



Shell Chemical Appalachia LLC
300 Frankfort Rd
Monaca, PA 15061

June 12, 2025

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 102 Combustion Turbine/Duct Burner Unit #2 Excess NOx Emissions Malfunction Report

Dear Mr. Gorog,

Shell Chemical Appalachia LLC (“Shell”), located in Beaver County PA, is submitting this malfunction report to the Pennsylvania Department of Environmental Protection (PADEP) for excess NOx emissions from Cogen Unit #2¹ on May 19, 2025.

This malfunction did not pose an imminent and substantial danger to 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 May 19, 2025, Cogen Unit #2 stack’s previous hour NOx concentration exceeded the permit limit of 2 ppmvd (1 hour average at 15% O₂) at 22:00 and 23:00. The exceedances were the result of two separate shutdowns of the SCR system (Source ID C102) which yielded disruptions to ammonia flow.
 - **Time when the malfunction or breakdown was first observed**
First SCR system malfunction: 5/19/25 22:05
Second SCR system malfunction: 5/19/25 23:46
 - **The date and time that the malfunction started and ended**
First SCR system malfunction: 5/19/25 22:05-22:10
Second SCR system malfunction: 5/19/25 23:46-23:53
- In total, this yielded two previous 1-hr average NOx concentration exceedances for the 22:00 and 23:00 hours (21:00 and 22:00 hours in CEMS program, which is not adjusted for Daylight Savings time).
- **An estimate of the emissions associated with the malfunction**
10.02 lb of excess NOx emissions over duration of both malfunctions.
 - **The calculations that were used to determine that quantity**

¹ Identified as Combustion Turbine/Duct Burner (Source ID 102) in PA-04-00740C

The calculations are based on Cogen Unit #2 stack's CEMS analyzer readings over the period of the malfunction windows.

Minute data was extracted from the CEMS analyzer for the following parameters: NOx ppmvd @15% O2 and NOx lb/hr. A representative baseline NOx 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 NOx lb/hr data for each minute the NOx 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 NOx 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 operator action was taken to re-establish ammonia flow and restore normal operations.

- **A detailed analysis that sets forth the root cause of the malfunction, to the extent determinable**

First SCR System Malfunction

On May 19, 2025, at approximately 22:05, Cogen #2's SCR "A" heater unexpectedly shut down. The system responded per design and stopped ammonia injection to the SCR system, which caused the unit's stack NOx levels to increase. Five minutes later, the standby "B" heater was put into service and ammonia flow was restored.

Prior to the event, Operations was preparing SCR *blower* "A" for maintenance. Part of the preparation included electrically de-energizing the blower, which was not in service at the time. Per procedure, the de-energization needed to be tested to ensure the blower would not start. However, instead of performing a start attempt on the "A" blower, the switch for the "A" heater was inadvertently selected. This resulted in a shutdown of the "A" heater, which was in service at the time, and a disruption to ammonia flow. Quick operator action was taken when the SCR heater tripped, and the standby "B" heater was put into service and ammonia flow was restored.

Second SCR System Malfunction

On May 19, 2025, at approximately 23:46, Cogen #2's SCR "B" heater unexpectedly shut down. The system responded per design and stopped ammonia injection to the SCR system, which caused the unit's stack NOx levels to increase. Six minutes later, the "B" heater was put back into service and ammonia flow was restored.

Following the first SCR system malfunction, Operations was investigating a standing alarm on "A" heater, which came in during the first event. The heater remained electrically "locked out", preventing it from being started up and serving as a viable standby. In an effort to clear the alarm, Operations cycled power to the "A" heater, but inadvertently de-energized both (A and B) SCR heaters due to inadequate labeling on the electrical breaker. This caused the running "B" heater to shut down, resulting in a disruption to ammonia flow. Quick operator action was taken when the SCR heater tripped, and "B" heater was put back into service and ammonia flow was restored.

- **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**

First SCR System Malfunction

Detailed discussions were held with personnel involved on the importance of selecting the correct equipment prior to start/stop attempts.

Second SCR System Malfunction

The breaker label showed that the breaker only powered "A" heater but, in fact, provided power to

both A and B heaters. This label has been corrected to provide clarity on what pieces of equipment that breaker powers.

