Opportunities for Improvement:

A Review of Safety Management at the Department of Energy

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"The best way to predict the future
...is to create it." – Peter Drucker

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EXECUTIVE SUMMARY

This report presents the results of a safety management review of the Office of Energy, Science, and Environment (ESE). The goal of this review was to identify opportunities for DOE to improve safety management and gain work efficiencies, with a particular focus on nuclear and other high-energy missions. The review involved more than 160 interviews of DOE and contractor personnel at headquarters and in the field. Through this review, it became clear that the DOE and contractor staff have valuable perspectives that can help improve the effectiveness of, and investments in, safety management. It was also clear that, with the separation of the National Nuclear Security Administration (NNSA) functions, an opportunity exists to more closely align the focus and infrastructure of ESE with its broad missions.

The review found eight key issues—four are considered opportunities to improve the corporate infrastructure. The recommendations in this area are interdependent; that is, they must be implemented collectively in order to realize marked improvement. First, the roles and responsibilities of the staff must be redefined to align with organizational missions, eliminate redundancies, address emerging risks, and provide for single-point accountability. In defining roles and responsibilities, senior management should use a top-down approach in determining how it wishes to conduct safety management activities. Second, the current organizational structures of the ESE program elements and some of the Field Offices must be re-evaluated to consider roles and responsibilities and do so in a manner that will clarify authorities and reduce multiple interfaces. Third, the Department must use integrated planning and scheduling to capture the oversight activities of Headquarters, Field, and contractor personnel. Integrated planning will promote the effective use of resources and reduce unnecessary burdens on the conduct of work. Fourth, an aggressive program to understand and maintain critical skills must be executed to assure future readiness. Resolving the current shortages of nuclear criticality safety skills should receive first priority. Those personnel with critical technical skills must be made accessible, and field experience made a major consideration in selecting Headquarters management.

The remaining four issues relate to improving safety requirements that guide the conduct of work and provide feedback on performance. First, the safety management requirements, as delineated in directives and rules, are more compatible with production facilities and need to be re-evaluated for applicability to the broad missions in ESE. National and international standards should be used in lieu of developing new requirements. Second, the requirements and systems for reporting occurrences and providing feedback on operating experience must be revised to reduce the collection of nuisance data and provide meaningful information. Third, the corrective action program must move from its compliance-oriented processes to effectiveness reviews such that continuous improvement is reinforced. Finally, the innovations and experiences of accelerated closure sites should be captured so that their legacy can be shared for future similar work.

The draft of this report was published and distributed for comment in November 2001. It acted as a catalyst for the Executive Safety Conference, which followed in December 2001. The conference included four breakout sessions to further identify barriers to improving safety management and recommend additional opportunities to gain effectiveness and better utilize resources. The conference provided the Department with an even greater access to the viewpoints of some of its stakeholders (e.g., DOE headquarter and field management, contractor management, and DNFSB). It also succeeded in defining the specific actions items needed to move the recommendations of this report forward and to "Take ISM to the Next Level".

A peer review of both efforts, those of this report and of the safety conference, was conducted by an independent nationally-recognized expert, Dr. Thomas Murley (former executive of the U. S. Nuclear Regulatory Commission). The peer review concluded that the recommendations of this report are "on target" to improving safety management and gaining work efficiencies. It also offered several specific suggestions for enhancing the Department's corrective action programs, by taking a more holistic approach, and for facilitating better communications between the DOE and its contractors.

The recommendations, specific action items, and outcomes from this report, the Executive Safety Conference, and the peer review are incorporated and tracked in the *Project Plan for Safety Management Report and Executive Safety Conference* available on the DOE ISM website (http://tis.eh.doe.gov/ism).

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Background

The Under Secretary of Energy, Science and Environment (ESE) requested this review to determine how the U. S. Department of Energy (DOE) might improve safety management. Luis A. Reyes, a loaned executive from the U.S. Nuclear Regulatory Commission (NRC), conducted the review as Special Assistant to the Under Secretary. Assisting him was Margie Lewis, President of Parallax, a consultant firm to DOE and the commercial nuclear industry. The review focused on the DOE and contractor line management organizational structures, interfaces, and functional responsibilities. It also considered DOE's oversight approaches, safety infrastructure, and safety metrics. Several drivers were defined for this review, as listed below:

- Best-in-class performance in nuclear (and other high-energy) safety is vital to the mission of DOE and the national interest.
- The safety infrastructure represents a major, if not the major, cost of DOE's ongoing operations. It is important to ensure that safety investments are made wisely.
- The safety infrastructure was originally designed for forward-engineered, long-life facilities, and may not be as compatible with the deactivation and decommissioning objectives that exist at many sites.
- The safety infrastructure may unnecessarily duplicate, or differ with, other federal/ commercial safety standards.
- The "Top to Bottom EM Review" includes a safety management component.

Approach

This review entailed extensive data gathering. The authors interviewed more than 160 DOE and contractor line managers and staff, both at headquarters and in the field. Among those visited were Assistant Secretaries, Field Office Managers, Presidents of prime contractors, Laboratory Directors, and staff personnel. The review included visits to six field locations—Savannah River Site, Oak Ridge, Hanford Site, Brookhaven National Laboratory, Rocky Flats Environmental Technology Site, and United States Enrichment Corporation—and involved personnel from Science, Environmental Management, Nuclear Energy, and the National Nuclear Security Administration. Personnel from Human

Resources, Oversight, and Environment, Safety and Health were also visited. The objectives were to identify issues, discuss these issues with DOE and contractor management, and solicit recommendations for improving performance.

