The Lessons of Texas City in Complying with OSHA's NEP

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Abstract

Recent developments have underscored the need for petroleum refinery executives to re-examine their knowledge management policies and systems. On July 10, 2007, a Senate subcommittee hearing regarding the BP Texas City refinery disaster prompted an outcry for federal oversight of refineries. And on June 7, 2007, OSHA released its instructions for implementing a National Emphasis Program (NEP) that is dedicated to reducing or eliminating workplace hazards associated with the catastrophic release of highly hazardous chemicals at petroleum refineries.

As part of the NEP, OSHA will be inspecting approximately 81 petroleum refineries over a two-year period to ensure compliance with OSHA's Process Safety Management (PSM) of Highly Hazardous Chemical standard. Inspections will emphasize walk-arounds by inspectors, who will examine the selected processes, review applicable documentation including original design and lists of written management-of-change procedures.

Industry leaders can view this regulatory activity as an opportunity to deploy learning management programs that test comprehension and provide audit trails of employee and contractor participation, thus strengthening the safety culture throughout the organization.

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Background

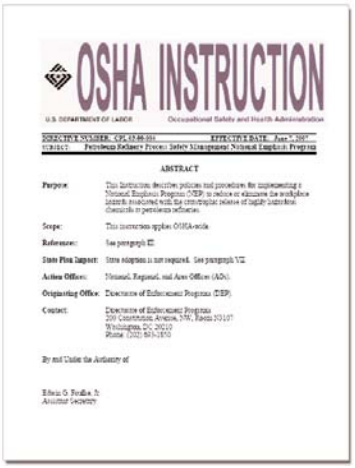
The emotional testimony of Linda Hunnings, widow of a contractor who died in the 2005 explosion at BP's Texas City refinery, before a Senate Subcommittee on July 10, 2007 capped two years of escalating demands that US regulators increase compliance enforcement at the nation's petroleum refineries. Before the hearing adjourned, Senator Frank Lautenberg, Chair of the Transportation Safety, Infrastructure Security and Water Quality Subcommittee said his subcommittee would craft legislation that could expand the scope and depth of federal oversight of petroleum refineries.

Hunnings was only one of the speakers urging greater enforcement by regulators. Carolyn Merritt, Chair of the Chemical Safety Board (CSB), was especially pointed in her testimony about lessons learned from the CSB's investigation of industrial accidents. According to Merritt, in many cases the enforcement and oversight of existing regulations by the US Occupational Safety and Health Administration (OSHA) was inadequate to prevent several investigated accidents.

Merritt added: "Thorough implementation of existing OSHA and EPA process safety rules would prevent a number of tragic accidents, including the one in Texas City."

OSHA's New National Emphasis Program

Even without new legislation such as that mentioned by Senator Lautenberg that would expand the authority of the CSB, the petroleum industry is already feeling the outfall from Texas City.


OSHA INSTRUCTION

U.S. DEPARTMENT OF LABOR Occupational Safety and Health Administration

DIRECTIVE NUMBER: CPL 03-00-004 EFFECTIVE DATE: June 7, 2007

SUBJECT: Petroleum Refinery Process Safety Management National Emphasis Program

ABSTRACT

Purpose:

Scope:

References:

State Plan Impact:

Action Offices:

Originating Office: Directorate of Enforcement Programs (DEP)

Contact:

By and Under the Authority of

On June 7, 2007 OSHA released instructions describing the policies and procedures for implementing a National Emphasis Program (NEP) to reduce or eliminate the workplace hazards associated with the catastrophic release of highly hazardous chemicals at petroleum refineries. Specifically, the Instruction "…describes an OSHA National Emphasis Program (NEP) for inspecting petroleum refineries and contains policies and procedures to verify employers' compliance with OSHA's Process Safety Management (PSM) of Highly Hazardous Chemical standard. Under this program, OSHA will conduct 81 inspections over the next two years.

The Instruction will implement the NEP, offering the regulated community insight into OSHA's compliance expectations, inspection procedures, and inspection requirements not already established by PSM.

The Investigations

On March 20, 2007 at a public meeting in Texas City, TX, the CSB voted 5-0 to approve its final report on the March 2005 explosion in the BP Texas City refinery. At that meeting CSB Chairwoman Carolyn W. Merritt said, "With the vote tonight, we embark on seeing the most significant safety improvements ever pursued by this agency."

