

**U.S. Chemical Safety and  
Hazard Investigation Board**

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**Rick Engler**  
Board Member

Christine Baker, Director  
Office of the Director  
Department of Industrial Relations  
1515 Clay Street, 17th Floor  
Oakland, CA 94612

June 22, 2015

Dear Director Baker:

Thank you for the opportunity to provide comments on the State of California Department of Industrial Relations (DIR) Division of Occupational Safety and Health Proposed GISO §5189.1 Version 4.5 – May 26, 2015, *Process Safety Management (PSM) for Petroleum Refineries*.

The CSB previously reviewed Version 1.0 and 2.0 *Draft Process Safety Management (PSM) for Refineries* Proposed General Industrial Safety Order (GISO) §5189.1 and has publically expressed that it has been greatly encouraged by DIR and Cal-OSHA's leadership in advancing PSM protections for workers and communities. The CSB has also stated that California can be a model for reforms that are being considered on the federal level by Executive Order 13650, *Improving Chemical Facility Safety and Security*.<sup>1</sup> The CSB has recently reviewed Proposed GISO §5189.1 Version 4.5 and has found that overall the draft of the Proposed Rule does not go far enough to require real risk reduction and the prevention of major accidents. Without risk reduction measures for refineries to work towards, and with no clear role of the regulator, it is unclear how the draft Proposed Rule is an improvement upon PSM regulations that are currently in place.

As a result of the U.S. Chemical Safety and Hazard Investigation Board's (CSB) investigation of the August 6, 2012, Chevron Richmond refinery fire, the CSB issued nine recommendations to the Governor and Legislature of the State of California which relate to the restructuring and enhancing of California's PSM program.<sup>2,3</sup> Although this is not intended to be a formal evaluation of California's response to the CSB's recommendations, the CSB found that the version of the drafts released last fall meaningfully addresses the CSB recommendations made in the three Chevron investigation reports.

Between Version 2.0 released on October 31, 2014, and Version 4.5, released on May 26, 2015, there have been significant changes to the draft Proposed Rule language. The CSB believes these changes considerably reduce the rule's efficacy to reduce risk of incidents at refineries. It should be noted that the CSB's Chevron Regulatory report<sup>4</sup> was not approved by the CSB Board until after Version 2.0 of the draft was made publically available. The Board believes a thorough review of the report would help

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<sup>1</sup> Inside EPA. 2015, Feb 17. CSB Points To California Process Safety Proposal As Model For EPA. Available at: <http://www.OutsideEPA.com>.

<sup>2</sup> USCSB. 2013. Interim Investigation Report: Chevron Richmond Refinery Fire. Pages 56-7. Available at: [http://www.csb.gov/assets/1/19/Chevron\\_Interim\\_Report\\_Final\\_2013-04-17.pdf](http://www.csb.gov/assets/1/19/Chevron_Interim_Report_Final_2013-04-17.pdf)

<sup>3</sup> USCSB. 2014. Regulatory Report: Chevron Richmond Refinery Pipe Rupture and Fire. REPORT NO. 2012-03-I-CA. Pages 96-8. Available at: [http://www.csb.gov/assets/1/19/Chevron\\_Regulatory\\_Report\\_11102014\\_FINAL\\_-\\_post.pdf](http://www.csb.gov/assets/1/19/Chevron_Regulatory_Report_11102014_FINAL_-_post.pdf)

<sup>4</sup> USCSB. 2014. Regulatory Report: Chevron Richmond Refinery Pipe Rupture and Fire. REPORT NO. 2012-03-I-CA. Pages 96-8. Available at: [http://www.csb.gov/assets/1/19/Chevron\\_Regulatory\\_Report\\_11102014\\_FINAL\\_-\\_post.pdf](http://www.csb.gov/assets/1/19/Chevron_Regulatory_Report_11102014_FINAL_-_post.pdf)

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strengthen the final draft of the PSM regulation. In addition, the edits between Version 2.0 and 4.5 were not made publicly available, and as a result, the CSB was not able to comment on the changes made. The CSB strongly urges DIR to restore the protective language from Version 2.0 discussed below.

