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#2

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Bay Area Air Quality Management District
Mail Stop FM 1
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**Chevron Richmond Refinery
April 2019 Flaring Causal Analysis Report**

To Whom It May Concern:

Attached is the flaring causal analysis report for April 2019 for Chevron's Richmond Refinery. This report is submitted pursuant to Regulation 12, Rule 12, Section 12-12-406. The report is due within 60 days of the end of April 2019 for any reportable flaring events that occurred during the month of April 2019. There were four reportable flaring events that occurred in April 2019. One event commenced in March 2019 and was included as Attachment II in the March 2019 Flaring Causal Analysis Report; the same causal analysis report for that event is included in this report for completeness.

If you have any questions regarding this report, please contact Laura Kurt at (510) 242-5219.

Sincerely,

Shawn Lee

Attachments

Attachment II

Causal Analysis Report

Chevron Richmond Refinery
Reportable Flaring Events

April 13, 2019

Unplanned Shutdown of TKC Unit Due to Level Indication Malfunction

Refinery Flare Event – Cause Investigation Report

1. Date on which the report was drafted: June 27, 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

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

Date of initial report: N/A

Reason for rescission/modification: N/A

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: April 13, 2019
The start time of the event: 12:41AM
The end time of the event: 4:01AM
The net duration of event (in hours and minutes): 3 Hours, 20 Minutes

Flare (Source Number): SISO (S-6012)

The Date(s) of the event: April 13, 2019
The start time of the event: 12:42AM
The end time of the event: 12:44AM
The net duration of event (in hours and minutes): 2 Minutes

Flare (Source Number): FCC (S-6016)

The Date(s) of the event: April 13, 2019
The start time of the event: 12:41AM
The end time of the event: 1:16AM
The net duration of event (in hours and minutes): 10 Minutes (intermittent)

6. A brief description of the flaring event –

On April 13, 2019 at approximately 12:41AM, a compressor in the Hydroprocessing Area Business Unit shutdown following indication of high liquid level in the compressor knock-out vessel. Process gases entered the relief system and flaring began at the Fluid Catalytic Cracking (FCC), South Isomax (SISO) and North Isomax (NISO) flares. The primary source of vent gas flared during this event was process material from Taylor Katalytic Converter (TKC) process equipment. Flaring ceased on April 13, 2019 at approximately 4:01AM. The sulfur dioxide (SO₂) emissions from only the NISO flare exceeded 500 pounds (lbs) within a 24-hr period. The vent gas volume from the NISO flare exceeded 500,000 SCF on the April 13, 2019 calendar day.

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

See Attachment IIa

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

| Flare | Volume (MMSCF) |
|-------|----------------|
| NISO | 1.3 |
| SISO | 0.002 |
| FCC | 0.016 |

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

| Flare | Calendar Day | CH ₄ (lbs.) | NMHC (lbs.) | SO ₂ (lbs.) |
|-------|----------------|------------------------|-------------|------------------------|
| NISO | April 13, 2019 | 268 | 1,945 | 25,310 |
| SISO | April 13, 2019 | 1 | 2 | 14 |
| FCC | April 13, 2019 | 5 | 16 | 20 |

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.

Initial investigation indicated that plugging in the level bridle caused a false high level. The level bridle was flushed and level indication returned to normal operation. After level indication was restored following this April 13, 2019 flaring incident, inaccurate liquid level indication on the same compressor knock-out vessel caused a second flaring incident on May 3, 2019. Further root cause investigation identified ammonium bisulfide salts can accumulate in the level indication equipment on the compressor knock-out vessel and caused the false level indication in both flaring incidents.

The main contributor of vent gas flow during this event originated from TKC reactor vessels.

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 shutdown the unit per procedure.

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. However, the root cause of the flaring was due to malfunction, which resulted in the sudden flow of gas to relief.

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 5.4 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.

1. Install permanent heat tracing on all level indication bridles on the compressor knock-out vessel to prevent the formation of ammonium bisulfide salts.
Projected Completion Date: November 31, 2019

Unplanned Shutdown of TKC Unit Due to Level Indication Malfunction

On April 13, 2019 at approximately 12:41AM, a compressor in the Hydroprocessing Area Business Unit shutdown following indication of high liquid level in the compressor knock-out vessel. Process gases entered the relief system and flaring began at the Fluid Catalytic Cracking (FCC), South Isomax (SISO) and North Isomax (NISO) flares.

