

**Attachment III**

Causal Analysis Report

Chevron Richmond Refinery  
Reportable Flaring Events

November 8-10, 2020  
Flaring Due to Unit Startup Following Power Outage

## Refinery Flare Event – Cause Investigation Report

**1. Date on which the report was drafted:** April 22, 2021

**2. The refinery name and site number:**

Refinery: Chevron Richmond Refinery

Refinery Site Number: A0010

**3. The assigned refinery contact name and phone number:**

Contact Name: Brandon Sutter

Contact Phone Number: (925) 394-8773

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Is this a rescission/modification of a previous report: Yes

Date of initial report: 1/29/2021

Reason for rescission/modification: Amendment of Attachment III

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**4. Identification of flare (s) at which the reportable event occurred by reviewing water seal monitoring data to determine which seals were breached during the event**

Flare	Reportable Event (SO <sub>2</sub> or Vent Gas Volume)
RLOP (S-6039)	SO <sub>2</sub>

**5. The flaring event duration for each affected flare**

**Flare (Source Number): RLOP (S-6039)**

The Date(s) of the event: November 8, 2020 – November 10, 2020

The start time of the event: 09:38 PM

The end time of the event: 03:30 AM

The net duration of event (in hours and minutes): 1 day, 17 hours, 53 minutes

*\*note flaring was intermittent during the times described above in Section 5*

**6. A brief description of the flaring event –**

On November 8th, 2020, multiple process units in the Hydroprocessing ABU (Area Business Unit) were starting up following unplanned shutdowns. Due to the start-up operating conditions, the Flare Gas Recovery (FGR) system had a high base load. In addition, a FGR compressor startup was delayed and part of the FGR system began to build up differential pressure. Both issues reduced the FGR system's capacity to capture process gases. Subsequently, the FGR system exceeded its capacity and process gases were sent to the relief system. Flaring began at approximately 9:38 PM on November 8th, 2020 at the RLOP Flare. The primary source of vent gas flared during this event was process material from the units starting up in the Hydroprocessing ABU. Operations immediately responded, taking action to clear the high liquid level, drop the FGR system's differential pressure, and worked to bring the compressor online. Intermittent flaring stopped on November 10th, 2020 at approximately 3:30 AM. The sulfur dioxide (SO<sub>2</sub>) emissions from the RLOP flare exceeded 500 pounds (lbs) within a 24-hr period.

**7. A process flow diagram showing the equipment and process units that were the primary cause of the event.**

See Attachment IIIa.

**8. The total volume of vent gas flared (MMSCF) throughout the event**

Flare	Volume (MMSCF)
RLOP	0.28

**9. The emissions associated with the flaring event per calendar day**

Flare	Calendar Day	CH4 (lbs.)	NMHC (lbs.)	SO2 (lbs.)
RLOP	November 8, 2020	1.7	22.7	1,213.0
RLOP	November 9, 2020	10.8	180.9	10,934.3
RLOP	November 10, 2020	5.4	89.1	5,189.6

*Assumptions used to calculate some of the emissions – consistent with the reporting under Reg. 12-11.*

**10. A statement as to whether or not the gas was scrubbed to eliminate or reduce any entrained compounds and a list of the compounds for which the scrubbing was performed.**

The vent gas was not scrubbed to eliminate or reduce any entrained compounds.

**11. The primary cause of the flaring event including a detailed description of the cause and all contributing factors. Also identify the upstream process units that contributed vent Gas flow to the flare header and provide other flow instrumentation data where available.**

Root cause: Design and procedures of FGR Compressor.

Contributing cause 1: Compressor required a large volume of off gas production as a startup prerequisite.

Contributing cause 2: Operational delay in removing condensate from FGR compressor system.

The main contributor of vent gas flow during this event originated from multiple units in the Hydroprocessing ABU.

**12. Describe all immediate corrective actions to stabilize the flaring event, and to reduce or eliminate emissions (flare gas recovered or stored to minimize flaring during the event). If a decision was made not to store or recover flare gas, explain why.**

Operations immediately responded, clearing the high liquid level, establishing wash water to the second-stage intercooler and dropping the differential pressure, which reduced flaring. Compressor continued to be worked on and was brought back online.

**13. Was the flaring the results of an emergency? If so, was the flaring necessary to prevent an accident, hazard or release to the atmosphere?**

The flaring was the result of an emergency, as defined in Regulation 12-12 (a condition at a petroleum refinery beyond the reasonable control of the owner or operator requiring immediate corrective action to restore normal and safe operation that was caused by a sudden, infrequent and not reasonably preventable equipment failure). The flaring was necessary to prevent an unabated release to the atmosphere.

**14. If not the result of an emergency and necessary to prevent an accident, hazard or release to the atmosphere, was the flaring consistent with an approved FMP? If yes, provide a citation to the facility's FMP and any explanation necessary to understand the basis for this determination.**

The flaring was the result of an emergency. The flaring is also consistent with Chevron's FMP Section 5.4 Figure 5-1. This event was unplanned. Causes for the flaring were analyzed through an investigation. The corrective actions have already been or will be implemented to reduce the likelihood of a recurrence of flaring resulting from the same causes.

**15. If the flaring was due to a regulatory mandate to vent to flare, why couldn't the gas be recovered, treated, and used as fuel gas?**

N/A. Flaring was not due to regulatory mandate.

**16. Identify and describe in detail each prevention measure (PM) considered to minimize flaring from the type of reportable flaring event that occurred.**

**a) State whether the PM is feasible (and will be implemented), or not feasible**

**b) Explain why the PM is not feasible, if applicable**

All prevention measures have been considered and have or will be implemented.

1. Assess whether compressor should be resized (as part of next process unit financial study).

Completion date: 12/30/2021

2. Review FGR Compressor startup procedure. Consider adding a new scenario related to starting up after an unplanned outage.

Completion date: 6/30/2021

# Flaring Due to Compressor Differential Pressure

Signature: *Linda Duca*

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RLOP Flare