These comments will first address the CSB's overall concerns with the draft language. Appendix A provides more detail as to how the current draft addresses the each CSB recommendation.

### **Requirements for Targeted Risk Reduction:**

The CSB is concerned that the majority of language requiring that risk reduction be implemented to “the greatest extent feasible” has been removed between the October 2014 Version 2.0 and Version 4.5. It is unclear what, if any, performance measure DIR plans to use to ensure that refineries are adequately reducing the risk of incidents. Removing this central feature returns the PSM regulations to a list of required activities that lack real goal setting attributes or risk reduction.

Language referencing performance measures (“greatest extent feasible” language) has been removed from: Section (a) Scope and Purpose, Section (e) Process Hazard Analysis (PHA), Section (u) Safeguard protection analysis (SPA), Section (n) Management of Change (MOC), Section (j) Mechanical integrity and equipment deficiencies, in Section (l) “identify, characterize and prioritize each process safety risk”, Section (f) operating procedures that provide a level of protect are no longer required to be to a level of protection to the greatest extent feasible, only that it is functionally equivalent or safer than shutting down or isolating, and Section (o) recommendations that address the root cause analysis and interim recommendations that address the root cause analysis.

The only sections for which performance measures remain are: Section (l) hazard control analysis (HCA) and resulting inherent safety measures, and the root cause analysis, but not as the overall objective or resulting recommendations, for reducing the risk to a targeted level. In the two sections where the “greatest extent feasible” language remains it is limited to the identification of safety measures or conducting an analysis rather than for the effective implementation of a corrective action. Without clear performance measures, the CSB is concerned that refineries will satisfy the intent of the regulations by submitting the required process documentation, but without actually reducing risk of major incidents. This essentially mirrors the critique of the existing federal and state PSM rules.

### **Extension of timelines:**

In general, a majority of timelines for implementation have been extended between Version 2.0 and 4.5. The CSB strongly urges DIR to ensure that refineries implement the regulation as soon as feasible following issuance of the Final Rule.

### **Incident investigation procedures:**

The CSB has concerns regarding the incident investigation process as outlined in Section (o) Version 4.5. As written, the root cause analysis states that it should provide sufficient information to reduce the risk, however; the regulation does not create the obligation to actually reduce risk. In addition, the incident investigation does not require a damage mechanism review (DMR), a PHA, a HCA or a SPA, as originally required in Version 2.0. Instead, in Version 4.5, the incident investigation must only state which of these they reviewed, but they are not required.

### **“Major Change” language:**

Language throughout Version 4.5 uses the definition of a “major change” as opposed to “change” including in triggering a Damage Mechanism Review (DMR) Section (k), and the Management of Change (MOC) Section (n) and Management of Organizational Change (MOOC) Section (t) to trigger a Hazard Control Analysis (HCA). The CSB is concerned that only applying HCA to major changes is not

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sufficiently protective, as even smaller changes made without an HCA can potentially result in an incident. For example, in the 2010 Tesoro Anacortes incident with seven fatalities, the CSB found that the MOC for an apparent minor change of installing steam lance stations near the heat exchangers that ruptured failed to examine the need for more operators to be present during startup. Requiring operators to use steam lances rather than fixing leaks subjected them to serious hazards. In the 2005 BP Texas City refinery incident, the MOC for siting occupied trailers where all 15 workers were killed did not examine the hazards of placing workers next to a hazardous process. Even though these were the two most serious refinery incidents in the last 10 years, neither of these changes would be considered “major” under the definition of the current version 4.5 draft.

