Joint DOE/EFCOG Chemical Management Workshop, Advancing Chemical Safety in the 21st Century, March 14th, 2006

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Introduction:

A Defense Nuclear Facilities Safety Board (Board) member addressed your group at the first of these meetings, in November 1998, and one has done so for almost every meeting since that time. The Board obviously has a great interest in the success of your organization and its mission. Although, of course, we have no official purview for strictly chemical safety, chemical safety often overlaps with nuclear safety, and the facility and site organizational safety procedures and facility safety culture are often the same. My views in no way are official Board positions, but the Board and its staff have a great deal of experience in dealing with nuclear safety issues that to some extent are common to chemical safety. In fact of course, ISM deals with all aspects of operational safety, and the Board has witnessed the evolution of ISM in the DOE.

How chemical safety applies to the proper application of ISM:

The Board has often spoken officially of the need and usefulness of ISM, e.g., Recommendation 95-2, Integrated Safety Management System (1995). Great progress has been made in the incorporation of ISM at every level: Institution, Facility and Activity. ISM was defined by DOE Policy 450.4, Safety Management System Policy. The application of ISM at the institution, facility, and activity level must recognize all hazards with an operation. All too often in the past, only the nuclear hazard was seriously considered by application of the ISM functions and principles. DOE has recognized this from time to time in the past, e.g. the *Chemical Safety Vulnerability Working Group Report of 1995.* Unfortunately, the actions from this and other studies were slow to be adopted at many sites and even slower to be enacted at the activity level. One of the many issues and the cause of numerous incidents was the failure to identify the hazards, which in many cases meant that no one was around to recognize the hazards of the proposed operations. Although progress has been made, recent incidents indicate more needs to be done.

I would like to discuss one particular initiative from your group which may help to prevent chemical accidents from happening. One of the projects from the last workshop was an effort to outline the benefits of having a Chemical Safety and Life Cycle Management (CSLM) organization at each site to help manage the operations with chemicals. I believe this grew out of a previous year's project to attempt to identify chemical hazards. Throughout all of the DOE sites, this group found that many of the Occurrence Reporting System incidents were traceable to lack of chemical hazard identification. The issue is that chemical hazards are often not given the degree of attention commensurate with the risks they pose in the workplace and even risks to the public. Proper attention to real risks of chemical operations involves the application of the following ISM Guiding Principles. (1) Line management responsible for safety: Line management actually owns safety, meaning that work is planned, analyzed, controlled, and authorized by an accountable line manager. A CSLM with the proper authority and resources could be responsible for providing expertise for all aspects of the planning and operation involving chemical systems, including proper hazard identification. (2) Competence commensurate with responsibility: In order for contractor employees to understand the technical basis for their work, namely chemical technology, the source of the information must be sound and technically authoritative. DOE oversight must also be competent enough to review the work. Although STD 3009, Change #2 requires that toxicological hazards must be considered in nuclear facility hazards analyses, there are no official guides for chemical hazards, as there are for nuclear hazards. The proposed centralized chemical authority at the institutional level could enhance safety by guiding the analysis of chemical hazards throughout the whole life cycle of the hazardous material. Instead of having numerous facilities at a site provide their own methods, there would be only one way for all. If the recommendations of this group are adopted and effectively promulgated, this new initiative could help to correct past and current problems with the treatment of chemical hazards. It would be good to see the model for such a CSLM published and raised to the level of a guide or manual of operations within ISM. The CSLM system might also provide DOE with a convenient way to oversee chemical safety in the context of ISM by having a central office to conduct reviews.

Waste handling and characterization is an area of inconsistent application of the ISM core functions and principles which seems to come up more frequently lately. The radiological activity and even the characterization of the nuclides in a waste drum can be determined without even opening it. However, in many cases reactive chemical are also present and may not be so easy to characterize, but may be potentially more hazardous to the handlers. For example, SRS recently discovered higher levels of Volatile Organic Compounds in TRU waste drums than previously thought. Even in the case where external detectors can measure the amount of radioactive material present, care must taken and proper procedures used to eliminate errors. For example, Some drums at SRS didn't have the amount of fissile material identified correctly, due to a detector saturating and reading low. The particular drum was labeled "No Fissile Material," but contained over 600 Fissile Gram Equivalents. In another case, waste drums at Idaho exploded and burned in the process of retrieval from burial grounds. No one was hurt, but incidents such as this must not be ignored.

Comments on confluence of radiological and chemical hazards:

One area of recent concern is the many incidents involving reactive chemicals in the R&D labs around the complex, especially NNSA sites. Often small scale or pilot plant experiments, tend not to have the same scrutiny as the larger scale projects, but nevertheless expose workers to potential life-threatening injuries. The list of recent incidents (accidents) is fairly long but most have occurred at the national laboratories, where the bulk of the R&D for the complex is carried out.

There have been incidents with energetic materials reacting without the proper controls to protect the workers, and unexpected reactions where reactivity was not thought to be present. Most of these incidents can be traced to poor performance of the five ISM core functions, especially, lack of proper hazards analysis due to lack of hazard identification. Automated hazards analysis may actually contribute to the problem if not used properly. Automation is helpful if it prods the user to think about the problem, and remind the user to consider the proper sequence of steps to conduct the analysis, rather than simply "fill in the blanks" to get it out of the way. The root cause of some of these may also be the expert-based safety system entrenched at the laboratories, the "I've done it many times this way and had no problem" approach. Poor practices and lax attitudes are changing albeit slowly, but we must find ways to keep the pressure on for continued improvement. I must emphasize that many of these are not under the Board's purview, but they reflect the procedures and attitudes prevalent throughout the site.

A note on complacency:

The DOE community has not had a serious chemical incident in several years. Congratulations. However, as you know, complacency leads to lax enforcement of the rules and lack of oversight. Accident theory indicates that over a period of time, if no serious accidents occur, resources for safety enforcement and accident prevention tend to go down, increasing the risk for a serious accident. If one occurs, then everybody jumps on the bandwagon and devotes attention and resources to the problem, all of which could well have been spent to prevent the accident in the first place. During times of high productivity and safety performance, the investment in safety protection drops off. When an accident or near miss attracts management's attention, safety protection measures are strengthened. Although this model, originated by Reason, et al, was aimed at high risk operations, it applies as well to many chemical and R&D operations (See DNFSB TECH-35 for more discussion on this). We believe that DOE line management must work with the contractors to keep the pressure on to not allow anyone in the chain of command to become too complacent. DOE ES&H may begin to analyze data on accidents and near misses and devise precursor indicators and monitor those indicators.

However, as the Board pointed out in TECH-35, the lack of precursor indicators does not necessarily eliminate the risk of low probability, high consequence events. So, although performance indicators may be useful, in our business especially, one must use caution.

As we reminded you previously at one of these talks, an accident at a nuclear facility, even one with only minor injuries can often be extremely expensive in terms of lost time and resources, and possibly jeopardize the institutional mission.

Summary and Conclusions:

Congratulations on the work you have done to incorporate chemical safety at DOE sites, including but certainly not limited to the few examples I have cited. I hope your work will continue with DOE management backing. You have the Board's support for all of your efforts, especially to improve and refine the application of ISM to facilities where chemicals and materials are present. The agenda of talks by eminent speakers and the activities planned for the remainder of this workshop appear to be really exciting and useful, and I hope you can take advantage of them.