The US Chemical Safety Board is an independent federal agency charged with investigating industrial chemical accidents. CSB investigators look into all aspects of chemical accidents including physical causes such as equipment failure in addition to inadequacies in regulations, industry standards and safety management systems.

> *"It is my sincere hope and belief that our report and the recent Baker report will establish a new standard of care for corporate boards of directors and CEO's throughout the world. Process safety programs to protect the lives of workers and the public deserve the same level of attention, investment, and scrutiny as companies now dedicate to maintaining their financial controls. The boards of directors of oil and chemical companies should examine every detail of their process safety programs to ensure that no other terrible tragedy like the one at BP occurs."*
>
> CSB Chairwoman, Carolyn W. Merritt

What Happened at Texas City

According to the CSB investigation, the explosion at BP's Texas City refinery occurred during startup of the octane-boosting isomerization (ISOM) unit, when a distillation tower and attached blowdown drum were overfilled with highly flammable liquid hydrocarbons. The drum vented directly to the atmosphere, allowing a geyser-like release of highly flammable liquid and vapor onto the refinery grounds. The vapor was ignited by an idling diesel pickup truck nearby, triggering a series of explosions inside the unit and to surrounding areas. The fifteen fatalities (all contracted workers), and injuries occurred in and near temporary work trailers, which had been placed too close to the ISOM unit and were not evacuated before startup of the unit.

In grim detail, the CSB identified the step-by-step events that led to the explosion. After analyzing those events, the CSB made key findings and recommendations:

1. The temporary trailers were located too close to the ISOM unit. "Industry trailer siting guidelines did not predict the level of trailer damage that we actually saw," said Mr. Kaszniak. In October 2005, the CSB issued an urgent recommendation to the American Petroleum Institute (API) to develop new guidance for preventing trailers

from being sited near hazardous areas of refineries and chemical plants. "A human being is more likely to be injured or killed inside a trailer – which can shatter during an explosion – than if he is standing in the open air. For that reason, occupied trailers have no place near hazardous process areas of refineries or chemical plants.

2. The blowdown drum was dangerous. According to the CSB study and Merritt's testimony, "This 1950s-era equipment [which releases flammable liquid and vapor directly to the atmosphere] is unsafe, and many companies around the world have long since eliminated these systems. BP should have replaced its blowdown drums with inherently safer flare systems … designed to handle a worst-case flammable release, by safely separating and containing the flammable liquids and burning off the flammable vapors in a remote location." In October 2006, CSB issued recommendations to OSHA and API aimed at eliminating similar atmospheric blowdown systems from US refineries and chemical plants in favor of safer alternatives such as flare systems.

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3. Inadequate training and supervision, as well as operating procedures that were incomplete, ad hoc and outdated, make it more likely that operators would overlook important information and make operational mistakes. Operating procedures were not updated to reduce the likelihood or consequences of flooding the tower. Noted CSB Investigator Cheryl MacKenzie, who led the human factors analysis, "Although errors and procedural deviations occurred during the startup, it is important to recognize that individuals are doing what makes sense to them at the time, given the work environment, the organization's goals and other job-related factors."

4. Operators involved in the startup were likely fatigued, having worked 12-hour shifts for 29 straight days. Although fatigue prevention regulations have been developed for aviation and other transportation sectors, there are no such guidelines widely accepted and used in the oil and chemical sector. CSB recommended that the API and the United Steelworkers International Union, the largest unions representing refinery workers, work together to develop a new consensus standard for fatigue prevention in the industry.

5. A significant downsizing had occurred in operation and training at the BP refinery. The number of control board operators in the ISOM area had been halved after BP's global (25%) cut to fixed costs in 1999, from 2 operators to 1. In 2003, the single operator was given a third process unit to control. The 1999 budget cut also produced significant training reductions for operators and cost pressures prevented the refinery from using simulators to train operators for handling abnormal situations and process upsets.

6. BP relied on occupational injuries and illnesses (the lost-time injury rate) to assess safety performance. CSB cautions that the occupational injury rate is a measure of personal safety but, in a complex facility like an oil refinery, it does not predict the

likelihood of a catastrophic process-related event.