### **Preventative role of the regulator:**

There is very little language in Version 4.5 that relates to the role of the regulator in preventing potentially catastrophic chemical accidents. For example, between Version 2.0 and Version 4.5, in Section (l) relating to Hierarchy of Hazard Control Analysis (HCA), Section 10 (pertaining to the regulator review of HCAs ) was eliminated. In Version 2.0, Section (l)(1) allowed the Division to review submitted HCAs and where the Division identified deficiencies, the Division could require the employer to submit further information, perform a reanalysis and submit a revised HCA and modify the HCA to incorporate changes to proposed inherent safety measures. Removal of this language eliminates the ability of the regulator to ensure that the employer has properly controlled hazards.

The CSB believes that the regulator can play a critical preventative role in reducing risk of incidents by ensuring that refineries are adequately reducing risk. Pursuant to its recommendations, the CSB urges DIR to include language that outlines the role of the regulator including: the regulator’s review of the written PHA, HCA, and SPA; requirement of preventative inspections by the regulator to verify the effective implementation of the PHA, HCA and SPA; and requiring mechanisms for the regulator, the refinery, and workers and their representatives to play an equal and essential role in the direction of preventing potentially catastrophic incidents.

The CSB considers the above to be important, overall changes that should be made to the Proposed Rule to ensure a robust California refinery PSM program that meets the intent of the CSB’s recommendations.

We also note that the CSB’s investigation of the recent ExxonMobil incident has identified a number of key preliminary issues that are similar to issues we identified in the Chevron Richmond investigation that led to the regulatory recommendations to California. These preliminary issues include:

- Failures to assess the effectiveness of safeguards during a PHA as well as a general failure to identify and mitigate hazards
- Lack of workforce involvement and empowerment to give input about safety concerns
- A reluctance to shut down the unit; and
- Mechanical integrity failure of equipment due to known damage mechanisms

Though the CSB appreciates the substantial effort involved in the development of the draft Proposed Rule and implementing our recommendations, the CSB is concerned that the current draft, if finalized without the recommended changes, will not be effective in reducing risk of incidents at refineries. The CSB urges DIR to make the previously mentioned changes prior to finalizing the Proposed Rule. The CSB welcomes additional conversation with DIR on how to improve the draft Proposed Rule and looks forward to further dialogue with DIR on how to improve refinery safety in California.

If you have any questions, please contact Mr. Don Holmstrom, Director, Western Regional Office, at (303) 236-8701 or via email at: Don.Holmstrom@csb.gov.

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Sincerely,

A handwritten signature in cursive script, appearing to read "Susan Anenberg".

Susan Casper Anenberg, Ph.D.  
Deputy Managing Director for Recommendations

On behalf of

Rick Engler  
Board Member, Interim Executive and Administrative Authority

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**Appendix A:** CSB comments on how Proposed GISO §5189.1 Version 4.5 – May 26, 2015, *Process Safety Management (PSM) for Petroleum Refineries* addresses recommendations made to the Governor and Legislature of California as a result of the Chevron refinery fire investigation

The following provides comments on how Version 4.5 of the proposed regulation specifically addresses each of the CSB's Chevron investigation recommendations.

### **CSB Recommendation No. 2012-03-I-CA-9**

*Revise the California Code of Regulations, Title 8, Section 5189, Process Safety Management of Acutely Hazardous Materials, to require improvements to mechanical integrity and process hazard analysis programs for all California oil refineries. These improvements shall include engaging 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. Require the analysis and incorporation of applicable industry best practices and inherently safety systems to the greatest extent feasible into this review.*

The CSB recognizes that language in Version 4.5 Section (k)(5), Damage Mechanism Reviews (DMR), includes setting up a diverse team to conduct damage mechanism hazard reviews. The DMR also requires the review of industry best practices, and that the DMR is also required to be reviewed as part of the PHA, consistent with our recommendation. That said, Version 4.5 Section (k) does not include mention of incorporation of inherently safer systems analysis (ISSA) to the greatest extent feasible. As a result, Version 4.5 does not meet the intent of the CSB's recommendation.