After completing the review, a draft report was distributed for comment in November 2001 and an Executive Safety Conference was held in December 2001. The conference served to reconfirm the Department's commitment to ISM, and acted as a forum to solicit additional input to improving safety management and removing remaining barriers to success. A draft Project Plan (*Project Plan for Safety Management Report and Executive Safety Conference*) was then developed encompassing the recommendations of both the draft report and safety conference. To obtain an outside perspective, the Under Secretary of ESE requested that a peer review be conducted of the overall effort. Dr. Thomas Murley, (former NRC executive) completed the peer review in February 2002 and validated the findings of the safety management efforts.

OVERVIEW

The safety management review identified eight key issues. Four represent opportunities to improve the DOE organizational infrastructure to take greater advantage of safety investments. They include:

- Roles and Responsibilities
- Communications and Organizational Structure
- Planning
- Human Capital

The remaining four focus on opportunities for improving safety-related requirements and their applications to the various ESE missions. They also consider mechanisms for effective feedback on safety performance, and include:

- Applicability of Requirements
- Operating Experience and Reporting
- Corrective Actions
- Closure Sites Legacy

Sections I through VIII of this report provide a summary of each of the key issues, along with recommendations for achieving improvements and additional detailed descriptions. Many of the issues are inter-related, and thus the recommendations should be implemented collectively to achieve marked improvement. Section IX provides a summary of the key objectives of the breakout sessions at the Executive Safety Conference.

I. Roles and Responsibilities

In 1997, the Department identified a need to clarify the roles and responsibilities of its workforce in an effort to improve efficiency and effectiveness in the conduct of DOE staff duties. This resulted in publication of a series of documents called *Functions, Responsibilities, and Authorities Manuals* (FRAMs), which sought to define the activities being performed by DOE employees. The creation of many of these FRAMs entailed a bottom-up approach, in which each entity documented the activities of its own staff. There was little effort to consolidate roles across the DOE complex. As a result, the FRAMs contain significant duplication of activities and responsibilities and provide redundant direction to the staff. This redundancy affects staff at both DOE Headquarters (DOE-HQ) and the DOE Field Offices. Particularly confusing are the safety responsibilities. A large number of staffers interpret their responsibilities as providing direct oversight of work by contractors; consequently, numerous individuals, for example, evaluate a single contractor in the same performance area. Both DOE and contractor

FRAMs used a bottom-up approach and reflected little integration between organizational elements.

Recommendations

- *Revise the FRAM to show single-point clear accountability.*
  - *Use a top-down approach in which the Under Secretary and his direct staff decide how they wish to conduct oversight activities and then align roles and responsibilities of each field and HQ program element and each office reporting to the program elements.*
  - *Establish a clear chain of command in the FRAM and reduce the redundancy of functions and responsibilities across program elements.*
  - *Have a single group evaluate HQ FRAMs for integration among the various program elements, and for integration between the HQ program elements with the field elements.*
  - *Incorporate detailed accountabilities where authorities are delineated.*
- *Establish one acceptable process for delegating authority that has, as a minimum, the following attributes.*
  - *The delegation agreement should clearly describe the authority being delegated, its limitations, applicable guidelines, and expectations and accountability.*
  - *Delegations of authority should only occur between individuals, not to positions.*
  - *Both the individual delegating authority and the recipient of the authority should sign the delegation agreement to note their understanding and acceptance.*
  - *The program office should maintain the file of record for delegations.*
  - *The NRC delegation of authority process and agreement should be used as a template.*

managers identified this as an area where the effectiveness of safety management can be improved throughout DOE, but the problem was most significant at those sites where production has ended and at those facilities undergoing deactivation and decommissioning (D&D). Complicating the issue of roles and responsibilities is the fact that the delegation of authority in the program offices is not clearly documented and understood. Additionally, both managers and staff identified situations where policies were established or interpreted by DOE staff during the conduct of oversight activities instead of those designated in the FRAMs.

DETAILS

DOE documented roles and responsibilities for safety management in a Departmental FRAM and in individual program and field office FRAMs. Many of these FRAMs are stand-alone documents that used a bottom-up approach to validate the ongoing activities of a single organization. In many cases, they reflect little or no integration among the various program and field elements. The resulting redundancies are particularly noticeable in the conduct of oversight activities such as analyzing occurrences, establishing and monitoring performance indicators of the contractors, conducting contractor oversight assessments, and evaluating safety basis documents. In other cases, certain safety management responsibilities are accurately reflected in the FRAMs, such as those responsibilities for setting policies and directing the contractor. However, these responsibilities are being otherwise asserted during the conduct of oversight activities.

The FRAMs also define authority for safety management activities. Historically, Field Offices have exercised approval authority for safety basis documentation and for startups or restarts. Authority for this is often delegated via general memoranda and FRAMs and sometimes even more informally. As a result, managers interviewed noted confusion in the lines of authority and perceived a general uncertainty regarding accountability. They feel that they often have to clear a single action or input with multiple DOE elements.

