

ESTABLISHING OCCUPATIONAL SAFETY AND HEALTH POLICY FOR THE U.S. DEPARTMENT OF ENERGY'S ENVIRONMENTAL TECHNOLOGY DEVELOPMENT PROGRAM

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ABSTRACT

The U.S. Department of Energy (DOE) manages the largest environmental remediation program in the world, with responsibility for an estimated 5.5 trillion liters of contaminated ground water and 40 million cubic meters of contaminated soil and debris. (1) Just the contaminated soils on DOE weapons facilities could cover the entire island of Manhattan more than five feet deep. (2) Attempting to accomplish this mission with the technologies currently available would prove far too expensive. Consequently, the DOE has mounted a major program to develop innovative technology to expedite the cleanup. The Office of Environmental Management (EM) has made a commitment, however, to maintain a program that is second to none in the dedication and skill with which it promotes occupational safety and health during all phases of development and deployment of these new environmental remediation technologies. Since 1995, the EM Office of Science and Technology (OST) has conducted a program with the International Union of Operating Engineers (IUOE) to include occupational safety and health (OSH) considerations in the EM technology development program. Building on this experience, EM is implementing an improved OSH program built around Integrated Safety Management (ISM) principles. This paper reviews EM's policy on the integration of OSH into the technology development program.

The EM ISM approach has begun yielding results. EM's average annual rate of occupational illnesses and injuries just reached an all-time low rate of 1.6 per 100 employees, which is below the DOE average of 2.2 and well below the private sector average of 6.7. Even greater safety can be achieved by applying the best science and technology available, which was demonstrated in a recent study that found 71 percent of the technologies deployed by the Office of Science and Technology in 1999 had a moderate-to-high potential for reducing occupational safety and health exposures. (1)

The key policy initiatives of OST that will be reviewed in this paper include:

- The development of safety and health guidelines for the technology developer community;
- The integration of safety and health considerations into a stage-gate procedure that allows formal review of the safety at specific stages in their development of the technologies;
- The creation of guidance for integrating safety and health into the ongoing, formal peer review process that the American Society of Mechanical Engineers conducts for OST;
- Development of a Technology Safety Data Sheet (TSDS) for every technology at Mid-stage Review; and
- Identification and inclusion of safety and health compliance costs in technology cost-performance data.

INTRODUCTION

Thus far, OST has spent over \$3 billion on the development of new technologies, making it one of the largest single sources of environmental technology funding in the world. (3) The technology development program serves the EM cleanup-stewardship mission which is based on the principle that the Department must protect the workers, the public, and the environment. Former Assistant Secretary Carolyn Huntoon, who stimulated significant advances in this area, stated: "First and foremost, we must protect our workers, the public and the environment. 'Safety First' is more than just a slogan - it must be at the heart

of everything we do. I want a focus on safety to become the norm at all of our sites and with all of our employees -contractor or Federal." (4)

To follow through on this approach, Dr. Huntoon assembled a body of experts within an independent Environmental Management Advisory Board (EMAB) to provide recommendations for better integrating health and safety into the technology design process. The EMAB found that "the OST Program addresses occupational safety and health more comprehensively than other [U.S.] federal agencies with development programs in the remediation technology sector." (4) The EMAB also recom-

mended eight actions to further improve OST's performance in this area. These recommendations have been incorporated in a policy document "Occupational Safety and Health in the Environmental Management Science and Technology Program." This policy addresses a number of specific features of the OST technology development program, which will be addressed in further detail: (5)

- The policy requires developers to analyze the hazards of all aspects of new technologies and improve the safety of the technologies during development. It provides guidelines for developers to use in doing this, and review of their efforts in peer review and stage gate reviews.
- The policy requires enhanced development and communication of hazard information to workers and contractors, via Technology Safety Data Sheets (TSDS), more occupational safety and health information in Innovative Technology Summary Reports, and worker training requirements.
- The policy mandates the establishment of clear lines of responsibility, flowing through all procurement vehicles, for occupational safety and health at all stages in the development process.
- The policy promotes a new level of commitment to occupational safety and health, beginning in the earliest stages of technology development and maintained throughout all stages of the development process.

