



Shell Chemical Appalachia LLC  
300 Frankfort Rd  
Monaca, PA 15061

December 8, 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 Cogen Duct Burner Super High-Pressure Steam Trip and Ethylene Manufacturing Line (Source ID 201) Pressure Trip to High Pressure Flare Header (Source ID 205/C205A&B) Malfunction Emission Report**

Dear Mr. Gorog,

Shell Chemical Appalachia LLC (“Shell”) is submitting an Initial Malfunction Report to the Pennsylvania Department of Environmental Protection (PADEP) for an unexpected upset of the steam header (SHPS) supply to Ethylene Cracking Unit (ECU) resulting in excess emissions being sent to the High-Pressure Flare Header System.

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

On November 28, 2022, the control room console operator received alarms indicating a trip of the HRSG Unit 1 Duct Burners. Based on initial indications from the console screens, the operator intended to trip Steam Turbine Generator 2 to stabilize the steam headers. Instead, the console operator inadvertently tripped Gas Turbine Generator 2 which caused cascading effect on the steam headers resulting in a pressure drop to approximately 75 bar prior to recovering. The reduced steam pressure to ECU resulted in a reduction of power to the Cracked Gas Compressor (steam turbine driven). This resulted in a reduction in cracked gas forward flow, eventually activating a low flow trip of the Acetylene (AC) Reactor. By design, the trip routed cracked gas to the High-Pressure Flare Header to control excess emissions in the flares. Further actions were taken to investigate the initiating cause of the event and to document learnings from the entire event to share across operations. Further investigation determined that upgrades to the Cogen (ENMCS) control system resulted in an erroneous signal sent to Unit 1 GTG resulting in the initial ramp down of the unit and pressure drop in the steam header that could not be stabilized with other following actions.

- **Time when the incident was first observed, and duration of excess emissions**  
The incident first occurred with alarms in the control room related to the trip of the Cogen Unit 1 Duct Burners at approximately 14:42 on November 28, 2022. Flaring of cracked gas at the two HP ground flares began at approximately 15:03 on November 28, 2022, through the evening hours and reduced over the time the next day to normal levels at approximately 23:50 on November 29, 2022, when the ECU feed was back on spec and progressing normally. The HP elevate flare valve opened initially for approximately 15 seconds although no flaring occurred. Additionally, no visible emissions were observed during the event from the HP flares.

Excess emissions from flaring at the TEGF was reduced by quickly and safely achieving normal operations in the ECU after the incident after normal steam header pressures were re-established. All flared gas was maintained in the two TEGF and not directed to the elevated emergency flare.

- **Estimated rate of excess emissions**

Based on the amount of cracked gas sent to the TEGFs, estimated excess emissions are calculated as the following using the known composition, emission factors and calculations:

CO<sub>2</sub>e: 7,484.09 tons  
CO: 9.80 tons  
NO<sub>x</sub>: 4.37 tons  
SO<sub>2</sub>: 0.0 tons  
PM(filt): 0.12 tons  
PM<sub>10</sub>: 0.48 tons  
PM<sub>2.5</sub>: 0.48 tons  
VOC: 17.80 tons  
HAP: 0.12 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 Beudway, Air Quality Specialist