7. The refinery had long-standing process safety deficiencies. According to Investigator Kaszniak, "If the Process Safety Management standard had been thoroughly implemented at the refinery as required by federal regulations, this accident likely would not have occurred. Among the requirements not followed were ineffective incident investigations, lack of effective preventive maintenance, lack of change reviews and pre-startup reviews, and incomplete hazard analyses.

Spending cuts were made by BP executives without assessing the safety impact of those decisions. In a 2004 survey of the safety culture at the refinery, the resulting report identified "an exceptional degree of fear of catastrophic incidents" and stated respondents' belief that "production and budget compliance gets … rewarded before anything else." The CSB recommends that OSHA amend its PSM standard to require companies to perform a management-of-change safety review on organizational changes including mergers, acquisitions, reorganizations, personnel changes, and budget reductions.

Reflections on OSHA

The CSB report was unflinchingly harsh on OSHA, noting that OSHA had conducted only one planned PSM inspection of the Texas City refinery despite numerous fatal accidents at the plant between 1985 and 2005. Unplanned inspections of the refinery happened in response to accidents, complaints or referrals, but they were typically narrower in scope and shorter in duration than planned inspections.

Additionally, the CSB found that only nine Program Quality Verification (PQV) inspections had been done between 1995 and 2005, with none in the refining sector. The 26 state agencies that operate their own workplace safety programs conducted 48 PQV inspections with only six at refineries. The CSB report, which suggests that OSHA has an insufficient number of qualified inspectors to enforce the PSM standard at petroleum facilities, called on OSHA to "identify those facilities at the greatest risk of a catastrophic accident" and to "conduct comprehensive inspections" at those facilities. To do that, the CSB recommends that OSHA hire or develop new, specialized inspectors and expand the PSM training curriculum at its National Training Institute.

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Chairwoman Merritt said, "Rules already on the books would likely have prevented the tragedy in Texas City. But if a company is not following those rules, year-in and year-out, it is ultimately the responsibility of the federal government to enforce good safety practices before more lives are lost. OSHA should obtain and dedicate whatever resources are necessary for inspecting safety rules at oil and chemical plants. These facilities simply have too many potentially catastrophic hazards to be overlooked."

OSHA Inspections and Enforcement

OSHA has vigorously defended its inspection and enforcement record in the petroleum industry. On May 16, 2007, Richard Fairfax, Director of Enforcement Programs for OSHA, gave a prepared statement before the House of Representatives Subcommittee on Oversight and Investigations of the Committee on Energy and Commerce. In that statement, Fairfax highlighted OSHA's results, saying:

> *"OSHA's balanced strategy is achieving results, as evidenced by all-time low occupational injury, illness and fatality rates. The overall workplace injury/illness rate, at 4.6 per 100 employees in 2005, is the lowest since the Bureau of Labor Statistics began publishing data in 1973. Since 2002, the injury and illness rates have fallen by more than 13 percent, and the overall fatality rate has fallen by 7 percent since 2001. These numbers highlight OSHA's commitment to protecting the safety and health of the nation's workforce."*

Fairfax continued in a defense of OSHA's enforcement results, focusing on the results achieved in enforcement. He said:

> *"Enforcement is a key component of our strategy … All employers are responsible for ensuring the safety and health of the employees at their worksites. Since 2001, OSHA has proposed more than three-quarters of a billion dollars in penalties for safety and health violations. In addition, the agency has made 56 criminal referrals to the Department of Justice when we believed that an employer willfully violated the law and one or more employees died as a result.*

In addition to defining a formula for prioritizing the facilities for inspection, the procedures for selecting which processes to investigate, a step-by-step inspection process and the documents to request, OSHA emphasized implementation over documentation. It directs inspectors to "…focus on the implementation of the various PSM elements and ensure that employers do what they have committed to do in their PSM documentation."

The NEP Instruction emphasizes walk-arounds by inspectors, during which they are required to examine the selected processes, review applicable documentation including original design and lists of written management-of-change procedures to manage changes for process chemicals, technology, equipment, procedures and changes to facilities. Areas of focus include:

- **Operating Procedures – Normal Operating Procedures (NOP), Emergency Shutdown Procedures (ESP) and Emergency Operations (EOP):** To determine whether the employer developed and implemented the required NOPs, ESPs and EOPs, for example, OSHA inspectors are directed to interview at least three control board operators in the selected units to determine if they have received sufficient training, both initial and refresher, to be qualified to shut down the selected unit under the employer's ESP. Inspectors are also directed to randomly select two EOPs and two NOPs to

Are operating procedures implemented as written?

determine whether they meet PSM requirements. A key question from required interviews with at least three operators: Are operating procedures implemented as written?

