FLARE CAUSAL ANALYSIS REPORT - PUBLIC

1. **Date on which the report was drafted:** February 21, 2024

2. **The refinery name and site number.**
   Martinez Refinery, Plant # B2758

3. **The assigned refinery contact name and phone number.**
   Sharon Lim, (925) 335-3467

4. **Identification of the flare(s) at which the reportable event occurred by reviewing the water seal monitoring data to determine which seals were breached during the event.**
   The reportable event was for the exceedance of vent gas volume of greater than 500,000 SCF. The flares that processed the vent gas were West Air Flare **S1012**; East Air Flare **S854;** Coker Flare **S1517;**

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

   West Air Flare – Intermittent Use
   a. **The date(s) of the event:** December 13 - 19, 2023
   b. **The start time of the event:** 12/13/2023 12:54 PM
   c. **The end time of the event:** 12/19/2023 4:17 PM

   Coker Flare – Used during initial shutdown
   a. **The date(s) of the event:** December 13, 2023
   b. **The start time of the event:** 12/13/2023 12:55 PM
   c. **The end time of the event:** 12/13/2023 1:09 PM

   East Air Flare – Use during initial shutdown
   a. **The date(s) of the event:** December 13, 2023
   b. **The start time of the event:** 12/13/2023 12:55 PM
   c. **The end time of the event:** 12/13/2023 1:09 PM

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

   No. 3 HDO was shutdown due to a small HDO product leak at fin fans. This resulted in a hydrogen imbalance and subsequent flaring.

7. **A process flow diagram showing the equipment and process units that were the primary cause of the event.**
   Process Flow Diagrams are redacted.

8. **The total volume of vent gas flared (SCF) throughout the event.**
   36,437170 SCF

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

Date	Flow (SCF)	Methane (lbs)	Non-methane (lbs)	SO2 (lbs)
12/13	4,249,102	288	354	14
12/14	6,059,724	380	240	13
12/15	5,565,259	354	252	20
12/16	5259705	358	297	17
12/17	5158953	392	327	13
12/18	5,530,012	421	333	14
12/19	4,614,413	272	384	14
Total	36,437,170	2,465	2,187	105

Assumptions used to calculate emissions associated with the flaring event were based on the methodology used for reporting under Regulation 12 Rule 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 scrubbing was performed.

The gas that was flared 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.

Primary causal factor: At 12:54 PM on December 13, 2023, the Martinez Refinery shutdown 3HDO due to small product leak at the fin fans. An operator observed renewable diesel droplets from the E-4676 and E-4677 fin fan tubes. These droplets immediately solidified due to the cold temperatures. To stop the leak, the 3 HDO unit was depressured to the flare system per procedure. With this shutdown, the hydrogen system became imbalanced and the facility began flaring hydrogen.

Visual inspection of the fin fan tubes revealed leaks at or near the tube to tubesheet connections. During the pressure test, one joint on E-4676 and two joints on E-4677 were found leaking. Inspectors and engineering determined that the fin fans were built in accordance with standards API 661 and SP-44-01. It is common practice to retube exchangers. However, with each retube, the holes are expanded and create an inconsistent joint. While they were within industry tolerance, there was significant variation in the dimensions.

Secondary factors were the following:

1. H2 Plants were the sources of vent gas flow to the flare header. Approximately 90% of the flared vent gases during this time was hydrogen.

2. Time to perform all of the inspections and repairs.

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

Refinery Operations took immediate steps to increase the amount of gas that the fuel gas recovery compressors could recover and directed the gas to the No. 5 Gas Plant. Additionally, the Refinery reduced the hydrogen production rate in order to decrease the amount of gases vented to the flare.

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

No, this was not classified as an emergency.

"Emergency: 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 is caused by sudden, infrequent and not reasonably preventable equipment failure, natural disaster, act of war or terrorism or external power curtailment, excluding power curtailment due to an interruptible power service agreement from a utility."

14. If not the result of an emergency and necessary to prevent an accident, hazard or release to 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.

Yes, the flaring was consistent with the Facility's 2023 FMP. Please refer to Section 3.4.1 Startup and Shutdown of Process Units of the FMP and pages 22 in the FMP pertaining to Hydrogen System Imbalance. As described in the FMP, an imbalance in the hydrogen system can occur when the production of hydrogen is out of balance with hydrogen consumption at various units.

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

Not applicable. Flaring was not due to a regulatory mandate.

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

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

Reroll tubes to support a more durable seal between the tubes and tubesheet. ***Complete***

Repressure test the bundles to ensure all leaks were addressed. ***Complete***

Ensure Corporate and API standards are included in purchase requisition for this type of repair. (SP-44-01 and API 661) Add a step to verify hole size in inspection recommendation. ***Complete***

b. Explain why the PM is not feasible, if applicable
Not applicable.