U. S. Chemical Safety and Hazard Investigation Board

RECOMMENDATIONS STATUS CHANGE SUMMARY

Report:	Chevron Richmond Refinery Fire
Recommendation Number(s):	2012-3-I-CA-UR01
Date Issued:	April 19, 2013
Recipient:	Chevron USA (CUSA)
New Status:	Closed – Acceptable Action
Date of Status Change:	March 24, 2017

Recommendation Text:

CSB Recommendation No. 2012-3-I-CA-UR01

At all Chevron U.S. refineries, engage a diverse team of qualified personnel to perform a documented damage mechanism hazard review. This review shall be an integral part of the Process Hazard Analysis cycle and shall be conducted on all PSM-covered process piping circuits and process equipment. The damage mechanism hazard review shall identify potential process damage mechanisms and consequences of failure, and shall ensure safeguards are in place to control hazards presented by those damage mechanisms. Analyze and incorporate into this review applicable industry best practices, Chevron Energy Technology Company findings and recommendations, and inherently safer systems to the greatest extent feasible.

A. Rationale for Recommendation

On August 6, 2012, the Chevron Refinery in Richmond, California, experienced a catastrophic pipe failure in a crude unit, causing the release of a flammable hydrocarbon process fluid which partially vaporized into a large cloud. 19 Chevron employees engulfed by the vapor cloud escaped, narrowly avoiding serious injury. The ignition and subsequent continued burning of the hydrocarbon process fluid resulted in a large plume of unknown particulates and vapor. Approximately 15,000 people from the surrounding area sought medical treatment in the weeks following the incident. The CSB's investigation found that the pipe failure was caused by sulfidation corrosion, a damage mechanism that causes piping walls to thin.

Additionally, the CSB investigation found that the Process Hazard Analysis (PHA) conducted on the piping that failed at the Chevron Refinery did not identify corrosion as a potential cause of a leak or rupture. The CSB found that Chevron did not require the use of a recognized methodology for objectively determining the effectiveness of safeguards in place to prevent hazardous consequences. Instead, Chevron relied upon the judgment and experiences of the members of the PHA team. As a result, damage mechanisms, such as sulfidation corrosion, were only identified in a PHA if the participants conducting the PHA happened to have personal knowledge of the relevant mechanism. As this lack of formal methodology was found to be a characteristic of Chevron USA (CUSA), not solely the Chevron Refinery in Richmond, the CSB issued an urgent recommendation to CUSA to perform damage mechanism hazard

reviews[1] (DMRs) on all of its PSM-covered process piping circuits and process equipment and to incorporate these DMRs into their PHAs for all its U.S. refineries.

B. Response to the Recommendation

CUSA has implemented the CSB's recommendation by developing a standard process for the review of damage mechanisms that includes completion of the DMR by a multidisciplinary team. In December of 2016, CUSA completed DMRs at all of its U.S. refineries.

C. Board Analysis and Decision

As CUSA completed its DMR program and met the intent of the elements outlined in the CSB's recommendation, the Board voted to change the status of CSB Recommendation No. **2012-3-I-CA-UR01** to **"Closed – Acceptable Action."**

Further, the CSB believes the CUSA DMR program is robust and that if more companies implemented a similar system, refinery safety would be greatly advanced. CSB encourages CUSA to present and write industry papers regarding their DMR program so that other companies can learn from the Chevron DMR program and implement similar programs.

[1] A damage mechanism hazard review (DMR) analyzes risks presented by all process failure mechanisms. Such reviews ensure that potential hazards caused by process conditions, process materials, and external mechanisms are properly identified, analyzed, and systems are put in place to control or eliminate the hazard.