Office of Independent Environment, Safety, and Health Oversight
Environment, Safety and Health

Focused Safety Management Evaluation of the

Idaho National Engineering and Environmental Laboratory

January 2001

ISM

IntegratedSafety Management

Table of Contents

Abbreviations Used in This Report

AAAHC	Accreditation Association for Ambulatory Health Care
ALARA	As Low As Reasonably Achievable
ATR	Advanced Test Reactor
BBWI	Bechtel B&W Idaho
BWXT	BWX Technologies
CARB	Corrective Action Review Board
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CO_2	Carbon Dioxide
D&D	Decontamination and Decommissioning
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
DO IT	Define, Observe, Integrate, and Test
DSC	Dry Storage Container

Continued on inside back cover.

OVERSIGHT

Executive Summary

EVALUATION:	Office of Oversight Focused Safety Management Evaluation
SITE:	Idaho National Engineering and Environmental Laboratory
DATES:	September-December 2000

Scope

The Department of Energy (DOE) Office of Independent Environment, Safety, and Health Oversight, within the Office of Environment, Safety and Health, evaluated the integrated safety management (ISM) program at the Idaho National Engineering Laboratory (INEEL) as implemented by the responsible management elements of DOE Headquarters Office of Environmental Management (EM); the DOE Idaho Operations Office (ID); the prime contractor, Bechtel B&W Idaho (BBWI); and selected subcontractors. This focused safety management evaluation is the first to be conducted at a DOE site that has declared ISM to be fully implemented. It focused on four elements: (1) the adequacy of the ISM systems; (2) the effectiveness of essential systems, including fire protection systems; (3) corrective actions taken to address judgments of need identified by the investigation of the 1998 accident involving a carbon dioxide discharge that caused one fatality and multiple serious injuries; and (4) review of the INEEL occupational medicine program against nationally recognized standards for ambulatory health care.

Results

Safety management at INEEL has significantly improved since the 1998 accident. Site management is committed to ISM and has provided the necessary leadership to implement a comprehensive ISM system at INEEL. INEEL management demonstrates leadership by direct involvement in site safety, including participation on safety committees and increased presence at the site. The workforce and the unions have also demonstrated a strong commitment to safety and procedural compliance.

The EM program office is actively involved in defining environment, safety, and health (ES&H) priorities and resources for the site. EM has established new guidance to emphasize safety and health and has maintained an appropriate level of awareness and involvement with regard to safety at the INEEL.

Over the past two years, ID leadership has been instrumental in ensuring that ISM was given a high priority and sustaining progress through the transition of the site contractor in 1999. Under the leadership of the Operations Office Manager, ID is actively involved in safety and interfacing with the workforce, and has enhanced training for the ID staff. In addition to providing direction and incentives for contractors to implement ISM, ID has focused on implementing ISM in its own organization.

While ID has made major improvements, some further opportunities remain. These include the need for formal processes for translating requirements into procedures and contractual requirements, timely reviews of authorization basis documents, and consistent implementation of performance feedback and continuous improvement systems.

BBWI has established a comprehensive and well documented ISM program at INEEL. The efforts to establish a standards-based "safety culture" to support ISM implementation have been extensive and generally successful. Policy is adequately defined and communicated. Roles, responsibilities, and authorities are generally well defined and understood. Staffing levels and qualifications are generally commensurate with safety responsibilities. Management has devoted significant resources to ES&H programs and emphasized that safety is a high priority. The INEEL occupational medicine program meets DOE requirements, and several aspects of the program are particularly effective, such as automated record retention systems. Some aspects of the BBWI approach at INEEL are noteworthy,

including several mechanisms for promoting worker involvement and ensuring line management involvement in safety management at the facilities (see Table ES-1).

Corrective actions for most of the judgments of need from the 1998 carbon dioxide accident and legacy issues have been effectively implemented. However, corrective actions have not been effectively implemented in a few cases.

As part of the focused safety management evaluation, Oversight conducted a functional review of selected essential systems, including the fire protection system at the Idaho Nuclear Technology and Engineering Center (INTEC) and other essential equipment such as diesel generators. Essential systems are considered to be those that are important to the safety of the public or the workers, or to protection of the environment. These functional reviews included a detailed walkdown and review of engineering documents, operations, maintenance, and testing records to determine whether engineered systems can reliably perform their required safety-related functions. With few exceptions, the review concluded that the systems were adequately maintained and could perform their intended functions. However, the review of essential safety systems identified two safety issues related to the authorization basis. One of these safety issues involved deficiencies in the unreviewed safety question process and its implementation. The other involved inconsistencies between the facility conditions and the approved authorization basis at the Remote Analytical Laboratory, where the equipment configuration differed from that described in the authorization basis. Deficiencies were also noted in system drawings and valve labeling. Deficiencies in work scopes and hazard controls led to an error that placed a new fire protection system in service for two weeks without the knowledge of responsible facility personnel.

Another safety issue was identified in the work planning and control processes. Weaknesses were evident in the control of construction work performed by subcontractors, and to a lesser extent in certain BBWI research areas and maintenance activities. Subcontractor safety management performance and the flowdown of ISM constitute a problem at INEEL that has not yet been fully resolved. While significant progress has been made and efforts are ongoing, INEEL continues to experience events and near misses that indicate a need for continued attention and improvement in definition of work, analysis of hazards, and establishment of controls.

An additional safety issue addressed a longstanding noncompliance with DOE environmental requirements involving the discharge of INTEC service water system into a percolation pond, allowing contamination from previous discharges to be spread through the groundwater. Plans to discharge to a new percolation pond currently under construction should be thoroughly reviewed to ensure that all potential sources of radiological contamination are known and that risks are understood.

Conclusions

Significant improvement in safety management has been achieved at INEEL. ID and BBWI management have provided the leadership necessary to realize significant improvement in safety and the understanding, acceptance, and implementation of ISM. In general, senior management has a good appreciation of the remaining needs, and has ongoing or planned programs designed to further enhance safety management. However, continued attention is needed to address four safety issues (see Table ES-2) and ensure consistent implementation of work planning and feedback and improvement mechanisms. Particular attention is needed on the control of work performed by subcontractors and the application of the core functions of ISM.

Table ES-1. Noteworthy Practices

Noteworthy practices are particularly effective or innovative activities or programs that enhance safety. Other DOE sites obtain information about noteworthy practices and consider adapting them to their facilities. Several aspects of INEEL management and worker involvement are noteworthy practices:

- The worker applied safety program (WASP), where workers observe other workers' activities and provide them with feedback for improvements, and various other programs are in place to promote worker involvement in ISM
- Union Safety Summits, which bring ID, BBWI, and union workers together to address safety issues in the context of ISM
- The facility excellence program, which ensures direct management involvement in promoting a better understanding of ISM and achieving the necessary cultural and behavioral changes

Table ES-2. Safety Issues

DOE Order 414.1A, *Quality Assurance*, establishes a process for addressing and tracking safety issues identified by independent oversight evaluations. EM, as the lead program secretarial office, is required to develop a corrective action plan to address the safety issues identified during this Office of Oversight focused safety management evaluation.

- INEEL has not complied with the provisions of DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, relating to phasing out existing soil column discharges. In addition, INEEL does not have a defensible technical basis for a new percolation pond, which could create a new contaminated soil column.

- BBWI and construction subcontractor work planning processes and organizational interfaces have not always been effective in ensuring that all work is adequately defined, that all hazards are identified, and that necessary controls are specified before work documents are issued, as required by DOE Policy 450.4, *Safety Management System*.

- ID and BBWI have not ensured that the process for performing unreviewed safety question determinations meets the requirements and standards of DOE Order 5480.21, *Unreviewed Safety Questions*, with respect to screening criteria and guidance for documenting safety evaluations. BBWI has not consistently implemented the unreviewed safety question process, thereby compromising the authorization bases for nuclear and applicable non-nuclear facilities as stipulated by procedure MCP-123, *Unreviewed Safety Questions*.

- BBWI has not maintained configuration control of the essential systems at the INEEL Remote Analytical Laboratory consistent with the provisions of DOE-approved authorization bases as required by DOE Order 5480.23, *Safety Analysis Reports*.

1.0 Introduction

The U.S. Department of Energy (DOE), Office of Independent Environment, Safety, and Health Oversight, within the Office of Environment, Safety and Health, conducted a focused safety management evaluation at the Idaho National Engineering and Environmental Laboratory (INEEL) during September-December 2000. The purposes of the evaluation were to determine how effectively DOE and contractor line management have implemented integrated safety management (ISM) at INEEL and to assess the effectiveness of corrective actions taken in response to the 1998 carbon dioxide (CO_2) accident.

The Idaho Operations Office (ID) is the DOE office with operational responsibility for the Idaho National Engineering and Environmental Laboratory (INEEL).

The DOE Office of Environmental Management (EM) is the lead program secretarial office for INEEL and provides programmatic direction and funding for site cleanup, facility infrastructure, decontamination and decommissioning activities, and waste management functions. The DOE Office of Nuclear Energy and the Office of Naval Reactors also provide funding and programmatic direction for INEEL activities, such as reactor operations. INEEL receives operational direction from DOE's Idaho Operations Office (ID), which is the DOE office with operational responsibility for INEEL.

The management and operating contractor for INEEL is Bechtel BWXT Idaho, LLC (BBWI), which is a partnership between Bechtel National Incorporated, BWX Technologies (BWXT), and Inland Northwest Research Alliance (INRA). The BBWI team assumed responsibility for operating INEEL on October 1, 1999, and is responsible for site operations, maintenance of site infrastructure, site cleanup, environmental restoration, and decontamination and decommissioning (D&D) of facilities.

The Office of Oversight evaluated INEEL's implementation of DOE's ISM policy, which was declared to be complete in July 2000.

A focused safety management evaluation encompasses the organizations responsible for

TERMINOLOGY

Line management refers to those individuals in the chain of command that extends from the Secretary of Energy through the Deputy Secretary or Under Secretary to the program secretarial officer, DOE field office manager, and contractors who are organizationally and contractually responsible for work or job tasks (see Figure 1).

Safety management refers to those programs that ensure an acceptable level of protection of the public, workers, and environment is maintained throughout the life of a facility or operation. The term "safety," when used in the context of safety management program, specifically includes all aspects of environment, safety, and health (ES&H).

Integrated safety management system refers to a comprehensive and coordinated program of ES&H expectations and activities. DOE Policy 450.*4, Safety Management Syste*m, defines six components of an integrated safety management system: 1) the objective, 2) guiding principles, 3) core functions, 4) mechanisms, 5) responsibilities, and 6) implementation. These components (see Figure 2) provide the framework for the Office of Oversight's evaluation of safety management programs.

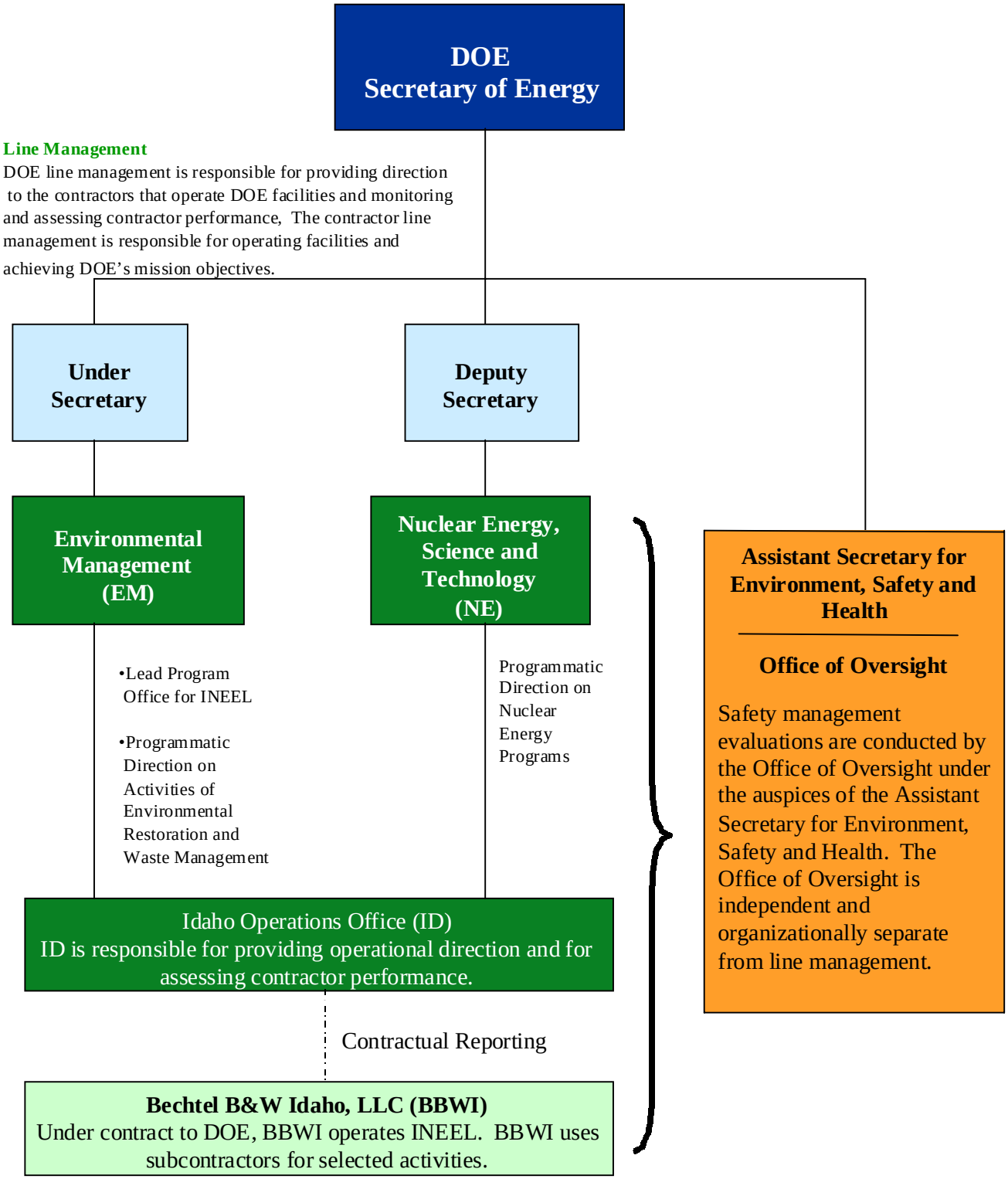


Figure 1. Organizations with Responsibilities at Idaho National Engineering and Environmental Laboratory

