



U. S. Chemical Safety and Hazard Investigation Board RECOMMENDATIONS STATUS CHANGE SUMMARY

Report:	Chevron Richmond Refinery Fire
Recommendation Number:	2012-3-I-CA-R21
Date Issued:	January 15, 2014
Recipient:	Governor and Legislature of the State of California
New Status:	Closed – Acceptable Alternative Action
Date of Status Change:	July 28, 2021

Recommendation Text:

Based on the findings in this report, enhance and restructure California's process safety management (PSM) regulations for petroleum refineries by including the follow goal-setting attributes:

- a) Require a comprehensive process hazard analysis (PHA) written by the company that includes:
 - i) Systematic analysis and documentation of all major hazards and safeguards, using the hierarchy of controls to identify hazards and significantly reduce risks to a goal of as low as reasonably practicable (ALARP) or similar;*
 - ii) Documentation of the recognized methodologies, rationale and conclusions used to claim that inherently safer systems have been implemented to as low as reasonably practicable (ALARP) or similar, and that additional safeguards intended to control remaining hazards will be effective;*
 - iii) Documented damage mechanism hazard review conducted by a diverse team of qualified personnel. This review shall be an integral part of the process hazard analysis (PHA) cycle and shall be conducted on all covered processes, piping circuits and equipment. The damage mechanism hazard review shall identify potential process damage mechanisms and consequences of failure, and shall ensure effective safeguards are in place to prevent or control hazards presented by those damage mechanisms. Require the analysis and incorporation of applicable industry best practices and inherently safer design to the greatest extent feasible into this review; and*
 - iv) 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) or similar, include requirements for inherently safer systems analysis to be automatically triggered for all management of change (MOC) and process hazard analysis (PHA) reviews, as well as prior to the construction of new processes, process unit rebuilds, significant process repairs, and in the development of corrective actions from incident investigation recommendations.**
- b) Require a thorough review of the comprehensive process hazard analysis by technically competent regulatory personnel;*

- c) *Require preventative audits and preventative inspections by the regulator to ensure the effective implementation of the comprehensive process hazard analysis (PHA);*
- d) *Require that all safety codes, standards, employer internal procedures and recognized and generally accepted good engineering practices (RAGAGEP) used in the implementation of the regulations contain adequate minimum requirements;*
- e) *Require mechanisms for the regulator, the refinery, and workers and their representatives to play an equal and essential role in the direction of preventing major incidents. Require an expanded role for workers in management of process safety by establishing the rights and responsibilities of workers and their representatives on health and safety-related matters, and the election of safety representatives and establishment of safety committees (with equal representation between management and labor) to serve health and safety-related functions. The elected representatives should have a legally recognized role that goes beyond consultation in activities such as the development of the comprehensive process hazard analysis, implementation of corrective actions generated from hierarchy of control analyses, management of change, incident investigation, audits, and the identification, prevention, and control of all process hazards. The regulation should provide workers and their representatives with the authority to stop work that is perceived to be unsafe until the employer resolves the matter or the regulator intervenes. Workforce participation practices should be documented by the refinery to the regulator;*
- f) *Require reporting of information to the public to the greatest extent feasible, such as a summary of the comprehensive process hazard analysis (PHA) which should include a list of inherently safer systems implemented; safeguards implemented for remaining hazards; standards utilized to reduce risks to As Low As Reasonably Practicable (ALARP) or similar; and process safety indicators that demonstrate the effectiveness of the safeguards and management systems;*
- g) *Implement an approach or system that determines when new or improved industry standards and practices are needed and initiate programs and other activities, such as an advisory committee or forum, to prompt the timely development and implementation of such standards and practices; and*
- h) *Ensure that a means of sustained funding is established to support an independent, well-funded, well-staffed, technically competent regulator.*

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.

As California's Division of Occupational Safety and Health (Cal/OSHA) administers the California Occupational Safety and Health Program and enforces California's process safety management (PSM) standard, established under title 8, section 5189 of the California Code of

Regulations (CCR), the U.S. Chemical Safety and Hazard Investigation Board (CSB) examined the effectiveness of the Cal/OSHA program. The CSB's investigation concluded the following:

- The California PSM regulation did not effectively establish goals to prevent accidents or reduce risk. Only two of the 14 elements (Process Hazard Analysis, or PHA, and mechanical integrity) of the PSM standard contained some goal-setting component.
- Cal/OSHA did not receive sufficient funding to employ a well-staffed, multi-disciplinary team capable of conducting thorough inspections of PSM-covered facilities in California; and
- Cal/OSHA did not effectively collect or promote industry use of major accident performance indicators to drive industry to reduce risks to As Low As Reasonably Practicable (ALARP).

