Shell Chemical Appalachia LLC
300 Frankfort Rd
Monaca, PA 15061

October 22, 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 #6 (Source ID 036) 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 #6 (Furnace #6) on September 30, 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 September 30, 2024, beginning at 14:00, Ethane Cracking Furnace #6 stack's NOx emissions exceeded the permit limit of 6.2 lb/hr during the transition from Startup to Hot Steam Standby for approximately 1 hour.

  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**
  September 30, 2024 at 14:00

- **The date and time that the malfunction started and ended**
  Started on September 30, 2024, at 14:00 and ended on September 30, 2024, at 15:00.

- **An estimate of the emissions associated with the malfunction**
  0.46 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 6 CEMs analyzer readings over the period of the malfunction window.

  NOx (mass) excess emissions were calculated as follows: (Sum NOx lb/hr emission rate for 9/30/2024 14:00 – 9/30/2024 15:00 block hours exceeding 6.2 lbs/hr) minus (NOx limit of 6.2 lb/hr during hot steam standby for the hour).

- **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 # 6, 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 September 30, 2024, Maintenance was in the process of replacing the battery backup for the Furnace 6 induction fan when the furnace tripped offline. This maintenance activity has occurred in the past without causing a furnace trip. The trip caused Furnace 6 operating mode to switch to pilot burners standby and then Operations began the process of restarting the furnace. As the furnace temperature increased and coil outlet temperature conditions were met the run status changed from Startup/Shutdown to HSSB, which decreased the NOx mass limit on the furnace to 6.2 lbs/hr. After this furnace mode switch occurred the operator was notified by a critical alarm that the NOx mass limit was exceeded. This operation normally uses ammonia injection as NOx control, but this was unavailable as the temperature within the convection section of the furnace was below the allowable range.

- **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 facility is investigating the process for replacing induction fan battery backup to determine the cause of the furnace trip. Procedures for this maintenance activity will be updated based on the findings of that investigation. Additionally, temperature range requirements for ammonia additions were investigated and it was determined that reducing the allowable range would potentially cause fouling on the selective reduction catalyst bed.

- **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**

  The investigation and potential corrective actions regarding battery backup replacement will be completed by the end of Q4-2024. This corrective action will reduce the likelihood of subsequent NOx exceedances due to this root cause.

If you have any questions regarding this matter, please contact Kimberly Kaal at (724) 709-2467 or kimberly.kaal@shell.com.

Sincerely,

Nathan Levin
General Manager

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

Attachment A

Furnace #6 NOx Mass Excess Emissions

EXCESS EMISSIONS REPORT - VARIABLE LIMIT

Company: Pennsylvania Chemicals
300 Frankfort Road
Monaca , PA

Stack ID: ECU6

DataGroup/Channel: F6>1-Hr Calcs / NOx Mass

Variable DataGroup/Channel: F6>1-Hr Calcs / NOXm Limit

Start Date/Time : 09/30/2024 00:00

Stop Date/Time : 09/30/2024 23:59

Total Hours in Period: 24.00

Filter for Valid Data: YES

Filter for Source On-Line: YES

Greater or Less Than Search Value: GREATER THAN

Result Period All or Block: BLOCK

Start of Period	End of Period	Duration (hrs)	Avg Value	Limit	Reason	Action
09/30/2024 14:00	09/30/2024 15:00	1.00	6.660	6.20		
	TOTAL DURATION :	1.00				

REASON CODE SUMMARY	(1-8)
Unknown Causes	1.00