OST developed the following principles to guide the effort to integrate safety and health considerations into the design and deployment of innovative technology.

1. OST takes responsibility for making its technologies as safe as possible for those who develop and use them; and for assisting decision makers in selecting safer technologies.
2. OST's intent is to increase safety and value and minimize bureaucracy.
3. OST is committed to assisting technology developers in practical ways to optimize occupational safety and health in its technologies.
4. OST will partner with worker organizations to achieve practical safety and health protection.
5. OST will continually improve its safety and health practices.

Finally, the new policy initiatives by the Office of Science and Technology have been framed within a larger safety strategy that has been implemented by all organizations within the Department of Energy. This approach, called Integrated Safety Management, is a major push by the Department to incorporate safety into management and work practices at all levels, with a particular emphasis on involving workers in the planning of all projects. A recent mail survey of 219 DOE employees across the complex conducted by the Operating Engineers found that the ISM approach is truly changing the safety culture. Overall, 90 percent had been trained on ISM; the same percentage indicated that ISM was in place in their workplace. An impressive 80 percent of workers and 100 percent of first-line supervisors indicated they could stop any unsafe operation without fear of reprisal.(9)

With respect to DOE ISM, OST articulates two primary responsibilities: 1) design technologies for safer operations and

2) inform the site cleanup user of specific remaining hazards and mitigation and training requirements for safe operation. The TSDS is used to stimulate achieving both responsibilities.

SAFETY AND HEALTH GUIDELINES FOR THE DEVELOPER COMMUNITY

The EM Advisory Board recommended that OST provide effective, usable safety and health guidelines and checklist to the developer community to assist them in considering safety. The OST had previously produced an extensive set of safety and health checklists through a cooperative agreement with the Operating Engineers National Hazmat Program. These checklists cover specific processes such as pressure vessels, compressors, and conveyor systems and were found to be quite valuable by a process safety expert at the U.S. Department of Labor's Occupational Safety and Health Administration. OST has made these available internationally through the OENHP website at: <http://www.iuoeiettc.org>.

The OST also sponsored a National Technical Workshop in October of 1998 that brought together 60 experts from government, the environmental remediation industry, the insurance industry, academia, and labor unions to draft a set of guidelines for creating safer remediation technologies. The guidance document they created has served as the primary reference for the current OST initiative. (6) DOE has made this available to all interested parties at the OENHP website: <http://www.iuoeiettc.org>.

The previous efforts have been incorporated into new occupational safety and health guidelines and checklists that have been incorporated as an appendix to the EM policy statement on occupational safety and health in EM's technology development processes, issued January 2001. These have been distributed to current and prospective technology developers, including as part of solicitations, and technical task plans. The goal is to help technology developers understand the role that occupational safety and health considerations must play throughout their research and development efforts. An additional goal is to provide developers with information and support needed to enable them to bring occupational safety and health considerations into their technology development work at an early stage, and to maintain attention to OSH throughout the development process.

INTEGRATION OF SAFETY AND HEALTH CONSIDERATIONS INTO A STAGE-GATE PROCEDURE

In 1995, OST adopted a model from the private sector for screening technologies along their development to determine which are worthy of continued funding and which should have government support terminated. This "stage-gate" model was developed by Robert Cooper for identifying winning new products. Cooper had evaluated the literature on screening products for potential success in the market and developed a model that looks for a "winning" profile that is fairly predictive. The seven stage model was validated using a cross-split half method. Overall predictive abilities were reported to be 84 percent. (7)

OST tried to duplicate this model but found it was too difficult to work with seven stages particularly at a higher level of oversight. A review by the U.S. National Research Council in 1999 produced the recommendation that "OST should use the minimum number of stages and gates needed to track a project

and should use peer reviews at key decision points (gates), especially in the selection of a new project.” (8) OST agreed with this recommendation and simplified the model to three stages—research, development, and demonstration.