Both SCR Malfunctions

The details of this event as well as key learnings will be shared with Operations as a training opportunity. This will be completed by 7/31/2025.

- **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**
No follow up report anticipated.
- **Corrective action is final or timeline for implementation**

Table 1: Root Causes and Corrective Actions

Event	Root Cause	Corrective Actions	Timing
First SCR System Malfunction	Incorrect piece of equipment selected when verifying electrical de-energization	Detailed discussions with personnel involved	Complete
Second SCR System Malfunction	Inadequate breaker label	Correct breaker label	Complete
Both SCR System Malfunctions	-	Share learnings/training	7/31/2025

If you have any questions regarding this matter, please don't hesitate to contact Kimberly Kaal at kimberly.kaal@shell.com or me at martin.padilla@shell.com.

Sincerely,



Martin Padilla
HSSE Manager

CC:
Scott Beaudway, Air Quality Specialist

Attachment A

Cogen 2 CEMS Output Data and Excess Emissions Calculations

Trace Date and Time	Daylight Savings Corrected/Actual Date and Time	Cogen 2 CEMS Data, minute average		Manual Calculations	
		NOx @15% O2, ppmvd	NOx, lb/hr	NOx above baseline, lb/hr (baseline=4.4 lb/hr)	Excess NOx Emissions, lbs
5/19/2025 20:30	5/19/2025 21:30	1.7	4.4	-	-
5/19/2025 20:31	5/19/2025 21:31	1.73	4.4	-	-
5/19/2025 20:32	5/19/2025 21:32	1.72	4.4	-	-
5/19/2025 20:33	5/19/2025 21:33	1.74	4.4	-	-
5/19/2025 20:34	5/19/2025 21:34	1.73	4.4	-	-
5/19/2025 20:35	5/19/2025 21:35	1.73	4.4	-	-
5/19/2025 20:36	5/19/2025 21:36	1.74	4.4	-	-
5/19/2025 20:37	5/19/2025 21:37	1.74	4.4	-	-
5/19/2025 20:38	5/19/2025 21:38	1.74	4.4	-	-
5/19/2025 20:39	5/19/2025 21:39	1.74	4.4	-	-
5/19/2025 20:40	5/19/2025 21:40	1.75	4.4	-	-
5/19/2025 20:41	5/19/2025 21:41	1.75	4.4	-	-
5/19/2025 20:42	5/19/2025 21:42	1.75	4.4	-	-
5/19/2025 20:43	5/19/2025 21:43	1.77	5.2	-	-
5/19/2025 20:44	5/19/2025 21:44	1.84	5.2	-	-
5/19/2025 20:45	5/19/2025 21:45	1.76	4.4	-	-
5/19/2025 20:46	5/19/2025 21:46	1.75	4.4	-	-
5/19/2025 20:47	5/19/2025 21:47	1.76	4.4	-	-