### **CSB Recommendation No. 2012-03-I-CA-10**

*For all California oil refineries, identify and require the reporting of leading and lagging process safety indicators, such as the action item completion status of recommendations from damage mechanism hazard reviews, to state and local regulatory agencies that have chemical release prevention authority. These indicators shall be used to ensure that requirements described in 2012-03-I-CA-R9 are effective at improving mechanical integrity and process hazard analysis performance at all California oil refineries and preventing major chemical incidents.*

The process safety information, Section (d), does not reference leading and lagging indicators. Process safety information is not used to ensure that mechanical integrity and PHA performance is sufficient. As a result, Version 4.5 does not meet the intent of the CSB's recommendation 2012-03-I-CA-10.

### **CSB Recommendation No. 2012-03-I-CA-11**

*Establish a multi-agency process safety regulatory program for all California oil refineries to improve the public accountability, transparency, and performance of chemical accident prevention and mechanical integrity programs. This program shall:*

- 1. Establish a system to report to the regulator the recognized methodologies, findings, conclusions and corrective actions related to refinery mechanical integrity inspection and repair work arising from Process Hazard Analyses, California oil refinery turnarounds and maintenance-related shutdowns;*
- 2. Require reporting of information such as damage mechanism hazard reviews, notice of upcoming maintenance-related shutdowns, records related to proposed and completed mechanical integrity work lists, and the technical rationale for any delay in work proposed but not yet completed;*

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- 3. Establish procedures for greater workforce and public participation including the public reporting of information; and*
- 4. Provide mechanisms for federal, state and local agency operational coordination, sharing of data (including safety indicator data), and joint accident prevention activities. The California Department of Industrial Relations will be designated as the lead state agency for establishing a repository of joint investigative and inspection data, coordinating the sharing of data and joint accident prevention activities.*

The CSB recognizes that DIR is part of the Governor's Interagency Refinery Task Force, however; inclusion of the above provision in the California PSM refinery regulations would ensure that a multi-agency process safety regulatory program exists beyond Task Force. The CSB urges DIR to add language to the Proposed Rule to establish the procedures, systems and data sharing mechanisms outlined in Recommendation No. 2012-03-I-CA-11.

### **CSB Recommendation No. 2012-03-I-CA-12**

*Require that Process Hazard Analyses required under California Code of Regulations, Title 8, Section 5189 Section (e) 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).*

Language in Version 4.5 for PHA does include language on the documentation and use of recognized methodologies such as, Hazard Control Analysis (HCA) to document the conclusions for an effective PHA. However, Layers of Protection Analysis (LOPA) or other qualitative, quantitative and/or semi-quantitative methods, is only required for Safeguard Protection Analysis (SPA). A SPA is only required where a PHA identifies the potential for a major incident. As a result, the language in Version 4.5 does not meet the CSB's recommendation. In order to satisfy the recommendation, DIR would need to add language to ensure that LOPA or other qualitative, quantitative and/or semi-quantitative methods are required as a result of the PHA findings.

### **CSB Recommendation No. 2012-03-I-CA-13**

*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 process, process unit rebuilds, significant process repairs and in the development of corrective actions from incident investigation recommendations.*

While inherently safer systems analysis is required to be implemented to the greatest extent feasible for HCA, the analysis is not required for MOC, PHA, for the construction of new processes, process unit rebuilds, and significant process repairs or in the development of corrective actions from incident investigation recommendations. In order to satisfy the intent of the CSB's recommendation, the CSB urges DIR to add language requiring ISSA for all processes mentioned in recommendation 2012-03-I-CA-13.

### **CSB Recommendation No. 2012-03-I-CA-14**

*Monitor and confirm the effective implementation of the damage mechanism hazard review program (2012-03-I-CA-R9 and 2012-03-I-CA-R10), so that all necessary mechanical integrity work at all California Chevron Refineries is identified and recommendations are completed in a timely way.*

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As mentioned, Version 4.5 does not include language clarifying the role of the regulator in California's refinery PSM program. In order to meet the intent of this recommendation, CSB urges DIR to add language requiring review of the DMR by the regulator to ensure that Chevron DMR recommendations are implemented.