The recent EM policy document provides guidance for considering specific safety and health criteria at specific gates during the technology review process. For instance, all safety information must be collected and incorporated into a Technology Safety Data Sheet before gate 5, which is full-scale demonstration.

GUIDANCE FOR INTEGRATING SAFETY AND HEALTH INTO THE ASME PEER REVIEW PROCESS

The Department of Energy believes strongly in the value of peer reviews for improving the quality of programs. OST has employed a peer review process to determine the scientific and technical merit of the technologies they are funding. The Institute for Regulatory Science facilitates reviews by highly qualified scientists and engineers through the American Society of Mechanical Engineers (ASME). OST requires technical peer reviews for all new projects as part of the project selection process, for all ongoing projects at least every three years, and at the decision points for transition from research to development or development to demonstration. (5) Prior to the current initiative, safety was not a consistent part of the peer review process. Now it is formally addressed in all peer reviews. The Institute for Regulatory Science ensures that at least one of the peer reviewers has a background in safety. Specific questions are addressed in each review to determine if the innovative technology is safer than the baseline technology that would be replaced.

DEVELOPMENT OF A TECHNOLOGY SAFETY DATA SHEET (TSDS) FOR EVERY TECHNOLOGY AT MID-STAGE REVIEW

Technology Safety Data Sheets (TSDSs), novel tools for communicating safety and health information about a new technology, are being pioneered by the Department of Energy. Three National Technical Workshops were held, beginning in 1995, to build on the lessons learned from Material Safety Data Sheets and develop a more focused and valuable information tool for workers. For the past five years, OST has worked with the International Union of Operating Engineers to produce TSDSs for technologies reaching the demonstration phase of development. To date, over 60 TSDSs have been created. At OST’s request, the IUOE recently conducted three pilots to test the value of requiring TSDSs at early stages. These pilots were completed, and IUOE submitted its report on October 3, 2000. The study indicated that too little information had been developed at early stages and suggested that mid-stage requirements were more appropriate. Based on this report, OST will work with the Focus Areas to identify resources and develop a phased implementation plan for TSDS development by Gate 4, Engineering Development.

IDENTIFICATION AND INCLUSION OF OCCUPATIONAL HEALTH AND SAFETY COMPLIANCE COSTS IN TECHNOLOGY COST-PERFORMANCE DATA

Agencies of the U.S. government have been working together under the Federal Remediation Technologies Roundtable (www.frtr.gov), a coordinating organization of several federal

agencies, to coordinate resources, share information, and develop a consistent format for identifying the costs and benefits of innovative remediation technologies. The costing model, unfortunately, does not directly identify health and safety costs, such as OSHA compliance charges. Consequently, when competing technologies are available to address an environmental remediation challenge, the inherently safer technology may be disadvantaged if all of the safety and health-related costs of implementing other technologies are not fully captured. OST sponsored a National Technical Workshop in Beaver, West Virginia, October 23-25, 2000, to consider this issue. The resulting guidance document included the following recommendations for DOE:

Attendees made the following specific recommendations to the Department of Energy, which are now under consideration:

- Identify the safety and health costs associated with each technology, so that purchasers have a more accurate understanding of their total costs.
- Consider simplified checklists to help identify the health and safety costs.
- Make the purchasers of unsafe technology bear the full burden of their choices and, therefore, consider compliance costs in their decision making.
- Stop providing disincentives to safe engineering by absorbing workers’ compensation and associated medical costs due to unsafe technology.
- Incorporate safety and health guidelines that are simple and demonstrate value added into the procurement process.
- Compute baseline health and safety costs for comparison with those of new technologies.
- Include safety and health cost methodology specifications and TSDS requirements in solicitations.
- Include safety and health cost information in the Innovative Technology Summary Reports (ITSR).

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