

March 17, 2023

VIA EMAIL: kimberly.kaal@shell.com

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

Re: January 30, 2023 Emission Exceedance Report and Mitigation Plan
Shell Chemical Appalachia, LLC
Potter Township
Beaver County

Dear Ms. Kaal,

On January 30, 2023, the Department received the Emission Exceedance Report and Mitigation Plan (“EERMP”) submitted to the Department by Shell Chemical Appalachia LLC (“Shell”). The Department has evaluated the submission and raised questions in telephone conversations, which Shell asked the Department to reduce to writing. Accordingly, the Department requests the additional information as described below (for convenience, the page of the EERMP to each request is identified):

- Page 1 Shell has indicated that the Department neglected to incorporate appropriate “short term or alternative limits” into the plan approval as follows: *“One important consideration which requires emphasis by Shell, in connection with the NOV, is that the Plan Approval did not include short-term limits which would have been appropriate for the start-up process and that would have accounted for malfunctions that typically occur with the commissioning of a major chemical production facility. The emissions which occurred during the ”shakedown period” were not explicitly included in the Facility’s potential-to-emit (PTE), which provided the basis for the emission limitations set forth in the Plan Approval. This concern was discussed with PADEP during the permitting process although short term or alternative limits were not incorporated into the permit.”* Provide a complete list of “short term or alternative limits” that were proposed by Shell and which Shell believes should have been incorporated into the plan approval as federally enforceable limitations.
- Page 5 – Regarding ethane cracking unit’s (ECU) operational issues resulting from extremely cold ambient temperature operation: given that extreme cold ambient temperature events are not uncommon in southwestern Pennsylvania, detail the possible design changes, work practices, operational procedures, and maintenance changes that

have been taken, or may be taken, to prevent reoccurrence of ECU operational issues during extreme cold ambient temperature events.

- Page 6 – Regarding the HP Flare System: the EERMP states that the elevated flare has been operated for a total of 134 minutes and that smoking (visible emissions) from the flare tip of the elevated flare has occurred for 46 of those minutes, which is characterized by Shell as approximately 0.03% of the time. Based upon this data, the Department understands that smoking events occurred approximately 34.3% of the total elevated flare operating time. Shell reported the cause of elevated flare visible emissions to be inadequate delivery of steam to the flare tips. Provide an analysis of the root cause of the steam inadequacy issues and measures that are available to reduce the likelihood of a recurrence. The root cause analysis shall discuss the alternatives including possible design changes, operational changes, and maintenance changes that have been taken, or may be taken, to ensure sufficient steam delivery to the flare tips and eliminate visible emissions during operation of the elevated flare while still maintaining the claimed destruction efficiency for VOC and HAP within the HP flare system.
- Page 7 – Regarding the Operation and Maintenance Procedures: identify methods, techniques, written operator training programs, operational procedures, and work practices that are being employed, or may be employed comprehensively to facility operations to minimize emissions to the atmosphere.
- Page 7 – Regarding the Use of Off-Specification Sphere: confirm that this off-spec sphere included in the site inventory and was approved by the Department as part of the plan approval.
- Page 7 – Regarding Designed for Minimum Turndown: define the minimum turndown mode of operation as it applies to the process equipment, including the ECU furnaces, and identify methods, techniques, operational procedures, and work practices that are being employed, or may be employed, in order to minimize emissions to the atmosphere.
- Page 8 – Regarding Continuous Monitoring: for any gas that is flared or emitted to the atmosphere, include representative gas chromatograph (GC) data for the specific inlet gas stream that is being flared, or emitted to the atmosphere if monitored, as part of any malfunction report, emission report, or EERMP report that is submitted to the Department. Supporting documentation of any representative GC data submitted shall include the sample frequency, the constituents analyzed, and a justification as to why the sample is representative for every gas flaring event or emission to the atmosphere.
- Page 8 – Regarding Turnaround Review: and as part of the evaluation of past turnaround events, identify design changes, methods, techniques, operator training programs, operational procedures, and work practices that are being employed, or may be employed to minimize emissions to the atmosphere.

- Page 9 -Regarding Flare Operational Assurance and Improvements and Totally Enclosed Ground Flare (TEGF) stages 1 through 3 being temporarily taken out of service due to observed damage at the burner tips: Shell reported that the causes of TEGF operational issues and/or visible emissions have been low flow conditions, damage at the burner tips, coking at the burner tips, and refractory defect issues. Provide an analysis of the root cause of the operational issues for, and visible emissions from, each TEGF and measures that are available to reduce the likelihood of a recurrence. The root cause analysis shall discuss alternatives that include design changes, operational changes, and maintenance changes that have been taken, or may be taken, to ensure TEGF reliability and eliminate visible emissions from the flares while still maintaining the claimed destruction efficiency for VOC and HAP within the TEGF flare systems.

