



Shell Chemical Appalachia LLC
300 Frankfort Rd
Monaca, PA 15061

December 7, 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 Source IDs 101, 102, 103 Combustion Turbine/Duct Burner Units #1, #2, #3 NOx Emissions Malfunction Report, November 5, 7, 17, 22, 2022

Dear Mr. Gorog,

Shell Chemical Appalachia LLC (“Shell”) is submitting this Malfunction Report to the Pennsylvania Department of Environmental Protection (PADEP).

- **Name and location of the facility**

Shell Polymers Monaca
300 Frankfort Road, Monaca PA, 15061

- **Nature and cause of the incident**

On November 5 at ~10:16PM the Combustion Turbine/Duct Burner (Cogen) Unit #2 SCR Heater A tripped offline and initiated a switch to SCR Heater B. This caused a temporary interruption to ammonia injection while SCR Heater B increased temperature to its design setpoint. This resulted in elevated NOx emissions (above 2 ppmvd @ 15% O2) while the heater was switched and ammonia injection restored.

Cause of the trip was determined to be a local stop in the field. However no personnel were found in the area at the time of the local stop. The SCR heater has operated successfully since this time. The SCR will be monitored for potential repeat occurrence and awareness of operational requirements increased.

On November 7 at ~9:30AM all Cogen Units experienced a sudden drop in natural gas fuel pressure. This resulted in a drop of load for all combustion turbines and tripping off all duct burners. The drop in load triggered the turbines to switch from dry low-NOx steady-state premix to lean-lean firing mode. The switch in firing mode activated as-designed to bring the turbine to a more stable operating condition under low load. This resulted in elevated NOx emissions (above 2 ppmvd @ 15% O2) while the natural gas pressure was restored, turbine load increased, and firing mode switched back to steady state premix for low NOx.

Cause of the natural gas fuel pressure drop was due to insufficient valve isolation while instrumentation and engineering technicians were working on the natural gas fuel knockout drum closed limit. Corrective action included restoring the valve to the closed position, manual proving of the isolation valves, and increased awareness to verify isolation before performing work.

On November 17 at ~ 2:57PM while restarting Cogen Unit #3 after a maintenance outage, the SCR dilution air flow signal suddenly decreased. This caused a trip of the ammonia injection system due to insufficient air. This resulted in elevated NOx emissions (above 2 ppmvd @ 15% O2) while Cogen Unit #3 was shut down again, muffler insulation was removed from interfering with the air flow element, and the unit was then restarted.

Cause of the low air flow signal was air blower muffler material breaking off and interfering with the flow element. Corrective action included removal of the interfering material and restarting of the unit. All blower mufflers have been replaced.

On November 22 at ~ 2:45PM duct burners on Cogen Unit #2 were restarted after an outage. This caused an increase in total NOx emissions in the exhaust of the Cogen Unit #2. This resulted in elevated NOx emissions (above 2 ppmvd @ 15% O2) while Operations increased ammonia flow in the SCR control system to adjust to the elevated NOx.

Cause of the elevated NOx was the activation of duct burners and slow response of the ammonia control system to keep up with the control demands. Corrective action included Operations taking manual control to add sufficient additional ammonia to the system, and increased awareness to controlled activation of the duct burners.

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

- November 5, 2022 at ~ 10:16 PM
 - Unit #2 1 hour (4.157 ppmvd @ 15% O2)
- November 7, 2022 at ~ 9:30AM
 - Unit #1 1 hour (7.240 ppmvd @ 15% O2)
 - Unit #2 1 hour (6.633 ppmvd @ 15% O2)
 - Unit #3 1 hour (4.688 ppmvd @ 15% O2)
- November 17, 2022 at ~ 2:57 PM
 - Unit #3 1 hour (13.987 ppmvd @ 15% O2)
- November 22, 2022 at ~ 2:45PM
 - Unit #2 1 hour (2.753 ppmvd @ 15% O2)

- **Estimated rate of excess emissions^a**

Source ID	Name	NOx (lbs)	NOx (tons)
101	Combustion Turbine/Duct Burner Unit #1	10.9	0.005
102	Combustion Turbine/Duct Burner Unit #2	16.4	0.008
103	Combustion Turbine/Duct Burner Unit #3	20.1	0.010
Total		47.4	0.024

^a Emissions in excess of 2 ppmvd @ 15% O2 applicable limit

Mark Gorog

Page 3 of 3

December 07, 2022

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