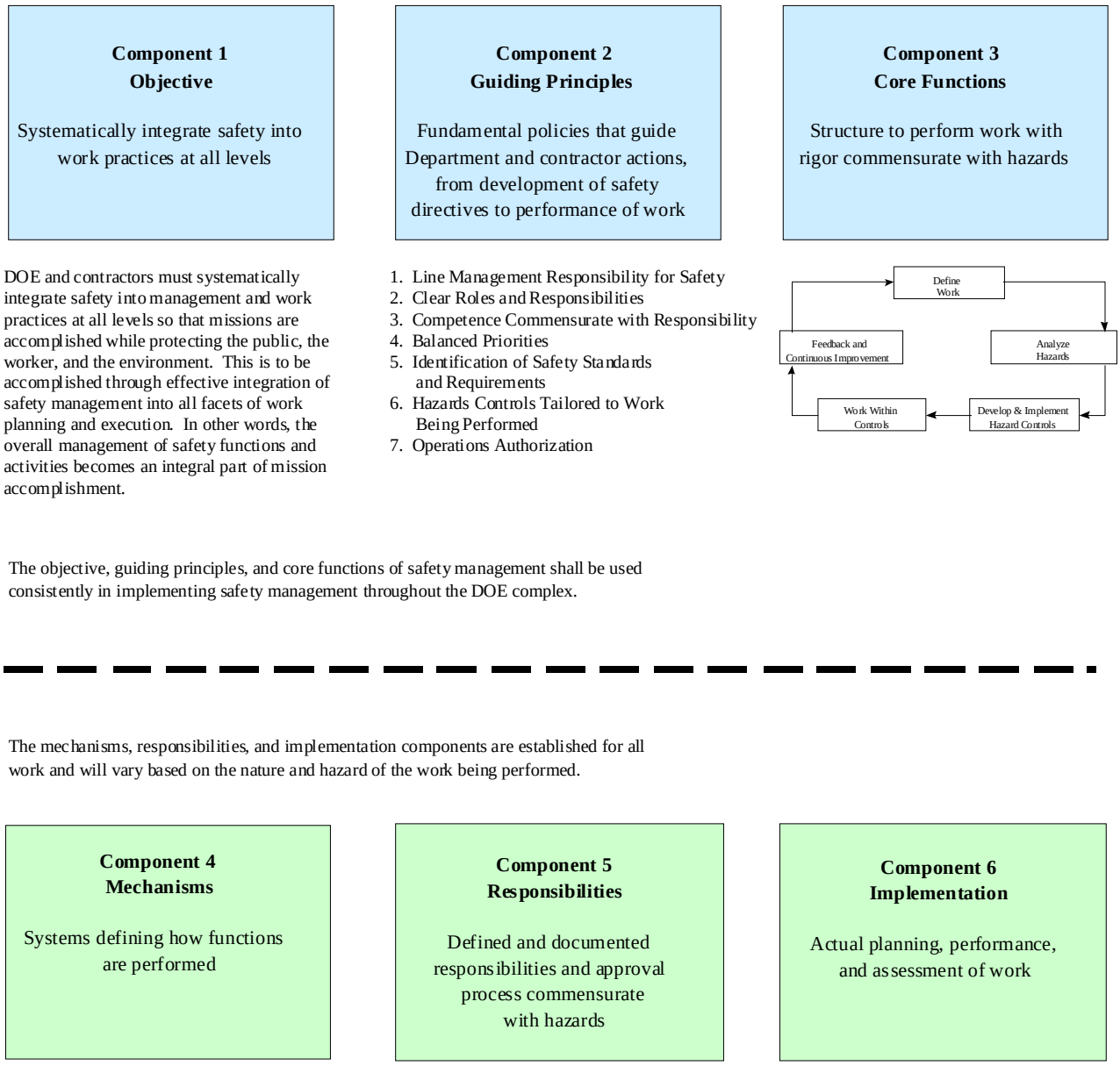


Figure 2. Components of DOE's Integrated Safety Management System

INEEL, from the lead program secretarial office to the DOE operations office, the operating contractor and its subcontractors, site users, and ultimately to the workers at selected facilities. The Office of Oversight evaluates site performance against the objective, principles, and core functions for ISM systems described in DOE Policy 450.4, *Safety Management System Policy*.

Since its evaluation of safety management at INEEL in 1995, the Office of Oversight has conducted or participated in a number of reviews, including two 1996 accident investigations, a 1998 emergency management evaluation, a 1998 follow-up review to examine issues identified in the 1995 evaluation, and the investigation of the 1998 CO_2 accident.

This focused safety management evaluation is the first to be conducted at a DOE site that has declared ISM to be fully implemented. INEEL completed the Phase I verification and three separate Phase II ISM verifications covering all INEEL contractor-operated

facilities and functional areas (conducted in September 1999, March 2000, and June 2000). After the final Phase II verification, BBWI and ID conducted self-assessments. On July 28, 2000, the ID Operations Office Manager issued a memorandum declaring implementation of ISM complete.

As indicated in a September 2000 memorandum from the Deputy Secretary of Energy, the initial implementation of ISM at most DOE sites is a significant milestone, but continued management attention is needed to ensure that the full benefits are realized. Line management oversight, worker involvement, and annual updates are essential to sustaining and continuously improving ISM. In addition, the Office of Oversight is responsible for conducting independent evaluations of ISM implementation and providing feedback to line management on the safety performance of contractors and DOE field elements.

The Oversight evaluation focused on selected INEEL facilities.

This focused safety management evaluation of INEEL focused on the effectiveness of the DOE lead program secretarial office (EM), ID, BBWI, and selected BBWI subcontractors in implementing the objective, guiding principles, and core functions of ISM. Specifically, the Oversight team evaluated the institutional processes that apply to all INEEL activities and the application of ISM in the following selected facilities and work activities:

- Test Area North (TAN) – removal of Three Mile Island fuel from the water pool and preparation of the fuel for transport to the Nuclear Regulatory Commission licensed facility at the Idaho Nuclear Technology and Engineering Center, and maintenance and surveillance activities associated with fuel management

- The Idaho Nuclear Engineering and Technology Center (INTEC) – ongoing operations and work activities related to fuel storage and facility operations and maintenance

- Central Facilities Area (CFA) – modifications needed to install a new gaseous fire suppression system at the Scoville Station.

These facilities were selected to allow evaluation of ISM application at facilities in different stages (i.e., equipment installation, operation, and maintenance), including observation of work planning and control processes as they are actually implemented at INEEL. In addition, the Oversight team was able to observe the work performed by subcontractors.

As a major area of emphasis for the focused safety management evaluation, the Oversight team conducted a functional review of the fire protection systems at INTEC, the Remote Analytical Laboratory (RAL), and Scoville, as well as other support equipment such as diesel generators. These functional reviews include a detailed walkdown and review of design, maintenance, testing, operations, and configuration management to determine whether engineered systems can reliably perform their designated safety-related functions. The reviews support DOE efforts to address Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 2000-2, *Configuration Management, Vital Safety Systems*. In addition, the functional review of fire protection systems considered DNFSB Technical Report #27, *Fire Protection at Defense Nuclear Facilities*. The results of the review of essential systems are reported under Guiding Principle #6, "Hazard Controls Tailored to the Work Being Performed."

As an integral part of the focused safety management evaluation, the Oversight team reviewed the status of the judgments of need identified in the accident investigation report for the July 28, 1998, accident at the INEEL Test Reactor Area. This accident, involving the release of CO_2 from a fire suppression system, resulted in one fatality and several life-threatening injuries. The accident investigation report identified judgments of need, which require corrective actions, in the areas of work planning and control, hazard evaluation, managing the flowdown of requirements, and the overall safety management system at INEEL. After this accident, INEEL accelerated its efforts to implement ISM and took actions to address each of the identified judgments of need.

In this report, the effectiveness of BBWI in implementing the ISM guiding principles is discussed in Section 2. BBWI's effectiveness in implementing the core functions is summarized in Section 2 and discussed in more detail in Appendix A. Section 3 discusses the effectiveness of DOE line management—EM as the lead program secretarial office, and ID as the responsible field element—in implementing their

ISM responsibilities. Section 4 presents the ratings. Section 5 discusses several opportunities for improvement for line management's consideration. Appendix B summarizes issues for corrective action and describes the status of legacy issues identified in past Oversight appraisals. Appendix C presents the judgments of need from the July 1998 CO_2 accident and summarizes the site's corrective actions for each, including the Office of Oversight's evaluation of the adequacy of the site's corrective actions. Appendix D describes the evaluation process and the Oversight team composition.

OVERVIEW OF INEEL

MISSION: INEEL's current mission is to serve as a multi-program laboratory providing the nation with innovative nuclear technologies and with unique scientific and engineering capabilities in non-nuclear programs that provide commercialization potential or enhance the quality of the environment.

ACTIVITIES: The Federal government initially established INEEL as the National Reactor Testing Station in 1949. Its original purpose was to provide an isolated location where prototype nuclear reactors could be designed, built, and tested. Most of the reactors were phased out after completing their research mission; only the Advanced Test Reactor and the Advanced Test Reactor Critical Facility are now operating. In January 1997, the Idaho National Engineering Laboratory changed its name to the Idaho National Engineering and Environmental Laboratory (INEEL) to highlight Idaho's role in developing waste cleanup and other environmental technologies. Current site activities include nuclear reactor technology research and development, waste management and environmental restoration, advanced energy production, defense-related support, safety and health, technology transfer, education, and non-nuclear research and development projects.

LOCATION: INEEL covers 571,000 acres (893 square miles) in a rural, sparsely populated sector of southeastern Idaho. The eastern boundary is 23 miles west of Idaho Falls. INEEL also occupies numerous buildings and laboratories located in Idaho Falls.

STAFFING AND BUDGET: INEEL employs about 10,000 people. Annual funding for the site is about $1.04 billion. The DOE Office of Environmental Management provides about 60 percent of the INEEL budget. As a multi-program laboratory, INEEL also receives funding from the Office of Naval Reactors; the Office of Nuclear Energy, Science and Technology; and several other DOE offices, as well as work for other programs.

MAJOR FACILITIES: The INEEL site has nine separate industrial sites, each designed for specific operations. Some of the larger or more significant sites are:

- The Test Area North (TAN) is located at the northern part of the site, which supports the Specific Manufacturing Capability program (U.S. Army tank armor), hot cell work, cleanup, D&D activities, and fuel storage.

- Facilities and operations for wet and dry storage of irradiated and unirradiated nuclear fuel and storage and treatment of high-level waste are located at INTEC, formerly the Idaho Chemical Processing Plant (ICPP), in the south central part of the site.

- A variety of low-level, mixed, and transuranic wastes is stored in burial grounds, retrievable storage pads, and enclosed storage facilities at the Radioactive Waste Management Complex (RWMC) in the southwestern part of the site.

- The Test Reactor Area (TRA), located in the south central part of the site, houses one operating test reactor (the Advanced Test Reactor), the operating critical facility reactor, four defueled reactors, storage of spent fuel, hot cells, consolidated storage of quantities of special nuclear material, and the Nuclear Materials Inspection and Storage Facility (NMIS), a repository for unirradiated fuel.

HAZARDS: Hazards at INEEL include radioactive materials, non-radioactive hazardous materials, and general industrial hazards. Radioactive hazards include those associated with deteriorating spent fuel and stored high-level liquid wastes. Non-radioactive hazardous materials include chemicals, compressed gases, and biohazards. Industrial hazards include high voltage, lasers, high noise levels, confined spaces, cryogenic systems, inert and low-oxygen atmospheres, and construction activities.

2.0 Site Integrated Safety Management Program

The overall effectiveness of ISM relies on sound institutional processes and effective implementation at the facility and work activity level. This section discusses each of the seven guiding principles of safety management, focusing primarily on organizational and institutional processes. This section also includes a summary-level description of the evaluation of the core functions of safety management. Appendix A provides more detailed information on the five core functions, focusing on facility- and activity-level processes.

2.1 Line Management Responsibility for Safety

GUIDING PRINCIPLE #1: Line management is directly responsible for the protection of the public, the workers, and the environment.

Organizations that have effective safety management programs place responsibility for safety with line management. Accordingly, line management must ensure that the safety management program includes safety policies and goals that are clearly articulated and communicated, and that workers are fully involved in safety issues and take appropriate action in the face of hazards encountered during normal and emergency conditions.

ID and INEEL managers indicated that the CO_2 accident prompted many INEEL managers and workers to develop an increased appreciation for safety, which has translated into a strong commitment to ISM and other safety-related programs, such as the voluntary protection program (VPP). As discussed in this section, increased commitment to safety has resulted in improvement of safety management across INEEL.

Safety Policies and Goals

INEEL has established appropriate environment, safety, and health (ES&H) policies including ISM, VPP, conduct of operations, conduct of maintenance, and a DOE-compliant quality assurance program. INEEL is also developing an environmental management system that, when completed (June 2002), is designed to meet International Standards Organization (ISO) 14001 provisions. Performance expectations and goals consistent with these policies have also been established and communicated, and are being used across INEEL. In addition to provisions for implementing ISM, these performance expectations include several safety-related goals and quantitative performance measures (e.g., injury and accident rates).

INEEL has developed and implemented a comprehensive and well documented ISM program.

In coordination with ID, INEEL has developed and implemented a comprehensive and well documented ISM program. The ISM Program Description Document references a large number of procedures that implement ISM and describes the process for flowdown of ES&H policies into implementing processes. As part of the ISM self-assessment process, INEEL took action to ensure compatibility between site-level policies and facility-level procedures. INEEL management is committed to ensure that ISM is sustained and continuously improved. The ISM maintenance process involves institutionalizing ISM at the activity level and continuing to track progress in such areas as requirements management, authorization basis updates, and training activities. INEEL implements a facility evaluation board (FEB) process that assesses the entire INEEL site annually and ensures line management involvement in the continuous feedback and improvement process.

Leadership

Senior line managers at INEEL demonstrate understanding of the importance of safety processes and the need for continuous improvement in safety management systems. As

documented in their Institutional Plan, senior management also recognizes that INEEL "has developed an unacceptable reputation for safety and compliance" because of serious industrial accidents, fines for violations of nuclear safety and quality requirements, and State of Idaho fines for violations of environmental regulations. To address this concern, significant effort has been applied at INEEL to improve safety management by, for example, establishing a vision of ES&H and quality assurance (ESH&QA) excellence in the Institutional Plan.

The report on the CO_2 accident investigation and other assessments indicated that there were significant weaknesses in various aspects of ES&H programs at the time of the 1998 accident. After the accident, ID and INEEL management (under the previous contractor until October 1999) provided leadership and resources to improve safety, implement ISM, and convert INEEL from an expert-based to a standards-based safety system approach.

Following the 1998 accident, an INEEL reorganization clarified line management responsibility for safety.

One of the major steps taken at that time was a reorganization of INEEL that was designed to ensure that line management responsibility for safety was clearly delineated. This reorganization involved the creation of management positions with responsibility for safety of operations, including the Site Operations Director and Site Area Directors. Also, the roles of support organizations, such as ESH&QA and Engineering, were redefined to include support to line management's implementation of ISM.

