# **Attachment I**

Causal Analysis Report

Chevron Richmond Refinery
Reportable Flaring Events

February 10, 2020
Flaring Due to Hydrogen Feed Compressor Trip

Refinery Flare Event – Cause Investigation Report

**1. Date on which the report was drafted:** April 29, 2020

**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: Katie Gong
Contact Phone Number: (510) 242-1930

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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**

| **Flare** | **Reportable Event (SO2 or Vent Gas Volume)** |
|---|---|
| NISO (S-6013) | SO2, Vent Gas Volume |
| SISO (S-6012) | None |
| FCC (S-6016) | None |

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

**Flare (Source Number): NISO (S-6013)**
The Date(s) of the event: February 10, 2020
The start time of the event: 4:01AM
The end time of the event: 10:36AM
The net duration of event (in hours and minutes): 2 hours 16 minutes

**Flare (Source Number): SISO (S-6012)**
The Date(s) of the event: February 10, 2020
The start time of the event: 6:09AM
The end time of the event: 10:08AM
The net duration of event (in hours and minutes): 7 minutes

**Flare (Source Number): FCC (S-6016)**
The Date(s) of the event: February 10, 2020
The start time of the event: 6:00AM
The end time of the event: 10:21AM
The net duration of event (in hours and minutes): 25 minutes

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

On February 10, 2020, a pressure swing adsorption system at the Hydrogen Plant had been out of service for maintenance and isolated from a hydrogen feed compressor with a valve. During maintenance of the pressure swing adsorption system, the hydrogen feed compressor tripped due to insufficient isolation by the valve. The hydrogen feed compressor shutdown reduced hydrogen feed to downstream units. This led to an unstable process condition at the Taylor Katalytic Denitrifier (TKN) Unit of the Hydroprocessing Area Business Unit. Due to the unstable condition, process gases were depressured to relief per procedure. Flaring began at approximately 4:01AM at the North Isomax (NISO) Flare. The primary source of vent gas flared during this event was process material from the TKN Unit. Flaring continued intermittently at the NISO Flare as the unit was stabilized. Flaring occurred at the South Isomax (SISO) and Fluid Catalytic Cracking (FCC) flares but did not exceed the reporting threshold in BAAQMD Regulation 12-12-208; however, Chevron is including the emissions from the flaring activities for informational purposes. Once the unit was stable, flaring ceased at approximately 10:36AM. The sulfur dioxide (SO2) emissions exceeded 500 pounds (lbs) and the vent gas volume exceeded 500,000 standard cubic feet (SCF) at only the NISO Flare on February 10, 2020.

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

See Attachment Ia

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

| Flare | Volume (MMSCF) |
|---|---|
| NISO | 1.09 |
| SISO | 0.02 |
| FCC | 0.04 |

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

| Flare | Calendar Day | CH4 (lbs.) | NMHC (lbs.) | SO2 (lbs.) |
|---|---|---|---|---|
| NISO | February 10, 2020 | 129.9 | 1133.8 | 947.2 |
| SISO | February 10, 2020 | 6.4 | 20.4 | 151.9 |
| FCC | February 10, 2020 | 10.9 | 55.5 | 109.9 |

*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.**

Root cause: The pressure swing adsorption system was isolated with a valve that did not isolate the system from the hydrogen feed compressor.

Contributing factor: The procedure did not include the scenario that the valve would not be able to isolate the pressure swing adsorption system from the compressor.

The main contributor of vent gas flow during this event originated from the TKN unit.

**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 by stabilizing the plant to minimize the duration of the flaring.

**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 5.1 Figure 5-1. This event was unplanned. Causes for the flaring were analyzed through a TapRoot® investigation and 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.

