Chevron U.S.A. Inc. El Segundo Refinery
October 2, 2025 Loss of Containment

Incident Description

On October 2, 2025, at approximately 9:31 PM, there was a loss of containment and fire in the Distillation and Gas Recovery Plant (Plant 7), a hydroprocessing distillation section of the Isomax Division. Within 45 seconds, Operations began an emergency shutdown of the Isomax Division via emergency shutdown systems and other safety instrumented systems. Chevron emergency response teams and local municipal fire departments extinguished the fire by approximately 7:00 AM on October 3, 2025.

Incident Investigation

Chevron initiated the incident investigation on October 3, 2025, *i.e.*, within 48 hours of the incident, using a TapRooT® root cause investigative methodology. The investigation was co-facilitated by two certified TapRooT® facilitators. The investigation team comprised individuals with requisite expertise and experience, both from El Segundo and other Chevron refineries, with disciplines including organizational learning, design engineering, process engineering, process safety management, incident management, fixed equipment integrity, fired heater technologies, and turnarounds. An employee representative from United Steelworkers participated in the investigation. The team reviewed relevant records, including furnace operational data, feed/product composition and rate data, piping circuit asset strategy and inspections data, damage mechanism reviews, process hazard analyses, inspection strategies, and fixed equipment inspections and maintenance procedures. A third-party laboratory performed metallurgical tests on the process equipment damaged during the fire.

The investigation team concluded that the loss of containment was due to a failure on a piping circuit located on the F-720 reboiler furnace outlet transfer to C-720 Topping Column. F-720 is a fired reboiler used to heat bottoms from the C-720 Topping Column to separate heavier fractions of hydrocarbons from lighter products. C-720 takes feed from the combined CKN (Hydrocracker first stage) and ISO (Hydrocracker second stage) effluent streams from the low-pressure separator. The failure occurred on the 5Cr-0.5Mo (5Cr) 16-inch radiant outlet header, on the side opposite the header from where the 6-inch outlet piping from a furnace pass connected. Consistent with a third-party metallurgical evaluation, the failure mechanism was determined to be a type of hydrogen-free, low-sulfur sulfidation corrosion that occurs in hydroprocessing distillation sections that is, per API Recommended Practice 939-C, *Guidelines for Avoiding Sulfidation (Sulfidic) Corrosion Failures in Oil Refineries* (2019), not widely understood in the industry.

Causal Factors

Chevron's investigation team identified four causal factors of the October 2 incident.

1. The refinery was not aware of any localized corrosion at the failure location. Post-incident inspection data showed that higher corrosion rates were occurring at the furnace outlet header on the side opposite from the outlet piping. There was no condition monitoring location (CML) at the failure location or at similar 16-inch furnace outlet header locations in the piping circuit where thickness measurements were taken. With no CMLs at those locations, the higher corrosion rates at the failure location were not identified.
2. The inspection strategy for general sulfidation was selected instead of the selection strategy that applied to hydrogen-free, low-sulfur sulfidation, resulting in fewer CMLs being selected for this circuit. The latter strategy would have also increased the likelihood that a CML would have been assigned to the furnace header on the side opposite from the outlet piping, although the selection criteria for both strategies could have been met without assigning a CML to this location.
3. Potential CMLs ("PCMLs") were not assigned to high-turbulence areas/areas with mixed-phase flow (including on the furnace outlet header on the side opposite from the outlet piping) on the F-720 radiant outlet circuit. Accordingly, a PCML was not assigned to the failure location, and thus a CML was not assigned to monitor this location.
4. In two instances, on-stream inspection of a CML on a deadleg located approximately 3 feet from the failure location resulted in data that met the definition of an integrity threat[1], but no integrity threat recommendation was written. While the CML was not at the failure location, the potential for expanded inspection could have, but not necessarily would have, found the thinned piping at the failure location.

Recommendations

To address these causal factors, the investigation team made the following recommendations:

Perform Enterprise-wide Health Check on Furnace Transfer Lines. Perform an enterprise-wide health check on furnace transfer lines in sulfidation service.

- Confirm that PCMLs were appropriately assigned.
- For furnace outlet headers on the side opposite from the outlet piping: if no CMLs had been previously identified or no previous inspections have been performed at any of those CML locations, perform a one-time inspection of the greater of (i) at least one furnace outlet header on the side opposite from

[1] An "integrity threat" is a fixed equipment condition or finding that may lead to a potential loss of containment if not addressed. An example of an integrity threat is piping approaching minimum thickness.

the outlet piping or (ii) the percentage in accordance with the inspection strategy that applies to hydrogen-free, low-sulfur sulfidation.

- Review inspection data on furnace transfer lines, including inactive CMLs and historical inspections, and take appropriate actions.

Verify Safe El Segundo Restart

- Prior to restart, review thickness measurements for both active and inactive CMLs in the plants within the Isomax Division that were shut down after the incident (Plants 5-7. Review the remaining life and follow the El Segundo integrity threats process as appropriate.

Clarify Sulfidation Inspection Strategies

- Consider updates to the inspection strategies for sulfidation corrosion to increase the potential that the highest areas of corrosion on furnace transfer lines are represented in the total CMLs selected for the circuit, including consideration of whether at least one CML location should be selected on the furnace outlet header on the side opposite from the outlet piping.
- Clarify which inspection strategy for sulfidation corrosion applies to hydrogen-free, low-sulfur sulfidation corrosion that can occur in hydroprocessing distillation sections, and verify that the appropriate inspection strategy is being used for the El Segundo F-720 outlet piping asset strategy and other hydroprocessing distillation sections in El Segundo.

Revise Fixed Equipment Inspection Procedures and Work Processes

- Revise the procedure for selecting the inspection, test, and preventative maintenance tasks that should be included in an asset strategy to clarify that PCML assignments should be reviewed in addition to CMLs.
- Update El Segundo's assurance process to increase the probability of finding instances where data meets the definition of an integrity threat, but no integrity threat recommendation was written.
- Revise the work process that manages integrity threats at El Segundo to include a timeframe for writing integrity threat recommendations, proportional to the severity of the risk, taking into consideration the remaining life of the fixed equipment.