



U.S. CHEMICAL SAFETY BOARD

An independent federal agency investigating chemical accidents to protect workers, the public, and the environment.

Testimony of Don Holmstrom and Dan Tillema, P.E., U.S. Chemical Safety Board, before the California East Bay Legislators' Public Inquiry into Chevron refinery Fire of August 2012

Good Morning. I would first like to thank California State Senator Hancock and Assemblymember Skinner for inviting the Chemical Safety Board to be here today. My name is Don Holmstrom, and I am the Director of CSB's Western Regional Office. Also here with me from the CSB is Dan Tillema who is the leading CSB's investigation into the incident that occurred on August 6, 2012, at the Chevron Richmond Refinery. We greatly appreciate your interest in our investigation of this incident, and in making improvements to help prevent a similar incident from occurring in the future in the state of California.

The CSB was created as an independent federal agency under the Clean Air Act Amendments of 1990, and began operating in 1998. The CSB's mission is to conduct thorough and independent investigations of serious chemical and industrial accidents that occur throughout the country. The goal of the CSB's investigations and recommendations has been the prevention of incidents like the one at Chevron through the improved safety management systems, standards, and regulations.

The CSB's first investigation of a major refinery incident involved the petroleum naphtha fire that occurred in February 1999 at the Tosco Avon Refinery here in Contra Costa County. Since that report, the CSB has investigated numerous oil industry incidents including the 2005 BP Texas City Refinery explosion and fire that resulted in 15 fatalities and 180 injuries. It is important to note that over half of the current CSB investigations (seven out of 13) are related to the oil industry including five oil refinery investigations. Over the last ten years, our Board has consistently raised serious concerns about oil refinery process safety performance.

The CSB has had two major opportunities in the last six years to evaluate the effectiveness of current process safety regulatory system for preventing major accidents. The first was the CSB's BP Texas City Investigation, a large and far-reaching investigation that examined safety system deficiencies, regulatory and corporate oversight, and, for the first time, the role of safety culture. In our final investigation report, the CSB noted major organizational, regulatory and safety

deficiencies and made far-reaching recommendations to BP, OSHA, the American Petroleum Institute, the United Steelworkers Union, and others. These included recommendations to OSHA to strengthen its enforcement of the Process Safety Management standard through more robust, comprehensive, planned inspections by technically competent and experienced inspectors; and to the American Petroleum Institute and United Steelworkers to develop and implement key performance indicators for major hazards, to provide an early warning system for process safety deficiencies.

Secondly, the CSB continues to investigate the April 20, 2010, explosion and fire that occurred on the Deepwater Horizon rig in the Gulf of Mexico, which resulted in 11 fatalities and unprecedented environmental damage. The CSB has issued a number of preliminary findings and has held two public hearings addressing the regulation of offshore major accident hazards. In July 2012, the CSB held a public hearing in Houston on leading and lagging process safety performance indicators for the energy industry and other high hazard industries. The CSB hopes to issue its final investigation report on the Deepwater Horizon incident later this summer.

In our Texas City investigation, the CSB noted the importance of having a well-resourced, independent, and technically competent regulator. With these qualities in place, the regulator can conduct planned, comprehensive, and robust inspections of facilities with the goal of preventing catastrophic accidents. These comprehensive inspections, we believe, are vital for the effectiveness of federal process safety requirements, embodied in OSHA's 1992 PSM standard, which applies to most refineries and larger chemical operations. OSHA in fact identified that its "primary enforcement model for the PSM standard"¹ was a planned comprehensive inspection called the Program Quality Verification or PQV audit. Planned inspections of high hazard sites have the most opportunity for prevention. Inspections related to accidents that have already occurred are a form of emergency response. This is particularly true given process safety incidents have catastrophic potential.

Following the CSB's findings, OSHA developed the Petroleum Refinery Process Safety Management National Emphasis Program, also known as the oil refinery NEP, in June of 2007. This federal program established guidelines for inspecting petroleum refineries to assure compliance with the PSM standard – however, it was ended in 2011. Federal OSHA said the refinery NEP program identified many process safety issues in refineries and called the results "deeply troubling" – with numerous repeat violations both within the industry and even the same company and the lessons from Texas City and other incidents not learned.² The program ended in 2011 with federal OSHA citing that it lacked the resources to continue the effort indefinitely.

