Shell Chemical Appalachia LLC
300 Frankfort Rd
Monaca, PA 15061

October 18, 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-04-00740A & C Source IDs 201 Ethylene Manufacturing Line and 205 High Pressure (HP) Header System Excess Emissions Malfunction Report – Propane Refrigeration Compressor Trip on Low Suction Pressure

Dear Mr. Gorog,

Shell Chemical Appalachia LLC ("Shell") is submitting this Malfunction Report to the Pennsylvania Department of Environmental Protection (PADEP) relating to excess emissions to the HP Flares following a low suction pressure trip of the Propane Refrigeration Compressor (PRC) on September 18, 2022.

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

- **Nature and cause of the incident**

  On September 18, 2022, Shell experienced a trip of the Propane Refrigeration Compressor (PRC) at approximately 12:03 that paused the start-up of the ECU. Feed was going into the ECU in accordance with the start-up procedures. The PRC tripped on low 1st stage suction pressure and resulted in feed going to the High Pressure (HP) Flare system including the HP Elevated Flare. During these commissioning, operations was experiencing oscillating vessel level readings which was causing the level controllers to work against each other in vessels V-11434 and V11431. These fluctuations eventually caused swings in the PRC stage 1 suction drum pressure which caused the trip on low pressure.

  The PRC was inspected after the trip and no defects were found. Inspection of the individual level controllers, pressure controllers and controller logic were performed finding no anomalies. Based on these inspections, the controller gain for the PCR stage 1 pressure controller was adjusted to dampen pressure swings. It is expected that this will improve overall control of the system and help reduce the potential for low suction pressure trips in the future.

- **Time when the incident was first observed, and duration of excess emissions**

  The incident occurred on September 18, 2022, beginning at 12:03 and concluded when the unit was ready to restart later that afternoon at approximately 16:41, lasting approximately 4.65 hours.

Emissions were reduced by quickly trouble shooting the cause of the PRC unit trip, making necessary adjustments to the pressure control equipment, and maintaining furnace feed at minimal levels to proceed with restarting the units when ready. Since restarting the PCR in September, the pressure controller adjustments have resulted in improved operation of this unit.

- **Estimated rate of excess emissions**
  - The incident resulted in use of the HP elevated flare for approximately 15 minutes with visible emissions from the HP elevated flare noted for much of that time as determined when reviewing the flare video footage. Method 22 observations were conducted shortly after the flare event occurred. No additional visible emissions were noted during these Method 22 observations.

  - The following emissions are the preliminary estimated excess emissions flared at the HP Flares during this event until the restart of the PRC. Note this estimate does not account for emissions associated with ECU repeated start-up steps to get back to the original ECU start-up progression. Emission estimates are based on the HP header vent gas flow meter readings and gas chromatograph composition data at the time:

    - VOC: 4.59 tons
    - HAP: 0.04 tons
    - NOx: 1.51 tons
    - CO: 6.34 tons
    - SO2: 0.0 tons
    - PM10/2.5: 0.17 tons
    - CO2e: 2817.7 tons

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