The updated FRAMs should emphasize integration of roles and responsibilities and clear interfaces among the various program and field elements. Individual roles and responsibilities must align closely with current Departmental and organizational missions, and redundancy and confusion must be reduced. Effective safety management requires that the FRAMs spell out accountability (and thus performance expectations) for each organizational element.

Finally, there is need for a formal, Department-wide process for delegating approval authority. The NRC, for example, uses a process for delegating authority that requires a formal written agreement between the individual delegating authority and the recipient of the authority. The agreement contains several key elements, including the authority being delegated, its limitations, applicable guidelines, and expectations and accountabilities. The NRC delegation process and agreement are recommended as a template for DOE.

II. Communications and Organizational Structure

The organizational structures of the DOE Field Offices vary from site to site. In most cases, the contractor organizations reflect the work being done at the site. At some sites, the DOE has also modified its organizational structure to better align with their work mission. In these cases, both DOE and contractor managers felt that interface communications were open and contributed to effective performance. At sites where the organizational structures were not in alignment, managers felt that interface and communications were ineffective. Both DOE and contractor managers had problems interfacing with DOE-HQ. In many cases, it was unclear where to go to resolve issues or to contribute input.

Where DOE and contractor organizational structures were not in alignment with their missions, managers found communications to be ineffective, thereby impeding performance.

Many of the DOE-HQ elements have Environment, Safety and Health (ES&H) groups that perform oversight and feedback functions. Many of the functions overlap or are redundant. Additionally, not every office has the staff skills appropriate to these functions; consequently, only a management structure is in place.

DETAILS

In those cases where DOE field and contractor organizational structures were not in alignment with their missions, managers found communication to be ineffective, thereby impeding performance. It was often necessary to exchange information with multiple groups and at several levels in the organization. Those same inefficiencies applied to interfaces between DOE field and HQ elements and also among the various HQ elements. DOE

Recommendations

- *Change the organizational structures of the DOE Field Offices to better reflect their missions and streamline interfaces with contractor organizations.*
- *Change the organizational structures of the DOE-HQ program elements to reflect their responsibilities and to streamline the interfaces required between the Field Offices and the various HQ elements.*
- *To consolidate efforts and pool resources, move the major ES&H crosscutting functions of the various HQ program elements to EH as the lead organization.*
  - *Identify those ES&H crosscutting functions that currently reside in the HQ program elements that can be moved to EH as the lead organization; i.e., the major ES&H functions of EM, SC, and NE.*
  - *At a minimum, move the functions related to identification and publication of operating experience and lessons learned, detailed analysis of occurrence reporting, conduct of significant ORRs, special ES&H reviews and accident investigations, and collection of core functional area expertise in ES&H.*

organizations both at HQ and in the field should be restructured to better reflect their missions (and thus roles and responsibilities) and to reduce the number of interfaces involved.

Additionally, various program elements in Headquarters have similar ES&H organizations with redundant responsibilities for safety management. For example, many of the program elements evaluate occurrences for publication of lessons learned, conduct operational readiness reviews (ORRs), provide subject matter experts for requirements interpretation, and establish quality assurance programs, sometimes without the resources necessary to be effective. To improve effectiveness and efficiency, senior management should evaluate these organizations to determine which activities could be centralized with the functions of the Office of Environment, Safety and Health (EH).

The activities related to these recommendations must be closely coordinated with those regarding clarification of roles and responsibilities in the preceding section (I. *Roles and Responsibilities*). It is important that ESE first determine how it wishes to conduct business before reviewing and revising its organizational structures.

III. PLANNING

DOE has a large number of activities that are part of its oversight and review responsibilities. Augmenting DOE oversight are contractor self-assessments and reviews by independent groups, such as safety review boards, consultants, and such external organizations as the Institute of Nuclear Power Operations (INPO). Most of DOE-HQ and the Field Offices plan their oversight and review activities to reflect their own resources and schedules. There is no coordinated intra-office planning for these activities. Several sites have integrated the contractor and DOE field office schedules of activities to eliminate duplication, consolidate activities, and maximize the conduct of contractor work. Yet even these integrated schedules typically fail to reflect DOE-HQ activities. As a result, HQ activities are more likely to impact field work or duplicate in-field efforts. DOE Field Office and contractor managers felt that integrated planning would greatly enhance the efficiency of oversight and other HQ activities and of work in general. Managers also noted that oversight and review activities are often planned and scheduled without explicitly considering evidence of contractor performance already on hand. Sources of such evidence include voluntary protection programs (VPPs), integrated safety management (ISM) activities, and performance indicators.

Assessments are often excessive and redundant, the assessment teams lack focus, and coordination between the various oversight organizations is weak.

DETAILS

Every site visited voiced concern over DOE's oversight and ES&H review of its contractors. Problem areas included document reviews (such as safety analysis reports,

design control documents, certifications, and waivers) and such on-the-ground activities as field assessments. There is particular concern that assessments are often excessive and redundant, assessment teams are often too large and lacking in focus, and coordination between the various oversight organizations is lacking. Managers have a sense that oversight activities do not reflect the reduced and changing risks in the DOE complex. For example, the reduction of the number of DOE high-hazard nuclear facilities means that each remaining facility receives an excessive amount of oversight and evaluation.