INEEL has established several steering committees that enable managers and staff to collectively participate in interactions that are partially or exclusively devoted to safety issues. These include the Executive Council, Senior Operations Review Board, Site Operations Council, Senior Maintenance Management Council, Operational Safety Board, and a number of other committees. Other forums, such as the Union Safety Summit, provide an opportunity for DOE and BBWI senior management to interact directly with the workers on safety issues. Most committees have comprehensive charters and are engaged in substantive discussions related to safety items requiring decisions.

BBWI line managers are actively and visibly involved in safety management.

BBWI line managers are actively and visibly involved in facility- and task-level safety management activities. The Site Area Directors, located at each site, are hands-on managers and are closely involved in all aspect of work performance. Another program geared toward promoting senior line management presence at the facility and task level is the facility excellence program, which calls for senior ID and BBWI management to tour and assess facilities along with the line manager responsible for the facility, ES&H professionals, and workers. Provisions for management presence at the activity level are also established in the Site Operations Manual (PDD-1005) and in a procedure that establishes appropriate requirements for line managers to oversee work, assess safety conditions, and obtain informal employee feedback.

Continued BBWI senior management leadership is needed to ensure that safety is not degraded as contractual and legally-mandated milestones approach.

While significant progress is evident, continued leadership will be needed to sustain the progress and continue to enhance safety management. Some INEEL managers expressed their opinion that ISM work planning processes are contributing to slow progress

Aerial View of Test Area North

and inefficiency in certain work activities. They indicated that frequent work stoppages to address safety concerns could impact their ability to meet work schedules; one example is completion of the Three Mile Island (TMI) project at INEEL's Test Area North (TAN) by June 2001, which is a milestone of the Settlement Agreement under the Federal District Consent Order. They also indicated a need to streamline work planning processes. ID and INEEL senior managers are aware of such perceptions and expressed their concerns that the commitment to ISM is not uniformly strong at all levels of the INEEL organization. While streamlining of work planning processes may be appropriate in certain cases, it needs to be done in a manner that ensures adequate safety. Further, the results of this Oversight review, as discussed in Section 2.8, indicate that many of the problems with safety-related work stoppages resulted from a failure to effectively implement the ISM hazard identification and analysis processes early in the planning effort.

NOTEWORTHY PRACTICES

Noteworthy practices are particularly effective or innovative activities or programs that enhance safety. Other DOE sites should obtain information about noteworthy practices and consider adapting adapt them to their facilities.

Several aspects of INEEL management and worker involvement are noteworthy practices:

- The worker applied safety program (WASP), where workers observe other worker's activities and provide them with feedback for improvements, and various other programs are in place to promote worker involvement in ISM
- Union Safety Summits, which bring ID, BBWI, and union workers together to address safety issues in the context of ISM
- The facility excellence program, which ensures direct management involvement in promoting a better understanding of ISM and achieving the necessary cultural and behavioral changes. Senior ID and BBWI management, along with line managers responsible for the facility, ES&H professionals, and workers, tour, assess, and score safety performance of facilities at INEEL on a regular basis. The score card for each facility is displayed at the entrance of the facility and provides a visible symbol of management presence and interest.

INEEL Occupational Medicine Program

INEEL management has provided the leadership, support, and resources to establish an effective occupational medicine program at INEEL. In coordination with the Office of Oversight, the Accreditation Association for Ambulatory Health Care (AAAHC)—a non-profit accreditation organization—conducted a review of the INEEL occupational medical program. The AAAHC used nationally recognized standards for ambulatory health care, which DOE has endorsed. The AAAHC determined that INEEL was in substantial compliance with all appropriate standards. AAAHC also recognized the INEEL occupational medicine program for its ingenuity and excellence in several areas of practice. For example, INEEL's automation of medical records has enhanced data retention, security, and accessibility. The AAAHC determined that the INEEL policies and procedures support the program missions and goals, medical personnel were dedicated to providing the highest quality of health care, and medical facilities were excellent. AAAHC awarded the INEEL occupational medicine program a three-year accreditation, the highest level of accreditation attainable.

Worker Empowerment

A strong commitment to fostering a safe work environment is evident throughout the INEEL site. Management and workers generally demonstrate a strong commitment to ensuring worker safety through active participation in the VPP and a variety of related voluntary and management-supported institutional safety initiatives.

The INEEL voluntary protection program promotes worker involvement.

The INEEL VPP provides a foundation for continuous safety improvement through worker involvement in identifying issues and hazards and implementing appropriate actions. The INEEL VPP is aggressively pursuing Star status, which indicates that the program has demonstrated a high level of participation and effectiveness. The awards-based "Passport" initiative (e.g., Passport to Excellence, Passport to Star), which is sponsored by the BBWI VPP organization, has been successful in encouraging employee involvement. Other INEEL activities that

have been successful in promoting worker involvement and safety awareness include company employee safety teams, the worker applied safety program (WASP), and the Define, Observe, Integrate, and Test (DO IT) activities. For example, the company employee safety team meetings have been effective in bringing ID, BBWI, and craft (i.e., union subcontractor) personnel together to address safety issues and implementation of ISM. One subcontractor is also implementing a VPP.

While continued effort is needed, INEEL has made significant progress in ensuring that workers understand and accept ownership and responsibility for maintaining their safety and the safety of others. Workers have the authority to stop work in accordance with Management Control Procedure (MCP) 553, *Stop Work Authority*, without any expressed fear of management retribution. BBWI employees and subcontractors actively participate in pre-job planning, pre-job walkthroughs, ES&H inspections, hazard evaluation groups, and development of job safety analyses and work procedures. Supervisors and managers receive classroom advocacy training to foster and sustain employee involvement and ownership for safety.

Workers have several methods for raising safety concerns, including direct submittal into the Issue Communication and Resolution Environment (ICARE) system. INEEL also has an employee concerns hotline that allows for anonymous reporting of safety concerns. While generally adequate, the interface between these programs and the corrective action process is not fully established. Specifically, MCP-598, *Corrective Action Control System*, does not establish formal mechanisms to ensure that disposition dates for safety concerns are reviewed, that timely feedback on the disposition of remedial actions is provided, and that work orders have been satisfactorily completed.

Currently, BBWI is collecting data on accidents, injuries, and employee participation in WASP observations. However, these data are not being rigorously analyzed to provide feedback to worker safety programs (e.g., directing WASP activities to areas needing attention, or correlating personal injuries to job safety analyses and procedures to identify needed revisions to work controls). BBWI is planning to further analyze data to benefit worker safety programs.

Stakeholder Involvement

INEEL actively works with various external stakeholder organizations, including Federal agencies (Environmental Protection Agency Region 10), the State of Idaho, local governments, and stakeholder groups such as the INEEL Citizen's Advisory Board and the Shoshone-Bannock Tribes. For example, the INEEL Citizen's Advisory Board has made over 70 recommendations on a variety of subjects to DOE since September 1994, including recommendations on key EM and INEEL planning documents such as the INEEL Institutional Plan. INEEL management has frequent interactions with stakeholders to discuss ES&H issues and to identify areas where improvements are needed. To improve stakeholder involvement in INEEL processes, BBWI has developed and implemented a Strategic Communications Plan that guides INEEL efforts to effectively interact with stakeholders and the public. In addition, ID has an Agreement in Principle with local tribes that addresses the DOE Indian Policy including cooperation, participation, and communication relating to INEEL.

INEEL is working to meet mandated cleanup schedules.

INEEL has a number of mandates and commitments to stakeholders that drive the environmental management program, including the 1993 settlement agreement among DOE, the state of Idaho and the Department of the Navy. According to this agreement and a subsequent court order, INEEL must place TMI-2 core debris into dry storage by June 2001. INEEL also must remove stored transuranic waste by 2015, remove all spent nuclear fuel by end of 2034, and prepare high-level waste for shipment out of the

A TAN System for Drying Three Mile Island Fuel Debris

state by the end of 2035. INEEL has reflected these commitments in their strategic plans, goals, and budget processes.

Summary. Policies and expectations for ES&H have been established and effectively communicated. The ISM program has been implemented and successfully passed the DOE verification process. ID and BBWI management provided the leadership needed to enhance safety management programs and to develop processes to ensure that line management is actively involved in safety. ID and BBWI have also generally been effective in increasing worker involvement and developing processes for interfacing with stakeholders. ID and INEEL managers have a good understanding of the residual weaknesses and have ongoing initiatives or plans to address them. INEEL management is committed to sustaining ISM. Continued attention is needed to ensure that safety is not compromised as INEEL faces the challenges of meeting mandated cleanup milestones and schedules.

2.2 Clear Roles, Responsibilities, and Accountabilities

GUIDING PRINCIPLE #2: Clear and unambiguous lines of authority and responsibility for ensuring safety shall be established and maintained at all organizational levels within the Department and its contractors.

Organizations that have effective safety management programs place responsibility, authority, and accountability for safety with line managers. Accordingly, line management must ensure that the program includes well-defined roles, responsibilities, and processes for ensuring that management is accountable for safety performance.

Poor definition and communication of roles and responsibilities were identified as a significant weakness in the 1995 Oversight safety management evaluation and the CO_2 accident investigation, as well as other assessments and accident investigations at INEEL. Management has recognized these weaknesses and devoted considerable attention to addressing them through ISM and other improvement initiatives.

Safety roles and responsibilities are clearly defined for BBWI organizations.

Safety management roles and responsibilities for line managers, functional managers, staff, and workers are comprehensive and well defined. A simplified organization chart showing the BBWI organizational elements responsible for most facility and task-level activities is shown in Figure 3, which also summarizes the key roles and responsibilities for the key BBWI organizational elements. As shown in the figure, the line management chain extends through the Site Operations Director and Site Area Directors.

Contractor personnel have a clear understanding of their roles and responsibilities under the BBWI matrix management approach. Under this approach, ES&H subject matter experts and other support specialists (e.g., engineering, construction, and quality assurance) are assigned to specific areas/facilities to support line managers. The assigned managers and staff report to their functional organization (e.g., ESH&QA) and take their day-to-day directions from the respective Site Area Directors. The responsibilities have been well documented in procedures, and personnel demonstrated a good understanding of their responsibilities.

ISM has been instrumental in clarifying roles and responsibilities at INEEL.

The implementation of the ISM program was instrumental to clarifying and communicating organizational and individual roles and responsibilities. Two key ISM documents, PDD-1004 (ISM Description Document) and PDD-1005 (Site Operations Manual), summarize the roles and responsibilities of various safety-significant positions. PDD-1005 is specifically focused on roles and responsibility of the safety management chain, including the Site Operations Director, Site Area Director, area ESH&QA managers, functional support managers, and subject matter experts. The roles and responsibilities for many positions and assignments are described in more detail in administrative procedures and in work planning and control procedures.

Under the ISM program, INEEL sites, including TAN and INTEC, have developed site-specific procedures to define roles and responsibility for their organizations. These procedures build on the roles and responsibilities defined in PDD-1004 and 1005 and provide a comprehensive set of roles and responsibilities, including references to other procedures and extensive lists of roles and responsibilities of various positions such as shift managers and operators. Responsibilities for implementation of hazard identification and control functions, such as work control

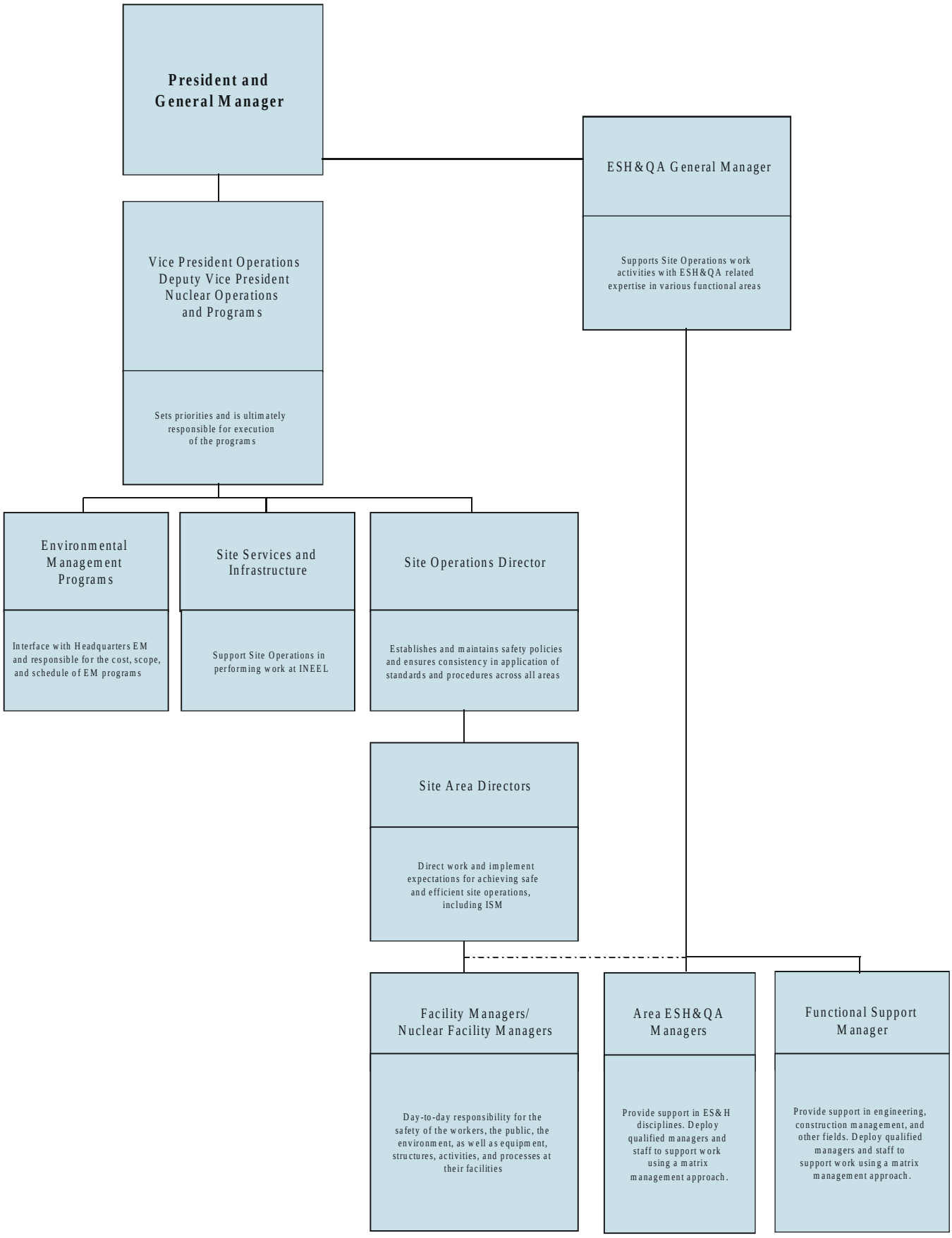


Figure 3. Simplified BBWI Organization

forms and facility hazards lists, are clearly identified. However, as discussed under Guiding Principle #6 and in Section 2.8, there are weaknesses in implementing some of the defined responsibilities.