¹ OSHA Instruction CPL02-02-045. Compliance Directives are the main method OSHA uses to communicate the targeting plans, inspection methods and compliance expectations to their Compliance Safety and Health Officers for enforcing a new regulation. The PSM Compliance Directive was updated in 1994.

² Testimony of OSHA Deputy Assistant Secretary Jordan Barab before the US Senate Health, Education, Labor, and Pensions Subcommittee on Employment and Workplace Safety; June 10, 2010.

In 2007, Cal/OSHA reported to federal OSHA that it was not adopting the voluntary refinery NEP and instead would rely on its existing PSM enforcement program. The CSB is currently examining Cal/OSHA's response to the NEP and plans to address this issue fully in our final report on the Chevron accident.

As part of that investigation, the CSB is examining the effectiveness of the regulation of high hazard chemical facilities in California. There are a number of regulatory bodies within California that are responsible for overseeing the health and safety of workers and the public through the regulation of refineries and other high hazard facilities. In the case of the Chevron refinery, these include Contra Costa County, the City of Richmond, the EPA, and the California Division of Occupational Safety and Health, known as Cal/OSHA.

This patchwork system of regulation has serious challenges. The CSB has been examining whether implementation of the safety case regime would be a more effective regulatory tool in the state of California. The safety case regime, which originated in Europe, requires high hazard facilities to demonstrate, to the satisfaction of a competent regulator, that they can operate safely and in conformance with the latest industry standards and achieving the lowest practical risk levels. That is a pre-condition for operating. By contrast the current U.S. regulatory system for process safety is largely reactive; companies generally have a default right to operate, subject to penalties when accidents occur or their activities otherwise draw negative attention from regulators. In the case of the Chevron refinery fire, the reactive system of regulation simply did not work to prevent what was ultimately a preventable accident.

Implementing an effective regulatory regime such as the safety case, with the ability to manage and regulate high hazard industries and prevent serious accidents, requires a number of inter-dependent features. First, the regulatory regime must be truly goal-setting in nature; another term for this is a performance-based regulatory regime. This approach provides industry the opportunity to tailor the regulations to its specific facilities with the goal of continuous risk reduction and incident prevention. The safety case regime also imposes a general duty on industry to reduce all risks in its operations to as low as reasonably practicable (ALARP). Such an approach places the impetus on industry to evolve with current best safety practices, wherever they have been developed, to ensure that process hazards have been adequately identified, evaluated, and controlled. Furthermore, this regime requires industry to utilize leading and lagging indicators to drive risks involved in major hazard facilities to as low as reasonably practicable. Finally, for effective implementation, this type of regime requires an independent, competent, and well-funded regulator. Experience and competence in technical areas such as chemical engineering, human factors, and process safety management are necessary to provide effective auditing and regulatory oversight for prevention. In a recent federal OSHA forum on reforming process safety regulations, noted safety expert Andrew Hopkins pointed out that all of these elements are essential for an effective major accident prevention regime. Dr. Hopkins

emphasized that the whole package of the safety case system needs to be introduced to make it work, including a competent, well-funded regulator³

I will now turn to Dan Tillema to complete the CSB statement.

Thanks Don.

In the CSB Chevron investigation, we have noted a number of instances, as early as 2002 where the Richmond refinery could have taken timely action to replace the piping that failed on August 6th. However, Chevron failed to do so; in fact the California process safety regulatory system lacked sufficient well-trained, technically competent staff and also lacked more rigorous regulatory requirements to require Chevron to reduce safety risk. That is not to specifically fault California – California rules and enforcement capacity--with a few exceptions--essentially mirror the current federal system. Some examples:

1. In September 2009, a memo was written by Chevron's in-house "Energy Technology Company" containing updated inspection strategies for preventing sulfidation corrosion failures in Chevron refineries. It recommended 100 percent inspections to ensure piping was not corroding exceptionally fast or near failure. This was not implemented by the Chevron Richmond Refinery, and neither Contra Costa nor Cal/OSHA was aware of this memo. And while Cal/OSHA cited the Chevron Richmond Refinery post-incident for ineffective process hazard analyses or PHAs, there is nothing currently in the PSM regulations addressing PHAs that would require periodic corrosion reviews or effective risk reduction.
2. A second issue is the use of safety standards by industry that have no effective requirements to implement basic protections. The American Petroleum Institute standard addressing sulfidation corrosion, API 939-C contains important technical information but the recommended safety practices are presented as suggestions with an overabundance of "should" and "consider" statements. Current PSM regulations do not have effective mechanisms for the regulator to require improvements to existing recognized standards so that they establish needed process safety or integrity requirements.
3. Past investigations of incidents at the Richmond crude and lube units by Chevron identified sulfidation corrosion as the failure mechanism but were limited in their scope and failed to examine the issue of sulfidation corrosion more broadly; subsequent to the August 6th fire Chevron has replaced piping in a number of locations in both process units. Current state and local PSM regulations addressing incident investigation do not require rigorous post-incident hazard reviews or mandate the use of inherently safer technology, such as corrosion-resistant piping materials. Such requirements would help drive risk as low as reasonable practicable or ALARP. Currently, the implementation of

