



# U. S. Chemical Safety and Hazard Investigation Board

## RECOMMENDATIONS STATUS CHANGE

### SUMMARY

<b>Report:</b>	Chevron Refinery Fire
<b>Recommendation Number(s):</b>	2012-3-I-CA-R03
<b>Date Issued:</b>	April 19, 2013
<b>Recipient:</b>	City of Richmond, California
<b>New Status:</b>	Open – Acceptable Response or Alternate Response
<b>Date of Status Change:</b>	August 12 <sup>th</sup> , 2015

#### Recommendation Text(s):

*Revise the Industrial Safety Ordinance (ISO) to require that Process Hazard Analyses include documentation of the recognized methodologies, rationale and conclusions used to claim that safeguards intended to control hazards will be effective. This process shall use established qualitative, quantitative, and/or semi-quantitative methods such as Layers of Protection Analysis (LOPA).*

#### Board Status Change Decision:

##### 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 flammable hydrocarbon process fluid which partially vaporized into a large cloud. Nineteen 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 over time. The CSB found multiple reasons for the failure of the Richmond refinery, as well as the city's regulatory mechanism, to detect this serious damage to prevent the failure. The CSB found that the Richmond Industrial Safety Ordinance did not require the use of recognized methodology for making an objective determination of effectiveness of safeguards in place to prevent potentially hazardous consequences.

##### B. Response to the Recommendation

The City of Richmond has been proactive in responding to the CSB's recommendations. Following issuance of the CSB's recommendations, the Richmond City Council adopted a resolution directing the City Manager and the City Attorney to take steps to implement all of the recommendations from the CSB. On July 1, 2014, the City of Richmond adopted ordinance No. 13-14 N.S. which amended sections of the Richmond Municipal Code Chapter 6.43 relating to the Industrial Safety Ordinance (ISO).

With regards to addressing recommendation 2012-3-I-CA-R03, the City of Richmond added the following language in Section (J)(1)-(4) regarding safeguard protection analysis and layers of protection analysis:

*(j) Safeguard Protection Analysis.*

- (1) *Effective September 30, 2014, a stationary source shall conduct a Layer of Protection Analysis or an alternative type of analysis approved by Contra Costa Health Services that uses a quantitative, qualitative or equivalent semi-quantitative method to determine the effectiveness of existing safeguards and safeguards recommended in a PHA to reduce the probability and/or severity of a catastrophic release. The safeguard protection analysis may be a standalone analysis or incorporated within a PHA.*
- (2) *The stationary source shall complete the safeguard protection analysis no later than June 30, 2019. A safeguard protection analysis that was completed by a stationary source within five years prior to June 30, 2019, in accordance with the standards set forth in subsection (j)(1) of this section, will be deemed to comply with this requirement. The stationary source shall update and revalidate the safeguard protection analysis at least once every five years.*
- (3) *All safeguard protection analyses shall be performed by a team with expertise in engineering and process operations. The team shall include at least one employee who has experience and knowledge specific to the safeguards and one member who is knowledgeable about the specific safeguard protection analysis method used.*
- (4) *The stationary source shall prepare a written report that documents the safeguard protection analysis in accordance with the standard of practice applicable to the type of analysis conducted. The stationary source will complete the report within thirty days after the completion of the safeguard protection analysis and make the report available to Contra Costa Health Services during an audit or inspection and upon request.*

The above language partially satisfies the CSB’s recommendation by requiring that safeguard protection analysis incorporate a quantitative, qualitative or equivalent semi-quantitative method such as LOPA into its process hazard analysis (PHA). The language also requires that the stationary source update and revalidate its safeguard protection analysis at least once every five years, which is above and beyond what was originally specified in the CSB recommendation.

Although the revised City of Richmond ISO makes significant progress towards satisfying the recommendation, R3 and R4 are related, in that R4 requires safeguards be established to the greatest extent feasible.<sup>1</sup> While the language above does outline the requirements for LOPA, it does not state that LOPA and safeguard protection analysis are implemented to the greatest extent feasible. The status change letter will communicate to the City of Richmond that in addition to risk being driven to ALARP in inherently safer systems analysis, language should also be added to ensure LOPA and safeguard protection analysis are implemented to the greatest extent feasible.

### C. Board Analysis and Decision

Based on the above action on behalf of the City of Richmond to satisfy the intent of the recommendation, the Board voted to change the status of CSB Recommendation No. 2012-3-I-CA-R03 to: **“Open – Acceptable Response or Alternate Response.”**

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<sup>1</sup> 2012-3-I-CA-R04: Revise the Industrial Safety Ordinance (ISO) to require the documented use of inherently safer systems analysis and the hierarchy of controls to the **greatest extent feasible in establishing safeguards for identified process hazards**. The goal shall be to drive the risk of major accidents to As Low As Reasonably Practicable (ALARP). Include requirements for inherently safer systems analysis to be automatically triggered for all Management of Change and Process Hazard Analysis reviews, prior to the construction of new processes, process unit rebuilds, significant process repairs, and in the development of corrective actions from incident investigation recommendations.