

**Attachment III**

Causal Analysis Report

Chevron Richmond Refinery  
Reportable Flaring Events

January 8, 2019 – January 9, 2019  
Shutdown and Start-up of Hydrogen Plant Train 2 (S-4450)

Refinery Flare Event – Cause Investigation Report

**1. Date on which the report was drafted:** March 29, 2019

**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: Laura Kurt

Contact Phone Number: (510) 242-5219

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Is this a rescission/modification of a previous report: No.

Date of initial report: N/A

Reason for rescission/modification: N/A

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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**

<b>Flare</b>	<b>Reportable Event (SO2 or Vent Gas Volume)</b>
H2 (S-6021)*	Vent Gas Volume

*\*Note: The Hydrogen Plant (H2) flare does not have a water seal.*

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

**Flare (Source Number): H2 (S-6021)**

The Date(s) of the event: 1/8/2019 – 1/9/2019

The start time of the event: 10:56AM on 1/8/2019

The end time of the event: 3:53AM on 1/9/2019

The net duration of event: 16 hours and 57 minutes

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

The Chevron Richmond Refinery began start-up of the newly constructed Hydrogen Plant on November 16, 2018. Natural gas feed was introduced into Train 2 for the first time on January 4, 2019 and the Train 2 commissioning period continued for several months as control logic, operating strategy, and equipment were tested and implemented. On January 7, 2019, Train 2 shutdown and was subsequently re-started. The Hydrogen Plant does not have flare gas recovery or a water seal, and therefore all relief flow results in flaring. Both the start-up and shutdown procedures include routing flows to relief. The vent gas volume exceeded 500,000 scf on January 8 and 9, 2019.

**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)
H2	43.1

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

Flare	Calendar Day	CH4 (lbs.)	NMHC (lbs.)	SO2 (lbs.)
H2	January 8, 2019	5,650	231	3
H2	January 9, 2019	1,310	43	0

*Assumptions used to calculate 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.**

A root cause investigation found that flaring was due to startup and commissioning activities.

Vent gas flow originated from the Hydrogen Plant Train 2 (S-4450) and associated equipment, including S-4472.

**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 followed start-up procedures. The Hydrogen Plant does not have flare gas recovery.

**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 not due to an Emergency (defined in Regulation 12-12-201) as interpreted by the BAAQMD.

**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 consistent with Chevron's FMP Section 2.1 Table 2-4. Table 2-4 identifies the vent before the PSA2 (S-4450) and PSA2 as sources that may flare in non-emergency events (e.g. start-up, shutdown).

**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**

Flaring cannot be prevented during plant start-up or shutdown due to facility and relief system design. Operational activities were consistent with start-up procedures and the commissioning plan. Lessons learned during the commissioning period have been incorporated into procedures to support reliable operations.

# Hydrogen Plant Train 2 Planned Start-up

During commissioning, Train 2 shutdown on January 7, 2019 and subsequently started up on January 8, 2019. Both the start-up and shutdown procedures include routing flows to relief and the Hydrogen Plant flare does not have a water seal or flare gas recovery.

