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**HEALTH**



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# Chevron Refinery's 2021 Wharf Oil Spill Oversight Committee Report

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July 17, 2023



# Chevron Refinery's Long Wharf





- Oil sheen visible on surface water
- No injuries or environmental damage
- Oil booms were deployed
- Pipeline taken out of service for repair
- A Level 2 activation under the Community Warning System (CWS) – meets Major Chemical Accident or Release (MCAR) criteria



# Richmond Industrial Safety Ordinance (RISO)



- What is a root cause?
  - Root causes answer the question “Why did something happen”
  - Typically point to a system failure, not a person
- If corrected, the incident would not have occurred
- Allows meaningful recommendations to be developed
  - Management has the ability to fix

# Public Participation

- Comprised of members of the public, agencies, and facility
  - Chaired by CCH Hazmat
  - Richmond Fire
  - Chevron management and union reps
  - Richmond residents
  - County Hazardous Materials Commission

# Oversight Committee

Oversight  
Committee  
Established



Selection of  
Contractor to  
Perform  
Investigation

Draft Report  
Reviewed by  
Oversight  
Committee



Public Meeting and  
Comment Period



Public Presentation  
of Final Report to ISO  
Ad Hoc Committee

- Since 1994, AcuTech has been a global leader providing value added consulting services for improving risk, safety, environmental, and security performance to industries handling hazardous materials.
- AcuTech team included
  - Alison Ballon – Principal Engineer, Incident Investigation Specialist & Project Manager
  - David Moore, PE, CSP – President and CEO
  - David Heller, CSP, CPSA – Senior Principal Engineer, Incident Investigation Specialist
  - Mark Politte – Senior Principal Engineer, Mechanical Integrity Specialist
  - Ken Min – Senior Engineer, Mechanical Integrity Specialist



# Independent Review Scope

- AcuTech selected by Oversight committee as contractor to perform the following scope:
- Review completed Chevron Richmond Refinery RCA report and interview key members of investigation
- Review other completed and available investigation reports from the Coast Guard, the Oil Spill and Prevention Response team from California Department of Fish and Wildlife, and CalOSHA.

- Perform independent review with a final report to include:
  - Review of the Mechanical Integrity program and how it applies to the pipeline, including:
    - Inspection data of the ballast line;
    - Corrosion monitoring;
    - Determination of the metallurgy and failure route;
    - Procedure for use of the ballast line pre- and post-loading operation;
    - Surveillance during use; and
    - Other process safety management systems that may be applicable to the incident.

- Perform independent review with a final report to include:
  - Review Chevron action plan to ensure recommendations and action plans address findings from the incident investigation;
    - *NOTE - Original scope was expanded to evaluate how action plans were addressed and ensuring recommended actions were completed as intended*
  - Review the creation of the incident/event timeline; and
  - Review the Chevron Richmond Refinery's notification process.



- The approach to conduct the independent review included:
  - Review RCA report for completeness and adherence to RISO
  - Develop questions and additional data requests for Chevron regarding the incident and their systems, processes and programs
  - Review data relating to the event, RCA process and report, mechanical integrity specifics for line 003, and agency notifications and investigation reports
  - Conduct interviews with Chevron personnel regarding the incident investigation
  - Review Chevron's follow-up response and status of their actions related to the incident along with draft recommended action completion reports
  - Develop an opinion on the RCA and actions by Chevron related to the investigation and follow-up

August 13, 2021

- AcuTech contracted by CCH to begin
- Unable to begin until Chevron released investigation report

June 22, 2022

- Contract updated to extend term
- Ongoing discussions with Chevron and AcuTech to release report

August 26, 2022

- Chevron released report to AcuTech

September 2022 – January 2023

- Document requests sent to Chevron
- Conducted interviews with Chevron personnel
- Drafted 3<sup>rd</sup> party review report

January 28, 2023

- AcuTech, Chevron, and CCH agreed AcuTech report should include action plan implementation
- Chevron could provide copy on March 31, 2023

March 31, 2023

- Chevron provided action plan report to AcuTech
- Report issued to Contra Costa County District Attorney's Office

# Evaluation of Incident Investigation

- The TapRoot® methodology used by Chevron is a recognized commercially available root cause analysis tool
  - widely used in industry for this purpose
  - referenced in guidance from CCH ISO for compliance with the ISO
- Chevron used this tool and other means (interviews, engineering reviews, further site inspections, records reviews) to determine the root causes and contributing factors
- Approach was complete in capturing direct causes, contributing factors, root causes and providing a complete timeline of events
  - Also in compliance with RISO/ISO requirements



# Evaluation of Incident Investigation

- Beyond the TapRoot® process, Chevron showed through interviews and actions that they took the incident very seriously
- Chevron management was engaged in understanding the root causes and seeing to the resolution of corrective actions
- Refinery manager held meetings to ensure actions were taken to understand the root causes of the event and take corrective action to prevent reoccurrence.
- AcuTech believes this is a key purpose of root cause analysis
  - Intent of the process was met as addressed by the thoroughness of the investigation and implementation of technical lessons learned