Based on these findings, the CSB issued three recommendations to the California State Legislature and the Governor. This status change summary pertains to CSB Recommendation No. 2012-03-I-CA-R21 (R21).

B. Response to the Recommendation

California's newly adopted process safety management regulation for petroleum refineries under Section 5189.1 became effective on October 1, 2017.¹ The new regulation applies only to petroleum refineries within California and has the goal of "reduc[ing] the risk of major incidents and eliminat[ing] or minimize[ing] process safety hazards to which employees may be exposed."² According to a press release from the California Department of Industrial Relations (DIR), the elements outlined in the regulation require refinery employers to:

- Conduct Damage Mechanism Reviews for processes that result in equipment or material degradation;
- Conduct a Hierarchy of Hazard Controls Analysis to encourage refinery management to implement the most effective safety measures when considering competing demands and costs when correcting hazards;
- Implement a Human Factors Program, which requires analysis of human factors such as staffing levels, training and competency, fatigue and other effects of shift work, and the human-machine interface;
- Develop, implement, and maintain written procedures for the Management of Organizational Change to ensure that plant safety remains consistent during personnel changes;
- Utilize Root Cause Analysis when investigating any incident that results in, or could have reasonably resulted in, a major incident;
- Perform and document a Process Hazard Analysis of the effectiveness of safeguards that apply to processes and identify, evaluate and control hazards associated with each process; and
- Understand the attitudes, beliefs, perceptions and values that employees share in relation to safety and evaluate responses to reports of hazards by implementing and maintaining an effective Process Safety Culture Assessment program.

¹ See California's Process Safety Management for Petroleum Refineries, New Section 5189.1 at <https://www.dir.ca.gov/oshsb/documents/Process-Safety-Management-for-Petroleum-Refineries-apprvdtxt.pdf>

² Section 5181.1(a).

The new regulation is intended to make California petroleum refineries safer for both workers and surrounding communities.

C. Board Analysis and Decision

Although California's newly adopted PSM regulation for petroleum refineries does not accomplish everything requested in this recommendation, it is a much more robust regulation that goes a long way toward improving process safety management at these refineries. California's PSM regulation introduces several new management system elements previously identified by the CSB as being necessary for improved refinery safety, including the use of hierarchy of hazard controls, performing damage mechanism reviews, and conducting safeguard protection analysis.

The parts of the regulation that were determined to be missing are further addressed in this paragraph. The recommendation requires proactively providing PHA information to the regulator and requires that the information to be reviewed by the regulator. Though the regulation does not include this requirement, it does require triennial compliance audits from the 'employer' as well as provides authority for the regulator to receive the PHA information upon request. The regulation does not specifically require audits and inspections to be conducted by the regulator, but the regulator already has the authority to implement these programs on their own should they desire to do so. The regulation does not require the public reporting of PSM related information; however, the public does already have the ability to access PSM related information. Lastly, the requirement to implement an approach that determines when new or improved industry standards and practices are needed and initiate programs and other activities to prompt the timely development and implementation is neither practical nor measurable. Any new standard or practice initiated and implemented is assumed to be based upon a need and, therefore, can meet this requirement. Typically, the need is based upon some negative consequence and the timeliness requirement is relative to parameters that already exist that allow for development and implementation of such standards and practices. Though not specifically addressed in this regulation, the requirement, as written, already generally exists in practice. In summation of the totality of the requirements of the recommendation that are not addressed by California's PSM regulation, it appears that there are alternatives that currently exist that allow the objectives to generally be met.

California's new PSM regulation adopted many improvements aimed at making refineries safer for workers and citizens through a more robust process safety management approach aimed at identifying hazards, implementing inherently safer solutions, and reducing risks to the greatest extent feasible. As such, the Board voted to change the status of CSB Recommendation No. 2012-3-I-CA-R21 to: "Closed—Acceptable Alternative Action."