



Shell Chemical Appalachia LLC  
300 Frankfort Rd  
Monaca, PA 15061

November 15, 2022

Mark Gorog P.E., Regional Manager Air Quality  
Program Pennsylvania Department of Environmental  
Protection Southwest Regional Office  
400 Waterfront Drive  
Pittsburgh, PA 15222

**RE: PA-04-00740C Ethylene Manufacturing Line (Source ID 201) Unplanned Maintenance Outage and High-Pressure (HP) Header System (Source ID 205) Malfunction Emission Report**

Dear Mr. Gorog,

Shell Chemical Appalachia LLC (“Shell”) is submitting this Malfunction Report f to Pennsylvania Department of Environmental Protection (PADEP) for an unplanned maintenance outage with the ethylene manufacturing line due to partially plugged strainer basket on the C2 splitter inlet.

- **Name and location of the facility**  
Shell Polymers Monaca  
300 Frankfort Road, Monaca PA, 15061

- **Nature and cause of the incident**

During start-up activities of Ethylene Manufacturing Line (Source 201), Shell experienced performance issues with the C2 splitter in making on spec ethylene. Through the commissioning and startup process, the C2 splitter was back flowed and malfunctioned several times. Attempts to clear the strainer through the commissioning and startup process resulted in flow restrictions which prevented consistent forward progression in making on spec ethylene. A shutdown plan was developed to safely bring down the Ethane Cracking Unit (ECU) and prepare for the unplanned maintenance work while minimizing the emissions from the malfunction event.

Once the C2 splitter was isolated and depressurized to facilitate the inspection, it was determined that the strainer basket was plugged with debris which was the likely cause of the flow restriction. The maintenance activities cleared the strainer basket of debris and allowed it to be returned to service for re-start of the unit.

- **Time when the incident was first observed, and duration of emissions from the malfunction event.**

Emissions from de-inventorying the ECU to the High Pressure (HP) Flares began on October 5, 2022, beginning at approximately 19:20 and the ECU was restarted on October 17, 2022. On spec ethylene production was achieved on October 19, 2022 and tail gas was on spec and no longer flared during the afternoon of October 22, 2022 ending the maintenance outage and progressing start-up activities.

Emissions and flaring were reduced by proactively reducing within unit inventory levels ahead of the outage, maintaining some equipment in operation during the maintenance outage to reduce re-start duration and flaring. Net heating value of the vent gas and in the combustion zone was maintained greater than 500 Btu/scf and averaged 956 Btu/scf during this period to maintain a high destruction efficiency. Although an unplanned maintenance outage, the unit was safely brought down and did not result in flaring at the elevated HP Flare. The repair of the C2 Splitter strainer basket resulted in improved unit performance, successful on-spec ethylene, while minimizing flaring through shut-down and re-start.

- **Estimated rate of emissions from the malfunction event.**

Based on the required de-inventory of various equipment for the safe shut-down of the ECU and access to C2 splitter and re-start-up steps required to bring the Source 201, the Ethylene Manufacturing Line back to on-spec ethylene production and tail gas, the following estimate of emissions is calculated. Based on the HP flare meter and process unit meter readings, the estimated emissions for this maintenance outage have been calculated using the gas composition and emission factors as:

CO<sub>2</sub>e: 32,956.2 tons

CO: 89.99 tons

NO<sub>x</sub>: 19.74 tons

SO<sub>2</sub>: 0.00 tons

PM(filt): 0.54 tons

PM<sub>10</sub>: 2.16 tons

PM<sub>2.5</sub>: 2.16 tons

VOC: 51.72 tons

HAP: 0.54 tons

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

Sincerely,

*Kimberly Kaal*

Kimberly Kaal  
Environmental Manager, Attorney-in-Fact

CC:  
Anna Hensel, District Supervisor  
Scott Beaudway, Air Quality Specialist