Podium Session 137

Safety

Wednesday, May 22, 2013, 1:30 PM – 5:00 PM

SR-137-01
“Explosibility Index”: Extension to Dust-Explosion Protection
Objective: The U. S. Bureau of Mines [USBM] developed the "Explosibility Index" to rank the relative hazards of different varieties of coal dust. To highlight differences in coal-dust properties, components of the Explosibility Index were separated into “Ignition Sensitivity” and “Explosion Severity”. A purpose of this paper is to show a physico-chemical basis for these two indices.

Methods: These characteristics of dusts have been utilized in comparing dusts of a wide variety of materials, from metals to pharmaceuticals. Also, the National Fire Protection Association [NFPA] has further utilized these indices by stating that “area [electrical] classification is not considered necessary” if the Ignition Sensitivity is less than 0.2 AND the Explosion Severity is less than 0.5 when compared to Pittsburgh Coal dust. Further, NFPA states “Dusts with explosibility parameters that fall below these limits are generally not considered to be significant explosion hazards.”

Results: The above statements infer that values of Ignition Sensitivity and Explosion Severity that exceed 0.2 and 0.5, respectively, would indicate a significant explosion hazard. Thus, higher values of either or both of these indices would justify proportionate explosion-protection measures in equipment or areas that could contain dense dust clouds.

Conclusions: A second purpose of this paper is to suggest a “matrix” method for determining the extent of explosion protection that should be provided, as functions of these indices. An additional “layer of protection” is suggested for each half-order-of-magnitude increase in the Explosibility Index, from 0.03 to 30.

CS-137-02
Process Safety Management: How a Different Approach to Mechanical Integrity Changed Everything
W. Beadie, Maul Foster & Alongi, Inc., Portland, OR.
Situation/Problem: A company with several ammonia refrigeration facilities struggled to implement the OSHA and USEPA requirements for process safety management (PSM) and risk management planning (RMP). Despite having written plans that accurately described required activities, the company frequently failed to complete the required tasks, particularly those related to the inspection and maintenance of process equipment. Several training sessions for all levels of management failed to improve compliance. Maintenance personnel were blamed for failing to conduct required activities, and upper management was blamed for failing to provide adequate resources.

Resolution: The company collaborated with equipment manufacturers to review and update maintenance schedules for all process equipment and to define a system that was more manageable than one confined to the standard recommendations provided in the equipment manuals. All maintenance recommendations were linked to reference documents to clearly demonstrate to upper management the basis of each task. Time and expense estimates were developed for each maintenance task. The information was provided in a format that allowed the company to easily select tasks for contractors and in-house maintenance personnel and to calculate the annual time and budget to implement the maintenance schedules.

Results: Upper management immediately recognized that existing maintenance staffing and budgets were inadequate for performing required inspections and tests. Additional maintenance personnel were hired and service contracts were defined with local refrigeration contractors to help perform all the required maintenance tasks. Compliance with maintenance schedules has improved significantly.

Lessons Learned: Simply knowing the PSM/RMP requirements does not, by itself, lead to compliance. Tasks must be managed, which practically requires a clear understanding of the necessary time and budget...
to implement activities. User-friendly, integrated tools for managing and conducting activities are vital to successfully manage process safety.

CS-137-03
Making Quantum Improvement in Safety Performance with Fewer Safety Resources
M. Dunwoody, Simply Smart Safety, Simpsonville, SC.

Situation/Problem: A 900-person candy making facility was having too many accidents. At the same time, corporate and facility resources were stretched so thin we had to figure out a different approach than had been done in the past.

Resolution: In order to make a quantum improvement in our safety record, we: developed specialized teams; brought the human touch to truly involve fellow workers; focused training/workshops utilizing unorthodox methods to obtain a high level of educated and engaged supporters of the safety process; revisiting specific programs such as Fall Protection, Lockout/Tagout, and Ergonomics to obtain unheard of support; developed individual plant safety capabilities to excel even when non-safety experienced individuals are tossed into a safety position, and utilized other areas and departments for taking over ownership of many important aspects of the safety process.

Results: OSHA injury rates are down over 30%. We have supervisors involved in safety everyday now in ways unheard of before. Best of all, we have ownership/responsibility of many safety programs and processes (for example LOTO, Fall Protection, Safety Committees, Fork Trucks, to name a few) outside of the safety department where they should reside.

Lessons Learned: When you bring everyone together, spend time truly understanding their issues, provide education on the hazards that are in their control, provide tools and some resources (there is never enough but this is explained to all employees right from the beginning), and nurture along those that want to improve the safety process, great things can and did happen.

CS-137-04
Developing and Maintaining a Safety Culture in a Transient Workforce
M. Hanna, S&ME, Inc., Richmond, VA; F. Alston, URS, Oak Ridge, TN.

