



Benicia Refinery • Valero Refining Company - California
3400 East Second Street • Benicia, California 94510-1097 • Telephone (707) 745-7011 • Facsimile (707) 745-7339

Via Email Notification

October 30, 2024

Reportable Flaring Events Causal Analysis
August 21, 24, and 27 2024
Plant No. B2626

Dr. Philip Fine
Bay Area Air Quality Management District
Bay Area Metro Center
375 Beale Street, Suite 600
San Francisco, CA 94105

Dear Dr. Fine:

A reportable flaring event occurred on August 21, 2024, August 24, 2024 and August 27, 2024 at the Valero Refining Company – California, Benicia Refinery (Valero Refinery) (Id. No. B2626). The following Causal Analysis for the Reportable Flaring Events 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).*
September 24, 2024
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 Goodwin 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	8/21/2024	8/21/2024	8/21/2024
Start Time (hh:mm)	05:24	05:24	05:24
End Date	8/27/2024	8/27/2024	8/27/2024
End Time (hh:mm)	12:12	13:07	13:07
Duration (hh:mm)	150:48*	151:43*	151:43*

*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 an unplanned shutdown of the Fluidized Catalytic Cracking Unit (FCCU) (S-5) on August 21, 2024 (0.5 MMscfd exceeded). Additional impacts of the FCCU shutdown caused flare gas recovery compressor C-2101B to trip on August 24, 2024 (0.5 MMscfd exceeded) and August 27, 2024 (500 lbs SO₂ exceeded).

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).*

Item	South Flare (S-18)	North Flare (S-19)	Flare Event Total
8/21/2024*			
Volume (MMSCF)	0.749	0.366	1.115
8/22/2024			
Volume (MMSCF)	0.022	0.027	0.049
8/23/2024			
Volume (MMSCF)	0.033	0.141	0.174
8/24/2024*			
Volume (MMSCF)	0.057	0.824	0.881
8/25/2024			
Volume (MMSCF)	0.020	0.368	0.388
8/26/2024			
Volume (MMSCF)	0.021	0.158	0.179
8/27/2024			
Volume (MMSCF)	0.036	0.381	0.417

Flare Event Total			
Volume (MMSCF)	0.938	2.265	3.203

*Exceeded 0.5 MMscfd

9. The emissions associated with the flaring event per calendar day (12-12-406.5):
- # methane (CH₄) emitted;
 - # non-methane hydrocarbon emitted; and
 - # 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
8/21/2024			
CH4 (lbs)	120	147	267
NMHC's (lbs)	1820	368	2188
SO2 (lbs)	101	78	179
8/22/2024			
CH4 (lbs)	5	14	19
NMHC's (lbs)	77	6	83
SO2 (lbs)	1	6	7
8/23/2024			
CH4 (lbs)	2	70	72
NMHC's (lbs)	165	45	210
SO2 (lbs)	0	25	25
8/24/2024			
CH4 (lbs)	10	386	396
NMHC's (lbs)	262	403	665
SO2 (lbs)	1	219	220
8/25/2024			
CH4 (lbs)	13	158	171
NMHC's (lbs)	12	156	168
SO2 (lbs)	0	204	204
8/26/2024			
CH4 (lbs)	15	69	84
NMHC's (lbs)	4	52	56
SO2 (lbs)	0	112	112
8/27/2024*			
CH4 (lbs)	24	113	137
NMHC's (lbs)	10	313	323
SO2 (lbs)	0	631	631
Flare Event Total			
CH4 (lbs)	189	957	1146

NMHC's (lbs)	2349	1343	3692
SO2 (lbs)	103	1276	1379

*Exceeded 500 lbs SO2

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.

The refinery does not have the capability to scrub process unit vent gases that are sent to the flare. During typical operating conditions, the gases routed to the flare header are recovered. However, when the gases routed to the flare header exceed the capacity of the flare header, the gases must be combusted using the flare to maintain safe and environmentally compliant operations.

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 unplanned shutdown of the Fluid Catalytic Cracking Unit (FCCU). Gas Turbine GT-702 on the FCCU unit tripped offline when vibration tolerances were exceeded due to a coupling failure. The coupling failure was attributed to casing misalignment during vendor assembly of GT-702, outside of the OEM standard. The FCCU shut down on August 21, 2024 at approximately 04:45 hrs. An emergency repair was initiated on GT-702 after restart attempts were unsuccessful.

The FCCU unplanned shutdown was a contributing factor for the flaring on August 24, 2024 and August 27, 2024.

In preparation for the FCCU maintenance period, equipment clearing and unit stabilization created a flare load that was recovered with both flare gas compressors. However, on August 24, 2024 safety valve SV 2130 on C-2101B lifted to flare and caused C-2101B to trip. The safety valve serves as a protective measure for the C-2101B equipment. The compressor was put in a safe posture and the safety valve was removed immediately, brought to the offsite safety valve repair shop and serviced. It was reinstalled at approximately 16:30 hours on August 24, 2024. C-2101B was restarted and flaring stopped. Volume of flared material was minimized with the use of the C-2101A compressor and unit postures minimized flare contribution.

The FCCU maintenance period continued with equipment clearing and unit stabilization that created a flare load and variations in the flare load composition causing C-2101B to trip on high discharge pressure and temperature on August 27, 2024. Once C-2101B was restarted, flaring stopped. Volume of flared material was minimized with the use of C-2101A and unit postures minimized flare contribution.

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).

The shutdown operations followed established procedures. These procedures are intended to minimize flaring consistent with District regulations and Valero's Flare Minimization Plan (FMP), while ensuring the safety of the community, refinery personnel, and equipment.

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. This series of events is consistent with Sections 2.2.3 and 2.2.1 of the approved Valero Refinery FMP, Equipment Failure and Malfunction and Planned and Unplanned Maintenance Activities.

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.

The following additional prevention measures were identified in order to minimize the likelihood of similar flaring events occurring in the future:

- a) Set clear expectations with vendors on repair details and scope alteration through use of general repair standard
 - i. Expected completion April 4, 2025
- b) Consider raising C-2101B temperature trip to allow for greater flexibility in handling variations in flare gas composition
 - i. Expected completion April 15, 2025

Dr. Philip Fine, BAAQMD
October 30, 2024
Page 6

- c) Consider reassessing the C-2101B trip set pressure based on the specific pressure contribution from C-2101B stream
 - i. Expected completion April 15, 2025

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

Sincerely,



Taryn Goodwin
Manager – Environmental Engineering

ecc:

Compliance@baaqmd.gov;

Anthony Smith anthony.smith@baaqmd.gov;

Colby La Place CSLaPlace@Solanocounty.com

Enclosures: (1 P&ID)

36-000-03E-73503 – Confidential Business Information (CBI)