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OCT 27 2021

Contra Costa Health
Hazardous Materials

**ATTACHMENT C
30-DAY FOLLOW-UP NOTIFICATION REPORT
FORM**

CONTRA COSTA HEALTH SERVICES

INSTRUCTIONS: A hardcopy and an electronic copy of this report is to be submitted for all Level 2 and 3 incidents or when requested by CCHS. See Attachment C-1 for suggestions regarding the type of information to be included in the report. Attach additional sheets as necessary. This form is to be used for update reports after the initial 30-day report has been submitted. Forward the completed form to:

For CCHS Use Only:

Received By: AM
Date Received: 10/24/21
Incident Number: 21020902
Copied To: _____
Event Classification Level: _____

ATTENTION: Matt Kaufmann
Hazardous Materials Program Director
Contra Costa Health Services Department
4585 Pacheco Boulevard, Suite 100
Martinez, CA 94553-2229

INCIDENT DATE: February 9, 2021
INCIDENT TIME: 14:36
FACILITY: Chevron Richmond Refinery

PERSON TO CONTACT FOR ADDITIONAL INFORMATION:

Patricia Roberts: (510) 242-3887 (office)

PROVIDE ANY ADDITIONAL INFORMATION THAT WAS NOT INCLUDED IN THE 72-HOUR REPORT WHEN THE 72-HOUR REPORT WAS SUBMITTED, INCLUDING MATERIAL RELEASED AND ESTIMATED OR KNOWN QUANTITIES, COMMUNITY IMPACT, INJURIES, ETC.:

On February 9, 2021, at approximately 2:36 pm, a private citizen notified the Refinery Shift Lead of a sheen on the water in the vicinity of the Richmond Long Wharf (RLW). At approximately 3:14 pm, the leak was determined to be from piping circuit 1611-X005-003 (003 Line) on the RLW from a hole approximately ¼ inch in diameter on the bottom of the line. Booms were deployed around the leak area, routine RLW activities were shut down, and the area was evacuated of non-essential personnel. Operations isolated the 003 Line and pumped material from it into a recovered oil tank. The leak was confirmed to be stopped at approximately 4:35 pm.

Based on the conservative assumptions that the line contained 100% hydrocarbon and was liquid-packed at the time of the leak, the Chevron Richmond Process Engineering Department calculated that up to 18.1 barrels of hydrocarbon leaked into the San Francisco Bay, resulting in an internal Level 3a classification (1-50 bbl of hydrocarbon to water). A TapRoot team was commissioned, notwithstanding the fact that only Level 3b incidents require such review. The material was characterized as low sulfur diesel and flush water with a flash point of 146° F. According to the Unified Command (UC), no reports of impacted wildlife were made to the Oiled Wildlife Care Network hotline, and no impacts to wildlife were observed by response personnel during the duration of the response. The California Office of Environmental Health Hazard Assessment also determined that no fishery closures were warranted. On February 23, 2021, after no sheen was observed over a four-day monitoring period, the UC determined that clean-up endpoints had been achieved.

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I. INCIDENT INVESTIGATION RESULTS

Is the investigation of the incident complete at this time? Yes No

If the answer is no, when do you expect completion of the Investigation? _____

If the answer is yes, complete the following:

SUMMARIZE INVESTIGATION RESULTS BELOW OR ATTACH COPY OF REPORT:

External visual inspection, ultrasonic testing, radiographic testing, saturated low frequency eddy current (SLOFEC) inspection, and subsequent postmortem internal inspection indicated that the damage was the result of localized internal corrosion at a location of fractured cement lining.

Several damage mechanisms may have contributed to the failure, including under deposit corrosion. A 2021 SLOFEC inspection of the 003 Line found localized corrosion in the vicinity of the leak location along the bottom of the pipe. Radiographs show breaks in the cement lining and localized pitting on the lower sections of horizontal pipe, where failed lining may have allowed deposits to collect. This damage location and morphology is characteristic of under deposit corrosion. Under deposit corrosion is the result of an isolated and corrosive environment forming underneath deposits or sediment in piping and vessels. The corrosion drivers can be a combination of factors, such as corrosive species concentrating under deposits, and the galvanic effect resulting from electrochemical differences between the piping covered by the deposits and the uncovered piping. In the case of the cement-lined segments of the 003 Line, penetration of water underneath the cement lining could have facilitated this type of corrosion leading to the failure.

Chevron's severity classification for a release of liquid hydrocarbon is a function of the volume of hydrocarbon released. Releases of liquid hydrocarbon to water have increased severity classifications as compared with releases to land of the same volume. If the leak was detected and contained sooner and/or if passive containment prevented the hydrocarbon from entering the water, the severity of the event would have been reduced (*i.e.*, Level 1 or 2 instead of Level 3a incident).

SUMMARIZE PREVENTATIVE MEASURES TO BE TAKEN TO PREVENT RECURRENCE INCLUDING MILESTONE AND COMPLETION DATES FOR IMPLEMENTATION:

Recommended Action	Targeted Milestone / Completion Date(s)
Review the design and inspection plan that applied to the 003 Line and provide any recommended alternatives.	1/28/2022
Communicate/train wharf operations on Loss/Near Loss and Management of Change practices and procedures.	4/29/2022
For fixed equipment at the wharf, consider implementing a process and/or utilizing tools similar to the "bad actor" process utilized for rotating equipment.	4/29/2022
Review piping and instrumentation diagrams (P&IDs) and inspection isometrics for lines with cement lined piping in hydrocarbon service and other lines whose piping design is unique to the wharf.	Cement-lined piping (4/29/2022) Other lines unique to the Wharf (1/27/2023)

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Recommended Action	Targeted Milestone / Completion Date(s)
Review leak detection technologies (<i>e.g.</i> , tell tales, cameras, flow/pressure indication, etc.) and/or passive containment technologies.	10/28/2022

STATE AND DESCRIBE THE ROOT-CAUSE(S) OF THE INCIDENT:

Contributing Factor 1. The cement-lined carbon steel pipe in intermittent use failed due to internal corrosion.

- Root Cause 1. The asset strategy for the 003 Line did not include inspection techniques that were adequate for detecting localized corrosion in cement-lined pipe.
- Root Cause 2. Loss/Near Loss Reports for prior incidents had not been consistently generated.
- Root Cause 3. There is no formal process to trigger lookbacks on the history of the line that could track “bad actors.”
- Root Cause 4. MOC review may have provided an opportunity to identify any concerns unique to cement-lined piping.

Contributing Factor 2. If the leak was detected and contained sooner, the severity of the event would have been reduced (i.e., Level 1 or 2 instead of Level 3a incident).

- Root Cause 5. Leak detection and passive containment at RLW requires further review.