As discussed in Section 3, ID has effective mechanisms to hold BBWI accountable for safety performance, such as the Program Execution Guidance and Performance Evaluation Measurement Plan (PEMP). BBWI management also uses such mechanisms to communicate expectations, hold lower tiers of the organization accountable for performance, and monitor performance.

The roles and responsibilities for individual employees are clearly defined and communicated. In addition to work procedures, roles and responsibilities of individual employees are documented in the employee position descriptions. These descriptions state the qualifications for the job assignments and are the basis for the annual performance review and salary administration. Position descriptions for ESH&QA managers and safety professionals are comprehensive and provide an appropriate mechanism for holding them accountable for their safety performance.

INEEL has improved its systems for holding employees accountable for safety performance.

In general, INEEL has improved its systems for holding employees accountable for safety performance. The contractor uses comprehensive performance appraisal mechanisms for personnel accountability for safety. Each employee, including upper managers and operational managers, has a personalized safety and health plan that is reviewed annually, adjusted by the employee's supervisor, and signed by two levels of supervision. The contractor has also demonstrated decisiveness in several recent instances where they have replaced managers and penalized staff and workers for poor safety performance. The contractor has also recognized and rewarded personnel for good safety performance through several site programs.

To further enhance responsibilities and accountability, BBWI has initiated and is vigorously pursuing a formal program (called Roles, Responsibilities, Accountabilities, and Authorities) designed to align roles and responsibilities of positions and assignments to INEEL strategic goals. While this program can be a useful exercise, especially for upper management, the effort needs to be consistent with the systems already in place to avoid confusion and overlap. The Roles, Responsibilities, Accountabilities, and Authorities program is also potentially useful as a management tool for enhancing accountability.

While deficiencies in implementation continue (see Guiding Principle #6), INEEL has established effective mechanisms to hold subcontractors accountable for safety performance. For hazardous work (i.e., a Hazard Level 1 determination for a subcontracting task), the ISM clause automatically flows down into the contract. BBWI regularly evaluates subcontractor safety performance, including a monthly evaluation of ES&H performance. A work stoppage is triggered if subcontractors fail to meet a required minimum score on the monthly evaluation. On several occasions, BBWI has directed subcontractors to address deficiencies and submit corrective action plans before restarting work.

INEEL has experienced a number of near-miss events indicating a need to ensure that the tenant use agreements and interface agreements are effectively established and implemented. A significant fraction of these near-miss events involve subcontractors that are not permanently assigned to an area, and thus may be less familiar with the facilities, work control processes, and organizational interfaces. In addition, many of the weaknesses identified during this Oversight evaluation (see Appendix A) involve subcontractors. A review of near misses indicates that, in several instances, unclear organizational relationships or interfaces contributed to the event. For example, the ID review of a near-miss electrical event (ORPS ID-BBWI-LANDLORD-2000-0015, May 5, 2000, in which work was performed on an incorrect component that was not de-energized) involving INTEC and construction/project management indicated that the work order package to perform the work identified four primary owners of the system. Because the responsibility for establishing effective controls was shared among several organizations, there was insufficient coordination. Other near misses and events indicate that deficient and/or poorly understood roles, responsibilities, and accountability are more likely during project turnover between the operating organizations and subcontractors, or when one stage of a subcontractor's activities ends and a new subcontractor begins another stage. BBWI Site Operations recognizes these shortcomings, as evidenced by a recent review of these issues and the provisions of its corrective action plan (dated October 2000) for the May electrical event.

INEEL has recently focused on further clarifying organizational relationships between line management and construction subcontractors.

INEEL has recently published MCP-9141, *Developing Tenant Use Agreements*, to better define relationships between the Site Area Directorate (i.e., line management) and other organizations, such as research and development, construction, utilities, power management, and programs. Interface agreements between several organizations, including INTEC and construction/project management and INTEC and the environmental remediation program's Waste Area Group 3, are also being developed. Personnel from these organizations may need to perform work in various INEEL areas, although they are not permanent or matrixed members of the area's workforce.

Summary. INEEL management has devoted considerable attention to clarifying roles and responsibilities through ISM and other initiatives. In general, safety roles and responsibilities are clearly defined for BBWI organizations, and personnel have a clear understanding of their roles and responsibilities under the matrix management approach. The contractor has enhanced systems for holding organizations and employees accountable for safety performance. They have recently focused on further clarifying organizational relationships between line management and other organizations, such as construction subcontractors, that perform work at facilities but are not assigned to the area. INEEL has experienced a number of near-miss events indicating a need to ensure that organizational interfaces are effectively established and implemented. The contractor has initiated and is vigorously pursuing the Roles, Responsibilities, Accountabilities and Authorities program to further enhance roles and responsibilities.

2.3 Competence Commensurate with Responsibility

GUIDING PRINCIPLE #3: Personnel shall possess the experience, knowledge, skills, and abilities that are necessary to discharge their responsibilities.

A fully functioning safety management system has workers and managers who are technically competent to perform their jobs and who are appropriately educated and knowledgeable of the hazards associated with site operations. Management must assure that effective training programs are in place and that sufficient qualified staff are available. Workers must have the technical capability to respond to workplace hazards.

Staffing and Qualifications

BBWI and its subcontractors generally have appropriate staffing and personnel qualifications for their current mission and level of activity. They have developed a strategic staffing plan based on the expected evolution of projects and tasks described in the INEEL Fiscal Year (FY) 2000-2004 Institutional Plan. At the facility level, CFA, TAN, and INTEC are focused on short-term staffing needs. However, there has been little documented strategic staff planning at the facility level beyond the next fiscal year.

INEEL has effective processes for establishing competence commensurate with responsibility.

With a few exceptions involving construction subcontractors (discussed later in this section), the work observed by the Oversight team was performed by

Hot Cell Work at RAL

personnel who had the required training and qualifications. Staff competence commensurate with assigned responsibility is generally ensured through a combination of position-specific job task analysis and selection prerequisites (education, qualification, certification, and experience); site-, function-, and facility-specific training, qualification, and certification; on-the-job training; and task-specific training prerequisites and requirements. Pre-job briefings include appropriate verification of worker training prerequisites. The INEEL process for radiation work permit (RWP) development and use of the Radiological Control Information Management System also provide an excellent control mechanism for ensuring that only qualified individuals are allowed to work under a given RWP.

Although not degrading safety, some INEEL organizations have experienced staff and skill shortages that have slowed projects. For example, some jobs could not be performed at TAN because of the shortage of qualified heavy equipment operators. Also, a shortage of qualified work planners at TAN has caused delays in completing work packages (each qualified work planner has a backlog of 100 or more work requests).

INEEL is addressing staffing and skill mix concerns.

Contractor management recognizes the staffing and skill mix concerns and is taking steps to address them. The Site Area Directors routinely address staffing and skill mix concerns at their weekly meetings. Also, some fissile material handlers and work planners were shifted from INTEC to TAN to support the accelerated TMI-2 fuel dry storage project, and TAN is in the process of hiring additional work planners. However, short-term staffing and skill mix concerns are expected to persist for the near future, because the contractor plans to redeploy employees currently working on other projects that are nearing completion and is therefore reluctant to hire new personnel except for critical skill needs. As discussed under Guiding Principles #1 and #4, the accelerated TMI-2 fuel dry storage project schedule represents a significant challenge. Management attention is needed to ensure that the quality of work planning and related controls is not degraded by the combination of the pressure to meet mandated milestones and the shortages in certain skill areas needed to effectively implement the work planning process (qualified work planners, electricians, and operators).

Training Programs

Contractor management has clearly assigned the responsibility for staff training to line management and has established a high-quality, effective training program. To support line management, training managers and staff are assigned to each facility's organization, and required sitewide training is provided. The sitewide Training and Qualification Manual defines a consistent, sitewide, systematic approach to defining needed competence, determining appropriate methods for establishing competence, developing necessary training materials, providing training, and assessing needed changes to enhance the training process. INEEL nuclear facilities (including TAN and INTEC) also maintain their own Training Program Descriptions and Training Implementation Matrices, which supplement the sitewide Training and Qualification Manual and document the facilities' programs for nuclear facility personnel selection, training, and qualification.

BBWI has effective training program processes.

There is a comprehensive process for identifying the training needs and status of each individual. Supervisors develop and annually review each employee position description and individual training plan as part of the systematic approach to training established by the Training and Qualification Manual. In addition, the training status of each employee is tracked in a sitewide Training Requirements and Information Network (TRAIN), which is used to produce individual monthly qualification cards. These cards provide a hard-copy record of an individual's training status and are useful to supervisors in the field who may not have immediate access to a network computer. New training activities are implemented based on a systematic process that closely parallels the five core functions of ISM. Continuing and refresher training is provided to maintain competence and proficiency, with required nuclear facility staff requalification and/or recertification every two years.

Supervisors and managers were knowledgeable of their training program responsibilities and the information available in employee position descriptions, individual training plans, TRAIN records, and monthly

qualification cards. Pre-job briefing checklists also require that supervisors review TRAIN records and/or monthly qualification cards to verify that individuals are qualified for assigned tasks. In addition, Site Area Directors have actively supported their respective training programs. Further, training course attendance is tracked, is actively followed by management, and has improved substantially as a result of management involvement.

Several aspects of the site training programs are particularly effective.

Many other aspects of the site training programs have been effective. For example, the lockout/tagout simulator and associated training support are regarded as a significant INEEL asset and a positive initiative to improve consistency and quality of performance in this important industrial safety area. In addition, the FM-200/Halon training course is comprehensive and adequately covers the hazards of the gases used for fire suppression systems at the site. To enhance this course, lessons learned from the CO_2 accident are covered, and videotapes of actual Halon and FM-200 discharges are used to illustrate the pre-discharge alarms and the environment in the rooms during a discharge. Further, the effectiveness of training is periodically evaluated through supervisory monitoring, course evaluations, lessons-learned reviews, Institute of Nuclear Power Operations (INPO) assist visits and assessments, and annual self-assessments.

Several new activities to further improve staff competence have been initiated. For example, to enhance the competence of individuals screening information for unreviewed safety questions, there are plans to reduce the number of individuals qualified to perform screening and enhance their computer-based and classroom unreviewed safety question training. In addition, the need to enhance the ability of individuals to perform effective self-assessments was recognized, and enhanced training on this subject is being developed.

Some aspects of INEEL training need management attention and improvement.

While most aspects of the INEEL training program provide assurance that personnel can competently perform their safety-related responsibilities, some areas warrant additional management attention and improvement:

- **INTEC's chemical hazards training is not sufficient to assure competence commensurate with responsibility when working with certain chemical hazards and in certain facilities.** As discussed under Core Function #3, chemical hazards training did not adequately address several hazardous materials present at INEEL, including beryllium and hydrofluoric acid, and several other weaknesses were noted in chemical hazard training.

- **INTEC's maintenance personnel are not provided craft skills and engineered safety feature training, as required by DOE Order 5480.20a, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities*.** INTEC is working to address this concern and has completed development of the required job task analysis and lesson plans; however, funding to develop necessary training materials is still awaiting budget approval. In the interim, INTEC has determined that the current maintenance staff have sufficient experience and information (e.g., functional descriptions of engineered safety features) to conduct work safely. However, maintenance staff training is not in compliance with the order, and several INEEL personnel believe that the current staff need additional skill and systems training. This training shortfall will be exacerbated as less-experienced personnel are integrated into the INTEC workforce.

- **Training requirements for subcontractor staff are not always clear, and verification that these requirements are met is difficult and not always performed.** As discussed under Core Function #3, weaknesses are evident in the training program for subcontractors (e.g., several workers and their supervisors could not demonstrate completion of required training).

INEEL recognizes these concerns and efforts are under way to resolve them.

Summary. In general, BBWI has adequate staff and expertise to meet current mission needs and appropriately implement its safety responsibilities.

While some staff shortages exist, management recognizes the problem areas and is taking appropriate actions to address these challenges. In addition, the staff has extensive experience, education, and qualifications. Although isolated examples of inadequate training and deficiencies in records of training and qualification were identified, these deficiencies are being addressed and did not appear to degrade the safety performance of work observed by the Oversight team. Further, a comprehensive technical training program has been established that is based on a systematic approach to training.

2.4 Balanced Priorities

GUIDING PRINCIPLE #4: Resources shall be effectively allocated to address safety, programmatic, and operational considerations. Protecting the public, the workers, and the environment shall be a priority whenever activities are planned and performed.

A well-performing organization has a management system that identifies, analyzes, and prioritizes risks posed by the hazards inherent in the work to be performed. The system must also establish priorities to mitigate those risks. The priorities are used to request, allocate, and apply resources to meet safety goals, program goals and objectives, and operational needs.

Translate Mission into Work: Set Expectations

INEEL management has demonstrated a strong commitment to ensuring that ISM and ES&H receive sufficient priority and resources. Organizational changes, such as the formation of the Site Operations Directorate and the Site Area Director positions and the establishment of key ES&H contractual commitments, such as full implementation of ISM, reflect INEEL efforts to ensure that ES&H and ISM receive sufficient attention and priority. Recent actions, such as including safety-related provisions as a critical outcome in the INEEL Strategic Plan, demonstrate senior management's continuing commitment to ensuring that ES&H receives appropriate priority.

There is an effective process for establishing facility-specific priorities and goals.

INEEL has an effective process for translating institutional expectations into facility-specific goals and actions. The Site Operations Directorate Operations Plan identifies key objectives and measures to achieve excellence in operations and compliance with applicable ES&H requirements, such as performing ISM maintenance activities and achieving VPP Star status. Based on these objectives and measures, each Site Area Director establishes specific site area goals and milestones to achieving operational excellence. Senior line management involvement in tracking progress of these commitments on a site area basis is evident at both TAN and INTEC. Plans, milestones, and tracking progress toward critical outcomes identified in the INEEL Strategic Plan are integrated within the Detailed Work Plans (DWPs) and reflected within the contract PEMP.

TMI Fuel Storage

In coordination with ID, BBWI has focused on establishing effective processes and mechanisms to define the scope, schedule, and cost of work and to identify and communicate associated risks and hazards. To meet ID expectations (e.g., provisions in the Request for Proposal and subsequent provisions in the PEMP), the contractor has strengthened INEEL work planning and control activities through the development and implementation of the DWP process. The DWP provides a formal process for achieving increasingly detailed description of the work at lower tiers. Using this process, broad mission objectives and critical outcomes, such as management of spent nuclear fuel, are translated into discrete tasks to ensure proper planning and the identification of hazards for work

activities. The DWP process requires the involvement of the key organizations, such as ESH&QA and engineering, in the planning process as part of the project team. For example, the DWP for the TMI-2 fuel transfer project clearly identifies the ES&H resource activities, such as facility surveillance, maintenance, ESH&QA support, engineering activities, and support services such as training, issues management, self-assessments and lessons-learned, that are needed for the scope of the work.

