



Shell Chemical Appalachia LLC  
300 Frankfort Rd  
Monaca, PA 15061

July 26, 2023

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 IDs 101 and 103 Combustion Turbine/Duct Burners Units #1 and #3  
CO 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 emissions from the Cogen Units #1 and #3<sup>1</sup> between June 24 and June 27, 2023.

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 June 24, 2023, beginning at approximately 06:00, Cogen Unit #3 stack’s CO concentration exceeded the permit limit of 2 ppmvd (1 hour average at 15% O<sub>2</sub>). This carried on intermittently until June 26. Similarly, Cogen Unit #1 stack’s CO concentration exceeded 2 ppmvd (1 hour average at 15% O<sub>2</sub>) starting on June 25 at 06:00, and this carried intermittently until June 27. Both Cogen units were in a normal mode of operation during these windows, and the cause of the incident is still under investigation.

- **Time when the malfunction or breakdown was first observed**

Cogen Unit #1

June 25, 2023 at ~06:00 (2 hours)  
June 25, 2023 at ~22:00 (6 hours)  
June 26, 2023 at ~23:00 (1 hour)  
June 27, 2023 at ~04:00 (2 hours)  
June 27, 2023 at ~12:00 (1 hour)

Cogen Unit #3

June 24, 2023 at ~06:00 (2 hours)  
June 24, 2023 at ~09:00 (5 hours)  
June 24, 2023 at ~20:00 (9 hours)  
June 25-26, 2023 at ~20:00 (8 hours)

- **The date and time that the malfunction started and ended**

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<sup>1</sup> Identified as Combustion Turbine/Duct Burners (Source IDs 101 and 103) PA-04-00740C

Cogen Unit #1

June 25, 2023 at ~06:00 and ending on June 27, 2023 at 13:00

Cogen Unit #3

June 24, 2023 at ~06:00 and ending on June 26, 2023 at 04:00

- **An estimate of the emissions associated with the malfunction**

Cogen Unit #1

CO concentration exceedances varied between 2.029 and 2.354 ppmvd @15% CO  
5.52 lb of excess CO emissions over duration of the event

Cogen Unit #3

CO concentration exceedances varied between 2.026 and 2.623 ppmvd @15% CO  
19.92 lb of excess CO emissions over the duration of the event

- **The calculations that were used to determine that quantity**

The calculations are based on the Cogen Units #1 and #3 stack CEMS analyzer readings over the period of the malfunction window.

CO (mass) excess emissions were calculated as follows: (Sum of CO lb/hr emission rates for each hour exceeding 2 ppmvd @ 15% O<sub>2</sub>) minus (Minimum of CO lb/hr emission rates during representative operating hours not exceeding 2 ppmvd @ 15% O<sub>2</sub> around the incident) times (Total number of hours exceeding 2 ppmvd @ 15% O<sub>2</sub>)

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

Field observations and troubleshooting were conducted in an attempt to identify the root cause of the CO concentration exceedances. This included validation the CEMS analyzers and manipulation of Duct burners #1 and #3. When capacity became available to generate additional steam, the duct burners were activated and reduced CO emissions to below the allowable maximum.

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

As described above, the root cause of the malfunction is still under investigation.

At the time of the event, troubleshooting commenced to determine the cause of the CO concentration exceedances. The CEMS analyzers for Cogen #1 and #3 were checked by trained analyzer technicians and determined to be reading correctly. In addition, Duct burners #1 and #3 were manipulated in attempt to improve the systems' combustion efficiency.

Further troubleshooting requires support from the Cogen combustion turbines manufacturer, which is being scheduled for the near future to coincide with availability of a testing contractor to provide temporary CEMS at the outlet of the turbines. This troubleshooting will include monitoring of the exhaust emissions and, if required, combustion burner adjustments will be made in response to real-time emissions readings.

If combustion turbine performance testing concludes that no adjustments are needed, the elevated CO emissions could be related to fouling of the CO oxidation catalyst beds located upstream of the exhaust vents. In October of 2023, there are planned, sequential outages all of three Cogen units. During these outages, the CO catalyst beds will be cleaned to restore any potential lost efficiency as part of planned maintenance activities.

- **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**

The Cogen unit manufacturer “tuning” described above, if required, would optimize the burn efficiency of the combustion turbines and help prevent future permit exceedances.

The cleaning of the CO catalyst beds is a good preventative maintenance practice even if the catalyst health is not determined to be the cause of this malfunction.

- **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 will be submitted on or by November 30, 2023

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

1. Cogen Unit #1 and #3 CO testing and, if required, tuning- September 15, 2023
2. Cogen Unit #1 and #3 CO oxidation catalyst bed cleaning- November 15, 2023

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  
Environmental Manager, Attorney-in-Fact

CC:

Scott Beaudway, Air Quality Specialist  
Beth Speicher, Environmental Group Manager