Page 11 – Regarding the LAER analyses update to determine if additional work practices and controls (technology) are necessary to meet LAER: the focus on LAER by Shell is too narrow and a broader evaluation is required. In light of how the facility is now operating “as built,” please evaluate the validity of the initial facility authorization and evaluate any new physical changes or changes in the method of operation which may minimize emissions to the atmosphere. Additionally, reexamine the technical appropriateness, accuracy and reliability of assumptions, emission factors, data, calculations, and any other information relied upon in Shell’s plan approval application to ascertain projected emissions from the air contamination sources and air cleaning devices authorized by the Plan Approval; identify any invalid or incorrect assumptions; and identify possible measures which will minimize emissions to the atmosphere.

- Page 13 – Regarding the Flare Guardian test report: Shell represents that diagnostic testing utilizing Zeeco’s Flare Guardian technology was conducted at the facility in January 2023 to demonstrate destruction efficiency of one totally enclosed ground flare (TEGF Unit B) at the facility. Shell is now relying on these results to conclude that actual VOC emissions during commissioning are below permitted 12-month total VOC limits, which is contrary to Shell’s previous emission reports. Flare Guardian is presented as an intriguing concept. It is, however, at present a novel, unproven technology. Based upon limited research and review it is the Department’s understanding that the Flare Guardian technology calculates flare destruction efficiency based upon the relative concentration of CO₂ vs hydrocarbons in the flame. It is premature for Shell to base emission estimates upon limited diagnostic testing utilizing this novel, unproven technology. Accordingly, provide the following:
 - a detailed engineering analysis of the operational principles of Flare Guardian technology;
 - the manufacturer’s written tests report(s) for all Flare Guardian testing conducted at the Shell facility;
 - the methodology used at Shell to verify proper set-up, calibration, operation, maintenance of the equipment in accordance with the manufacturer’s specifications and operational procedures;

- the rationale and supporting assumptions for the assertion that the January 2023 limited diagnostic testing is representative of the actual continuous destruction efficiency of TEGF Unit B;
- the rationale and supporting assumptions for the assertion that the January 2023 limited diagnostic testing is representative of the actual continuous destruction efficiency of other untested flare emissions at the facility;
- the rationale and supporting assumptions for the assertion that the January 2023 limited diagnostic testing is representative of the actual continuous destruction efficiency and may be applied retroactively to previous flaring events at the facility;
- the rationale and supporting assumptions for the assertion that the January 2023 limited diagnostic testing is representative of the actual continuous destruction efficiency and may be applied to prospectively to future flaring events at the facility in the absence of a continuously operating Flare Guardian monitor.
- an analysis of previously submitted emission estimates, evaluating their credibility for particulate emission (PM) and carbon monoxide emissions during these flaring events and include all supporting assumptions. Regardless of the claimed destruction efficiency for VOC emissions, visible emissions from a flaring event are an indicator of incomplete destruction of carbon (particulate) in the exhaust plume. As such, PM and carbon monoxide emissions may be higher than Shell has asserted for these events.

Other Requests:

- The Department identified inconsistencies in the HAP emissions reported in the November and December 2022 emission reports. Calendar year HAP emission totals reported in the December emissions report were significantly less than what was reported for the calendar year in the November report. The change in HAP emissions appear to result from a change in the hexane emissions factor used for combustion sources and changes to 1,3 butadiene and methanol from Equipment Components (Source ID 501). Support and provide rationale for all assumptions for all HAP emission estimates, including the most recent updates to hexane, 1,3 butadiene, and methanol emission factors.

Please provide a response to the requested information within 10 business days of receipt of this letter. If you have any questions or require clarification, please contact Melissa Jativa at mjativa@pa.gov or 412.442.4303; Sheri Guerrieri at shguerrier@pa.gov or 412.442.4174; or Mark Gorog at mgorog@pa.gov or 412.442.4150.

This letter is intended as a response to your January 30, 2023, Emission Exceedance Report and Mitigation Plan so that Shell may address identified concerns in a timely manner. The Department has additional concerns related to on-going malfunction events that continue to occur at the facility and those will be addressed under a separate cover.

Sincerely,



Mark R. Gorog, P.E.
Regional Manager
Air Quality Program

cc: Shell CSU Environmental Manager (H. J. Sewell)
AQ Case File (M. Jativa)
SW Operations (E. Speicher)
Hbg. (S. Foster)
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RD (J. Miller)
Region III, US EPA (E. Malone)