Although the process is generally adequate, personnel are still gaining experience with DWP and have not yet consistently demonstrated effectiveness in implementing the process to develop schedules and identify required resources. Continued management attention will be needed to ensure that the work plans developed under this new process are effectively executed and that lessons learned are applied to improve the process.

Project management functions have been strengthened.

Management has also recently focused on improving project management functions. Project scheduling and resource determination constituted a significant weakness in recent years, and project controls and requirements were not standardized across programs. Contractor management has taken steps to strengthen and standardize project management functions, such as issuing top-level project requirements documents that clearly identify planning and project turnover provisions, including the integration of ES&H activities. Work planning and control scheduling tools are being upgraded to enable project managers to determine critical paths and resource requirements.

The recent focus on improving processes and tools has had a positive impact. Project execution plans developed prior to the enhanced project management requirements, such as the plans for TMI-2 dry fuel storage and the Scoville project, do not contain the same level of detail as the project execution plan for the Cathodic Protection Expansion Project, which was prepared under the current project management requirements. For example, the Cathodic project execution plan references appropriate procedures for project change control processes for a Grade III level project, including establishment of clear thresholds for significant design/scope changes requiring review and approval. In addition, the Cathodic project execution plan clearly defines roles, the responsibilities of the project team, and the organizational interfaces for the project, and identifies ES&H and National Environmental Policy Act considerations, including applicable safety and health requirements for construction as well as operational considerations, such as work planning and control requirements. In contrast, the project execution plans for the TMI-2 and Scoville projects were not upgraded, did not contain the same level of detail and specificity, and were not as effective as a project management tool (although other project documentation contained sufficient information to allow effective planning and scheduling and identification of the hazards/risks).

Although processes are in place, additional effort is needed to ensure consistently effective implementation. As discussed under Guiding Principles #2 and #6, some problems persist in implementing work planning processes and organizational interfaces.

Integration of ES&H into Operations

INEEL has been successful in addressing past weaknesses in integration and implementation of ES&H functions and activities. The implementation of ISM, the development of mechanisms to standardize site practices (e.g., conduct of operations), and the 1999 reorganization (e.g., establishment of Site Operations Directorate and Site Area Directors) were key steps in making the needed improvements. The Site Operations Directorate, with the support of various committees such as the Site Operations Council, is responsible for effective integration of ES&H functions and coordinates the implementation of functional programs and policies, such as maintenance management, training, and conduct of operations at the site areas. Several significant actions to strengthen the Site Operations Directorate were taken in FY 2000, such as having the Site Area Directors directly report to the Site Operations Directorate. These organizational actions enhanced communication and resource utilization across the site areas, and facilitated the efforts to link ES&H weaknesses and commitments to business systems for planning, prioritizing, and budgeting ES&H resources.

Effective processes for integrating ES&H into day-to-day activities are in place.

In general, processes to integrate ES&H into day-to-day activities have been effective. For example, weekly

Site Operations Directorate meetings with Site Area Directors provide an effective mechanism for communicating ES&H information and addressing resource needs across the site areas. Plan-of-the-week and plan-of-the-day meetings are conducted to ensure that work activities are properly authorized and that necessary ES&H resources are available for the work to proceed. For construction activities, the INTEC Site Area Director and project/construction management have established an interface agreement (i.e., IAG-72) that requires the assigned construction coordinator to ensure that all construction work orders are on the plan of the day, and that the construction project schedules are integrated into the site area's scheduling processes. Oversight's observation of plan-of-the-day meetings at TAN and INTEC indicated that work activities were properly authorized and had the necessary ES&H resources. However, as discussed under Guiding Principle #6 and Appendix A, improvements are needed in the scope of maintenance work requests and the definition and breakdown of work for the various stages of complex construction projects.

Project Prioritization and Resource Management

The INEEL Executive Council establishes overall priorities and reconciles budget and resources based on DOE work scope requirements. Disputes relating to balance between mission priorities and safety are resolved through this Council. The Executive Council is also responsible for reviewing work packages if a budget impact indicates a need for such a review in accordance with the ES&H infrastructure program, although no such cases have yet occurred.

INEEL has established processes to monitor and maintain ES&H infrastructure.

Under the direction of EM and ID, INEEL has established effective management controls and processes to monitor and maintain ES&H infrastructure. For example, the INEEL ES&H Risk Review Board uses a risk-based model to evaluate ES&H risks and budgets. In addition, threshold limits/triggers have been established to ensure that appropriate line managers review budget impacts on ES&H activities. These processes are integrated into work planning and budgeting processes so that ES&H infrastructure activities are identified as an integral part of the development of the scope of work for programs and projects. Baseline change control processes for indirect and direct funded work require proposed changes in budgets to be assessed for their impact on ES&H activities. For example, the ES&H infrastructure process requires changes in indirect funding to be compared to the established ES&H FY 2000 baseline to track and trend changes and determine the cumulative effect of budget changes on ES&H indirect funded activities. These enhanced controls and processes for ES&H infrastructure effectively address one of the fundamental concerns from the CO_2 Type A accident investigation regarding the need to improve analysis and control of incremental reductions in safety infrastructure funding.

INEEL is working to improve maintenance programs.

Actions are ongoing to improve the effectiveness of the INEEL maintenance management program. INEEL has experienced significant increases in unplanned equipment breakdowns that have impacted the ability to perform work. Recent external and BBWI evaluations of the maintenance management program identified a number of concerns relating to backlog management and technical basis for preventive maintenance on essential systems. Action plans to address these concerns are being developed, and ID has established several key performance measures to

Aerial View of INTEC

promote improvements in corrective and preventive maintenance on equipment and systems. The Oversight team's review of the fire protection system at INTEC revealed that backlogs for maintaining the system were small, the overall material condition of the system was good, and planned actions to improve the overall effectiveness of the maintenance management program were appropriate to fully meet the intent of DOE Order 4330.4B, *Maintenance Management Program*. However, as discussed under Guiding Principle #6, there are weaknesses in configuration management for essential systems.

TAN Building 607

INEEL has also continued to maintain a viable building assessment inspection program to assure the physical condition of buildings, in accordance with DOE Order 430.1, *Life Cycle Assessment*. With few exceptions, buildings at TAN and INTEC have undergone a periodic review of the structure, electrical systems, and roofs within the last two years. Needed upgrades are addressed through the long-range infrastructure planning process for prioritization of line item and general plant projects needs. For example, INEEL has a 2002 project to repair the roof of the TAN 607 and 607A Hot Shop. A surveillance and maintenance program to monitor hazards in inactive and surplus facilities has been implemented. Semiannual inspections are being conducted using a multidisciplined team and standardized checklist to evaluate changing facility conditions and hazards. The Oversight team's walkdowns of inactive INTEC Buildings 601, 627, and 640 indicate that the facilities were well maintained, and that surveillance and maintenance activities were being implemented in accordance with established requirements.

Continued management attention is needed to address essential systems testing, site infrastructure, and disposition of excess facilities.

While line management has established a reasonable balance of priorities between ES&H responsibilities and mission requirements, continued management attention is still needed to effectively address essential systems maintenance and testing, site infrastructure, unfunded training (see Guiding Principle #3), and disposition of excess facilities. As described in the INEEL long-range plan, approved capital projects are not sufficient to address infrastructure needs, and there are significant challenges in meeting environmental management compliance requirements/ milestones with the current funding targets. While some progress is being made on deactivation of non-essential facilities, a significant number (about 150) of non-essential buildings/structures remain to be addressed. Based on current funding levels, the total number of excess buildings is expected to grow to approximately 300 by FY 2005. The growing backlog of non-essential facilities could allow facility degradation, which would increase the ES&H hazards of future D&D activities. However, excess-facility surveillance and maintenance activities help mitigate some of the concerns.

Summary. In coordination with ID, BBWI has improved its institutional processes for ensuring that ES&H needs are identified, integrated with operational activities, and given sufficient priority and resources. Management has also focused on developing project management methods and tools to facilitate the implementation of these processes. Continued attention is needed to ensure that the full benefits of these improvements are realized, and that personnel become proficient in applying the new methods and tools. Management is aware of residual concerns, such as maintenance backlogs, and has developed appropriate plans to address identified concerns; progress toward implementing these plans is being monitored by BBWI and ID. Work planning for construction management, configuration management of essential systems, and the increasing number of surplus facilities warrant increased management attention.

2.5 Identification of Safety Standards and Requirements

GUIDING PRINCIPLE #5: Before work is performed, the associated hazards shall be evaluated and an agreed-upon

set of safety standards shall be established that, if properly implemented, will provide adequate assurance that the public, the workers, and the environment are protected from adverse consequences.

An effective safety management system must include processes to identify, communicate, execute, and monitor all applicable DOE requirements and Federal, state, and local regulations. In addition, processes that provide change control and maintenance mechanisms for a given set of baseline requirements must be in place. Translating these requirements into policies, programs, and procedures; tailoring them to specific work activities; and effectively implementing them so as to protect workers, the public, and the environment are a necessary and integral part of an effective safety management system. These processes are closely related with processes to analyze and control hazards described under Guiding Principle #6.

BBWI Requirements Management

Until the past two years, INEEL had longstanding weaknesses in requirements management. Early in 1995, the previous site contractor developed a set of company-wide manuals of procedures in an effort to promote consistency in maintenance and operations among the various INEEL sites, which had previously been managed by different contractors each operating under its own procedures. However, a 1995 Oversight evaluation of safety management determined that the company-wide procedures were not fully developed and not adequately enforced.

ISM and the 1998 accident prompted efforts to enhance requirements management.

When a requirement for ISM was added to the contract in February 1998, the previous contractor focused more attention on requirements management. In July 1998, the CO_2 accident highlighted awareness of significant deficiencies in requirements management. This event prompted significant improvements in many aspects of the safety management program, including requirements management.

Significant initiatives to strengthen requirements management, which were begun by the previous contractor in 1998, have been continued by BBWI. In December 1998, functional area managers were required to validate that selected laws and regulations from List A of the management and operating contract and all DOE directives on List B of the contract were adequately incorporated into the appropriate manuals. In April 1999, a Headquarters ISM Phase I review team identified deficiencies in the content of these manuals and in the process for maintaining them. The previous contractor addressed these deficiencies by revising the manuals and strengthening the process for maintaining them. Responsibilities for maintaining these manuals are now clearly assigned to specific BBWI managers by LST-1, *List of Functional Areas and Functional Area Managers*. A process has been established in MCP-2447, *Identification and Rolldown of Requirements*, which includes provisions for notifying responsible managers of changes to Lists A and B, developing implementation plans, and tracking completion of necessary changes. The process for incorporating new and revised contractual requirements into the manuals has been effectively implemented.

Steps to enhance requirements management are ongoing.

Steps are being taken to ensure that the requirements of all company-wide manuals are translated into training and procedures at each site area. In May-June 1999, a pilot process was implemented for rolldown and validation of requirements from the manuals to site-specific procedures at each of five site areas. In August 1999, the first of three Phase II reviews conducted by DOE Headquarters validated satisfactory flowdown of requirements from the 18 manuals to site procedures for the five pilot facilities. BBWI applied this same process to procedures at the balance of INEEL facilities, which were also validated in subsequent Phase II verification reviews. In addition, a Facility Operations Review and Implementation Board and a Facility Training Review and Implementation Board ensure that new and revised requirements are implemented and that appropriate training is conducted.

Some requirements management processes are not incorporated into procedures.

Although significant improvements have been made, some important aspects of the requirements management process are not yet fully incorporated into

formal procedures. For example, the process for informing responsible individuals of changes to regulations and laws is informal and lacks provisions for ensuring that appropriate changes are made to company procedures to implement such changes. A rigorous process for managing changes to environmental regulations and laws has been established by MCP-3675, *Environmental Requirements Flowdown*, and parts of this process have been informally applied to other functional areas. However, processes for managing changes to requirements in other disciplines (non-environmental) lack formality and do not provide positive assurance that company procedures will be changed as necessary. Similarly, the process for evaluating changes to consensus standards, which are referenced by applicable directives and regulations, is not incorporated into a procedure. The informal process depends largely on the initiative and expertise of subject matter experts and does not include provisions for independent review, timeliness, or line management oversight.

One safety issue was identified under Guiding Principle #5. It involved compliance with DOE Order 5400.5, *Radiation Protection of the Public and the Environment*.

ISSUE #1: INEEL has not complied with the provisions of DOE Order 5400.5, *Radiation Protection of the Public and the Environment,* relating to phasing out existing soil column discharges. In addition, INEEL does not have a defensible technical basis for a new percolation pond, which could create a new contaminated soil column.

Although INEEL has enhanced its requirements management systems, INTEC has not been in compliance with certain provisions of DOE Order 5400.5 since it was issued in 1993. While INTEC discontinued the practice of discharging radionuclides in service waste effluents in 1993, INTEC continues to discharge about two million gallons of liquid effluents per day to the existing contaminated soil column under the percolation pond. These ongoing discharges are contrary to DOE Order 5400.5, paragraph 3.c.(2), which states that "liquid discharges, even though uncontaminated, are prohibited in inactive release areas to prevent the further spread of radionuclides previously deposited." DOE Order 5400.5 included a provision for a formal exception if compliance could not be immediately achieved. However, INEEL did not formally request an exception.

INEEL has recently acknowledged that INTEC has not been in full compliance with DOE Order 5400.5. The November 2000 Proposed Interim Control Strategy states that neither an initial notification of inability to comply nor the consequent reviews required by DOE Order 5400.5 have been completed. One factor that may have contributed to the longstanding non-compliance was the fact that the INTEC service wastewater was also addressed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Record of Decision for Operable Unit 3-13, Waste Area Group 3. According to the CERCLA decision, discharges of INTEC service wastewater into existing percolation ponds must be discontinued before December 2003.

The risks of creating a new contaminated soil column discharge have not been fully evaluated.

As part of the effort to comply with the CERCLA decision, a new percolation pond was built for effluent from the INTEC service wastewater system. However, in designing the new pond, the hazards and the requirements of DOE Order 5400.5, which prohibit the creation of new soil column discharges, were not rigorously analyzed. While INTEC service wastewater is normally free of radioactive contamination, the risks of contaminating a new soil column due to inadvertent contamination of this water have not been thoroughly reviewed or mitigated. There is a potential for service water to contaminate a soil column, which would require future environmental remediation. Radioactively contaminated water is known to have been inadvertently discharged through the service waste system. In addition, a small amount of residual contamination will remain in the lines following connection to the new percolation pond, and thus the discharges will continue to contain small concentrations of some radionuclides. Further, unmonitored release of radioactivity below the set point of process monitors could go undetected for a considerable period (up to 60 days based on the monthly sampling frequency for service waste system discharges and the time required for analysis of samples), possibly contaminating a soil column.

