As required by BAAQMD 12-12-406 a Causal Analysis was conducted on the following flaring incident. A Causal Analysis is required when the volume flared exceeds 0.5 MMSCF or sulfur dioxide emissions are greater than 500 pounds. The intermittent flaring occurred from May 9 at approximately 9:30 pm to May 10, 2022 at 7:11 am. The report contents are based on requirements of the BAAQMD June 25, 2007 Compliance Advisory (BCA) and are referenced as such.

- The BAAQMD and Consent Decree 500 lb SO$_2$ report threshold was not exceeded.
- The BAAQMD 500,000 scf/calendar day flow threshold was exceeded on May 10, 2022.

**Total Volume and Emissions from Affected Flares [BCA 4, 5, 8, 9]:**

**Refrery MP-30 Flare (S-398):**

<table>
<thead>
<tr>
<th>Date/Flare</th>
<th>Start Time</th>
<th>End Time</th>
<th>Duration (Hrs:Min)</th>
<th>Gas Flow Rate, MSCF</th>
<th>Avg. H$_2$S Mole %</th>
<th>SO$_2$, lb</th>
<th>CH$_4$, lb</th>
<th>NMHC, lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>05/09/2022</td>
<td>9:30 pm</td>
<td>11:59 pm</td>
<td>04:39</td>
<td>494</td>
<td>0.01</td>
<td>8</td>
<td>123</td>
<td>29</td>
</tr>
<tr>
<td>05/10/2022</td>
<td>00:00 am</td>
<td>7:11 am</td>
<td>07:11</td>
<td>564</td>
<td>0.49</td>
<td>456</td>
<td>261</td>
<td>43</td>
</tr>
</tbody>
</table>

SO$_2$ emissions are calculated using the following equation:

$$\text{SO}_2 (\text{lb}) = (\text{FR}) \times (\text{H}_2\text{S conc.}) \times (0.1689)$$

FR = total flow rate during flaring, scf

$$0.1689 = \frac{[\text{lb-mol H}_2\text{S}/379 \text{ scf H}_2\text{S}][64 \text{ lb SO}_2/\text{mol H}_2\text{S}]}{[\text{SCF}]}$$

**Flaring Event Description [BCA 6, 7, 10, 11]**

On May 9, 2022, process vessels at Unit 246 were purged and cooled with nitrogen as part of a planned shutdown for maintenance of the unit. During this period, nitrogen was used to purge gases from the unit and cool equipment. These unscrubbed gases were directed to the flare and bypassed the flare gas recovery system.
Primary Cause and Contributing Factors [BAAQMD 12-12-406.1, BCA 11]

On May 9, 2022, Unit 246 was shut down for cooler equipment repairs and partially depressured. During the shutdown, unscrubbed gas and vent gas was sent to the flare.

The primary cause of the flaring was the shutdown and partial depressuring of Unit 246. During purging and cooling, nitrogen is sent directly to the MP-30 Flare. During this time, the only gases flared are those unscrubbed gases remaining in the process unit and the nitrogen used to purge the unit.

Measures to Limit Duration/Quantity [BCA 10, 11, 12,]

By sending the gases used to purge and cool the process directly to the flare instead of the flare gas recovery system, flaring is minimized because high levels of nitrogen can cause damage to the flare gas recovery compressors and cause issues with fuel gas quality. Therefore, there is no need to circulate the flare gas recovery compressors to prevent these issues that could have led to additional flaring volume.

Prevention Measures [BAAQMD 12-12-406.2, BCA 16,:]

No new prevention measures or corrective actions were identified. The maintenance at Unit 246 and partial depressurization is a planned activity.

Was the Flaring the Result of an Emergency [BAAQMD 12-12-406.4, BCA 13]:

No.

Was flaring due to a Regulatory Mandate to Vent to a Flare [BAAQMD 12-12-406.4, BCA 15]:

No.

Consistency with Flare Minimization Plan (FMP) [BAAQMD 12-12-406.3, BCA 14]:

The activities described that resulted in flaring are consistent with activities included in the Flare Minimization Plan. Specifically, these activities can be found described in the FMP in more detail in Section 4.2 as described below:

- Maintenance, Turnaround, Startup, Shutdown – Equipment Preparation for Maintenance (Section 4.2.1.1)
Please contact Bud Ghosh at (510) 245-5184 if you have any questions.

Sincerely,

Jennifer Ahlskog
Environmental Team Lead

Attachment

PFD Refinery Flare & Blowdown System (RVR-ENVRNM-YF-FLRE-001)

cc:
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