Many of the sites visited were recently awarded VPP status or have implemented International Organization for Standardization (ISO) 14001. For example, Brookhaven noted that its implementation of ISO 14001 and its integration into the ISM program have generally improved its environmental programs and workers' attitudes. In the commercial industry, these programs are typically leveraged by such outside agencies as the Occupational Safety and Health Administration (OSHA) and the Environmental Protection Agency (EPA), to reduce the amount of oversight necessary. Similarly, the NRC determines the level of oversight needed for licensees by using performance indicators and an assessment of events that entail risk. Requirements for oversight vary, and there is a need to determine the appropriate level for each activity and to make use of all available resources. Managers

RECOMMENDATIONS

- *Use an integrated planning process that coordinates and schedules the oversight and other review activities in the field and in HQ on one schedule.*
  - *Schedule the oversight and review activities of the contractor, DOE Field Office, and HQ program elements, as well as routine audits conducted by the Office of the Inspector General, on an integrated plan.*
  - *These activities should contain as a minimum, assessments, reviews, authorization basis review and approvals, and ORRs.*
  - *Include resources expected for each scheduled activity.*
  - *Consolidate these activities, collaborate on results, and use parallel review paths where possible.*
  - *Require Field Offices to keep the integrated schedule current and manage proposed changes.*
- *Use a measure of contractor performance to determine the level of oversight and review needed for contractors and DOE field work.*
  - *Draw on performance measures to determine and vary the level of oversight and ES&H review needed for contractor and field activity.*
  - *At a minimum, use the effectiveness of self-assessment programs, results of VPP, ISM, and ISO 14001, effectiveness of corrective actions, and assessment of events that entail risk to determine needed reviews.*
  - *Adopt methods that other agencies such as EPA, NRC, and OSHA use in leveraging programs to vary or reduce their oversight activities.*
  - *Consider the type and level of risks of facilities or activities (i.e., radiological versus industrial) and past performance when planning oversight and other ES&H activities.*

pointed out several performance indicators that are available to evaluators, including self-assessments, ISM programs, and special certifications achieved by the contractor that can be used in determining where DOE resources should be expended. By bringing all oversight and other HQ activities under an integrated planning process, DOE can apply resources where they are needed.

An objective of integrated planning should be to make review activities of the contractor, the DOE Field Office, DOE-HQ elements, and other outside organizations visible to each other. Each entity should know what has already been evaluated and what is planned for evaluation. Each should be able to collaborate and share information efficiently. These efforts should have a positive impact on the conduct of work, and redundancies should be eliminated early in the planning process.

Finally, oversight and review activities should be sensitive to the risks specific to the activity or facility being evaluated. For example, many managers were concerned that the risk of radiological exposures continued to be DOE's major focus for activities when industrial safety risks are increasing.

IV. Human Capital

In recent years, there have been significant changes in the levels and types of activities conducted by the DOE workforce. The number of operating production facilities has decreased, while activities involving deactivation and decommissioning of facilities have increased. Within several years, closure and restoration activities should be completed at a number of sites. To accommodate the changing workload, the Department has reduced its workforce, mainly through attrition. Continuing retirements will further reduce the workforce. This presents a fluid situation that many contractors and DOE managers see as an opportunity to improve the efficiency and effectiveness of safety management. Retirements of managers in DOE-HQ make it possible to promote field-experienced managers to policy-setting HQ positions. In addition, early- and mid-career employees currently located at closure sites can be relocated to other sites scheduled for closure, bringing with them their unique field experience. Several managers identified a need to address imbalances in locations where the rate of workforce attrition has been lower than that of workload reduction. Managers also identified a need to upgrade certain technical skills, such as nuclear criticality safety and industrial hygiene.

The analysis found that forty percent of Headquarters' staff and thirty percent of the total DOE staff would likely retire by 2007.

DETAILS

The Office of the Secretary has prepared a short-term Human Capital Improvement Plan. This plan is a tool for implementing the Secretary's vision of making the Department the best in the federal government. The Department has also completed a five-year

RECOMMENDATIONS

- *Through the Federal Technical Capability Panel, determine the results obtained by each office in addressing shortages of nuclear criticality safety resources.*
  - *Establish a nuclear criticality safety resource center in EH to develop expertise to be used throughout the DOE complex.*
  - *Sponsor "Q" clearances for top nuclear criticality safety contractor personnel.*
- *Increase the weight given to field experience in rating candidates for management positions in DOE-HQ offices.*
  - *Double the weight given field experience when rating candidates for management positions in DOE-HQ so that field experience becomes one of the dominant factors.*
- *Inform early- and mid-career employees located at closure sites of career opportunities at other DOE closure sites.*
  - *Determine career opportunities that may be available over the next several years at other sites that may benefit from closure site field-experienced employees.*
  - *As a minimum, notify each closure site interested employee within DOE of these opportunities.*
  - *As soon as possible, HQ should facilitate agreements between the sites for employee future career path; use Rocky Flats efforts in this area as a starting point.*

workforce restructuring plan that was submitted to the Office of Management and Budget in September of this year. This plan provided input to a workforce analysis initiated at the Human Capital Summit held in July of this year. The analysis found that forty percent of Headquarters' staff and thirty percent of the total DOE staff would likely retire by 2007. It also found that only six percent of the total DOE technical workforce is less than 35 years of age.

