Lesson Learned Statement:

Workplace hazards should be properly identified and understood, so that controls are properly developed and implemented. An activity hazard analysis (AHA) must define all "basic job steps" to be performed. It is also important that critical Material Safety Data Sheet (MSDS) information be captured in the hazard analysis. Critical information for all chemical constituents and possible solutions needs to be integrated into work controls. Technical understanding of solution(s) and potential reactivity as it relates to the job activity is essential.

Line managers must ensure that when the field activity deviates from expected conditions, a time out is called to identify and control the work activity and resulting hazards. During the pre-job briefing, workers need to be made aware of the hazards associated with potential chemical solutions, both planned and unplanned.

Roles and responsibilities for all aspects of the activity should be unambiguous from the planning stage, through implementation, to completion of the activity. Line managers need to ensure that all personnel involved with a work activity clearly understand their roles and responsibilities.

Discussion:

On August 22, 2000, a laborer working on an environmental management technology deployment project at the Portsmouth Gaseous Diffusion Plant required hospitalization after receiving serious burns from a violent exothermic chemical reaction of sodium permanganate and sodium thiosulfate. A Type B Accident Investigation Board was appointed to determine why this accident occurred and what can be done to prevent a recurrence. The full report, documenting the results of the Board, is available electronically at http://tis.eh.doe.gov/oversight.

Analysis:

The DOE Accident Investigation Board determined that the direct cause of the accident was that the laborer placed crystalline thiosulfate into a 5-gallon bucket that contained about 3 gallons of concentrated sodium permanganate solution. The violent release of a steam bubble generated from the exothermic reaction caused the solution to be ejected over 15 feet into the air from the 5-gallon bucket and onto the laborer causing serious burns.

Recommended Actions:

Facility managers and DOE Field Element Managers should consider the issues in this lessons learned alert and take appropriate actions as follows:
In defining the work and analyzing the hazards for activities involving chemical solutions, the facilities should:

- Ensure that the activity hazard analysis defines all basic job steps to be performed.
- Ensure that current and correct MSDS information is available and captured in the hazard analysis.
- Analyze the potential reactivity of chemical solutions associated with job activities.
- Ensure that neutralization and handling requirements are addressed.
- Ensure that roles and responsibilities are clearly defined and understood.

In developing and implementing controls for activities involving chemical solutions, the facilities should:

- Ensure that the controls and requirements are clearly stated and are implemented in the field.
- Implement appropriate personnel protective equipment requirements.
- Develop hazard controls for chemical solutions neutralization associated with job activity.
- Implement appropriate hazard communication requirements.
- Ensure that the most up-to-date technical information is utilized.

In order to perform work safely for activities involving chemical solutions, the facilities should:

- Ensure that workers are made aware of and understand the hazards associated with each chemical.
- Establish controls to ensure that incompatible materials are stored with an appropriate separation.
- Ensure that lessons learned for incidents involving chemical reactions are disseminated and appropriately incorporated into the facilities' safety program.
- Ensure that their chemical safety program encourages adherence to industry good practice guidelines for safety management of reactive chemical processes.

**Originator:**

Prakash Kunjeer DOE EH-21 Office of Special Projects

**Validator:**

Dennis Vernon, DOE EH-21 Office of Special Projects

**Contact:**

Brenda Hawks, Oak Ridge Operations Office, (865)576-2503, HawksBL@oro.doe.gov

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NA

**Name Of Reviewing Official:**

Chip Lagdon, DOE EH-21 Office of Special Projects
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Work planning, chemical hazards, exothermic reaction, thiosulfate, sodium permanganate

References:

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Information in this report is accurate to the best of our knowledge. As means of measuring the effectiveness of this report please use the "Comment" link at the bottom of this page notify the Lessons Learned Web Site Administrator of any action taken as a result of this report or of any technical inaccuracies you find. Your feedback is important and appreciated.

DOE Function / Work Categories:

ISM Category:

Hazard:

End of Lesson!