



Shell Chemical Appalachia LLC  
300 Frankfort Rd  
Monaca, PA 15061

July 11, 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 Ethane Cracking Furnace #3 (Source ID 033) NOx Excess 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 Ethane Cracking Furnace #3 (Furnace #3) on June 21 and 22, 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 June 21, 2024, beginning at 23:00, Furnace #3 stack’s NOx emissions exceeded the plan approval limit of 6.2 lb/hr during hot steam standby. This occurred during the completion of the transition from Hot Steam Standby in Firebox to Hot Steam Standby to Quench Tower, which moves steam from being routed to the furnace firebox to the quench tower. The cause of the NOx mass emissions exceedance was determined to be from furnace convection section temperatures dropping below minimum which tripped closed the ammonia flow valves for the SCR NOx controls.

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

June 21, 2024 at 23:00

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

Started on June 21, 2024, at 23:00 and ended on June 22, 2024, at 3:00.

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

30.409 lbs of excess NOx emissions over the duration of the event

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

The calculation is based on the ECU Furnace 3 CEMs analyzer readings over the period of the malfunction window.

NOx (mass) excess emissions were calculated as follows: (Sum NOx lb/hr emission rates for

6/21/2024 23:00-6/22/2024 2:00 block hours exceeding 6.2 lb/hr) minus (NOx limit of 6.2 lb/hr during hot steam standby for each hour). (Note: Block hours 23:00, 00:00, 01:00, and 02:00)

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

The console operator received a NOx flow last 1-hour average critical alarm which indicates that the plan approval limit was exceeded. Operations adjusted by adding secondary burners to Furnace # 3, which increased the convection section temperature to reestablish the ammonia flow.

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

On June 21, 2024, 21:00 while Furnace #3 was at the completion of the F-10301-Furnace – Hot Steam Standby in Firebox to Hot Steam Standby to Quench Tower procedure, convection temperatures dropped below 260 °C and tripped closed 103FCV-945 and 103KSV-201 ammonia flow valves. The console received a NOx flow last 1-hour average critical alarm at 23:00 which indicates that the plan approval limit was exceeded. Operations adjusted by adding secondary burners to Furnace #3 and increasing the convection section temperature to reestablish the ammonia flow. Operations typically lights the secondary burners before transitioning to the quench tower. However, this was not done for this transition. The original transition procedure does not include verifying secondary burner status. Low temperature alarm on 103TI-614 temperature indicator did not adequately notify console operator prior to stopping ammonia flow.

- **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**

ECU Operations has added verification of secondary burner status to the F-10x01- Furnace- Hot Steam Standby in Firebox to Hot Steam Standby to Quench Tower procedure. This will prevent recurrence from the same root cause. Changes to short term alarms are under evaluation for additional assurance.

- **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 is anticipated.

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

Corrective action is final to reduce likelihood of subsequent NOx exceedances due to this root cause. ECU Operations added verification of secondary burner status to the procedure.

If you have any questions regarding this matter, please contact Kimberly Kaal at

kimberly.kaal@shell.com or me at william.watson@shell.com

Sincerely,



William Watson  
Operations Manager

CC:  
Scott Beudway, Air Quality Specialist  
Beth Speicher, Environmental Group Manager

**Attachment A**

Furnace #3 NOx Mass Excess Emissions

## Furnace #3 Excess Emissions Calculation

Date and Time	NOx Emission Rate (lb/hr)	Mode	NOx Emission Limit (lb/hr)	Exceedance NOx Rate (lb/hr)
6/21/2024 23:00	11.334	Hot Steam Standby	6.2	5.134
6/22/2024 0:00	23.062	Hot Steam Standby	6.2	16.862
6/22/2024 1:00	11.762	Hot Steam Standby	6.2	5.562
6/22/2024 2:00	9.051	Hot Steam Standby	6.2	2.851

Total Excess NOx Emissions (lbs)

**30.409**

Basis:

CEMS date and time. Eastern Standard Time as Daylight Saving time is not used by CEMS

CEMS lb/hr block hour emission rates

PA-04-00740C defined operating mode and applicable NOx limit