The implementation plan for Defense Nuclear Facilities Safety Board Recommendation 93-3, *Improving DOE Technical Capability in Defense Nuclear Facilities Programs*, requires each DOE senior line manager to: 1) conduct a workforce analysis of their organization, 2) develop a staffing plan that identifies critical technical capabilities and positions that are essential to safe operations at defense nuclear facilities, and 3) prepare an Annual Report to the Secretary. To implement these recommendations, DOE established the Federal Technical Capability Panel. On July 31, 2001, the Panel submitted its latest annual report to the Secretary. This report identified shortages of nuclear criticality safety skills throughout the defense nuclear complex and spelled out procedures for addressing these shortages. Actions proposed or already taken involve recruitment, training, and qualifications. Some of the recruitments are from DOE positions outside the defense nuclear facilities complex. The Panel's report also anticipated shortages of nuclear criticality safety and industrial hygiene skills at the non-defense facilities. Despite all the actions taken, there still exists a shortage of nuclear

Many viewed the shortage of field experience at HQ as a problem in resolving work-related issues.

criticality safety skills throughout the Department. Additionally, contractors who previously assisted with the workload in nuclear criticality safety are no longer available due to government efforts to reduce security clearances.

Interviews with DOE staff at closure sites revealed that actions are already being taken to retain critical skills until site closure is complete. Late-career employees seemed inclined to avail themselves of government retirement benefits upon closure. Early and mid-career employees were aware of actions taken by the facility's management to transfer them to other federal agencies and, in some cases, to other DOE sites. These employees were not aware of job opportunities at DOE closure sites where their experience could best be utilized.

Both DOE and contractor managers also felt that DOE-HQ managers needed to have field experience. Many viewed the shortage of such experience at HQ as a problem in resolving work-related issues. The changes in the types of work that needs to be done in the field require HQ guidance and resolution of variances with existing DOE procedures. This has not always been forthcoming, specifically in the areas of preventive maintenance of equipment scheduled for removal, training requirements for staff at facilities being decommissioned, and updates of hazard analyses.

V. Applicability of Requirements

The Department uses directives and regulations to define performance requirements. These requirements tend to reflect DOE's production mission, and are not always consistent with the broad DOE missions of environmental management that apply to waste storage and management, waste transportation, surveillance and maintenance, and closure. Managers from both DOE and contractor organizations involved in these environmental management activities found themselves devoting resources to requirements that, in their view, had little or no safety application for their particular work activities. This was especially notable among organizations that are on an accelerated D&D or closure schedule. Although the Department has a formal process for requesting exemptions to specific requirements, this process is seen as inefficient, particularly for activities to be completed in a short time frame.

There was also hesitation among managers to request exemptions to requirements because they expected either a less than timely response or a refusal.

DETAILS

Managers consistently cited implementation of requirements as an area where efficiency and effectiveness can be greatly improved. Specifically cited were the implementation of the authorization basis requirements of 10 CFR 830, *Nuclear Safety Management*, requirements for preventive maintenance at short-lived facilities, multiple reporting requirements, and the perceived inability to apply graded approaches or to receive appropriate and timely exemptions and waivers. Managers believe that the authorization basis requirements of 10 CFR 830 are incompatible with some environmental management

RECOMMENDATIONS

- *Revise directives and guidance documents so that they are applicable to the various broad missions of environmental management, research, construction, and other nondefense-related activities.*
  - *Group the directives and guidance documents in terms of their impact on safety and work efficiency (high, medium, low).*
  - *Create small groups of personnel to review the directives and their guidance documents; ensure that the group has a reasonable cross section of stakeholders (i.e., personnel with direct responsibility from the field, each applicable HQ program element, directive owner, core experts).*
  - *Based on priority, review directives for their applicability, usability, and effectiveness to the various activities in the field.*
  - *Solicit early input from a select group of contractor and DOE field users, and solicit comments on revised directives from contractors and Field Offices.*
  - *Document resolution of comments for distribution.*
- *Provide clarification where applicability of requirements is questionable.*
  - *Create a requirements interpretation process that is published and shared with the rest of the complex.*
  - *Set and meet schedules for responding to requests on applicability of requirements.*
  - *Identify opportunities where the graded approach is effectively used and share with the complex.*
  - *Develop guidance documents or acceptable interpretations of requirements for broad missions; e.g., authorization basis for waste storage on concrete pads or preventive maintenance at short-lived facilities.*
- *Improve the efficiency of the exemption/waiver processes and communicate requested and approved exemptions/waivers throughout the greater DOE complex.*
  - *Prioritize evaluation of exemptions/waivers based on need; ensure appropriate resources exist to meet needed time frames.*
  - *Set target turnaround times for exemption/waiver determinations and measure effectiveness in meeting schedules; consider using project scheduling to anticipate needs and monitor the status of determinations to their completion.*
  - *Communicate requested exemptions/waivers, as well as approved and disapproved requests to the DOE complex for efficiency.*
- *Use national standards (such as ANSI, ASME, IEEE, etc.) unless there is a clear reason for generating new requirements.*

activities, and will result in voluminous documents that will prove both costly and ineffective. There were also concerns about overly conservative authorization basis documents for activities under the mission of the Offices of Environmental Management (EM) and Science and about the resources required to develop these documents at short-lived facilities. Projects were cited where the authorization basis document was not scheduled for completion until after the facility was to be torn down.

