrachloride	*1.00E-01*	*IRIS*
Chlorobenzene	*5.00E-02*	*PPRTV*
1,2-Dichloroethane	*7.00E-03*	*PPRTV*
1,2-Dichloropropane	*4.00E-03*	*IRIS*
1,3-Dichloropropene	*2.00E-02*	*IRIS*
Ethylene Dibromide (1,2-Dibromethane)	*9.00E-03*	*IRIS*
Methylene Chloride (Dichloromethane)	*6.00E-01*	*IRIS*
Methylcyclohexane	*9.50E-02*	*PPRTV*
n-Nonane	*2.00E-02*	*PPRTV*
Tetrachloroethylene (Perchloroethylene)	*4.00E-02*	*IRIS*
1,2,3-Trimethylbenzene	*6.00E-02*	*IRIS*
1,2,4-Trimethylbenzene	*6.00E-02*	*IRIS*
1,3,5-Trimethylbenzene	*6.00E-02*	*IRIS*

Response: As requested, Shell will add the COPCs and the CNC RfCs to Table 1 and the COPCs and CNC HQ and HI calculations to Table 2 in the updated modeling submittal.

42. *The COPCs and their ANC RfCs listed in the table below were not included in Table 1. The COPCs and their RfC should be included in Table 1 and the COPCs and ANC HQ calculations should be added to Table 3.*

COPC	*ANC RfC (mg/m^3)*	*Reference*
Butane	*3.57E+02*	*ACGIH TWA (calculated)*
Carbon Tetrachloride	*1.90E+00*	*CalEPA*
Chlorobenzene	*6.91E+00*	*ACGIH TWA (Calculated)*
Cyclopentane	*4.30E+02*	*ACGIH TWA (Calculated)*
Dibutyl phthalate	*7.50E-01*	*ACGIH TWA (Calculated)*
1,1-Dichloroethane	*6.07E+01*	*ACGIH TWA (Calculated)*

1,3-Dichloropropene	*6.81E-01*	*ACGIH TWA (Calculated)*
Heptane	*5.12E+01*	*ACGIH STEL (Calculated)*
Methylene Chloride	*1.40E+01*	*CalEPA*
Methylcyclohexane	*6.02E+01*	*ACGIH TWA (Calculated)*
2-Methylnapthalene	*4.37E-01*	*ACGIH TWA (Calculated)*
n-Nonane	*1.57E+02*	*ACGIH TWA (Calculated)*
n-Octane	*2.10E+02*	*ACGIH TWA (Calculated)*
Phenanthrene	*3.00E-02*	*ACGIH TWA (Calculated)*
Tetrachloroethylene	*1.70E+01*	*ACGIH TWA (Calculated)*
Propane	*2.71E+02*	*OSHA TWA (Calculated)*
Propylene	*1.29E+02*	*ACGIH TWA (Calculated)*
1,1,2,2-Tetrachloroethane	*1.03E+00*	*ACGIH TWA (Calculated)*
1,1,2-Trichloroethane	*8.18E+00*	*ACGIH TWA (Calculated)*
Vinyl Chloride	*1.80E+02*	*CalEPA*

Response: As requested, Shell will add the COPCs and their RfC to Table 1 and the COPCs and ANC HQ calculations to Table 3 in the updated modeling submittal.

43. *Table 3 lists an ANC HQ for Zinc, however there is no ANC RfC for Zinc listed in Table 1. The ANC RfC for Zinc and its reference should be listed in Table 1.*

Response: EPA IRIS states that acute non-cancer RfC value for zinc has not been estimated. As such, Shell proposes to remove the zinc acute HQ in the updated submission.

44. *In addressing the comments within this enclosure, the ELCR and CNC HQs and HI presented in Table 2 and the ANC HQs presented in Table 3 should be recalculated.*

Response: As requested, Shell will update the ELCR and CNC HQs and HI presented values presented in Table 2 and the ANC HQs presented in Table 3 to reflect updated calculations consistent with the comments presented in this enclosure om the updated modeling submittal.

45. *There is no mention of Table 2 (Estimated Health Effects from COPCs at Receptors with the Highest Aggregate ELCR and Chronic HQ) in subsection 1.1 (Chronic Cancer and Non- cancer Risks) of this subsection.*

Response: As requested, Shell will add appropriate reference to Table 2 in subsection 1.1 in the updated modeling submittal.

46. *There should be a discussion of exposed populations (receptors) in Appendix D-3C. The risk assessment does not address to whom and what time frame the exposure and risk calculations were evaluated. The risk assessment should also include a discussion of distance from source emissions to community and sensitive populations such as schools, day care, or nursing homes in the area.*

Response: Shell will expand the discussion of receptors to include exposed populations and sensitive populations in the revised modeling submittal.

47. *Based on the exposed populations, there should be a discussion of the exposure assumptions that are being used to estimate exposure and risk in Appendix D-3C. For example, are the risks calculated for an adult or child resident and is the exposure period over a lifetime?*

Response: These updates will be included in the revised submission. The IURs and chronic non-cancer RfCs used to calculate the increased cancer and chronic non-cancer risk are based on continuous lifetime exposure to the modeled concentrations (i.e, 24 hours per day, every day for 70 years). The Acute RfCs are designed to protect sensitive populations, such as children. This documentation will be added to the revised modeling submittal.

