



Shell Chemical Appalachia LLC  
300 Frankfort Rd  
Monaca, PA 15061

March 14, 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 February 21-22, 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 February 21, 2024, at approximately 23:36, Visible Emissions (VE) were present at the Ethylene Header of the LP Multipoint Ground Flare (MPGF). The cause of the VE was from inadequate combustion air supplied to the flare header.
- **Time when the malfunction or breakdown was first observed**  
Smoking started on February 21, 2024, at 23:36. Smoking was first observed on February 22, 2024 at approximately 03:00.
- **The date and time that the malfunction started and ended**  
Smoking started on February 21, 2024 at 23:36 and ended on February 22, 2024 at 03:11.
- **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.
  - 3 hours 34 minutes and 43 seconds of VE observed between 2/21/24 23:36 and 2/22/24 03:11

Method 22 observations were performed by operations and are attached to this malfunction report (Attachment A). However, only the last ~2 minutes of the event were captured based on when the

VE was identified.

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

Once the VE was identified, the speed of the perimeter air assist fan that supplies combustion air to the ethylene header of the MPGF manually increased by operations until the smoking ceased.

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

On the night of February 21, 2024, preparation activities to start up the Ethylene tank's boil off gas (BOG) compressor train B were ongoing. One of the startup steps is to route ethylene through the compressor's primary seal. The primary seal gas is routed to the ethylene header of the MPGF, and this change in flow and composition caused the VE. Note that normally, the seal gas is mostly nitrogen.

Once the smoking was identified, manual air fan speed adjustments were made until the smoking ceased. The fan speed is on cascade control with vent gas flow in the flare header, but the fan's automatic response was not sufficient enough to avoid smoking for this event, as not enough air was provided. The root cause of the control scheme not providing enough combustion air relates back to the manufacturer's fan curve, which the control scheme is based on. This is detailed more in the section below.

- **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 corrective actions and path forward for the MPGF ethylene header air fan response/control scheme are detailed in the report titled *RE: PA-04-00740C LP Multipoint Ground Flare (C204B) Ethylene Header Visible Emissions Follow Up Report*, which was submitted to the Department on October 27, 2023. These details are also included below for reference, including an implementation timing update.

The site has engaged with the flare vendor. The vendor reviewed the system and its issues in detail and recommended a step test to allow for a more robust "fan curve". The curve represents the required fan speed for a range of vent gas flows but will benefit from being adjusted to real plant data.

The step test will include manually increasing flow from the ethylene tank to the MPGF, monitoring for VE, and then ramping up fan speed in a controlled manner and documenting the point at which the VE dissipates.

The step test has not yet been implemented due to:

- 1.) Extended Ethane Cracking Unit (ECU) downtime in the fourth quarter of 2023, resulting in no ethylene production/use of the BOG system.
- 2.) Long lead time associated with the parts required to tie-in supplemental natural gas to the MPGF ethylene header. The supplemental natural gas is required to boost the NHV of the header when there is just BOG compressor seal gas present, which is mostly nitrogen. This is the normal steady state mode of this header.

Not having the supplemental natural gas lined up ahead of the step test would invalidate the data, since the expectation is that it will impact the final results and resultant updated fan curve.

- **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**

Test run timing update:

- 1.) The natural gas tie-in parts arrived in early March 2024 and were installed the week of March 11.
- 2.) The site is working with the flare vendor to coordinate the test run based on their availability. The expectation, pending plant status, is that the test run will be implemented and the air fan control scheme updated by mid-May 2024.

If you have any questions regarding this matter, please contact me at (724) 709-2825 or [william.watson@shell.com](mailto:william.watson@shell.com).

Sincerely,



William Watson  
Operations Manager

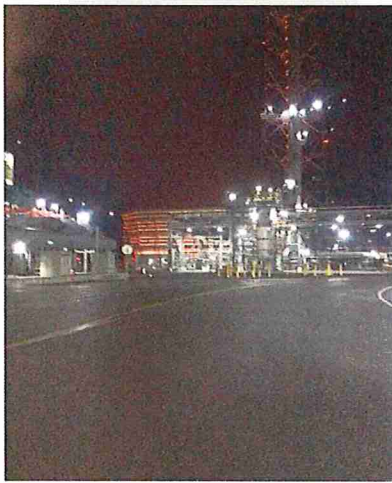
CC:

Scott Beaudway, Air Quality Specialist  
Beth Speicher, Environmental Group Manager  
Kristin Goddard, Environmental Compliance Specialist

**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): 2/22/24 3:10  
 Sky Conditions: Partly Cloudy  
 Precipitation: Light Rain  
 Wind Direction (direction from): SE 149.9  
 Wind Speed (m/s): 0.3  
[Site MET Data \(Wind Direction 500QT-060A and Speed 500QT-050A\)](#)  
 Visible Emissions Source: Multipoint Ground Flare (A-59004)  
 Observation Location: I (CVTO)  
 Observation Picture:



**Observations**

	Clock Time	Observation Period (when you are actually looking at stack)	Emissions Observed (when you actually see smoke)
Begin	2/22/2024 3:10		0:01:45
	2/22/2024 3:25		0:00:00
	2/22/2024 3:40		0:00:00
	2/22/2024 3:55		0:00:00
	2/22/2024 4:10		0:00:00
	2/22/2024 4:25	15 minute intervals	0:00:00
	2/22/2024 4:40		0:00:00
	2/22/2024 4:55		0:00:00
	2/22/2024 5:10		0:00:00
End	2/22/2024 5:25		0:00:00
Compliant? (Y/N)		Y	

**General Notes**

ECU sending ethylene seal gas to MPGF ethylene storage header in preparation for BOG compressor startup. Console operator observed possible smoking on the flare camera and dispatched field operator to confirm. Air Assist Fan speed was manually increased by console operator 03:12 and smoking ceased. 1 minute and 45 seconds of smoking noted.