Situation/Problem: A safe work culture is important in ensuring that workers are not injured on the job, while enhancing productivity and profitability. Developing and maintaining a safe work culture where the situation compels a D&D project to be comprised of transient workers is not an easy task. Oftentimes, the transient workers are unable or unwilling to invest the time needed to form a sense of identification and commitment to the project and its management systems. Identification is an important dimension of trust that should be developed in order to embrace and share the common goals, values and belief of the organization. Therefore, trust is an important element in developing and maintaining a safe work culture. A safety culture survey was administered to a transient workforce to determine their perception of the work culture and management’s commitment to safety. The result of the initial surveys indicated that cultural changes were needed in order to improve employee’s perception of the culture and further improve workplace safety.

Resolution: The resolution of the situation required that changes in the management systems were instituted to improve interaction between the worker and management, worker participation in shaping the work culture, and perception of work place safety. The survey was re-administered approximately one year later. The results were analyzed and compared to the survey results for the prior year.

Results: The results of the changes in management systems yielded improved employee perception of the work safety culture and improved worker involvement, worker identification with the goals of the organization; trust in management’s commitment and concern for worker safety, improved safety performance, and belief that the work culture is safe.

Lessons Learned: The lessons learned included a verification of trust being an important element in the safe work culture and the ability to create a safe work culture within a transient workforce.

CS-137-05
WITHDRAWN: Empowering Employees: Applying Lean Manufacturing Principles to Improve Overall Safety Culture
A. Steiner, Caterpillar, Inc., Prentice, WI.

SR-137-06
Oregon Commercial Crab Fishing Safety Assessment
G. Croteau, M. Cohen, J. Camp, University of Washington, Department of Environmental Health, Field Research & Consultation Group, Seattle, WA; E. Zoller, Oregon Health and Sciences University, Portland, OR; J. Lincoln, NIOSH, Anchorage, AK.

Objective: A study was conducted to investigate the perceptions and experiences of Oregon Dungeness crab fishermen regarding critical safety issues. This fishery represents one of the most dangerous work environments in the U.S., with most fatalities (79%) resulting from capsized vessels while crossing river bars or working near shore. From 2003–2009, 14 deaths were recorded; none of the victims wore a personal flotation device (PFD) at the time of the incident.
Methods: The study entailed a dockside survey of crab fishermen in November 2010 in Newport, Oregon, as they prepared for the 2010–2011 season. In addition, five different types of PFDs were distributed to 50 fishermen who were requested to complete a PFD assessment survey form.

Results: A total of 83 fishermen, including 24 vessel captains, completed the dockside survey and a completed PFD assessment survey was returned by 33 of the fishermen. Overall, PFD use was found to be infrequent; the majority of respondents indicated a PFD was never routinely worn either crossing river bars, working on deck, or in transit. Just 61 and 54% of the respondents indicated they would wear a PFD during an emergency or storm, respectively. Respondents indicated lack of comfort (31%), gear entanglement potential (31%) and restricted movement when working (60%) as the primary factors for not wearing a PFD. Respondents’ perspectives regarding key safety issues were also insightful. Overall, an inflatable vest type PFD received the most favorable comments regarding its comfort and ability to work in. However, each PFD assessed was found to have distinct advantages and disadvantages, an indication that personal preference is an important factor in an individual’s selection and subsequent PFD use.

Conclusions: Additional efforts should be made to encourage PFD use, expand safety training and on board safety drills, and improve understanding of vessel stability.

SR-137-07
Reduction in Hexavalent Chromium Exposure during Stainless Steel Welding at an Engineering Industry

Objective: Workplace exposure to Hexavalent Chromium may cause irritation or damage to respiratory tract, lung cancer and dermatitis. Hexavalent Chromium exposure may exist during stainless steel welding and grinding, among other metallurgical activities. The ACGIH® TLV®-TWA for Hexavalent Chromium is 50 μg/m³ and OSHA PEL for Hexavalent Chromium is 5 μg/m³. The aim of this study was to assess occupational exposure to Hexavalent Chromium during stainless steel welding at an engineering facility.

Methods: Employee exposure monitoring for Hexavalent Chromium was conducted at an engineering site in Texas during July and August, 2012. NIOSH recommended air sampling and analytical methods were used for monitoring. The exposure assessment study consisted of collecting personal breathing zone samples using 37-mm diameter polyvinyl chloride (PVC) filters (5-μm pore size) within polystyrene cassettes. The samples were analyzed as Hexavalent Chromium particulates using ion chromatograph equipped with a UV-vis detector at 540-nm wavelength (OSHA ID-215 Method). The results of exposure monitoring were compared with the Hexavalent Chromium Occupational Exposure Limits (OEL).

Results The results indicated employee exposure to Hexavalent Chromium was above the OSHA PEL during stainless steel welding. Recommendations were made to reduce Hexavalent Chromium exposures after initial exposure evaluation. Repeat monitoring was conducted after implementing engineering controls. Hexavalent Chromium exposure was reduced by 50% to 90% after repeat monitoring study. Controls which reduced exposures were use of Local Exhaust Ventilation (LEV) and Powered Air Purifying Respirator (PAPR).

Conclusions: The results confirmed employees are exposed to Hexavalent Chromium during stainless steel welding. Furthermore, the installation of LEV equipped with HEPA filter and employee’s use of PAPRs were effective in significantly reducing employee exposures to Hexavalent Chromium.