The plans for the new percolation pond must be rigorously analyzed to ensure future compliance with DOE Order 5400.5 and to ensure that the risks of contaminating a soil column are fully assessed. The

most recent INEEL risk analysis of the percolation pond is a 1997 safety analysis report, which indicates a low probability for an accidental release. A rigorous evaluation of the as-built systems is needed to assess factors such as equipment reliability, maintenance, residual contamination, and releases of small amounts of contaminated material to the new pond. In addition, actions are needed to achieve compliance with DOE Order 5400.5, either by discontinuing discharges or by obtaining an approved exemption.

Subcontractors

The BBWI processes do not provide adequate assurance that changes to safety requirements are incorporated into subcontracts. The set of safety procedures applicable to subcontractors is separate from those applicable to BBWI employees. These procedures, which comprise a Subcontractor Requirements Manual, were developed from safety procedures in the BBWI company-wide manuals. BBWI reviewed the procedures in the Subcontractor Requirements Manual for consistency with company-wide safety procedures as part of the rolldown initiative conducted in late 1999 and early 2000. However, the process for changing this manual to maintain consistency with BBWI procedures is informal, and inconsistencies were identified between procedures in this manual and management control procedures applicable to the BBWI workforce. A Subcontractor Steering Committee has been established to control the content of the manual as specified by PDD-1001, *Subcontractor Requirements Program Description*. However, this committee has not functioned as described by this procedure and has not been fully effective.

Some subcontracts do not adequately require compliance with INEEL safety requirements.

Weaknesses are evident in administrative aspects of requirements flowdown to subcontractors. BBWI construction management expects subcontractors to comply with the latest revisions of procedures in the Subcontractor Requirements Manual and incorporates a checklist into each subcontract to specify the applicable procedures in the applicable Subcontractor Requirements Manual. However, requirements that should have been checked as applicable were not always checked, so subcontractors were not contractually required to comply.

LST-1, *List of Functional Areas and Functional Area Managers*, does not assign a functional area manager for the Subcontractor Requirements Manual. As stated in this list, "Functional area manager responsibility is assigned to a senior manager with sufficient authority to ensure implementation of standards and requirements that fall within the scope of assigned functional area." The individual assigned as the functional support manager responsible for the Subcontractor Requirements Manual lacks the requisite information and authority to effectively control the content of the manual. That individual is not on distribution for contract changes with potential impact on safety requirements, lacks expertise in the area of safety, and is not a line manager over individuals maintaining the manual.

Although weaknesses in applying some aspects of requirements management processes to subcontractors are evident, the Oversight team's review of actual work activities indicates that subcontractors are generally implementing applicable requirements.

Summary. A strong commitment to strengthen the management of requirements was evident at all levels in the INEEL organization. Both ID and BBWI understand that previous performance in this area was unsatisfactory and that changes were essential to ensure an acceptable level of safety in the INEEL workplace. ID has set high standards for performance by including a complete set of safety requirements in the management and operating contract and has provided the leadership necessary to achieve improved performance in this area. The contractor has taken appropriate steps to ensure that applicable requirements are included in company-wide manuals and that the procedures at each site area are consistent with these manuals. The process for flowdown to subcontractors is less rigorous and does not ensure that changes to safety requirements are promptly incorporated into subcontracts.

2.6 Hazard Controls Tailored to Work Being Performed

GUIDING PRINCIPLE #6: Administrative and engineering controls to prevent and mitigate hazards shall be tailored to the work being performed and associated hazards.

To conduct work safely, line management must ensure that structured processes exist and are implemented sitewide to identify and analyze work hazards consistent with the complexity of the work

activity and the significance of the risk. The appropriate engineering and administrative controls and personal protective equipment must be established and properly implemented to prevent or mitigate hazards identified before start of the work activity.

Institutional Level

INEEL has demonstrated a strong management commitment to strengthen hazard analysis and controls. BBWI has established a comprehensive set of institutional procedures to promote the uniform implementation of DOE requirements for hazard analysis and control at all INEEL site areas. With the exception of procedures for unreviewed safety question determinations (USQDs), discussed later in this section, the procedures reviewed were consistent with DOE guidance and requirements. As discussed in the following paragraphs, institutional procedures are adequate, with a few exceptions.

BBWI has established comprehensive institutional procedures for hazard analysis and control.

Company-wide work control processes for maintenance, construction, D&D, operations, and research activities establish provisions for hazard analysis and control. These processes are defined in management control procedures or standards for three major types of activities: operations (MCP-3562); research (MCP-3571); and maintenance, construction, and D&D (STD-101). Each work control process has been tailored to the type of work and is designed to ensure that hazards are identified, workers are informed of these hazards, and controls are in place to mitigate the hazards before work begins. All three processes use checklists to facilitate hazard identification and mitigation and emphasize worker participation in job planning. Environmental work controls are integrated into each of these processes, and a separate checklist for identifying environmental hazards and mitigating actions is provided by MCP-3480.

Most of these company-wide processes have been developed over the past two years and are continuously evolving based upon changing requirements and feedback from users. If followed, the processes ensure that hazards are identified and appropriate controls are established before work begins.

Institutional procedures for performing safety analysis meet DOE requirements.

BBWI has established company-wide procedures for the development of safety analysis reports (SARs), authorization agreements, and fire hazards analyses to ensure consistency in the analysis and control of hazards at nuclear facilities. These institutional procedures provide direction, consistent with applicable DOE orders, for hazard analysis and control at the facility level. For example, MCP-2449, *Nuclear Safety Analysis*, provides company-wide requirements for preparing nuclear safety analysis reports pursuant to DOE orders for SARs (DOE Order 5480.23) and technical safety requirements (DOE Order 5480.22). The procedure requires a graded approach in the level of analysis based upon the hazard classification of the applicable facility. MCP-3567, *Authorization Agreement with Authorization Basis List*, provides instructions for preparing formal agreements between BBWI and DOE specifying the safety conditions under which DOE authorizes BBWI to operate each INEEL nuclear facility. The process specified by this procedure is consistent with DOE Guide 450.4-1, *Integrated Safety Management System Guide*, and DNFSB Technical Report 19, *Authorization Agreements for Defense Nuclear Facilities and Activities*. MCP-579, *Performing Fire Hazards Analysis*, provides requirements for identification and evaluation of

Construction at Scoville Power Station

fire hazards at nuclear facilities as required by DOE Order 420.1, *Facility Safety*. MCP-553, *Stop Work Authority*, authorizes all personnel, from senior management to the workforce, to stop work and clarify requirements before an unsafe situation develops. POD-12, *Engineering Design*, and MCP-2811, *Design and Engineering Control*, provide an adequate engineering change control process (although these procedures were not adequately implemented in the case of the CPP-684 RAL ventilation system deficiencies discussed later in this section).

Comprehensive fire hazards analyses have been completed for all 27 nuclear facilities at INEEL.

Institutional procedures for safety analysis and control have been effectively implemented at the facility level. For example, BBWI has applied the institutional procedure for conducting fire hazards analysis (MCP-579, *Performing Fire Hazards Analysis*) effectively and has completed fire hazards analyses for all 27 nuclear facilities at INEEL. These analyses provide comprehensive assessments of fire hazards in nuclear facilities that meet the requirements of DOE Order 420.1, *Facility Safety*. Authorization agreements and authorization basis lists are in place for all 27 nuclear facilities in accordance with MCP-3567.

INEEL has an aggressive plan for updating final safety analysis reports (FSARs) and technical safety requirements (TSRs) that has been approved by ID and is being implemented. BBWI developed PLN-489, *Implementation Plan for DOE Orders 5480.23, Nuclear Safety Analysis Reports and 5480.22, Technical Safety Requirements*, which specifies submittal of FSARs for all 27 nuclear facilities by the end of September 2002. FSARs and TSRs for five nuclear facilities were updated from 1992 through 1999, and seven more were updated and submitted to ID for approval in FY 2000. In addition, two new FSARs were prepared and submitted to ID for two new nuclear facilities in FY 2000. According to PLN-489, six FSAR and TSR upgrades are scheduled to be completed and submitted to ID for approval in FY 2001, and the remaining nine are to be completed and submitted for ID approval in FY 2002.

Although an adequate plan is in place and good progress is being made, the current INEEL authorization basis documentation is out of date and does not meet the requirements in the BBWI contract. DOE-approved FSARs currently exist for all 27 facilities, but only five are compliant with DOE Order 5480.23. DOE-approved bases for interim operations currently exist for all 27 facilities, but they have not been updated since 1998. Authorization agreements and authorization basis lists are available for all 21 Hazard Category 1 and 2 nuclear facilities. The lack of current and complete authorization basis documentation adversely impacts the ability to perform USQDs. (See the "Essential System Functional Review" section below for additional weaknesses identified by a detailed review of selected essential systems.)

ID and BBWI recognize that the current authorization basis and other hazard analysis information (e.g., facility hazard lists) are not comprehensive or mature. The work control processes being conducted through STD-101 partially mitigate this deficiency because they include a thorough walkdown of tasks and analysis of hazards that may not be accurately portrayed in the authorization basis. However, some INEEL managers are concerned about inefficiencies associated with these work control processes and would like to see them modified. Because of the deficiencies in the authorization basis and other hazards analysis information, any such changes need to be carefully analyzed to ensure that safety is not degraded.

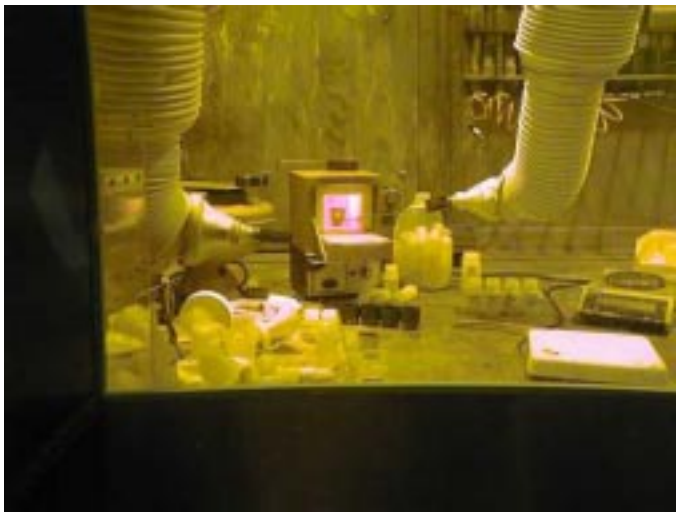
Although most institutional procedures are adequate, deficiencies in MCP-123, *Unreviewed Safety Questions*, have contributed to the failure to identify USQs (see discussion later in this section under "Essential System Functional Review").

Facility and Activity Level

Facility- and activity-level hazard analysis and controls are discussed in Appendix A. This section summarizes the most important results and discusses a safety issue related to the authorization basis.

Most institutional work control processes are effective.

In general, institutional work control processes have been effectively implemented at the facility and activity level through STD-101 and other procedures. Management has conveyed a clear expectation that institutional procedures for hazard analysis and control be followed at each facility for each activity. Work control processes, although sometimes viewed as tedious and time consuming, have generally been



A Hot Cell at RAL at INTEC

effective in identifying and controlling hazards. A good level of compliance was observed during this evaluation. Workers at TAN and INTEC were well informed of hazards in their work areas. Workers participated in pre-job planning activities involving hazard identification, attended pre-job briefings where hazards were discussed, and participated in job walkdowns before the start of work. Posting and labeling for hazard identification and control were observed to be good at both INTEC and TAN. However, the ability to effectively implement the institutional work control processes is hindered by deficiencies in supporting mechanisms, such as poor-quality work packages, job hazard analyses that were not revised to reflect changes in job conditions, and inaccurate equipment and facility hazard lists.

Many of the INEEL processes to ensure that work can be conducted safely prior to authorization have been improved and are working well. With the implementation of the new standards and procedure, these processes continue to improve. However, the combination of scheduling pressures, resource constraints, limited planner experience and training, and insufficient integration of processes has resulted in inaccurate or incomplete work documents being issued to the field. These deficient work documents have consequently resulted in near misses by subcontractors, delayed work activities pending revision of work documents and hazard controls, and an overreliance on pre-job briefings and workability walkdowns to identify and correct planning deficiencies. A safety issue involving work planning was identified involving work planning processes and organizational interfaces.

ISSUE #2: BBWI and construction subcontractor work planning processes and organizational interfaces have not always been effective in ensuring that all work is adequately defined, that all hazards are identified, and that necessary controls are specified before work documents are issued, as required by DOE Policy 450.4, *Safety Management System*.

As discussed below and in Section 2.8, work planning deficiencies, including deficiencies in hazard analysis and control, were most evident in construction work performed primarily by subcontractors. However, there are similar deficiencies to a lesser extent in maintenance and research activities.

Construction. Work planning for construction projects is often hindered by work scopes that are too broad, insufficiently documented hazard evaluations, inconsistent safety and health requirements, and cumbersome training documentation that precludes readily assessing personnel qualifications to perform work.

- The definition of work for complex construction projects performed by BBWI subcontractors is often too general or too broad to clearly define the work, and hazards and controls are not always identified to reflect changing job site conditions and various stages of the construction project.

- Some hazard evaluations and controls are inconsistent with the current work activities. For example, some rescue plans for confined-space work (e.g. C-40 valve box construction) have not been updated to reflect changes in construction, and cannot be implemented as written. Some job safety analyses (JSAs) are not kept current with changing hazards encountered at the worksite. For example, the JSA for the Building 651 vestibule project identified confined spaces, excavation, and heat stress hazards associated with electrical work, which were no longer present.

- Organizational interfaces were not effective at the Scoville substation, where a construction contractor inadvertently placed an FM-200 fire protection system on line before the system was fully tested and without notifying the workers in the area of the additional hazards associated with a potential inadvertent system discharge. (FM-200 fire protection systems are significantly less hazardous

to workers than CO_2 systems because discharges at design concentrations are not lethal and do not obscure visibility in the way that CO_2 does; however, an unexpected discharge could result in physical hazards to workers in the area, such as causing falls from ladders). As discussed under Guiding Principle #2, organizational interfaces are a generic problem that BBWI is working to address.

- Some ES&H requirements have not been kept current or are not followed. Two sets of institutional ES&H procedures for similar requirements resulted in some inconsistent control requirements for the same hazards. Some ES&H procedural requirements were not followed (e.g., welding requirements as described in PRD-2010). Requirements and controls associated with new hazards are not always identified and documented in the construction work package. For example, hazards associated with welding and dust were not adequately evaluated or documented in accordance with procedures.

- Training and qualification programs for some subcontractors lack rigor and do not facilitate supervisors' verification of qualifications prior to performing work. In addition, several subcontractors did not meet training requirements for the work they were performing.