There was a strong feeling that all relevant requirements, along with their guidance documents, should be evaluated against the various DOE missions, with considerable field input from both DOE and the contractor personnel. DOE can realize additional efficiencies by acting as a clearinghouse for sharing effective programs and documents among sites with similar activities. As an example of what can be done, DOE Rocky Flats has shared its authorization basis documents for D&D with the Richland Operations Office to enhance efficiency. DOE should also consider developing standard authorization basis or guidance documents that would address each of the various broad missions across the complex. These standard documents should take advantage of staff experience and the already-approved authorization basis documents for specific activities.

DOE permits a graded approach to many of the requirements in rules and directives. However, both contractors and DOE managers found the actual implementation of the graded approach process unclear. There was also hesitation among managers to request exemptions to requirements because they expected either a less than timely response or a refusal. The perception is that DOE-HQ is fundamentally resistant to granting exemptions. There was strong support for a review of both the graded approach and the exemption/ waiver process to examine, among other things, how well each is communicated and understood. Such a review should also explore the need for an integrated project planning process to prioritize and guide the reviews of waiver and exemption requests. In both cases, DOE should establish a feedback mechanism in which requested and dispositioned exemptions/waivers, as well as successful graded approaches, are communicated throughout the complex, making the benefits of these efforts accessible to all.

Managers also pointed out the inefficiencies involved in DOE developing safety standards where national or international standards are sufficient or can be supplemented. These include standards developed by organizations such as ANSI, ASME, IEEE, and NIH. The Department should adopt a process that utilizes national standards unless there is a clear reason for generating new requirements.

VI. Operating Experience and Reporting

The Department has several mechanisms for obtaining information from the field through formal reporting requirements. Currently, the Occurrence Reporting and Processing System (ORPS) reports on problems that occur while conducting field activities. This information is available through a database accessible to all contractor and DOE employees with a need to know. Several DOE-HQ organizations review the information in ORPS and distribute reports describing operating experience throughout the complex. In the past, resource priorities and organizational changes have interfered with the full exploitation of operating experience. Managers expressed a desire to have consistent feedback on operating experience from other facilities in the complex. Also, there have been no recent reviews or updates of reporting requirements for ORPS. Both DOE and contractor managers expressed frustrations with what, in their views, are outdated reporting requirements.

The Department is a member of the Institute of Nuclear Power Operations (INPO). This gives DOE access to information on operational safety practices gathered from industry experience. DOE's current INPO membership contract expires in April 2002.

RECOMMENDATIONS

- *Revise existing occurrence reporting requirements to eliminate nuisance reporting.*
  - *Determine the expectations of the occurrence reporting system; i.e., input to performance indicators, indication of incidents, operating experience and feedback, trending and data analysis, performance improvement, Price Anderson, etc.*
  - *Revise occurrence reporting categories and data fields to also align with cleanup and science missions and expectations.*
  - *Change reporting thresholds to eliminate nuisance reporting; i.e., minor skin contamination, vehicles failing inspections and not removed from service, and defective items not posing substantial safety hazards.*
  - *Involve field personnel (such as facility representatives) early in the review and revision process.*
- *Make a concerted effort to consolidate some of the various reporting systems.*
- *Integrate into one group in EH the coordination of data from operating experience, analysis of operating trends, and the INPO interface.*
  - *Implement one effective, complex-wide operating experience and performance trending program in EH.*
  - *At a minimum, use INPO's operating experience program as a guide.*
  - *Perform data analysis and trending of occurrence reporting to share with the complex.*
  - *Solicit stakeholder input and conduct effectiveness reviews of activities and products.*
  - *Move the responsibility for INPO interface to the same group responsible for coordinating operating experience and data analysis.*
- *Renew the INPO membership.*

DETAILS

REPORTING REQUIREMENTS AND SYSTEMS

The occurrence reporting requirements were last updated in 1997. At that time, some of the most significant changes involved 1) making defective items and materials reportable and 2) lowering the reporting threshold to include events such as those related to performance degradation and personnel exposures to hazardous substances. In a number of cases, occurrence reporting thresholds may be much lower than those of the commercial industry. Managers and facility representatives also stated that, in many cases, the current reporting requirements are not compatible with recent cleanup and science missions, while minor and expected conditions are often unnecessarily reported. An example is the required reporting of equipment intentionally operated to failure conditions at D&D facilities. The result is an overpopulation of ORPS with data of questionable value. This can frustrate

facility representatives and others who query ORPS for operating experience information. Also frustrating are the requirements to maintain performance data in a variety of independent reporting systems, including ORPS, the Noncompliance Tracking System (NTS), the Computerized Accident/Incident Reporting System (CAIRS), and the Radiation Exposure Module (REM).

