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Benicia Refinery • Valero Refining Company - California

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Via Email Notification

March 1, 2022

Reportable Flaring Event Causal Analysis
December 11, 2021
Plant No. B2626

Mr. Jack Broadbent
Bay Area Air Quality Management District
Bay Area Metro Center
375 Beale Street, Suite 600
San Francisco, CA 94105

Dear Mr. Broadbent:

A reportable flaring event occurred on December 10, 2021 at the Valero Refining Company – California, Benicia Refinery (Valero Refinery) (Id. No. B2626). The following Causal Analysis for this Reportable Flaring Event is provided to the Bay Area Air Quality Management District (District) pursuant to and in accordance with Section 12-12-406 and the District's Compliance Advisory dated June 25, 2007.

1. *Date on which the report was drafted (12-12-406).*

March 1, 2022

2. *The refinery name and site number (12-12-406).*

Valero Refinery, Id. No. B2626

3. *The assigned refinery contact name and phone number (12-12-406).*

Taryn Wier at (707) 745-7475

4. *Identification of the flare(s) at which the reportable event occurred by reviewing water seal monitoring data to determine which seals were breached during the event (12-12-406).*

South (S-18) and North (S-19) Flare

5. *The flaring event duration for each affected flare (12-12-406.1):*

- a) *The date(s) of the event;*
- b) *The start and end time of the event; and*
- c) *The net duration of event (in hours and minutes).*

Item	South Flare (S-18)	North Flare (S-19)	Flare Event Total
Start Date	12/10/2021	12/10/2021	12/10/2021
Start Time (hh:mm)	20:25	08:30	08:30
End Date	12/10/2021	12/11/2021	12/11/2021
End Time (hh:mm)	23:44	00:45	00:45
Duration (hh:mm)	3:19*	16:15*	16:15*

*Flaring was intermittent during this time period

6. *A brief description of the flaring event (12-12-406.1) (e.g., “flaring due to turnaround maintenance”).*

Flaring was due to turnaround startup activities.

7. *A process flow diagram showing the equipment and process units that were the primary cause of the event (12-12-406.1).*

The relevant piping and instrumentation diagrams (P&IDs) are attached and highlighted.

Please note that the attached P&ID contains information that the Valero Refinery considers to be trade secret and confidential business information (CBI) as defined by the California Public Records Act, Government Code § 6254.7 et seq., and the Freedom of Information Act, 40 CFR Part 2 (40 CFR § 2.105(a)(4)), 5 USC 552(b)(4), and 18 USC 1905. Because of the sensitive and competitive nature of this information, the Valero Refinery requests that the District afford the information CBI status and treatment indefinitely.

8. *The total volume of vent gas flared (MMSCF) throughout the event (12-12-406.5). – do I need to put flow on 12/11??*

Item	South Flare (S-18)	North Flare (S-19)	Flare Event Total
12/10/2021			
Volume (MMSCF)	0.116	1.011	1.127
12/11/2021			
Volume (MMSCF)	0.00	0.037	0.037
Flare Event Total			
Volume (MMSCF)	0.116	1.048	1.164

9. *The emissions associated with the flaring event per calendar day (12-12-406.5):*

- a) # methane (CH₄) emitted;
- b) # non-methane hydrocarbon emitted; and
- c) # SO₂ emitted.

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.

Item	South Flare (S-18)	North Flare (S-19)	Daily Total
12/10/2021			
CH4 (lbs)	48	219	267
NMHC's (lbs)	258	1530	1788
SO2 (lbs)	32	2215	2247
12/11/2021			
CH4 (lbs)	0	9	9
NMHC's (lbs)	0	50	50
SO2 (lbs)	0	118	118
Flare Event Total			
CH4 (lbs)	48	228	276
NMHC's (lbs)	258	1580	1838
SO2 (lbs)	32	2333	2365

The assumptions used to calculate emissions associated with the flaring event are consistent with those 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 the scrubbing was performed (12-12-406.1).*

The vent gases flared during this event were not scrubbed.

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 (12-12-406.1).*

The primary cause of flaring was the startup of the Fluid Catalytic Cracking Unit (FCCU) and Cat Light Ends (CLE). The startup followed established procedures. These procedures are designed to minimize flaring consistent with District regulations and Valero's FMP, while ensuring the safety of the community, refinery personnel, and equipment.

