



Shell Chemical Appalachia LLC
300 Frankfort Rd
Monaca, PA 15061

March 14, 2024

Mark Gorog P.E., Regional Manager Air Quality Program
Pennsylvania Department of Environmental Protection (PADEP)
Southwest Regional Office
400 Waterfront Drive
Pittsburgh, PA 15222

RE: PA-04-00740C Source ID 103 Combustion Turbine/Duct Burner Unit #3 Excess NOx Emissions Malfunction Report

Dear Mr. Gorog,

Shell Chemical Appalachia LLC (“Shell”) is submitting this Malfunction Report to the Pennsylvania Department of Environmental Protection (PADEP) for excess NOx emissions from Cogen Unit #3¹ on February 23, 2024.

This malfunction did not pose an imminent and substantial danger to the public health and safety or the environment.

- **Name and location of the facility**
Shell Polymers Monaca
300 Frankfort Road, Monaca PA, 15061
- **Nature and cause of the incident**
On February 23, 2024, beginning at approximately 21:00, Cogen Unit #3 stack’s previous hour NOx concentration exceeded the permit limit of 2 ppmvd (1 hour average at 15% O₂). This carried on for two consecutive hours. The cause of the exceedance was an electrical failure that ultimately caused a temporary malfunction of the SCR system (Source ID C103).
- **Time when the malfunction or breakdown was first observed**
The SCR system malfunction occurred at 20:48 on February 23, 2024.
- **The date and time that the malfunction started and ended**
The SCR system malfunction started on February 23, 2024, 20:48 and ended approximately 30 minutes later at 21:14. Shortly after, the NOx concentration minute data fell below 2 ppmvd at 21:23.

In total, this yielded NOx hourly average exceedances for the 20:00 and 21:00 hours.

- **An estimate of the emissions associated with the malfunction**
8.01 lb of excess NOx emissions over duration of the event
- **The calculations that were used to determine that quantity**
The calculations are based on the Cogen Unit #3 stack CEMS analyzer readings over the period of the malfunction window.

¹ Identified as Combustion Turbine/Duct Burner (Source ID 103) PA-04-00740C

Minute data was extracted from the CEMS program for the following parameters: NO_x ppmvd @15% O₂ and NO_x lb/hr. A representative baseline NO_x lb/hr value was calculated by averaging the steady state, compliant data leading up to the event. This baseline value was then subtracted from the NO_x lb/hr data for each minute the NO_x concentration exceeded 2 ppmvd @15% O₂ during the malfunction. The minute excess lb/hr data was then converted to lb data and summed together to calculate the total excess NO_x emissions.

See Attachment A for CEMS output and calculation details.

- **The steps, if any, that the facility took to limit the duration and/or quantity of emissions associated with the malfunction**

Quick investigation and troubleshooting identified the source of the problem to be an electrical trip. Once it was concluded that the impacted equipment could safely be put back in service, the SCR system's functionality was restored, and NO_x emissions fell below the permitted maximum.

- **A detailed analysis that sets forth the Root Cause of the malfunction, to the extent determinable**

On February 23, 2024 at approximately 20:48, the Cogen unit console received a large alarm flood. Quick field and console troubleshooting commenced, and it was determined that one of the Cogen #3 transformers had tripped. This resulted in the shutdown of various auxiliary equipment, including that associated with the SCR system. Due to redundancy of the electrical configuration, the tripped equipment was able to be safely restarted while the tripped transformer remained out of service.

Further investigation of the transformer trip via the site's electrical group commenced. It was determined that water ingress into the transformer was the source of the trip. Specifically, there was a loose conduit cover on the outside of the transformer which allowed rainwater to enter the conduit system.

- **An analysis of the measures, if any, that are available to reduce the likelihood of a recurrence of a malfunction resulting from the same Root Cause or contributing causes in the future**

A survey of all transformers in the Utilities and General Facilities (UGF) area to check for water ingress is ongoing. The associated at-risk conduit systems are also being assessed. The necessary conduit system sealing will follow pending the findings.

Once this is complete, other operating area's suspect transformers will be assessed.

- **To the extent that investigations of the causes and/or possible corrective action(s) still are underway on the due date of the report, a statement of the anticipated date by which a follow-up report will be submitted**

A follow up report is not anticipated.

- **Corrective action is final or timeline for implementation**

The UGF transformer survey and necessary system sealing is expected to be complete by the end of May 2024.

March 14, 2024

If you have any questions regarding this matter, please contact me at (724) 709-2825 or william.watson@shell.com.