A review and revision of existing reporting requirements would reduce the collection of inadequate and less significant data. A top-down approach would enable senior management to communicate what it expects the DOE reporting systems to accomplish before revisions are made. For example, managers have indicated a desire to use reporting systems for trending and data analyses, as input to performance indicators, as a means for developing lessons learned, and as a way to provide information on performance in the field. A top-down approach would bring reporting categories, data fields, and meaningful thresholds in line with the actual missions of the DOE. It is also important that revisions to reporting requirements and systems involve significant efforts to capture, resolve, and integrate field input for improving the system. The Department should also make a concerted effort to consolidate some of its different reporting systems.

As an immediate action, the occurrence reporting requirements should be revised or clarified to reduce nuisance reporting, over-reporting, and under-reporting. This would help restore the current low level of confidence in the system.

Operating Experience

Managers consistently expressed a need for a complex-wide operating experience program in which feedback on significant occurrences, corrective actions, and lessons learned can be shared. EH previously distributed operating experience reports, safety notices, and special reports (all of which appeared to have been popular among the managers interviewed), but the program was discontinued following organizational changes. Some of this program is re-emerging through various program elements, and EH is now writing and distributing biweekly reports. Special-issue reports with more detailed feedback tools are under consideration. Managers interviewed also expressed a desire to have HQ perform more data analysis and trending of occurrences as part of a centralized operating experience program.

DOE-HQ has also set up a Society for Effective Lessons Learned Sharing (SELLS). This is an informal, voluntary program that encourages all personnel working within the DOE complex to input lessons learned for sharing throughout the complex. SELLS is governed by an executive committee comprised of federal and contractor personnel. As an example of Field Office efforts in lessons learned, Rocky Flats recently completed a joint on-site safety assessment on electrical safety practices, in which DOE, Kaiser Hill, and the United Steel Workers of America participated. This evaluation provided significant insights into good practices, improvement opportunities, trends, and lessons learned in electrical safety. It also had the benefit of establishing stronger relationships between the three parties in developing better worker protection programs. Rocky Flats managers cited the ensuing report as an example of the type of information and analysis they desire from the central organization, data that could be of value throughout the complex.

To improve safety performance, DOE should implement a strong, centralized operating experience program that communicates complex-wide performance issues and successes. The nuclear power industry, through INPO, has realized the value of nationwide (and worldwide) communications of commercial industry experience. The nuclear power industry's operating experience communications evolved, in part, from analyses of specific events at Three Mile Island and Chernobyl, where the need for a systematic means of sharing operating experience between plants became evident. Since inception, INPO's operating experience program has helped the power industry reduce recurring events, improve plant safety cultures, and enhance system reliability. Many of the commercial industry tools, particularly those at INPO, can be adapted for DOE use. However, it is important that DOE follow a deliberate process in evolving operating experience tools such that they align with missions, satisfy the over-arching strategy, and involve feedback from stakeholders.

INPO also offers strong self-assessment knowledge and experience. The Department should draw on INPO's wealth of experience to strengthen its own self-assessment programs and to streamline and refocus oversight assessments. Notably, the Westinghouse Savannah River Company reported that their interface with INPO has resulted in improved safety performance. They have involved INPO in assistance visits for their self-assessment and corrective action programs and radiation protection program. They have also sent personnel to various INPO training courses.

VII. CORRECTIVE ACTIONS

DOE Order 414.1A, *Quality Assurance*, requires DOE line managers to develop and implement a Corrective Action Plan (CAP) that describes the actions that will be taken to correct safety and health problems. The program office reviews and approves the CAP. Follow-up is often conducted by the organization that identified the findings to verify the completion of each corrective action in the CAP. A report of completion status goes to key managers in the Department. Although completing proposed corrective actions is necessary to resolve issues, they do not by themselves ensure that the problem is solved. Several managers identified effectiveness of corrective actions as an area of opportunity. These managers suggested the conduct of effectiveness reviews to augment current procedures. Such reviews would provide additional assurance that items in the CAP were addressed successfully and that behaviors were established to emphasize effective resolution of issues rather than simple completion of the actions in the CAP.

DETAILS

Both DOE and contractor managers felt that compliance-oriented reviews foster a climate in which both DOE and the contractors focus more on compliance than on effectiveness. The nuclear power industry and the NRC both

RECOMMENDATIONS

- *Supplement or replace current reviews of corrective action completion with effectiveness reviews.*
  - *To reinforce improved performance, perform reviews of the effectiveness of corrective actions in resolving issues.*
  - *Check completion of individual corrective actions on a sample basis.*

recognized the value of effectiveness reviews when some plants' performances failed to improve even when corrective actions were verified as complete. Although more challenging to conduct, effectiveness reviews yielded improved performance. For example, since coming under NRC regulation, the United States Enrichment Corporation instituted "End Point Assessments" to better gauge effectiveness of its corrective actions. These assessments are conducted four to six months after completion of CAPs, and use metrics to determine effectiveness. Similarly, one of the goals of the enforcement process set forth in the Price-Anderson Amendments Act is to encourage prompt identification of problems and the completion of effective corrective actions to prevent recurrence. Price Anderson reinforces the effectiveness of corrective actions by providing a mechanism for adjusting civil penalties.