**Attachment A**

Cogen 1 CEMS Output Data

Cogen 1 CEMS Data		
Date_Time	CO ppmvd @ 15% O2	CO lb/hr
6/25/2023 0:00	1.864	2.037
6/25/2023 1:00	1.732	2.043
6/25/2023 2:00	1.609	2.045
6/25/2023 3:00	1.543	1.53
6/25/2023 4:00	1.915	1.87
6/25/2023 5:00	1.989	1.87
6/25/2023 6:00	2.154	2.314
6/25/2023 7:00	2.313	2.3
6/25/2023 8:00	-	-
6/25/2023 9:00	1.718	1.794
6/25/2023 10:00	1.362	1.33
6/25/2023 11:00	1.418	1.315
6/25/2023 12:00	1.061	0.87
6/25/2023 13:00	0.793	0.868
6/25/2023 14:00	0.823	0.861
6/25/2023 15:00	1.011	0.863
6/25/2023 16:00	1.49	1.311
6/25/2023 17:00	1.497	1.312
6/25/2023 18:00	1.334	1.31
6/25/2023 19:00	1.576	1.762
6/25/2023 20:00	1.875	1.78
6/25/2023 21:00	1.98	1.793
6/25/2023 22:00	2.074	2.253
6/25/2023 23:00	2.188	2.266
6/26/2023 0:00	2.227	2.27
6/26/2023 1:00	2.296	2.275
6/26/2023 2:00	2.354	2.279
6/26/2023 3:00	2.217	2.276
6/26/2023 4:00	1.957	1.818
6/26/2023 5:00	1.869	1.814
6/26/2023 6:00	1.823	1.811
6/26/2023 7:00	1.728	1.8
6/26/2023 8:00	1.743	1.793
6/26/2023 9:00	1.359	1.34
6/26/2023 10:00	1.144	1.334
6/26/2023 11:00	1.144	1.332
6/26/2023 12:00	0.634	0.441
6/26/2023 13:00	0.573	0.442
6/26/2023 14:00	0.808	0.89
6/26/2023 15:00	0.826	0.889
6/26/2023 16:00	0.933	0.899
6/26/2023 17:00	1.26	1.364
6/26/2023 18:00	1.426	1.371
6/26/2023 19:00	1.399	1.367
6/26/2023 20:00	1.778	1.824
6/26/2023 21:00	1.963	1.824
6/26/2023 22:00	1.797	1.829
6/26/2023 23:00	2.042	2.295
6/27/2023 0:00	1.807	1.837
6/27/2023 1:00	1.827	1.837
6/27/2023 2:00	1.856	1.842
6/27/2023 3:00	1.944	1.845
6/27/2023 4:00	2.149	2.308
6/27/2023 5:00	2.149	2.304
6/27/2023 6:00	1.794	1.925
6/27/2023 7:00	1.641	1.934
6/27/2023 8:00	1.629	1.937
6/27/2023 9:00	1.503	1.45
6/27/2023 10:00	1.538	1.45
6/27/2023 11:00	1.66	1.933
6/27/2023 12:00	2.029	2.424
6/27/2023 13:00	1.542	1.454
6/27/2023 14:00	1.12	1.549
6/27/2023 15:00	1.099	1.067
6/27/2023 16:00	0.704	1.09
6/27/2023 17:00	0.755	1.088
6/27/2023 18:00	0.573	0.543
6/27/2023 19:00	0.717	1.086
6/27/2023 20:00	0.791	1.086
6/27/2023 21:00	0.775	1.088
6/27/2023 22:00	0.791	1.089
6/27/2023 23:00	0.775	1.089
6/28/2023 0:00	0.795	1.09

**Attachment B**

Cogen 3 CEMS Output Data

Cogen 3 CEMS Data		
Date_Time	CO ppmvd @ 15% O2	CO lb/hr
6/24/2023 4:00	1.842	2.078
6/24/2023 5:00	1.99	2.051
6/24/2023 6:00	2.046	2.46
6/24/2023 7:00	2.084	2.475
6/24/2023 8:00	1.997	1.972
6/24/2023 9:00	2.066	2.462
6/24/2023 10:00	2.108	2.459
6/24/2023 11:00	2.118	2.435
6/24/2023 12:00	2.134	2.423
6/24/2023 13:00	2.154	2.376
6/24/2023 14:00	1.182	1.453
6/24/2023 15:00	1.63	1.938
6/24/2023 16:00	1.622	1.848
6/24/2023 17:00	1.694	1.8
6/24/2023 18:00	1.703	1.799
6/24/2023 19:00	1.76	1.82
6/24/2023 20:00	2.104	2.306
6/24/2023 21:00	2.138	2.324
6/24/2023 22:00	2.348	2.335
6/24/2023 23:00	2.477	2.81
6/25/2023 0:00	2.623	2.815
6/25/2023 1:00	2.458	2.82
6/25/2023 2:00	2.311	2.353
6/25/2023 3:00	2.204	2.358
6/25/2023 4:00	2.013	2.461
6/25/2023 5:00	1.793	2.063
6/25/2023 6:00	1.825	2.092
6/25/2023 7:00	1.811	2.191
6/25/2023 8:00	1.986	2.155
6/25/2023 9:00	1.767	2.106
6/25/2023 10:00	1.411	1.582
6/25/2023 11:00	1.396	1.485
6/25/2023 12:00	1.243	1.491
6/25/2023 13:00	1.123	1.505
6/25/2023 14:00	1.18	1.495
6/25/2023 15:00	1.447	1.486
6/25/2023 16:00	1.877	1.999
6/25/2023 17:00	1.878	2.007
6/25/2023 18:00	1.676	2.025
6/25/2023 19:00	1.86	2.014
6/25/2023 20:00	2.086	2.514
6/25/2023 21:00	2.026	2.602
6/25/2023 22:00	2.137	2.57
6/25/2023 23:00	2.143	2.573
6/26/2023 0:00	2.236	2.514
6/26/2023 1:00	2.262	2.544
6/26/2023 2:00	2.264	2.552
6/26/2023 3:00	2.153	2.556
6/26/2023 4:00	1.92	2.046