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Development of a Safety Management System (SMS) for Drilling and Servicing Operations within OSHA Jurisdiction Area of Texas

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Abstract

Workers of oil and gas extraction industries are exposed to multiple safety hazards, resulting in high fatality rates. Texas has the highest employment and fatality of oil and gas industries. Current regulations that apply to the industries in Texas require no safety management system (SMS) and inadequately address the safety hazards associated with drilling and servicing operations. The objective of the study is to develop a SMS to improve safety performances of Texas drilling and servicing operations. First, current SMSs in the United States, i.e., Process Safety Management (PSM), and Safety and Environment Management Systems (SEMS) were studied to determine if they can be directly extended. According to analysis of Occupational Safety and Health Administration (OSHA) incident data, development of a new SMS is a better solution rather than extension of the two SMSs. A new SMS has been proposed by identifying and categorizing causal factors of incidents. The SMS has been developed to integrate both process and personnel safety and was designed right for Texas drilling and servicing operations. Industries can use the management system as a framework to establish their safety programs.

Keywords: Process Safety; Personnel Safety; Drilling and Servicing; Safety Management System.

Background

Average annual occupational fatality rate from 2003 to 2009 in the oil and gas extraction industry is seven times higher than the rate for all U.S. industries (Mulloy, 2014). Similar to other industries, there are some common safety hazards existing in oil and gas extraction industries, such as falls, struck-by, and caught-in/caught-between. However, oil and gas extraction industries also have some unique hazards including fires, explosions, high pressure equipment, confined spaces, and rotating machine hazards, etc. (Federal Register, 1983; OSHA, 2017b). In order to improve safety performances of oil and gas extraction activities, American Petroleum Institute (API), International Association of Drilling Contractors (IADC), and American National Standards Institute/American Society of Safety Engineers (ANSI/ASSE) have published a series of industry practice documents regarding the safety hazards associated with oil and gas extraction activities. Currently, all aspects of oil and gas well drilling and servicing operations are governed by OSHA General Industry Standards, and site preparation activities are covered by OSHA Construction Standards (OSHA). Special hazards existing in workplaces, which are not addressed by the aforementioned two standards, are covered by General Duty Clauses (OSHA, 2009). Besides OSHA federal regulations, only California and Utah provide state requirements regarding occupational safety (OSHA, 2017a).

In order to draft the separate rulemaking for drilling and servicing operations, OSHA conducted studies about fatal injuries related to the operations in 1980’s (Federal Register, 1983). The studies identified major hazards and causal factors resulting in incidents, suggesting General Industry Standards fail to adequately address the hazards associated with drilling and servicing operations. Thus in 1983, OSHA drafted a proposed standard (48 FR 57202) addressing the hazards and made it as a supplement to OSHA General Industry Standards (Federal Register, 1983). However, the final action of the proposed standards failed to execute (OSHA, 2017d). During the past 30 years, operation techniques have advanced, knowledge of both the employee and employer has improved, and the safety culture of the industry has changed. Therefore, the conclusions from these studies may not be very useful for today’s oil and gas industries. In 1992, Process Safety Management (PSM) of highly hazardous chemicals was issued by OSHA for the purpose of preventing or minimizing the consequences of catastrophic releases of hazardous chemicals. However, oil and gas well drilling and servicing operations were exempted by PSM since rulemaking for drilling and servicing (48 FR 57202) was still in process. In 2013, in order to improve chemical facility safety and security, OSHA requested comments on a potential revision to PSM and identified candidate topics for policy changes. One of the candidate topics was to consider whether the PSM exemption on oil and gas well drilling and servicing operations should be removed (OSHA, 2013). Several organizations such as Chemical Safety Board (CSB),...
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