Sincerely,

A handwritten signature in black ink, appearing to read 'W. Watson', written in a cursive style.

William Watson
Operations Manager

CC:

Scott Beaudway, Air Quality Specialist

Beth Speicher, Environmental Group Manager

Kristin Goddard, Environmental Compliance Specialist

Attachment A

Cogen 3 CEMS Output Data and Excess Emissions Calculations

Date and Time	Cogen 3 CEMS Output, minute avg		Manual Calculations	
	Nox, ppmvd @15% O2	Nox, lb/hr	Nox above baseline, lb/hr (baseline= 4.2 lb/hr)	Excess NOx Emissions, lbs
2/23/2024 20:00	1.79	4.6	-	-
2/23/2024 20:01	1.72	3.9	-	-
2/23/2024 20:02	1.73	3.9	-	-
2/23/2024 20:03	1.79	4.5	-	-
2/23/2024 20:04	1.74	3.9	-	-
2/23/2024 20:05	1.71	3.9	-	-
2/23/2024 20:06	1.66	3.9	-	-
2/23/2024 20:07	1.75	3.9	-	-
2/23/2024 20:08	1.8	4.5	-	-
2/23/2024 20:09	1.63	3.9	-	-
2/23/2024 20:10	1.83	4.5	-	-
2/23/2024 20:11	1.66	3.9	-	-
2/23/2024 20:12	1.76	3.9	-	-
2/23/2024 20:13	1.73	3.9	-	-
2/23/2024 20:14	1.77	4.5	-	-
2/23/2024 20:15	1.73	3.9	-	-
2/23/2024 20:16	1.73	3.9	-	-
2/23/2024 20:17	1.72	3.9	-	-
2/23/2024 20:18	1.75	3.9	-	-
2/23/2024 20:19	1.65	3.9	-	-
2/23/2024 20:20	1.83	4.5	-	-
2/23/2024 20:21	1.72	3.9	-	-
2/23/2024 20:22	1.78	4.6	-	-
2/23/2024 20:23	1.78	4.6	-	-
2/23/2024 20:24	1.77	4.6	-	-
2/23/2024 20:25	1.72	3.9	-	-
2/23/2024 20:26	1.69	3.9	-	-
2/23/2024 20:27	1.88	4.6	-	-
2/23/2024 20:28	1.82	4.6	-	-
2/23/2024 20:29	1.67	3.9	-	-
2/23/2024 20:30	1.71	3.9	-	-
2/23/2024 20:31	1.87	4.6	-	-
2/23/2024 20:32	1.73	3.9	-	-
2/23/2024 20:33	1.82	4.6	-	-
2/23/2024 20:34	1.64	3.9	-	-
2/23/2024 20:35	1.75	3.9	-	-
2/23/2024 20:36	1.81	4.6	-	-
2/23/2024 20:37	1.76	3.9	-	-
2/23/2024 20:38	1.74	3.9	-	-
2/23/2024 20:39	1.81	4.6	-	-
2/23/2024 20:40	1.67	3.9	-	-
2/23/2024 20:41	1.8	4.6	-	-
2/23/2024 20:42	1.78	4.6	-	-
2/23/2024 20:43	1.7	3.9	-	-
2/23/2024 20:44	1.76	3.9	-	-
2/23/2024 20:45	1.66	3.9	-	-
2/23/2024 20:46	1.78	4.5	-	-
2/23/2024 20:47	1.87	4.5	-	-
2/23/2024 20:48	5.29	12.3	8.11	0.14
2/23/2024 20:49	7.33	17.5	13.31	0.22
2/23/2024 20:50	8.05	19.4	15.21	0.25
2/23/2024 20:51	8.26	19.4	15.21	0.25

2/23/2024 21:47	1.76	3.9	-	-
2/23/2024 21:48	1.79	4.6	-	-
2/23/2024 21:49	1.74	3.9	-	-
2/23/2024 21:50	1.78	4.6	-	-
2/23/2024 21:51	1.85	4.6	-	-
2/23/2024 21:52	1.81	4.6	-	-
2/23/2024 21:53	1.71	3.9	-	-
2/23/2024 21:54	1.64	3.9	-	-
2/23/2024 21:55	1.77	4.6	-	-
2/23/2024 21:56	1.75	3.9	-	-
2/23/2024 21:57	1.74	3.9	-	-
2/23/2024 21:58	1.77	4.6	-	-
2/23/2024 21:59	1.71	3.9	-	-
2/23/2024 22:00	1.71	3.9	-	-