Oil was introduced to the FCC at 16:54 on 12/10/2021. At 18:37, as the startup process was inventorying the liquid levels in the equipment, the deethanizer tower level increased. In order to control the liquid level in the tower, the deethanizer tower bottoms drain to the CLE flare knockout drum was opened, which routed the material to the flare system. Routing the deethanizer tower bottoms to the flare caused the flare gas recovery compressor C-2101B to trip on a high-level in the second stage knockout drum due to the higher content of methane and propane material (C3/C4s), which resulted in additional flaring during the startup.

Operations immediately began troubleshooting the cause of the tower liquid level and discovered an inadvertent partially closed valve upstream of the tower bottoms' pumps. The valve was opened to its normal line up upon discovery at 19:30 which alleviated the tower level and load to the flare system.

At 20:05, an additional load to the flare system was observed. Operations began immediately troubleshooting the cause of the increased load and identified a safety valve lifting in the downstream Merox system, which was reseated at 21:55. The cause of the safety valve lifting was a result of the earlier opened valve causing an increase in pressure and flow to the downstream Merox system, which is sensitive to changes in flow.

Due to the nature of the material in the flare knockout drum (cold C3/C4s), the drum had to be heated and product was vaporized to the flare gas recovery system until it was warm enough to safely send to slop oil. The warmup process was complete around 00:15 on 12/11/2021, material was returned to its normal lineup, and flare flow and SO₂ concentration began decreasing in the flare.

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 (12-12-406.1).

- a) The startup operations followed prepared procedures. These procedures are intended to minimize flaring and ensure the safety of personnel and equipment. The Valero Refinery has developed specialized procedures to comply with the unique requirements imposed by the BAAQMD's stringent flare rule Reg. 12-12. There was no upset or malfunction involved.
- b) Troubleshooting the cause for level build-up in the deethanizer tower began immediately and the cause of the partially closed valve was remedied immediately upon discovery.
- c) Troubleshooting the source of the lifted safety valve to flare began immediately upon discovery, and actively worked to reseal the valve immediately upon discovery.

The Valero Refinery does not have the ability to store flare gas. Per Section 4.2 of the FMP, the ability to store flare gas is not a cost effective prevention measure.

13. Was the flaring the result of an emergency (See definition in Reg. 12-12-201)? If so, was the flaring necessary to prevent an accident, hazard or release to the atmosphere (12-12-406.4)?

This section is not applicable, as this flaring incident was not the result of an emergency.

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 (12-12-406.3).

Pursuant to Regulation 12-12-301, flaring is prohibited unless it is consistent with an approved FMP. The current approved FMP is Revision 15.0 dated September 30, 2019. This series of events is consistent with Section 2.2 of the Valero Refinery FMP, Reasons for Flaring:

2.2.1 -Planned Maintenance Activities (FCC Startup)

2.2.2 – Fuel Gas Quantity and Quality

15. *If the flaring was due to a regulatory mandate to vent to a flare, why couldn't the gas be recovered, treated, and used as fuel gas (12-12-406.4)?*

The flaring was not due to a regulatory mandate to vent to a flare. The flaring was consistent with the Valero Refinery's approved FMP.

16. *Identify and describe in detail each prevention measure (PM) considered to minimize flaring from the type of reportable flaring event that occurred (12-12-406.2):*

- a) *State whether the PM is feasible (and will be implemented), or not feasible.*
- b) *Explain why the PM is not feasible, if applicable.*

During a post-incident review of the flaring event, the following additional prevention measures were identified in order to prevent a similar flaring event from reoccurring in the future:

- A. Add a specific step to the startup procedure to confirm the valve at the bottom of the deethanizer tower (8MV005) is open.
- B. Check travel and limit switches on 8MV005 in order to ensure the motor operated valve is working correctly.

Please contact Ms. Taryn Wier at (707) 745-7475 if you have any questions on this reportable flare event.

Sincerely,



Taryn Wier
Manager – Environmental Engineering

ecc:
Compliance@baaqmd.gov;
Christopher Thompson cthompson@baaqmd.gov

Enclosures: (1 P&ID)
36-000-03E-73503 – Confidential Business Information (CBI)

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