### **CSB Recommendation No. 2012-03-I-CA-21**

*Based on the findings in this report, enhance and restructure California's process safety management (PSM) regulations for petroleum refineries by including the following 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;*

**CSB Comment:** As previously stated, while the HCA Section (I) contains language ensuring that hazards are controlled to the greatest extent feasible, the PHA in Version 4.5 does not require the reduction of risks to ALARP.

*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;*

**CSB Comment:** While documentation is required for PHA, as mentioned, ISSA is only required to be implemented to the greatest extent feasible for the HCA, not for the SPA, which is only required where the PHA identifies the risk of a major incident.

*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*

**CSB Comment:** Incorporation of inherently safer design to the greatest extent feasible, as well as ensuring adequate safeguards or hazard control, is not required as a result of the DMR.

*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.*

**CSB Comment:** As mentioned, while ISSA and ALARP are considered as part of the HCA, they are not required as part of the other processes mentioned in the above recommendation.

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*b. Require a thorough review of the comprehensive process hazard analysis by technically competent regulatory personnel;*

**CSB Comment:** As mentioned, Version 4.5 does not require the regulator to review the PHA.

*c. Require preventative audits and preventative inspections by the regulator to ensure the effective implementation of the comprehensive process hazard analysis (PHA);*

**CSB Comment:** Although audits are required, there is no requirement of the regulator to conduct preventative inspections to ensure implementation of the 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;*

**CSB Comment:** Version 4.5 contains language pertaining to collaboration between workers, their representatives and employers, but there is no language pertaining to the role of the regulator. Language absent from Version 4.5 that the CSB has recommended includes: a lack of language regarding the election of safety representatives and safety committees and regulator documentation of workforce participation. While Version 4.5 does contain language relating to stop work authority in Section (q), the CSB's recommendation has stronger language that provides the employee or employee representative stop work authority, and for unsafe work to be stopped until regulator intervention. As written in Version 4.5, no regulatory intervention is required.

*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;*

**CSB Comment:** Currently there is no language that requires the disclosure of the above elements to the public. The CSB strongly urges DIR to add language to ensure the information collected as part of the California refinery PSM program is transparent and made publically available.



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*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*

**CSB Comment:** While the review of industry practices is required in the DMR, Section (k) of Version 4.5, and RAGAGEP Section (d)(5) is required for process equipment, there is overall no language requiring that industry standards and practices be reviewed and incorporated. The CSB urges DIR to add language that will ensure that the California refinery PSM program does not become outdated by ensuring that improved industry standards and practices are incorporated into the program and regulation.

**CSB Recommendation No. 2012-03-I-CA-23**

*Work with the regulator, the petroleum refining industry, labor, and other relevant stakeholders in the state of California to develop and implement a system that collects, tracks, and analyzes process safety leading and lagging indicators from refineries and contractors to promote continuous safety improvements. At a minimum, this program shall:*

*a. Require the use of leading and lagging process safety indicators to actively monitor the effectiveness of process safety management systems and safeguards for major accident prevention. Include leading and lagging indicators that are measureable, actionable, and standardized. Require that the reported data be used for continuous process safety improvement and accident prevention;*

*b. Analyze data to identify trends and poor performers and publish annual reports with the data at facility and corporate levels;*

*c. Require companies to publicly report required indicators annually at facility and corporate levels;*

*d. Use process safety indicators (1) to drive continuous improvement for major accident prevention by using the data to identify industry and facility safety trends and deficiencies and (2) to determine appropriate allocation of regulator resources and inspections; and*

*e. Be periodically updated to incorporate new learning from world-wide industry improvements in order to drive continuous major accident safety improvements in California.*

Currently there is no language in Version 4.5 that relates to Recommendation No. 2012-03-I-CA-23 to establish a system that collects, tracks and analyzes process safety indicators to promote continuous safety improvements. The CSB urges DIR to add language to establish this program, ensuring that the minimum requirements above are included. Inclusion of these measures in the regulation will ensure that the program is created and implemented.