



Shell Chemical Appalachia LLC
300 Frankfort Rd
Monaca, PA 15061

November 16, 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) Boil-Off Gas Compressor A & B Coupling Failure and Multi-Point Ground Flare (MPGF) Header System (Source ID C204/C204B) Malfunction Emission Report

Dear Mr. Gorog,

Shell Chemical Appalachia LLC (“Shell”) is submitting this Malfunction Report to the Pennsylvania Department of Environmental Protection (PADEP) for unexpected failure of Boil-Off Gas (BOG) Compressor A & B due to a motor coupling failure.

- **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 a coupling failure, within a few days of starting, of BOG Compressor A and the redundant BOG B was shut down after it was inspected and found that the coupling was developing similar failure cracks. The BOG compressor recovers ethylene boil-off vapor from the ethylene tank and returns the ethylene back to the tank. Likely cause of the BOG compressor coupling failure, located between the motor and compressor gear box, was unanticipated vibration under operating load, based on the failure pattern of A and crack pattern of B. As a result, ethylene tank boil-off vapor is currently being sent to the MPGF to control the emissions associated with the malfunction while the failure is investigated, permanent design solution determined, and replacement couplings located and installed.

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

Emission from the malfunction event began with the failure of redundant BOG B on October 17, 2022, beginning at approximately 16:30 and is currently an ongoing event until the replacement couplings are installed and the BOG compressors restarted. At least one of the BOG compressors could be restarted as early as today with the replacement

coupling.

Emissions associated with the malfunction event from flaring at the MPGF are being reduced by proactively reducing ethylene tank levels with the start-up of several Polyethylene units. Also limiting the amount of produced ethylene going into the ethylene tank based on the Polyethylene unit demands. Adjustment to ECU production / PE demand is coordinated and communicated daily.

- **Estimated rate of excess emissions associated with the Malfunction Event**

Based on the daily amount of ethylene being sent to the MPGF, estimated emissions from the malfunction event are calculated as the following using the know composition, and emission factors:

CO₂e: 134.86 tons/day
CO: 0.29 tons/day
NO_x: 0.064 tons/day
SO₂: 0.0 tons/day
PM(filt): 0.0017 tons/day
PM₁₀: 0.0069 tons/day
PM_{2.5}: 0.0069 tons/day
VOC: 0.43 tons/day
HAP: 0.001 tons/day

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

Sincerely,

Kimberly Kaal

Kimberly Kaal
Environmental Manager, Attorney-in-Fact

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