



Shell Chemical Appalachia LLC
300 Frankfort Rd
Monaca, PA 15061

October 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-04-00740A & C Source IDs 201 Ethylene Manufacturing Line and 205 High Pressure (HP) Header System Excess Emissions Malfunction Report – Cracked Gas Compressor 4th Stage Level Transmitter Failure and Unit Trip

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 level transmitter trip of the Cracked Gas Compressor (CGC) on September 15, 2022.

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

On September 15, 2022, Shell experienced a trip of the CGC at approximately 23:05 that paused the start-up of the ECU. Feed was going into the ECU in accordance with the start-up procedures. The CGC 4th Stage Suction Drum guided wave radar level transmitters 131LZ090A/B/C that control the drum liquid level, began to act erratic and were providing conflicting level readings. The 'A' transmitter returned an input/output (I/O) failure, and the 'B' and 'C' transmitters were returning levels within 8-9% of each other. The control operator compared the level to the independent level transmitter 131LI078, which returned a level of 38-39%. The control operator placed the level controller 131LC090 in manual and opened it to verify the levels would move. The 131LI078 reacted accordingly. 131LZ090A came back from the I/O failure and returned a level above 90%. The 'B' then returned an I/O failure, causing the compressor to trip on the 4th Stage Suction Drum high level.

While the suction drum level transmitters shut down the CGC on high liquid level as designed, the conflicting level readings leading up to the trip were investigated. It was determined that the recommended setting for the guided wave radar level transmitters had been calibrated for water and the calibrations should have accounted for water/hydrocarbon 2 phase fluid in the CGC suction drums. Instrument calibration settings were changed in all similar instruments to avoid additional commissioning trip events

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

The incident occurred on September 15, 2022, beginning at 23:05 and concluded when the unit was ready to restart the evening of September 16, 2022 at approximately 21:20, lasting approximately 22.25 hours.

Emissions were reduced by quickly trouble shooting the cause of the CGC unit trip, making necessary updated calibrations to level control equipment, and maintaining furnace feed at minimal levels to proceed with restarting the units when ready. A comprehensive review of all 163 guided wave radar level instruments was completed, with 29 of those instruments needing adjusted calibration settings.

• Estimated rate of excess emissions

- The incident resulted in use of the HP elevated flare for less than 2 minutes and with possible visible emissions from the high-pressure elevated flare were noted for several seconds when the flare first lit as determined when reviewing the flare video footage after the event. Method 22 observations were not conducted as the event lasted less than 2 minutes and occurred at night.
- The following emissions are the preliminary estimated excess emissions flared at the HP Flares during this event until the restart of the CGC. 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: 18.26 tons
 - HAP: 0.16 tons
 - NOx: 5.77 tons
 - CO: 23.97 tons
 - SO2: 0.0 tons
 - PM10/2.5: 0.63 tons
 - CO2e: 10,661.1 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 Beudway, Air Quality Specialist
Anna Hensel, District Supervisor