

## Regulation 12 Rule 12 Reportable Flaring Event Causal Analysis Report

1. **Report Date:** October 26, 2019
2. **Refinery Name and Site Number:** Shell Martinez Refinery - BAAQMD Site # A0011
3. **Refinery Contact and Phone Number:** Rick Shih (925) 313-0586
4. **Flare Identification:** LOP flare S-1471
5. **Flaring Event Duration:**
  - a. **Start Date:** 10/26/2019 **End Date:** 10/26/2019
  - b. **Time:** 9:59 am to 12:43 pm
  - c. **Total Duration of Event:** 2.75 hours
6. **Brief Description of Flaring Event:** Hydrocarbon flaring greater than 500 MSCF in a 24-hour period occurred when a pressure safety valve (PSV) associated with compressor [REDACTED] in the Catalytic Reforming Unit (CRU) overpressured and relieved to the flare.
7. **Process Flow Diagram:** see attached process flow diagram
8. **Volume of Gas Flared:** 1.06 MMSCF
9. **Total Emissions due to flaring based on Regulation 12 Rule 11 Methodology:**
  - a. 829 lbs of methane
  - b. 84 lbs NMHC
  - c. 0.2 lbs of sulfur dioxide
10. **Was the Gas Scrubbed?** The vent gas that went to the flare could not be scrubbed.
11. **Primary Cause of Flaring Event including Detailed Description of the Cause and Contributing Factors:**

The CRU converts low octane hydrocarbons to high octane gasoline blending components by mixing feedstock with hydrogen in the presence of a catalyst at elevated temperatures and pressures. On October 26, 2019, during startup of the CRU, two compressors in hydrogen service [REDACTED] were lined up within the CRU but only [REDACTED] was online. As shown in the figure below, these two compressors share common lines at both the suction side and discharge side of the compressors. The suction line is protected by a PSV. Because [REDACTED] was lined up at the time, higher pressure discharge from [REDACTED] was able to back-flow through [REDACTED] into the suction line. The pressure of the suction line then exceeded the setpoint of the PSV, resulting in the PSV relieving to the flare.

12. **Immediate Corrective Actions Taken:**

Compressor [REDACTED] was shut down and [REDACTED] were isolated to stop the flow of hydrogen to the flare from the PSV. The hydrogen was diverted to compressors [REDACTED].
13. **Was the Flaring the Result of an Emergency?**

Yes. The flaring was caused by overpressure in the suction line of [REDACTED] where the PSV relieved to the LOP flare header.

**14. Was the Flaring Consistent with an Approved FMP?**

Yes, the flaring was consistent with Shell's approved Flare Management Plan (FMP). As stated on page 3-1 of the FMP, Shell believes the key to flare minimization is careful planning to avoid flaring coupled with evaluation of any flaring events that occur and incorporation of lessons learned back into the planning process to further reduce flaring. As part of the FMP, Shell developed procedures to implement this process. As stated on page 3-1 of the FMP, "when these procedures are followed, any flaring is consistent with the FMP." Operations followed procedure C(F)-20 – Unanticipated Flaring. This procedure addresses flare events caused by process upsets or unplanned events.

**15. Was the Flaring due to a Regulatory Mandate to Vent to a Flare?**

The flaring was not due to a regulatory mandate to vent to the flare.

**16. Prevention Measures Considered to Minimize Flaring from this Type of Flaring Event**

The procedure will be updated to clarify that only one compressor out of the [REDACTED] group should be lined up at any one time (Due January 2020).

**Figure 1: Process Flow Diagram**

[The figure has been redacted from the Public Version as it contains Business Confidential Information]