48. *The COPCs listed below are considered to be carcinogens by a mutagenic mode of action by the EPA. The complete list of chemicals that are mutagens can be found in the Regional Screening Levels (RSLs) User's Guide, section 5.17 Mutagens, URL: www.epa.gov/risk/regional-screening-levels-rsls-users-guide#mutagens. Children are more susceptible to cancer and tumor development if exposed to carcinogens with a mutagenic mode of action. To account for this increased susceptibility, EPA applies age-dependent adjustment factors (ADAFs) to the cancer risk equation for these contaminants. The ADAF-adjusted cancer risk equation can be found in EPA's guidance document Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (March 2005) at the following URL: www.epa.gov/sites/default/files/2013-09/documents/childrens_supplement_final.pdf. Examples of how to estimate cancer risks for mutagens are provided on pages 36 through 41 of this document. The DEP recommends including the COPCs listed below in a separate evaluation of the cancer risks to children from a mutagenic mode of action using the ADAF-adjusted equations provided by the EPA.*

- *benzo[a]anthracene*
- *benzo[a]pyrene*
- *benzo[b]fluoranthene*
- *benzo[k]fluoranthene*
- *indeno[1,2,3-cd]pyrene*
- *chromium VI*
- *chrysene*
- *dibenzo[a,h]anthracene*
- *7,12-dimethylbenz[a]anthracene*
- *ethylene oxide*
- *formaldehyde*
- *methylcholanthrene*
- *methylene chloride*
- *vinyl chloride*

Response: Currently, there is no formal agency guidance on the mutagenic mode of action analysis, and the analysis was not in the approved modeling protocol. As such, Shell is not addressing this request in the updated modeling submittal.

Source IDs = C205A and C205B			Totally Enclosed Ground Flare (TEGF) A and TEGF B											
FLARE / FLARING MODE			NSR POLLUTANT EMISSION FACTORS (lb/MMBtu)											
			NOx	SO2	PM2.5	VOC	CO2	CH4	N2O	CO2e	CO	PM	PM10	H2SO4	Pb
TEGF A and TEGF B Supplemental Gas / Ann Avg			0.068	0.0015	0.0075	0.0054	Variable	Variable	0.0013	Variable	0.31	0.0019	0.0075	7.2E-05	4.9E-07
TEGF A and TEGF B Supplemental Gas / Short-Term			0.068	0.0015	0.0075	0.0054	Variable	Variable	0.0013	Variable	0.31	0.0019	0.0075	7.2E-05	4.9E-07
FLARE / FLARING MODE	Basis		NSR POLLUTANT RATES TO BE USED IN SIL ANALYSIS (lb/hr/flare)											
	MMBtu/hr/flare	NOTES	NOx	SO2	PM2.5	VOC	CO2	CH4	N2O	CO2e	CO	PM	PM10	H2SO4	Pb
TEGF A and TEGF B Supplemental Gas / Ann Avg	126.35	[A]	8.59	-	0.94	-	-	-	-	-	-	-	-	-	-
TEGF A and TEGF B Supplemental Gas / Short-Term	343.09	[B]	23.33	-	2.56	-	-	-	-	-	106.36	-	-	-	-

FLARE EMISSION CALCULATIONS NOTES:

Calculation Methodology:

- Hourly Emissions = (Heat Input - MMBtu/hr) x (Emission Factor - lb/MMBtu)

Basis for Emissions Factors:

- NOx/NO2 and CO = AP-42, Tables 13.5-1 and 13.5-2, respectively.
- SO2 = AP-42, Table 1.4-2.
- PM10/2.5 = AP-42, Table 1.4-2; filterable + condensable emission factor used as conservative estimate since flares are smokeless. Smokeless flares have zero filterable PM (see AP-42, Table 13.5-1).
- VOC emission factor for natural gas/tail gas supplemental gas = AP-42, Table 1.4-2.
- CO2 from VOC flaring is calculated based on the carbon content of the vent stream material and conservatively assumes 100% conversion to CO2.
- CH4 from VOC flaring is based on the amount of methane present in the vent stream material routed to the flares and a 99% DRE.
- N2O from VOC flaring is assumed to result from fuel gas flaring = fuel gas emission factor from 40 CFR 98, Table C-2.
- CO2e = sum of CO2, CH4 and N2O emissions adjusted for global warming potentials.
- PM = AP-42, Table 1.4-2 (filterable only) as conservative estimate since flares are smokeless.
- H2SO4 based on SO3-to-SO2 emission factor ratio in AP-42, Table 1.3-1 for distillate oil combustion in boilers > 100 MMBtu/hr.

[A] - TEGF A and TEGF B Supplemental Gas Annual Average Emission Rates:

- Annual average heat input based on amount of supplemental gas needed to increase combustion gas heating value to the 40 CFR 63 Subpart YY (EMACT) 800 Btu/scf requirement with compliance margin.
- Annual average heat input assumes approximately 90% of supplement is from Tail Gas and 10% is from Natural Gas.
- Conservative estimate of the emissions increases due to the EMACT Project.

[B] - TEGF A and TEGF B Supplemental Gas Short-Term Max Emission Rates:

- Short-term max heat input based on amount of supplemental gas estimated to be needed during short-term period to increase combustion gas heating value to the 40 CFR 63 Subpart YY (EMACT) 800 Btu/scf requirement with compliance margin.
- Conservative estimate of the emissions increases due to the EMACT Project.