- The construction work planning process does not facilitate incremental documentation of lessons learned and post-job reviews in the construction work package. For example, subcontractors typically conduct only one post-job review for a project that can last months and include a series of stages. Conducting only one post-job review for lengthy construction projects is likely to miss some key lessons learned along the way.

Maintenance. Deficiencies in the preparation of work packages, RWPs, procedures, and work instructions for some maintenance and operational work adversely affected readiness to perform work for maintenance and operations (see additional details in Appendix A).

- Information on the work control form, the Passport computerized work control system, the Passport RWP system, and STD-101 is not well integrated. The resulting inconsistencies lead to an inability to follow parts of STD-101 as written, a lack of integration of RWP information with work instructions, unused fields in work packages, and unclear statements of scope.

- Several jobs that were on the plan of the day and released for work were stopped due to deficiencies in the approved work packages. Sitewide systems supporting the work control process, such as the master equipment list, JSAs, facility hazards list, and chemical inventory database, were not up to date and fully usable by work planners.

- Some maintenance work planners lacked experience, training in ES&H disciplines, and/or guidance for planning work activities to ensure appropriate hazard identification and analysis, and inclusion of needed controls.

- Although the need is recognized, a work planners guide has not yet been developed and implemented to supplement the integrated work control process and provide additional guidance on the details of job planning.

Research. Research work planning, while generally thorough and methodical, lacks sufficient documentation to define facility-level planning processes, and some controls are not adequately identified or incorporated into the independent hazards review (IHR).

- Although IHR protocols have been established for research conducted in Building 637, these protocols are not adequately documented in laboratory instructions.

- Some administrative controls for research projects were not adequate or were insufficiently defined (e.g., hydrofluoric acid and beryllium training).

- In some cases, unreviewed safety question (USQ) safety evaluations in IHR packages lacked technical justifications to support the screening decisions.

Notwithstanding these deficiencies, the construction, maintenance, and research work observed by the Oversight team at INEEL was performed safely. In many cases, the work authorization processes were

successful in identifying the conditions noted above and stopping work to reevaluate the hazards and establish additional controls. However, the collective significance of the identified deficiencies warrants timely management action, with particular attention to the up-front planning stages of the work planning process and subcontractor performance. INEEL recognizes some of the weaknesses in work planning activities, and corrective actions are under way. For example, to improve construction work planning, INEEL is revising STD-101 and is addressing several of the aforementioned deficiencies. In addition, INEEL is upgrading the Passport system, obtaining additional experienced work planners for some facilities, and developing a work planners guide.

Essential System Functional Review

The functional review of essential systems focused on the fire protection systems at RAL and INTEC, and the Scoville substation. INTEC and RAL have a number of essential systems, including ventilation systems for the hot cells and various fire protection systems (a water deluge system and a dry chemical system designed to extinguish fires in the RAL hot cell). As discussed earlier, the Scoville fire protection system uses FM-200, which is significantly less hazardous than CO_2 systems.

Work on Electrical Equipment at Scoville

Scoville. At the time of the Oversight evaluation, the Scoville substation was undergoing modification as a result of problems found during acceptance testing. The initial design specifications for the FM-200 system were clear and well defined. However, the subcontractor's final system design, as installed, did not meet the initial design requirements. Some of the problems with the system design were discovered during the FM-200 acceptance test performed in March 2000. The test was designed to verify that the FM-200 fire protection system functions as intended. Major components of the acceptance test included a battery test and a full system discharge test.

The FM-200 acceptance testing was comprehensive and effective. The full discharge test requirement exceeded industry practice for testing similar installations. During acceptance testing, the discharge test identified a failure mode and effect that resulted in two FM-200 cylinders discharging to the cable trench, resulting in a concentration of FM-200 in the trench above the lowest observable adverse affect concentration level of 10.5 percent delineated in the design specifications; the acceptance test resulted in identification and correction of this potential life safety issue. In addition, the battery acceptance test revealed that the battery would not support system discharge after powering the alarm/detection system for 60 hours. Because of the thoroughness of the test criteria, significant electrical and mechanical manufacturer design flaws were identified and have been corrected in the as-built system.

Some equipment in Scoville substation is required, by DOE orders, to be protected by redundant fire suppression systems (construction began to turn these systems over to BBWI operations control in July 2000). However, this equipment is not currently protected by any automatic suppression systems or adequate compensatory actions. Neither the FM-200 nor the sprinkler system in the area is in service, and the only compensatory measure in place is a fire watch established during the Oversight evaluation. A plan addressing fire protection during the transition was not developed. Additionally, the fire department pre-fire plans do not address the new addition to the Scoville substation. Although construction stored some fire extinguishers in the area, no BBWI fire extinguishers were in the area.

INTEC and RAL. With a few exceptions (discussed under Safety Issue #4), the systems

reviewed were adequately designed to perform their safety-related functions. Corrective maintenance on the fire protection systems is effectively prioritized, and the scope of the maintenance work is delineated in organized work packages and adequately communicated to workers through pre-job briefings. Timely corrective maintenance and low backlogs indicate a high priority on fire protection systems. The scope of work for preventive maintenance and surveillances on the fire protection systems are also effectively defined and scheduled. Recent BBWI assessments identified inadequate surveillances on authorization basis equipment, such as smoke dampers, fire barriers, emergency lighting batteries, and certain water sprinkler pipes and fittings. Management is addressing these deficiencies with adequate corrective action plans. The previous backlog of surveillances was brought up to date during this Oversight evaluation.

Work on the fire protection systems at INTEC and RAL is generally well analyzed for hazards. For routine work, such as surveillances and preventive maintenance, the hazard analysis is adequately performed during the hazard review process associated with procedure development. For corrective maintenance, the site work control process governs the hazard analysis for specific jobs. For the fire systems work packages that were reviewed, the hazard analysis was comprehensive.

The approved procedures for operating and testing the INTEC and RAL fire protection systems generally provide adequate controls for the existing hazards. Fire protection instrument calibration procedures are detailed and comprehensive. Utility operations and test procedures for the firewater distribution system were clear, concise, and technically accurate. Although only recently implemented, fire department pre-fire plans and RAL procedures for operating the filter firewater (deluge) systems are adequate. Maintenance work packages and pre-job briefings are generally complete and communicate the established hazard controls to the workers.

In addition to the safety issues described later in this section, weaknesses were evident in some aspects of configuration control and other hazard controls at INTEC and RAL:

- **The Program Description Document, PDD-1083, *Main Water Distribution System for the INTEC Area*, is incomplete.** This document (February 2000) describes the features and requirements of the INTEC main water distribution system. However, it lacks data on water demand requirements (including the largest fire suppression system demand), the calculated density, the required water supply for a 120-minute duration event, and the worst-case water supply (considering domestic and firewater use).

- **Deficiencies were noted in configuration control of essential drawings.** Following the 1998 CO_2 accident, INEEL revised drawing control procedures to ensure that essential drawings are identified before changes are implemented in the field and that drawings are updated after system modification. The fire system plot plan drawing is an essential drawing and is required to be consistent with the current as-built configuration. During walkdowns of about 20 percent of the system, evaluators identified that two separate projects removed three valves from the firewater system; however, the essential system drawing was not marked for revision or updated.

- **Inadequate valve labeling and component tags could cause errors in valve operation and lockout/tagout.** Harsh weather has degraded outdoor labeling to the point that several post-indicating valve labels are missing. Additionally, configuration control was deficient on a test loop return valve that was not locked or otherwise controlled to prevent inadvertent operation as required by National Fire Protection Association Standard 20.

In addition to these weaknesses, the review of essential systems identified two safety issues related to configuration control and the authorization basis.

ISSUE #3: ID and BBWI have not ensured that the process for performing USQDs meets the requirements and standards of DOE Order 5480.21, *Unreviewed Safety Questions*, with respect to screening criteria and guidance for documenting safety evaluations. BBWI has not consistently implemented the USQ process, thereby compromising the authorization bases for nuclear and applicable non-nuclear facilities as stipulated by procedure MCP-123, *Unreviewed Safety Questions*.

Although most institutional procedures are adequate, deficiencies in MCP-123, *Unreviewed Safety Questions*, have contributed to the failure to identify USQs, some of which may be positive (a positive USQ means that there is a potential for a decrease in the margin of safety described in the authorization basis). This procedure was reviewed and approved by ID and issued to ensure consistent implementation of the requirements of DOE Order 5480.21, *Unreviewed Safety Question Determination*, at all INEEL site areas. However, certain aspects of the procedure are deficient, and the procedure has not been effectively applied when required in some cases:

- **The INEEL screening criteria specified by MCP-123 are inconsistent with DOE Order 5480.21 and application of these criteria does not provide adequate assurance that USQs will be identified.** DOE Order 5480.21 provides guidance for using screening criteria to eliminate the need for more detailed and more time-consuming safety analyses. The screening criteria in MCP-123, however, are not consistent with the DOE guidance in that they do not comprehensively address the range of relevant questions in the guidance, and they permit application of screening criteria to physical modifications to the facilities (a practice specifically identified as inappropriate in the DOE guidance). As a result, there have been a few instances where INEEL has failed to perform required safety evaluations. For example, a USQD screening performed in 1999 for replacing two INTEC standby diesel generators with an alternate generator of a different configuration did not identify the effect of this change on the RAL safety basis because the specific set of questions used for the screening did not include a relevant question. The USQ screenings for this change were not sufficiently comprehensive, did not discuss the bases for the negative response, and did not address other potentially affected facilities.

- **INEEL did not apply screening criteria or safety evaluation criteria to a facility condition that potentially involved USQs at INTEC.** A 1995 memorandum noted that required fire doors were not in place in the RAL and provided a justification as to why the facility condition was acceptable for an engineered safety feature review being performed at that time. This deficiency was noted again in an engineered safety feature review performed in September 1999. In addition, a July 2000 fire hazards analysis of the RAL, CPP-684, revealed that fire barriers, fire doors, and smoke dampers were not being tested. Although this equipment is described in the SAR, these findings were not screened or evaluated as a potential USQ as required by DOE Order 5480.21 and MCP-123. Although INTEC did not use information in the fire hazards analysis in the USQ screening process, other INEEL facilities, such as TAN, appropriately considered fire hazard information.

- **INTEC procedures do not ensure that sufficient documentation is maintained.** For INTEC, neither PRD-113 nor MCP-123 establishes detailed guidance or instruction on how to perform a safety evaluation, nor do they provide guidance on the detail necessary to document the evaluation, as required by DOE Order 5480.21. Also, some INTEC safety evaluations do not include sufficient information for determining whether or not a USQ exists. For example, the safety evaluation package for the modified source term for the Calcined Solids Storage Facility did not include calculations and modeling of a new source term that were used to determine that the accident dose remained within the INEEL guidelines.

- **USQ processes did not provide adequate technical justification for not analyzing new hazards.** A USQ screen performed for a project that involved beryllium in the Idaho Chemical Processing Plant Building 637 indicated that no new hazards were introduced. However, it did not identify beryllium as a hazard that could impact worker safety and did not provide a technical justification for the adequacy of the systems to control beryllium hazards. As a result, beryllium is not described in the DOE-approved authorization basis document for that building.

INEEL management recognizes the need to improve the quality of USQDs. Although the specific weaknesses noted above had not been previously identified, recent BBWI internal reviews had identified the need to strengthen performance in the USQ area, and corrective actions have been scheduled.

ISSUE #4: BBWI has not maintained configuration control of essential systems at the INEEL RAL consistent with the provisions of DOE-approved authorization bases as required by DOE Order 5480.23, *Safety Analysis Reports*.

Several aspects of the RAL essential systems have not been maintained consistent with the current authorization basis. BBWI identified five inconsistent conditions during preparatory assessments in the two weeks prior to this focused safety management evaluation. In addition, the Oversight team identified other inconsistencies during the evaluation, including:

- Two standby diesel generators protecting the RAL and described in the DOE-approved INTEC authorization bases were replaced with a single alternate generator in a different configuration. In the new configuration, the function described in the RAL authorization basis is not assured.

- Smoke detectors were not installed in the RAL ventilation exhaust system as described in the DOE-approved authorization basis. These smoke detectors were never required by the original design specification and may reflect an error in the RAL safety basis.

- The control circuit for a warm air supply fan in the RAL was not configured to shut down the supply fan under all operations and conditions in the event of a fire as described in the DOE-approved authorization basis.

For the items identified prior to the evaluation, adequate compensatory measures have been put in place while the site evaluates the conditions through the USQ process. BBWI is also evaluating the safety impact of the items identified by the Oversight team through the USQ process, and some compensatory actions have been initiated. However, the number of inconsistencies discovered over a period of a few weeks indicates significant problems in configuration control with respect to the authorization basis. In addition, the as-built systems did not meet all of the design requirements specified by the authorization basis.

Summary. Strong management commitment to improving hazard analysis and control is evident. Significant initiatives have been undertaken and are continuing. These initiatives have improved workers' understanding of the hazards and controls associated with their assigned work. Management has clearly conveyed expectations for compliance with procedures, and the workforce understands these expectations. However, the effectiveness of processes for hazard identification and control is hindered by the lack of up-to-date supporting documentation, such as FSARs and facility hazard lists, and inconsistencies between the authorization basis and actual facility conditions. In addition, the USQ procedure has deficiencies and has not been effectively applied in several cases. Further, work planning processes have not been consistently effective, contributing to events and near misses. Deficiencies are also evident in essential systems, indicating weaknesses in configuration control. INEEL management generally has a good understanding of the remaining weaknesses and has ongoing initiatives to address them, such as efforts to update authorization basis documentation and strengthen safety evaluations.

2.7 Operations Authorization

GUIDING PRINCIPLE #7: The conditions and requirements to be satisfied for operations to be initiated and conducted shall be clearly established and agreed upon.

Line management must ensure that operations are authorized using established mechanisms for developing and maintaining authorization basis documentation that clearly delineates the terms and conditions for authorizing site, facility, or activity operations. DOE has the ultimate responsibility for ensuring that all operations at DOE facilities are reviewed and authorized at a level commensurate with the hazards and that work authorization processes are established by the contractor. DOE and the contractor must confirm readiness to implement safety controls before starting work, and ensure that DOE personnel, contractors, and subcontractors execute defined requirements in such a manner that workers, the public, and the environment are protected from adverse consequences.

Processes for Confirming Readiness to Perform Work

INEEL line management has established and implemented formal processes to confirm that facility operations and work activities are prepared before authorizing operations and work activities to start. BBWI Site Operations has implemented systems of

procedure development, review, validation, walkdowns, pre-job and pre-evolution briefings, and schedules (plans of the day and plans of the week) that ensure readiness to start work. A BBWI procedure (MCP-2783, *Startup and Restart of Nuclear Facilities*) delineates requirements and mechanisms to guide startup and restart of the INEEL nuclear facilities. Maintenance work planning activities have undergone many changes and improvements since implementation of Standard 101, *Integrated Work Control Process*. STD-101 has been through six revisions in the last 14 months as experience has been gained in using the comprehensive process.

