

FLARE CAUSAL ANALYSIS REPORT*No. 1 H2 Plant Trip - Public*

- 1. Date on which the report was drafted.**
March 22, 2023
- 2. The refinery name and site number.**
Marathon's Tesoro Martinez Refinery, Plant # B2758
- 3. The assigned refinery contact name and phone number.**
Sharon Lim, Advanced Environmental Engineer
- 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.**
West Air Flare, **S1012** and Coker Flare, **S1517**
- 5. The flaring event duration for each affected flare:**
 - a. The date(s) of the event**
1/30/2023 to 2/6/2023
 - b. The start and end time of the event**
Start time: 22:35
End Time: 23:59

The net duration of the event
7 days, 1 hours and 24 minutes
- 6. A brief description of the flaring event**
No. 1 H2 Plant tripped, causing the loss of H2 production and #3 HDO shutdown.
- 7. A process flow diagram showing the equipment and process units that were the primary cause of the event.**
No. 1. H2 Plant and 3 HDO simplified process flow diagrams are redacted for public copy.
- 8. The total volume of vent gas flared (MMSCF) throughout the event.**
About 24.1 MMSCF was flared during this flaring event.
- 9. The emissions associated with the flaring event per calendar day:**
 - a. # methane emitted**
Please see Table 1.
 - b. # non-methane hydrocarbon emitted**
Please see Table 1.
 - c. # SO₂ emitted**
Please see Table 1.

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Table 1

Date	Methane (lbs/D)	NonMethane (lbs/D)	SO2 (lbs/D)
1/31/2023	1433	94	18
2/1/2023	1037	84	11
2/2/2023	609	54	6
2/3/2023	641	59	10
2/4/2023	634	57	9
2/5/2023	625	71	62
2/6/2023	612	69	8

Also provide the assumptions used to calculate emissions associated with the flaring event if they are different from those used for reporting under Regulation 12 Rule 11.

The emissions associated with this 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 vented gas was not scrubbed but was combusted at the flares. We used the flare gas recovery compressors to recycle vent gas to 5 Gas Plant when 5 Gas compressor temperatures and BTU content of the fuel gas allowed.

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.

The primary cause was the shutdown of No. 1 H2 Plant. At 22:35 on January 30, 2023, No. 1 H2 Plant had an emergency shutdown due to the loss of heater F-37 induced fans.

Due to the loss of hydrogen, Operations quickly pulled feed at #3 HDO and began recirculation. Renewable diesel was used to flush the feed and product lines.

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.

Flare Gas Recovery compressors were used to recycle flare gas to 5 Gas Plant.

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Due to loss of reformer heater ID fans at the hydrogen plant, the No. 1 H2 plant heater F-37 tripped, causing a unit shutdown. In the event of a shutdown, No. 1 H2 feed (natural gas) is pulled out and nitrogen is introduced to circulate and cool down the catalyst. As temperatures get reduced in the hydrogen plant catalysts, steam needs to be removed before it starts to condense. Additionally, hydrocarbon needs to be removed from the system once steam is removed, so the hydrogen plant had to vent to flare.

Upon racking in fin fan breaker for motor testing, power was lost to the upstream electrical rack. This resulted in a loss of power to a lighting panel, which was providing power to DCS equipment, causing a trip of both F-37 ID fans. With no immediate resolution, the unit shutdown procedure was executed. Heater was secured, shutdown procedures and 3HDO sequencer were utilized, and electrical support was called for. Electricians identified the issue, and the suspected faulty breaker was locked out. Moisture was found in the system. Once it was removed and secured, the No. 1 H2 Plant began restarting up.

After the loss of hydrogen, 3HDO was placed in circulation. Fresh feed was pulled out of the unit to stop consuming hydrogen. The gas was circulated and Operations maintained unit pressure so that the vent valve was closed, minimizing flow to flare from 3HDO.

3HDO recycle pump was damaged during the shutdown, and it took several days to repair. During this time, we had a hydrogen imbalance until 3HDO feed was reintroduced.

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?

Flaring was the result of an Emergency. Loss of the ID Fans caused the activation of the emergency shutdown of the No. 1 H2 Plant to prevent excessive temperatures in the process.

"Emergency: A condition at a 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.

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Yes, this is consistent with our FMP. Please see Section 3.4.1 Startup and Shutdown of Process Units and page 23 for hydrogen imbalance.

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.

15. 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

The following prevention measures were feasible and executed:

5 Gas Plant was started up first so that the flare gas compressors had a place to send the recovered flare gas. 5 Gas Plant compresses the gas for use in the fuel gas system and removes H₂S in its adsorbers.

Minimum hydrogen was produced until #3 HDO started up to minimize hydrogen to the flare and fuel gas systems. Some hydrogen was sent to the fuel gas and was burned at both F-37 and F-78.

The refinery idled over two years ago. Equipment was refurbished but as Operations started up various pieces of equipment, new problems were uncovered and were quickly addressed. (ie fin fans spinning in the wrong direction, pump issues, etc) With these additional repairs, future startups will be smoother and shorter.

For the No. 1 H₂ Plant Heater ID fans, moisture in the electrical wiring was removed and secured. The equipment was re-energized and No. 1 H₂ Plant restarted.

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

Not applicable.

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