- **Facility Siting:** All fatalities (and the majority of injuries) caused in the BP explosion at Texas City were in or around the temporary buildings located near the ISOM unit. CSB specifically recommended industry guidance to establish an acceptable distance of structures to hazardous processes.
- **Mechanical Integrity:** A range of inspection steps focus on the mechanical integrity of a diverse number of plant components, such as relief systems, valves, piping, and blowdown towers.
- **Operator Training:** The ability of refinery employees to perform their job responsibilities is critical to process safety. Cuts in training budgets at BP were also noted in both BP and CSB studies as a contributing factor to the Texas City explosion. OSHA inspectors are directed to focus on Operator Training, beginning with the question "Have operating employees been trained on the procedures they are expected to perform?" Inspectors are required to use the training records of five randomly selected operating employees to determine the response to the question.
- **Contractor Safety:** All of the fatalities at Texas City were contract employees. In fact, 2000 contract employees typically worked at the Texas City refinery, with increases to 6,000 at specific times. Host employers, however are responsible for ensuring that contract employees understand the hazards related to their work and periodically evaluate the performance of contractors to assure that the contractor's employees are following ALL the obligations required of contractors. Although the contractor is responsible for instructing its employees on the known potential fire, explosion or toxic release hazards, at a minimum, the host employer is responsible for determining, periodically reevaluating, and documenting that contract employees have received proper safety information and knowledge.

OSHA also has established Regional Emphasis Programs operating in Louisiana, Arkansas, Oklahoma, Texas and New Mexico that focus on reducing workplace injuries and fatalities in the refining and petrochemical industries.

A Focus on Competency

Both the CSB and the BP Panel have emphasized the failure of BP's safety culture.

"Process safety programs focus on among other things, the design and engineering of facilities; hazard assessments; management of change; inspection, testing and maintenance of equipment; effective alarms; effective process control; procedures; training of personnel; and

human factors… On the other hand, 'personal safety,' which is sometimes referred to as occupational safety, focuses on hazards that are more directly related to individual workers.

Process safety requires companies to embrace and enforce behavioral change across its entire employee and contractor populations. The training and contractor safety sections of the NEP Instruction deserve particular attention by an industry confronted by workforce challenges. Already, the industry faces a deficit of skilled workers experienced in refinery operations. Looking forward, the problem can be expected to expand as the industry confronts the "crew change." Although the industry is implementing programs to address its workforce shortage, it will continue to rely on contract workers and will likely require expanded initial and refresher training for employees.

An important issue identified in the BP study centered on the company's training program, which employees consistently said was inadequate. It is equally important to remember that the conclusion of both studies was that BP showed enterprise-wide failure of its safety culture. That finding led the BP panel to recommend, "BP should develop and implement a system to ensure that its executive management, its refining line management above the refinery level, and all US refining personnel including managers, supervisors, workers and contractors, possess an appropriate level of process safety knowledge and expertise."

Competency must be the standard by which "training" is measured. Computer-based systems that can target appropriate learning resources to individuals as they need specific knowledge can minimize the onslaught of information that often forces employees to "tune out."

Competency must be the standard by which "training" is measured. Computer-based systems that can target appropriate learning resources to individuals as they need specific knowledge can minimize the onslaught of information that often forces employees to "tune out." Similarly, learning management technologies that effectively test comprehension and automatically trigger remedial training when necessary can confirm understanding and validate the intention of individual employees to employ that knowledge. Advanced instructional design using simulation, interactivity, animation, sound and site-specific graphics can promote understanding of complex systems, operating procedures, and abnormal conditions. And, as companies rely on an increasingly diverse workforce, effective training can be tailored to address varied languages, cultures, literacy levels and professional skillsets.

Any petroleum refinery incorporates inherently hazardous conditions and inevitably will face demanding safety measures. BP's Texas City explosion focused legislative, regulatory and public attention on those conditions and required safety measures. The subsequent studies, pinpointed key failures and identified those areas that are likely to be scrutinized more closely at other facilities in the petroleum industry.

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