Shell Chemical Appalachia LLC
300 Frankfort Rd
Monaca, PA 15061

October 9, 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 LP Multipoint Ground Flare (C204B) Ethylene Header Visible 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 flaring visible emissions from the LP Multipoint Ground Flare Ethylene Header on September 18, 2024.

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 September 18, 2024, starting at approximately 14:52, Visible Emissions (VE) were present at the Ethylene Header of the LP Multipoint Ground Flare (MPGF). The cause of the VE was determined to be inadequate combustion air supplied to the flare following an increase in the flare vent gas flow rate.

- **Time when the malfunction or breakdown was first observed**
  VE started on September 18, 2024, at approximately 14:52.

- **The date and time that the malfunction started and ended**
  VE started on September 18, 2024, at 14:52. VE ended on September 18, 2024, at approximately 15:10.

- **An estimate of the emissions associated with the malfunction**
  No excess emissions. Malfunction is visible emissions only.

- **The calculations that were used to determine that quantity**
  Summary of VE elapsed time of the Ethylene Header of the LP Multipoint Ground Flare as determined by review of camera footage is captured below.

    - 17 minutes and 50 seconds of VE observed between 9/18/24 14:52:23 and 9/18/24 15:10:13.

Method 22 observations were performed by operations are attached to this report.

- **The steps, if any, that the facility took to limit the duration and/or quantity of emissions associated with the malfunction**
  The perimeter air assist fan that supplies combustion air to the MPGF ethylene header was in cascade control during this event, and its speed automatically increased as flare vent gas flow increased. However, the existing control scheme did not completely mitigate the VE.

- **A detailed analysis that sets forth the Root Cause of the malfunction, to the extent determinable**
  On September 18, 2024, at approximately 14:15, the Ethane Cracking Unit (ECU) operations team began venting ethylene and trace nitrogen from the Boil Off Gas (BOG) compressor system to the ethylene header of the MPGF following maintenance activities. Beginning at 14:52, the combination of vent gas flow and combustion air flow did not yield smokeless combustion. Note that the increased flare vent gas flow does not meet the definition of a flaring event per the site's Flare Minimization and Management plan.

  As mentioned, the air fan speed was on cascade control with vent gas flow in the flare header, but the fan's automatic response was not sufficient to avoid smoking for this event as not enough air was provided. The root cause of the control scheme not providing enough air was determined to be an issue with the fan curve. Note that the fan curve represents the required fan speed for a range of vent gas flows. As detailed in the malfunction report titled *RE: PA-04-00740C LP Multipoint Ground Flare (C204B) Ethylene Header Visible Emissions Malfunction Report*, which was submitted to the Department on March 14, 2024, the fan curve was updated earlier this year following a plant step test and vendor feedback. These changes were made to mitigate future VE events; however, the September 18, 2024, incident identified that an additional adjustment to the fan curve is required. Note that a similar VE event occurred on September 16, 2024, and has a separate malfunction report, but the root cause and corrective action for both of these events are the same.

- **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**
  Based on review of the 9/18/24 data, the fan curve was adjusted to increase the amount of combustion air for vent gas flows between 0 and 650 kg/hr. This change was implemented on 9/20/24.

- **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**
  N/A. Corrective action is complete.

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

Sincerely,

Nathan Levin
General Manager

CC:
Scott Beaudway, Air Quality Specialist
Valerie Shaffer, Air Quality District Supervisor

Attachment A- Method 22 Form

Shell Polymers Monaca

Method 22 Visible Emissions Observation Form SPM-HSE-FO-0003

Observer Name:	[redacted]	
Observer Title:	Field Operator	
Date and Time (MM/DD/YY XX:XX):	9/18/24 15:07	
Sky Conditions:	Cloudy	
Precipitation:	None	
Wind Direction (direction from):	E	112.17
Wind Speed (m/s):	2.42m/s	
	Site MET Data (Wind Direction 500QT-060A and Speed 500QT-050A)	
Visible Emissions Source:	Multipoint Ground Flare (A-59004)	
Observation Location:	H (MPGF)	
Observation Picture:		

Observations

		Clock Time	Observation Period (when you are actually looking at stack)	Emissions Observed (when you actually see smoke)
Begin	9/18/2024 15:07	15:07		0:00:00
				15:07:00
				15:09:00
				0:00:00
			15 minute intervals	0:00:00
				0:00:00
				0:00:00
				0:00:00
				0:00:00
End	9/18/2024 17:07	17:07		0:00:00
Compliant? (Y/N)		Y	**Y**	

General Notes

Field Operator noticed that the Multipurpose ground flare was smoking at 1507. Contacted console operator and he made adjustments to the fan blower on the ethylene vapor line. Smoke stopped at 1509. No other observation of smoke during the two hour period.