# Evaluation of Findings/Root Causes

## Chevron Identified Contributing Factors and Root Causes

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

➤ AcuTech agrees these were the underlying causes and factors leading to the event

# Evaluation of Findings/Root Causes

- Root causes identified failures in both Chevron Richmond Refinery's management of change (MOC) system and fixed equipment asset strategy (FEAS) program
- Shortcomings in these two systems played a large role in contributing to this event
  - Chevron identified the failures of the mechanical integrity systems adequately with critical introspection and committed to improved methods for inspection and maintenance of wharf line 003
  - Damage mechanisms for line 003 have been updated
  - Improvements have been made to the inspection process and replacement or repair of the line
  - Training to ensure correct use of the MOC program for pipe material change



# Evaluation of RCA Action Plans

| Recommended Action  | Targeted Milestone / Completion Date(s)   |
|---|---|
| 1. Review the design and inspection plan that applied to the 003 Line and provide any recommended alternatives.   | <b>1/28/2022</b>  |
| 2. Communicate/train wharf operations on Loss/Near Loss and Management of Change practices and procedures.  | <b>4/29/2022</b>  |
| 3. For fixed equipment at the wharf, consider implementing a process and/or utilizing tools similar to the “bad actor” process utilized for rotating equipment.                                       | <b>4/29/2022</b>  |
| 4. 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<br><b>(4/29/2022)</b><br>Other lines unique to the Wharf <b>(1/27/2023)</b> |
| 5. Review leak detection technologies (e.g., tell tales, cameras, flow/pressure indication, etc.) and/or passive containment technologies.  | <b>10/28/2022</b>   |

# Evaluation of RCA Action Plans

- Based on a review of the recommended actions, they:
  - address the root causes identified in the incident investigation
  - were completed by the targeted completion date
- 3 of the 5 recommended actions were only posed to wharf operations, not all personnel
  - Based on interviews with Chevron, wharf operations exhibited signs that the process safety culture was not as robust as the rest of the refinery
  - Recommended actions focusing on wharf were aimed to correct these organizational issues
  - Local reliability site bulletin was also issued to all personnel along with optional refresher trainings

# Implementation of RCA Action Plans

1. Review the design and inspection plan that applied to the 003 Line and provide any recommended alternatives.
  - Saturated Low Frequency Eddy Current (SLOFEC) added by Chevron as a supplemental Mechanical integrity inspection
  - Inspection plan updated
    - included 21 new monitoring locations
    - SLOFEC inspections once every 3 years on bottom 180 of line
    - Ultrasonic thickness inspection once every 3 years on remainder of line

# Implementation of RCA Action Plans

2. Communicate/train wharf operations on Loss/Near Loss and Management of Change practices and procedures.

- Positive changes were made regarding training of management of change and incident investigation
  - New training material specifically discussed this incident
    - Changes in piping from cement lined pipe to carbon steel would need MOC
  - Chevron wharf personnel completed mandatory in-person MOC and incident investigation trainings



# Implementation of RCA Action Plans

3. For fixed equipment at the wharf, consider implementing a process and/or utilizing tools similar to the “bad actor” process utilized for rotating equipment.
- Implemented more robust data analyses for repeat pipeline repairs (“bad actors”) in the wharf
  - Tool allows Chevron to monitor integrity threats, inspection recommendations, and history briefs
    - determine areas for increased focus and characterized as “bad actors” of wharf piping
  - “Bad actors” are reviewed every 6 months by a cross-functional team

# Implementation of RCA Action Plans

4. 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.

- corrections to P&IDs and inspection isometrics were completed to document three remaining lines that contain cement lined pipe
  - one line was 003 pipeline from incident, other two in sump drain lines

# Implementation of RCA Action Plans

5. Review leak detection technologies (e.g., tell tales, cameras, flow/pressure indication, etc.) and/or passive containment technologies.
- Chevron evaluated several different alternate leak detection and passive containment technologies
  - Currently piloting a leak detection technology on one of the Richmond Long Wharf pipelines
  - Additional secondary containment was deemed not feasible for valid reasons including operational and safety concerns

# Evaluation of Agency Notifications

- Appropriate agencies were notified by Chevron approximately 1 hour after Chevron received the initial public notification including
  - Contra Costa Health, California Occupational and Health Administration (CalOSHA), U.S. Coast Guard, California Department of Fish and Wildlife and others
- Notifications are in alignment with those required for this type of release
- CCH requires notification as soon as possible or within 15 minutes of discovery
- Chevron made reasonable efforts to meet the CCH requirements while still maintaining good emergency response practices of containing a leak to reduce environmental consequences



- AcuTech conducted an independent review of the Chevron Richmond Refinery Long Wharf incident based on the available data including from documents presented, interviews, and observations
- AcuTech did not identify concerns associated with the Chevron investigation report and believes it to be thorough in nature

## Next Steps





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