³ OSHA Expert Forum on the Use of Performance-Based Regulatory Models in the U.S. Oil and Gas Industry, Offshore and Onshore; Texas City, Texas; September 20, 2012.

both inherently safer technology and ALARP principles remain voluntary and are not required by regulation.

4. The CSB also has identified deficient management of change reviews conducted by Chevron where more corrosion resistant metallurgy such as 9CR was identified as needed for crude unit high temperature service that could have addressed the piping circuit that failed. However, this more corrosion resistant metallurgy was not implemented more broadly in crude unit high temperature service. Under the current regulatory system Chevron cannot be cited for conducting “ineffective” MOC’s – they are only required to simply conduct them and implement agreed upon actions. Too many of the elements of the PSM regulation simply require paper procedures or activities, rather than concrete measures to reduce risk at every opportunity.
5. Finally, post-Texas City between 2006 and August 6th, 2012, Cal/OSHA conducted three planned PSM inspections of the Chevron Richmond facility, totaling only 150 inspector hours of effort. None of these inspections resulted in citations or fines. In contrast, according to statistics provided by OSHA, federal NEP refinery inspections conducted between 2007 and the end of 2011 lasted roughly 1,000 man hours each and resulted in an average of 11.2 violations and \$76,821 in penalties per inspection. OSHA noted that hours spent on a typical refinery NEP inspection were 40 times greater than the average OSHA inspection. These numbers indicate a major disparity in thoroughness and comprehensiveness between the planned PSM inspections conducted by Cal/OSHA and the NEP inspections conducted by OSHA and other OSHA State Plan States. Our preliminary findings suggest that Cal/OSHA would benefit from greater process safety staffing with expanded technical qualifications; the current program has only about seven inspectors, only one of whom is a chemical engineer. Cal/OSHA has stated to the CSB that funding for the PSM program has been a significant issue limiting the size of the effort.

There were a number of internal opportunities for Chevron and others to do things differently to prevent this incident, which obviously no one wanted to occur. These steps were not taken and they are not required under the current regulatory regime. Implementing a more robust regulatory regime such as the safety case – which is in use by corporations such as Chevron throughout most of the industrialized world – would place the onus on the company to drive its risks to as low as practicable, with a competent regulator in place to ensure that this is being accomplished. Adoption of the safety case can address current deficiencies in chemical safety, minimizing risks and preventing the next incident like the fire at Chevron.

To summarize, the CSB has determined from the BP Texas City investigation and Deepwater Horizon public meetings the following are key features needed by a regulatory regime to prevent major accidents with catastrophic potential:

1. An independent, well-funded, technically competent regulator that frequently audits major hazard facilities, and uses company-reported leading and lagging process safety indicators to focus those audits
2. A written safety case – submitted for regulatory acceptance – that includes a systematic analysis and documentation of all major hazards and effective control methods to reduce those risks as low as reasonably practicable
3. The capability to adapt and implement safety requirements in response to newly identified hazards, advances in technology, lessons learned from major accidents, and improved safety codes without the constant need for new rule-making. This requires a regulatory and safety culture change “from the minimalist compliance of the prescriptive regime to the philosophy of best practice and continuous improvement”⁴ – to quote from Australian offshore regulators.

The CSB will present additional information about the Chevron investigation in the next two weeks, culminating in our public meeting in Richmond on the evening of Friday, April 19. We again thank Senator Hancock and Assemblymember Skinner for the opportunity to present an update on the CSB investigation into the Chevron refinery fire and look forward to any questions you may have.

⁴ Report of the Independent Review Team, Australian Offshore Petroleum Safety Case Review, 2000, p.33.