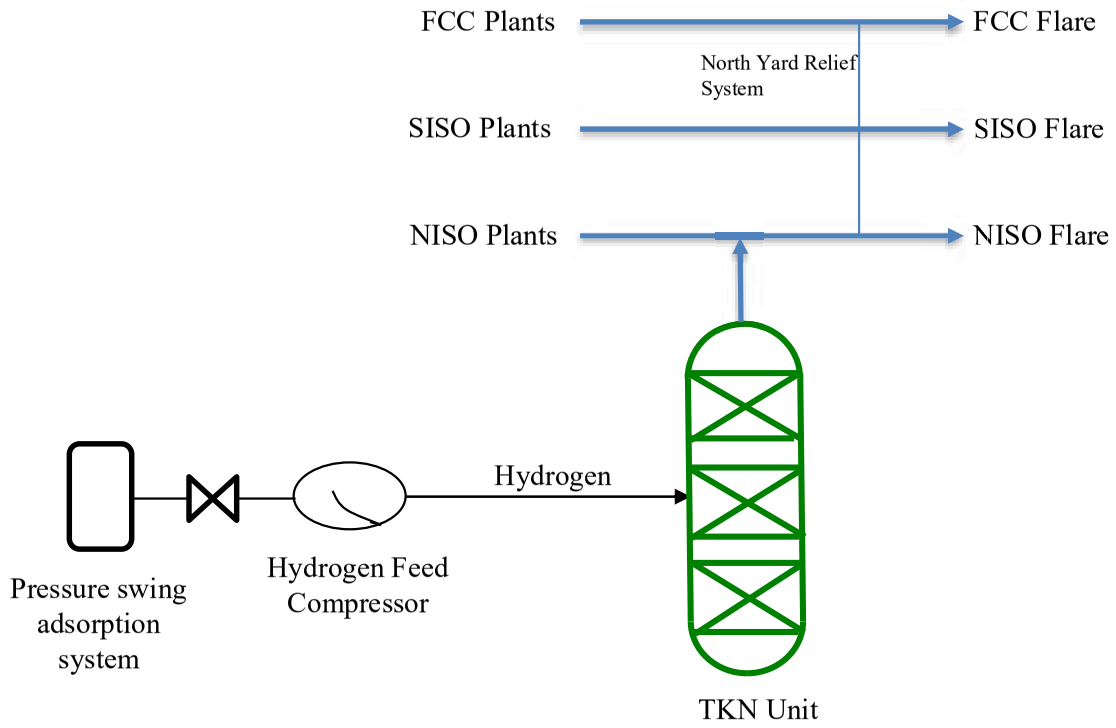
**16. Identify and describe in detail each prevention measure (PM) considered to minimize flaring from the type of reportable flaring event that occurred.**
**a) State whether the PM is feasible (and will be implemented), or not feasible**
**b) Explain why the PM is not feasible, if applicable**

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

Update the pressure swing adsorption system isolation procedure to take into account that the valve does not isolate the pressure swing adsorption system from the hydrogen feed compressor.
Projected completion date: 9/30/2020

# Flaring Due to Hydrogen Feed Compressor Trip

On February 10, 2020, a pressure swing adsorption system at the Hydrogen Plant had been out of service for maintenance and isolated from a hydrogen feed compressor with a valve. During maintenance of the pressure swing adsorption system, the hydrogen feed compressor tripped due to insufficient isolation by the valve. The hydrogen feed compressor shutdown reduced hydrogen feed to downstream units. This led to an unstable process condition at the Taylor Katalytic Denitrifier (TKN) Unit of the Hydroprocessing Area Business Unit. Due to the unstable condition, process gases were depressured to relief per procedure. Flaring began at approximately 4:01AM at the North Isomax (NISO) Flare. The primary source of vent gas flared during this event was process material from the TKN Unit. Flaring continued intermittently at the NISO Flare as the unit was stabilized. Flaring occurred at the South Isomax (SISO) and Fluid Catalytic Cracking (FCC) flares but did not exceed the reporting threshold in BAAQMD Regulation 12-12-208; however, Chevron is including the emissions from the flaring activities for informational purposes. Once the unit was stable, flaring ceased at approximately 10:36AM. The sulfur dioxide (SO2) emissions exceeded 500 pounds (lbs) and the vent gas volume exceeded 500,000 standard cubic feet (SCF) at only the NISO Flare on February 10, 2020.




**Chevron Richmond Refinery**

Attachment Ia