



Shell Chemical Appalachia LLC  
300 Frankfort Rd  
Monaca, PA 15061

February 6, 2023

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

**RE: PA-04-00740C – High Pressure Flare Header (Source ID 205), Boiler Feed Water Loss Malfunction and Excess Emission Event**

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 Boiler Feedwater (BFW) pump supplying BFW to the Ethane Cracking Unit (ECU) due to an extreme cold weather event.

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

- **Nature and cause of the incident**

During the early morning of December 24, 2022, the Cogeneration unit (Cogen) boiler feedwater pump “A” tripped due to a frozen suction pressure transmitter (503PTZ-105B) which caused a reduction of BFW supply to Cogen and ECU. This condition eventually led to an upset in ECU and resulted in flaring excess emissions at the Totally Enclosed Ground Flares (TEGFs) and the HP Elevated Flare (HPEF).<sup>1</sup>

The extreme low temperatures also resulted in other equipment failures associated with the ECU upset including frozen valves in ECU and other transmitters for steam and BFW impacting several cracking furnaces. As a result, Shell paused operations to mitigate critical control equipment impacted during the extreme cold temperature period.

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

Excess emissions from the malfunction event began on December 24, 2022, beginning at approximately 07:05. Flaring at the HP elevated flare began at 07:11 and stopped at 07:22 for approximately eleven 11 minutes. Visible emissions from the elevated flare

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<sup>1</sup> Identified as HP Ground Flares #1 and #2, Source ID C205A and C205B; and HP Elevated Flare, Source ID C205C in PA-04-00740C

were noted for approximately 3.5 minutes (3:32) based review of flare camera footage. Method 22 was also performed by operations and noted visible emissions twice during the event for a total of 3 minutes. The pause in operations lasted approximately 14 days while critical repairs were made to freeze impacted equipment and ECU operation resumed starting January 6, 2023, with ethane feed into the furnace beginning approximately 21:00 that evening.

Excess emissions associated with flaring were minimized by safely shutting down the ECU, minimizing the duration of flaring associated with the shutdown and restart of the ECU, and pausing operations to repair critical control equipment impacted by the extreme cold conditions. In addition, Shell proactively evaluated and took steps to mitigate the freezing issue associated with similar control equipment to avoid additional malfunctions. Sitewide winterization procedures and techniques remain under evaluation for continued improvements to equipment reliability.

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

Based on the duration of the flaring to the HP Flare Header, estimated emissions from the malfunction are calculated as the following using the known composition, and emission factors:

CO <sub>2</sub> e:	16,428 tons
CO:	31.80 tons
NO <sub>x</sub> :	9.09 tons
SO <sub>2</sub> :	0.0 tons
PM(filt):	0.25 tons
PM <sub>10</sub> :	1.00 tons
PM <sub>2.5</sub> :	1.00 tons
VOC:	12.17 tons
HAP:	0.02 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:  
Beth Speicher, Environmental Group Manager  
Scott Beaudway, Air Quality Specialist