5/19/2025 20:48	5/19/2025 21:48	1.75	4.4	-	-
5/19/2025 20:49	5/19/2025 21:49	1.74	4.4	-	-
5/19/2025 20:50	5/19/2025 21:50	1.76	4.4	-	-
5/19/2025 20:51	5/19/2025 21:51	1.74	4.4	-	-
5/19/2025 20:52	5/19/2025 21:52	1.74	4.4	-	-
5/19/2025 20:53	5/19/2025 21:53	1.74	4.4	-	-
5/19/2025 20:54	5/19/2025 21:54	1.73	4.4	-	-
5/19/2025 20:55	5/19/2025 21:55	1.73	4.4	-	-
5/19/2025 20:56	5/19/2025 21:56	1.72	4.4	-	-
5/19/2025 20:57	5/19/2025 21:57	1.73	4.4	-	-
5/19/2025 20:58	5/19/2025 21:58	1.72	4.4	-	-
5/19/2025 20:59	5/19/2025 21:59	1.71	4.4	-	-
5/19/2025 21:00	5/19/2025 22:00	1.71	4.4	-	-
5/19/2025 21:01	5/19/2025 22:01	1.71	4.4	-	-
5/19/2025 21:02	5/19/2025 22:02	1.7	4.4	-	-
5/19/2025 21:03	5/19/2025 22:03	1.69	4.3	-	-
5/19/2025 21:04	5/19/2025 22:04	1.7	4.3	-	-
5/19/2025 21:05	5/19/2025 22:05	4.78	13	8.62	0.14
5/19/2025 21:06	5/19/2025 22:06	8.82	23.1	18.72	0.31
5/19/2025 21:07	5/19/2025 22:07	9.27	24.5	20.12	0.34
5/19/2025 21:08	5/19/2025 22:08	9.41	25.2	20.82	0.35
5/19/2025 21:09	5/19/2025 22:09	9.49	25.2	20.82	0.35
5/19/2025 21:10	5/19/2025 22:10	9.55	25.2	20.82	0.35
5/19/2025 21:11	5/19/2025 22:11	9.6	25.2	20.82	0.35
5/19/2025 21:12	5/19/2025 22:12	9.62	25.2	20.82	0.35
5/19/2025 21:13	5/19/2025 22:13	7.47	20.2	15.82	0.26
5/19/2025 21:14	5/19/2025 22:14	5.79	15.1	10.72	0.18
5/19/2025 21:15	5/19/2025 22:15	4.5	12.3	7.92	0.13
5/19/2025 21:16	5/19/2025 22:16	3.84	10.1	5.72	0.10
5/19/2025 21:17	5/19/2025 22:17	3.36	8.7	4.32	0.07
5/19/2025 21:18	5/19/2025 22:18	6.33	16.6	12.22	0.20
5/19/2025 21:19	5/19/2025 22:19	6.71	18.1	13.72	0.23
5/19/2025 21:20	5/19/2025 22:20	6.64	17.4	13.02	0.22
5/19/2025 21:21	5/19/2025 22:21	6.71	18.1	13.72	0.23
5/19/2025 21:22	5/19/2025 22:22	8.26	21.8	17.42	0.29
5/19/2025 21:23	5/19/2025 22:23	6.61	17.4	13.02	0.22
5/19/2025 21:24	5/19/2025 22:24	5.66	15.3	10.92	0.18
5/19/2025 21:25	5/19/2025 22:25	5.24	13.8	9.42	0.16
5/19/2025 21:26	5/19/2025 22:26	5.21	13.9	9.52	0.16
5/19/2025 21:27	5/19/2025 22:27	5.19	13.9	9.52	0.16
5/19/2025 21:28	5/19/2025 22:28	5.18	13.9	9.52	0.16
5/19/2025 21:29	5/19/2025 22:29	4.68	12.4	8.02	0.13
5/19/2025 21:30	5/19/2025 22:30	4	11	6.62	0.11