VIII. CLOSURE SITES LEGACY

Several DOE sites are in the process of deactivation and decommissioning. Within several years, closure and restoration activities should be completed at a number of sites. Activities at these sites have required the use of unique initiatives for the performance of this work. In many cases, the DOE infrastructure of orders, policies, and procedures is not appropriate to these efforts, and it was necessary to implement new approaches and work techniques to get the work done. It is important to preserve the legacies of these first efforts at closure.

DETAILS

The closure sites now engaged in accelerated cleanup and dismantling face unique challenges. On one hand, the hazards at the sites, particularly those of an electrical or chemical nature, are often unpredictable due to a historical lack of configuration management. This requires a process of intrusive investigations and feedback, and cleanup must progress in a very deliberate and cautious manner. On the other hand, as the work progresses and the risks at some of the facilities lessen, safety standards and controls can appear overly conservative, to the point that they can undermine safety attitudes or mask industrial hazards.

Because the accelerated closure sites must also meet aggressive cleanup schedules and budgets, they must find ways to balance safety management with limited resources and short schedules. Effective project planning that integrates safety concerns becomes even more critical. Site management must be able to find the right balance in:

- Using more time-intensive quantitative methods to define risks versus making conservative assumptions that may limit efficiencies in the conduct of work
- Using greater numbers of passive safety features versus investing in active features
- Developing detailed and prescriptive work packages versus the need for flexibility as the work progresses and its scope changes

- Spending resources to generate a safety basis for changing conditions versus maintaining overly conservative assumptions

- Maintaining conservative criticality controls versus investing in in-process assay capabilities

The accelerated sites must also establish effective logistics programs so that waste package certifications, shipping containers, and shipping vehicles are available as scheduled.

RECOMMENDATIONS

- *Allocate resources to closure sites to capture their experience in using new approaches to accomplish safe and efficient results.*
  - *Find means to preserve the legacy of cleanup efforts in accelerated cleanup.*
  - *At a minimum, use tools such as digital video discs and compact discs to capture knowledge and experience gained at these sites.*

Meeting these challenges will entail innovation as the complex moves forward in its overall cleanup mission. The knowledge and experience gained at each site would be invaluable at the next. However, much of the knowledge now being gained is resident in the managers and workers on-the-ground, and will not be available to future cleanup programs unless an investment is made now to capture it. The Department should use technology tools such as digital video discs and compact discs to document the legacies of these closure activities.

IX. SUMMARY OF EXECUTIVE SAFETY CONFERENCE

The Executive Safety Conference, "*Taking Integrated Safety Management (ISM) to the Next Level*," held on December 11 and 12, 2001, involved senior DOE and contractor management and DNFSB attendees. The objectives of the conference were to reaffirm the Department's commitment to safety management; learn from outside organizations, such as the nuclear power industry, NRC, DNFSB and the US Navy; and identify and remove the remaining barriers to effective safety management. Using the initial input from the safety management review as a catalyst, the conference included breakout sessions to address specific action items to move the recommendations forward. The four sessions included:

- Session 1 – Coordination and Integration of DOE Line and Independent Oversight and Contractor Self-Assessment

- Session 2 – Tailoring Requirements, Standards, and Authorization Bases to Changing DOE Missions and Hazards to Facilitate Innovative Cleanup Approaches and Operational Efficiency, Reduce Time at Risk, and Assure Protection of Our Workers

- Session 3 – Improving the Contribution of Operating Experience, Performance Monitoring and Analysis, and Lessons Learned to Integrated Safety Management (Feedback for Improvement)

- Session 4 – Improving the Contribution of Contracts to the Effective Implementation

of Integrated Safety Management

Each of the sessions had participants from DOE field and headquarters as well as prime contractors. The sessions acknowledged the barriers presented in this report, identified additional barriers, and developed specific action items for DOE and contractor implementation. Many of the action items are subsets to the recommendations of this report, with the exception of those resulting from the efforts of Session 4 on contract improvements. Session 4's contract-related barriers were not within the scope of this report, yet are important aspects to achieving efficiency and effectiveness in safety management. A summary of the outcomes, action items and participants for the four Executive Safety Conference sessions are available on the DOE ISM website (http://tis.eh.doe.gov/ism).

Acronyms

Computerized Accident/Incident Reporting System ..... CAIRS

Corrective Action Plan ..... CAP

Deactivation and decommissioning ..... D&D

U. S. Department of Energy ..... DOE

Office of Environment, Safety and Health ..... EH

Office of Environmental Management ..... EM

Environmental Protection Agency ..... EPA

Environment, Safety and Health ..... ES&H

Office of Energy, Science, and the Environment ..... ESE

Functions, Responsibilities, and Authorities Manual ..... FRAM

Headquarters ..... HQ

Office of the Inspector General ..... IG

Institute for Nuclear Power Operations ..... INPO

Integrated Safety Management ..... ISM

International Organization for Standardization ..... ISO

National Nuclear Security Administration ..... NNSA

U.S. Nuclear Regulatory Commission ..... NRC

Noncompliance Tracking System ..... NTS

Occurrence Reporting and Processing System ..... ORPS

Operational Readiness Review ..... ORR

Occupational Safety and Health Administration ..... OSHA

Radiation Exposure Module ..... REM

Society for Effective Lessons Learned Sharing ..... SELLS

Voluntary Protection Program ..... VPP