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10/11/2024

**AIR QUALITY**

DEP, Southwest Regional Office

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 16, 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 16, 2024, starting at approximately 3:31, 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 16, 2024, at approximately 3:31.
- **The date and time that the malfunction started and ended**  
VE started on September 16, 2024, at 3:31. VE ended on September 16, 2024, at approximately 5:20.
- **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.
  - 1 hour 48 minutes and 46 seconds of VE observed between 9/16/24 3:31:42 and 9/16/24 5:20:28.

Method 22 observations were not performed by operations due to the VE not being identified at the time of the incident.

- **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 16, 2024, at approximately 12:52, the Ethane Cracking Unit (ECU) Boil Off Gas (BOG) compressor tripped due to high discharge pressure. With the BOG compressor offline, the ethylene tank started to vent to the ethylene header of the MPGF, and, beginning at 3:31, the combination of vent gas flow and combustion air flow did not yield smokeless combustion. Note that the increased flare vent gas flow meets the definition of a flaring event per the site's Flare Minimization and Management plan. A separate root cause analysis focused on the BOG compressor trip is being conducted and will be finalized within the 45-day requirement outlined in the Plan Approval.

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 16, 2024, incident identified that an additional adjustment to the fan curve is required.

- **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 9/16/24 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](mailto:kimberly.kaal@shell.com) or me at [nathan.levin@shell.com](mailto:nathan.levin@shell.com).

October 10, 2024

Sincerely,

A handwritten signature in black ink, appearing to read "Nathan Levin", with a stylized flourish at the end.

Nathan Levin  
General Manager

CC:

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