5/19/2025 21:31	5/19/2025 22:31	3.4	9.5	5.12	0.09
5/19/2025 21:32	5/19/2025 22:32	3.21	8.8	4.42	0.07
5/19/2025 21:33	5/19/2025 22:33	2.82	7.3	2.92	0.05
5/19/2025 21:34	5/19/2025 22:34	2.5	6.6	2.22	0.04
5/19/2025 21:35	5/19/2025 22:35	2.19	5.9	1.52	0.03
5/19/2025 21:36	5/19/2025 22:36	2.03	5.2	0.82	0.01
5/19/2025 21:37	5/19/2025 22:37	1.85	5.2	-	-
5/19/2025 21:38	5/19/2025 22:38	1.81	5.2	-	-
5/19/2025 21:39	5/19/2025 22:39	1.81	5.2	-	-
5/19/2025 21:40	5/19/2025 22:40	1.82	5.2	-	-
5/19/2025 21:41	5/19/2025 22:41	1.82	5.2	-	-
5/19/2025 21:42	5/19/2025 22:42	1.81	5.2	-	-
5/19/2025 21:43	5/19/2025 22:43	1.82	5.2	-	-
5/19/2025 21:44	5/19/2025 22:44	1.82	5.2	-	-
5/19/2025 21:45	5/19/2025 22:45	1.83	5.2	-	-
5/19/2025 21:46	5/19/2025 22:46	1.81	5.2	-	-
5/19/2025 21:47	5/19/2025 22:47	1.8	5.2	-	-
5/19/2025 21:48	5/19/2025 22:48	1.79	5.2	-	-
5/19/2025 21:49	5/19/2025 22:49	1.79	5.2	-	-
5/19/2025 21:50	5/19/2025 22:50	1.79	5.2	-	-
5/19/2025 21:51	5/19/2025 22:51	1.78	5.2	-	-
5/19/2025 21:52	5/19/2025 22:52	1.76	4.4	-	-
5/19/2025 21:53	5/19/2025 22:53	1.75	4.4	-	-
5/19/2025 21:54	5/19/2025 22:54	1.76	4.4	-	-
5/19/2025 21:55	5/19/2025 22:55	1.75	4.4	-	-
5/19/2025 21:56	5/19/2025 22:56	1.73	4.4	-	-
5/19/2025 21:57	5/19/2025 22:57	1.75	4.4	-	-
5/19/2025 21:58	5/19/2025 22:58	1.74	4.4	-	-
5/19/2025 21:59	5/19/2025 22:59	1.74	4.4	-	-
5/19/2025 22:00	5/19/2025 23:00	1.74	4.4	-	-
5/19/2025 22:01	5/19/2025 23:01	1.73	4.4	-	-
5/19/2025 22:02	5/19/2025 23:02	1.73	4.4	-	-
5/19/2025 22:03	5/19/2025 23:03	1.72	4.4	-	-
5/19/2025 22:04	5/19/2025 23:04	1.74	4.4	-	-
5/19/2025 22:05	5/19/2025 23:05	1.72	4.4	-	-
5/19/2025 22:06	5/19/2025 23:06	1.73	4.4	-	-
5/19/2025 22:07	5/19/2025 23:07	1.7	4.4	-	-
5/19/2025 22:08	5/19/2025 23:08	1.7	4.4	-	-
5/19/2025 22:09	5/19/2025 23:09	1.7	4.4	-	-
5/19/2025 22:10	5/19/2025 23:10	1.7	4.4	-	-
5/19/2025 22:11	5/19/2025 23:11	1.71	4.4	-	-
5/19/2025 22:12	5/19/2025 23:12	1.71	4.4	-	-
5/19/2025 22:13	5/19/2025 23:13	1.71	4.4	-	-
5/19/2025 22:14	5/19/2025 23:14	1.72	4.4	-	-
5/19/2025 22:15	5/19/2025 23:15	1.74	4.4	-	-
5/19/2025 22:16	5/19/2025 23:16	1.75	4.4	-	-
5/19/2025 22:17	5/19/2025 23:17	1.77	5.1	-	-
5/19/2025 22:18	5/19/2025 23:18	1.75	4.4	-	-
5/19/2025 22:19	5/19/2025 23:19	1.74	4.4	-	-
5/19/2025 22:20	5/19/2025 23:20	1.74	4.4	-	-
5/19/2025 22:21	5/19/2025 23:21	1.72	4.4	-	-
5/19/2025 22:22	5/19/2025 23:22	1.72	4.4	-	-
5/19/2025 22:23	5/19/2025 23:23	1.71	4.4	-	-
5/19/2025 22:24	5/19/2025 23:24	1.69	4.4	-	-
5/19/2025 22:25	5/19/2025 23:25	1.69	4.4	-	-
5/19/2025 22:26	5/19/2025 23:26	1.69	4.4	-	-
5/19/2025 22:27	5/19/2025 23:27	1.69	4.4	-	-
5/19/2025 22:28	5/19/2025 23:28	1.7	4.4	-	-
5/19/2025 22:29	5/19/2025 23:29	1.69	4.4	-	-
5/19/2025 22:30	5/19/2025 23:30	1.7	4.4	-	-
5/19/2025 22:31	5/19/2025 23:31	1.72	4.4	-	-
5/19/2025 22:32	5/19/2025 23:32	1.71	4.4	-	-
5/19/2025 22:33	5/19/2025 23:33	1.7	4.4	-	-
5/19/2025 22:34	5/19/2025 23:34	1.71	4.4	-	-
5/19/2025 22:35	5/19/2025 23:35	1.72	4.4	-	-

5/19/2025 22:36	5/19/2025 23:36	1.71	4.4	-	-
5/19/2025 22:37	5/19/2025 23:37	1.72	4.4	-	-
5/19/2025 22:38	5/19/2025 23:38	1.72	4.4	-	-
5/19/2025 22:39	5/19/2025 23:39	1.73	4.4	-	-
5/19/2025 22:40	5/19/2025 23:40	1.73	4.4	-	-
5/19/2025 22:41	5/19/2025 23:41	1.72	4.4	-	-
5/19/2025 22:42	5/19/2025 23:42	1.74	4.4	-	-
5/19/2025 22:43	5/19/2025 23:43	1.73	4.4	-	-
5/19/2025 22:44	5/19/2025 23:44	1.74	4.4	-	-
5/19/2025 22:45	5/19/2025 23:45	1.75	4.4	-	-
5/19/2025 22:46	5/19/2025 23:46	5.24	14	9.62	0.16
5/19/2025 22:47	5/19/2025 23:47	8.93	24.3	19.92	0.33
5/19/2025 22:48	5/19/2025 23:48	9.34	25	20.62	0.34
5/19/2025 22:49	5/19/2025 23:49	9.52	25.8	21.42	0.36
5/19/2025 22:50	5/19/2025 23:50	9.59	25.8	21.42	0.36
5/19/2025 22:51	5/19/2025 23:51	9.63	25.7	21.32	0.36
5/19/2025 22:52	5/19/2025 23:52	9.67	26.5	22.12	0.37
5/19/2025 22:53	5/19/2025 23:53	9.7	26.5	22.12	0.37
5/19/2025 22:54	5/19/2025 23:54	1.8	5.1	-	-
5/19/2025 22:55	5/19/2025 23:55	2.84	7.4	3.02	0.05
5/19/2025 22:56	5/19/2025 23:56	7.72	20.6	16.22	0.27
5/19/2025 22:57	5/19/2025 23:57	8.86	24.2	19.82	0.33
5/19/2025 22:58	5/19/2025 23:58	7.95	21.3	16.92	0.28
5/19/2025 22:59	5/19/2025 23:59	5.13	13.9	9.52	0.16
5/19/2025 23:00	5/20/2025 0:00	5.13	13.9	9.52	0.16
5/19/2025 23:01	5/20/2025 0:01	2.64	7.3	2.92	0.05
5/19/2025 23:02	5/20/2025 0:02	2.4	6.6	2.22	0.04
5/19/2025 23:03	5/20/2025 0:03	2.29	5.8	1.42	0.02
5/19/2025 23:04	5/20/2025 0:04	2.1	5.8	1.42	0.02
5/19/2025 23:05	5/20/2025 0:05	1.99	5.1	-	-
5/19/2025 23:06	5/20/2025 0:06	1.86	5.1	-	-
5/19/2025 23:07	5/20/2025 0:07	1.87	5.1	-	-
5/19/2025 23:08	5/20/2025 0:08	1.86	5.1	-	-
5/19/2025 23:09	5/20/2025 0:09	1.85	5.1	-	-
5/19/2025 23:10	5/20/2025 0:10	1.84	5.1	-	-
5/19/2025 23:11	5/20/2025 0:11	1.84	5.1	-	-
5/19/2025 23:12	5/20/2025 0:12	1.83	5.1	-	-
5/19/2025 23:13	5/20/2025 0:13	1.82	5.1	-	-
5/19/2025 23:14	5/20/2025 0:14	1.82	5.1	-	-
5/19/2025 23:15	5/20/2025 0:15	1.82	5.1	-	-
5/19/2025 23:16	5/20/2025 0:16	1.82	5.1	-	-
5/19/2025 23:17	5/20/2025 0:17	1.82	5.1	-	-
5/19/2025 23:18	5/20/2025 0:18	1.8	5.1	-	-
5/19/2025 23:19	5/20/2025 0:19	1.8	5.1	-	-
5/19/2025 23:20	5/20/2025 0:20	1.8	5.1	-	-
5/19/2025 23:21	5/20/2025 0:21	1.79	5.1	-	-
5/19/2025 23:22	5/20/2025 0:22	1.79	5.1	-	-
5/19/2025 23:23	5/20/2025 0:23	1.78	5.1	-	-
5/19/2025 23:24	5/20/2025 0:24	1.78	5.1	-	-
5/19/2025 23:25	5/20/2025 0:25	1.78	5.1	-	-
5/19/2025 23:26	5/20/2025 0:26	1.77	5.1	-	-
5/19/2025 23:27	5/20/2025 0:27	1.77	5.1	-	-
5/19/2025 23:28	5/20/2025 0:28	1.78	5.1	-	-
5/19/2025 23:29	5/20/2025 0:29	1.79	5.1	-	-