Formal work authorization processes are in place.

Formal processes and requirements have been established for authorization during each phase of a project. For example, during the conceptual design phase, field investigations and a preliminary hazard review is conducted by the project team in accordance with MCP-2863, *Construction Work Coordination and Hazard Control*. As part of the project's execution phase, the project team is also required to conduct and document a "construction readiness to proceed" review with affected organizations in accordance with MCP-2514, *Management of Construction Projects*. For construction work (i.e., subcontractor readiness to proceed), a job site walkdown, a hazards review, and a review of the work control documents (e.g., JSAs and RWPs) is conducted to ensure that proper controls have been established for the hazards at the job site. Construction project turnover and acceptance requirements for the transfer of projects (i.e., buildings and systems) from the construction subcontractor to the facility manager are defined in MCP-2869, *Construction Project Turnover and Acceptance*.

Scoville Substation

The hazard reviews for the Scoville project show that, with some exceptions, hazards and controls were adequately identified for the job site, and system operability testing was comprehensive and effective in uncovering system design issues requiring additional modification. At other facilities, the processes to confirm readiness to work often identify hazards or conditions that were not adequately identified in the work packages because of the weaknesses in the work planning process (see Guiding Principle #6).

Processes for Authorizing Work

Line management has established work authorization processes that formally authorize facility- and activity-level work with the level of review and approval based on the risk of the activity. The processes include STD-101, *Integrated Work Control Process*, for maintenance and construction work; MCP-3571, *Independent Hazard Review*, for research and development work; and MCP-3562, *Hazard Identification, Analysis, and Control for Operational Activities*. Environmental and D&D work are covered by STD-101, with additional requirements imposed by MCP-3480, *Environmental Instruction for Facilities, Processes, Materials, and Equipment*. With some exceptions (discussed Appendix A), the process provides adequate guidance and integration for the various work activities performed on site.

INEEL facilities formally approve work activities after verification by facility managers that conditions are still appropriate to conduct the scheduled work. For example, STD-101 requires the operations/facility manager to perform a conduct-of-operations review and approve work immediately before it commences, even if that work has been authorized and listed on the plan of the day. Within all work authorization procedures, responsibility and accountability requirements are clearly stated for facility managers, job supervisors/foremen, and workers to verify that all conditions are satisfactory before actually commencing work.

Facilities at INEEL use formally approved plans of the day and week as an authorizing document to perform work. Work that is not on the plan of the day cannot commence without formal approval and addition as emergent work. Some routine, low-risk work that is not on the plan of the day can be performed, but

must be authorized verbally on a daily and case-by-case basis. Work observed by the Oversight team was authorized at the appropriate management level (although the FM-200 fire protection system was inadvertently placed in service due to errors by the subcontractor and deficiencies in the controls).

Performing Work

The quality and completeness of jobs and evolutions have improved because of the enhanced pre-job briefings and increased management attention. BBWI has established formal procedures (STD-101) and implemented formal comprehensive checklists that enhance the pre-job briefings. Participation by Site Area Directors, deputies, and department managers in day-to-day operations and pre-job and pre-evolution briefings was evident.

A commitment to perform work safely is evident.

Managers, supervisors, and workers all demonstrated a commitment to meet management's expectation to do work safely, and to be willing to stop work if there were questions about safety. The stop-work concept is ingrained throughout all levels of the organization. For stop-work situations, INEEL has good processes for ensuring that work is resumed only after questions have been resolved, safety is verified, and appropriate authorization to resume work is granted. For example, resumption of work after an event at TAN involving an arc-strike was based on a comprehensive restart checklist that examined the event and the generic applicability to all similar operations.

Summary. At the facilities observed, supervisors and workers performed work activities safely and consistent with the requirements of the INEEL and facility work control processes, work packages, and procedures. Approved technical procedures guided operational activities that were performed in accordance with the approved plan of the day. Managers and workers exhibit a strong safety culture and observed safety rules and practices. Procedural adherence, a noted concern across many DOE sites, was good. The verification procedures, such as walkdowns of the job before it commences, often identify hazards and conditions that were not adequately identified during earlier because of weaknesses in the work planning process.

2.8 Summary Evaluation of the Core Functions

DOE Policy 450.4, *Safety Management System Policy*, defines the five core safety management functions that provide the necessary structure for any work activity that could affect the safety and health of the public, the workers, or the environment. The functions are applied as a continuous cycle, as shown in Figure 4, to systematically integrate safety into the management of work practices at the institutional, facility, project, and activity level for all work.

Because of the close relationship between the guiding principles and the core functions, some ID and BBWI institutional processes for implementing the core functions have been discussed under the applicable guiding principles. Within the framework of the core functions, the Oversight evaluation of safety management at INEEL focuses on the application of the core functions at the facility, project, and activity levels. The following paragraphs summarize INEEL performance with respect to the five core functions. Detailed results are presented in Appendix A.

Core Function #1 - Define the Scope of Work. Implementation of sitewide and facility requirements and procedures generally resulted in the appropriate identification, prioritization, and definition of project, construction, operations, maintenance, and research activities. Managers, supervisors, and workers generally understood the scope and limitations of work activities. However, in some cases work scopes were not clearly stated or work instructions were not defined to the level of detail necessary to allow proper completion. Work breakdown structures for some subcontractor construction projects were too broad to equate specific hazards with the broadly defined work steps. However, processes in place, such as planning walkdowns, pre-job briefings, and workability reviews, ensured that work was not initiated until work instructions were sufficiently defined and appropriate controls were in place.

Core Function #2 - Analyze the Hazards. Activity-level hazard analysis processes for operations, maintenance, construction, and research are defined and implemented at TAN, INTEC, and the Scoville substation in accordance with established INEEL hazard analysis processes. Technical procedures used by operations and laboratory chemists incorporate a thorough and disciplined hazard evaluation process. However, outdated or inaccurate support documents hinder some hazard analysis processes. In other cases,

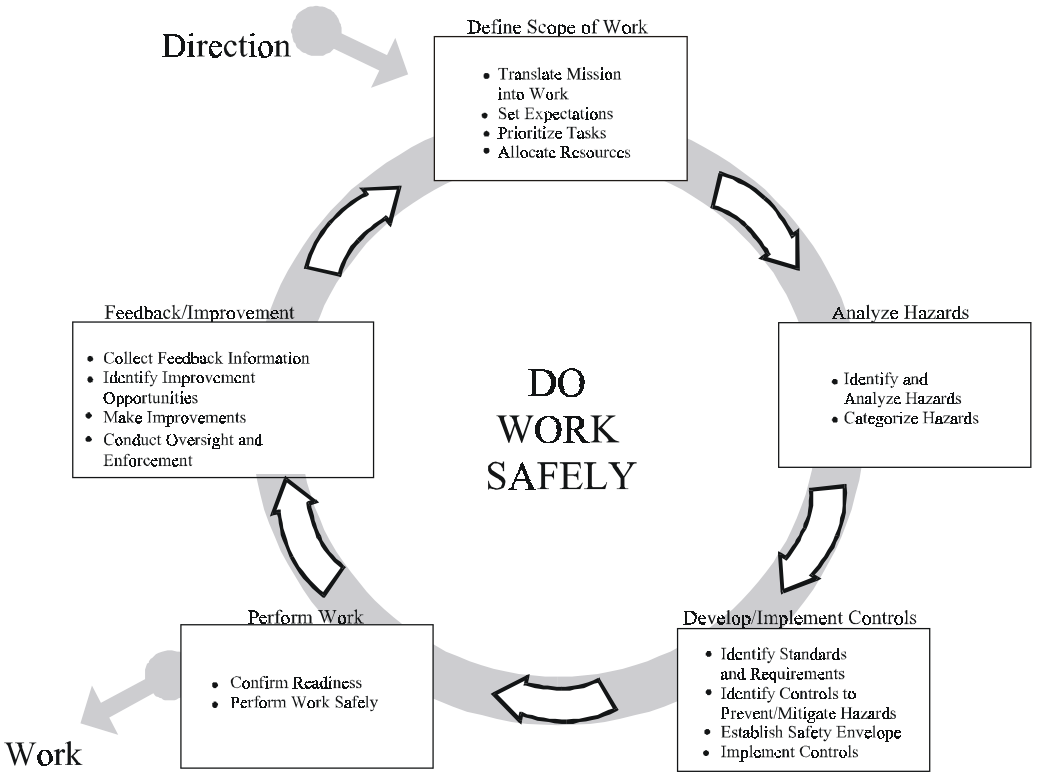


Figure 4. Core Functions of Safety Management

the technical basis for the hazard analyses and/or the hazard evaluations is not adequately determined or documented. Facility hazard lists and chemical inventories, which are used by maintenance work planners to identify hazards, do not reflect all facility hazards. JSAs that are also used by work planners, line managers, and maintenance and construction workers to identify activity-level hazards are not consistently controlled or updated, and in some cases do not identify or document all the pertinent activity hazards. The independent hazards review process, like the hazard evaluation group process, is effective in identifying and analyzing hazards associated with research work. However, supplementary hazard identification processes, such as USQD screening, are deficient and need review to ensure consistency with DOE orders. While most activity-level hazards at these sites are sufficiently identified, analyzed, and documented, several radiological, industrial hygiene, and/or industrial safety hazards were missed.

Core Function #3 - Develop and Implement Hazard Controls. The INEEL processes of defining and implementing controls at TAN, INTEC, and the Scoville substation are generally effective for controlling projects, operational activities, research and development, and maintenance. Management at the facilities has implemented a strong conduct of operations program, which is an important administrative control. Supervisory personnel and the workforce demonstrated a safety-conscious attitude (i.e., a safety culture). Environmental considerations are considered through checklists, requirements, and guidance in management control procedures (MCPs) and the various work control processes. Housekeeping, safety postings (e.g., radiological), and labeling of systems and equipment are generally good. Improvements in waste management process controls have been significant. For example, INEEL reduced Resource Conservation and Recovery Act (RCRA) violations from 110 in 1997 to 10 in 2000. In most cases, hazard controls are clearly defined in work documents, and safety professionals and discipline subject matter experts are appropriately involved. However, several common weaknesses in the work planning process were noted across the facilities. At TAN, these deficiencies resulted in work packages that were not sufficiently complete and caused work delays or stoppages on several jobs. At INTEC, there were deficiencies in documenting controls in operational procedures, research packages, and beryllium and hydrofluoric acid training. Maintenance planners at both facilities require more guidance in incorporating controls into work packages. Controls

for construction subcontractors need to be more clearly defined. Work packages and JSAs are not fully consistent with the requirements in program requirements documents and procedures. Deficiencies identified in configuration control, maintaining conditions required by safety documents, and screening of changes identified at INTEC indicate a systemic, sitewide deficiency in configuration management.

Core Function #4 - Perform Work Within Controls. Management presence in the field and worker involvement are evident in INEEL work activities. All physical work observed by the team was performed safely. Plan of the day, plan of the week, job pre-briefs, and workability walkdowns were generally well-structured and were effective in scheduling, reviewing, and authorizing operations, research, maintenance, and construction work. However, the team identified a few problems with work performance, such as inadequate preparation for pre-job briefs and ES&H procedure non-compliance during construction activities. Additional management attention is warranted to correct these problems.

Core Function #5 - Feedback and Continuous Improvement. Many feedback and continuous improvement processes are in use at INEEL. The integrated assessment program is involving more workers and organizations in self-assessment. Refocused and new processes should enhance the scope and increase the visibility of independent evaluations of performance. Workers provided formal feedback on the strengths and weaknesses of work and operations instructions. A sitewide program for capturing, correcting, and tracking ES&H deficiencies is in place. Lessons learned are documented, reviewed for applicability by subject matter experts, and applied in the field. However, these feedback and improvement processes are relatively new, and none are fully effective and mature. Procedural weaknesses and implementation deficiencies remain. Corrective actions for most of the weaknesses (i.e., judgments of need) from the 1998 CO_2 accident and legacy issues have been effectively implemented. However, in some cases, the corrective actions were not effectively implemented or were too narrowly focused to fully address the root causes, resulting in recurrence of similar deficiencies at other facilities.

Overall Assessment of the Core Functions. Although significant progress is evident and major improvements have been made, INEEL processes at the facility and activity level are still evolving and maturing as INEEL personnel gain experience in implementing them. Many aspects of the new processes are effective, such as the stop-work procedure. However, implementation of some of the new processes is inconsistent. The weaknesses are most evident in work performed by subcontractors.

3.0 DOE Implementation of Integrated Safety Management Responsibilities

As discussed throughout Section 2, ID played an integral role in the development and implementation of the ISM program at the INEEL site. This section provides additional information about the effectiveness of DOE line management in implementing their ISM responsibilities.

DOE Headquarters – Office of Environmental Management

In general, EM has provided adequate direction and support to ID and INEEL as the site has worked to enhance safety management in the past few years and implement the INEEL ISM program. EM is actively involved in the processes to establish ES&H priorities and resources at INEEL. EM uses a formal risk-based approach, which includes ES&H considerations, to prioritize projects. EM staffing levels and personnel qualifications have been sufficient to perform their assigned mission.

Within the EM organization, EM-41 (the EM Idaho Office) serves as the EM Team Lead responsible for the INEEL site. This office has primarily responsibility for providing programmatic guidance and direction for INEEL environmental management program and landlord activities, and for ensuring that mission and ES&H requirements are appropriately considered in the Headquarters budget process. EM-41 has maintained awareness of the status of ES&H programs and ISM through a designated point of contact and onsite reviews. For example, EM-41 is knowledgeable of current funding constraints and potential budget impacts on ongoing safety basis activities, and is working to ensure that adequate funding is obtained to ensure compliance with INEEL's Implementation Plan for DOE Orders 5480.23 and 5480.22.

Consistent with the DOE direction to improve safety management at all DOE sites, EM has established a new guideline to emphasize safety and health. On March 14, 2000, EM-1 released a memorandum to re-affirm "expectations for improving safety performance," and directed all EM site Team Leads to strengthen their accountability for safety in their delegated areas of responsibility as delineated in the EM Functions, Responsibilities and Authorities Manual (FRAM). The memorandum specifically requires the site Team Leads to be cognizant of major safety issues and trends, continuously track site safety status, promptly act on problems jeopardizing safety, and take appropriate steps to advance the key safety goals. In response to this direction, EM-41 is in the process of developing a more comprehensive oversight approach at INEEL.

Idaho Operations Office

The 1998 CO_2 accident and a new Operations Office Manager contributed to significant changes in the ID organization and approach to implementing its line management responsibilities. For example, ID restructured its organization to provide better focus on operations and ISM and to more clearly realign ID with site activities. A simplified description of the ID organization and the major responsibilities of key organizational elements are shown in Figure 5.

In addition to providing direction and incentives for contractors to implement ISM, ID has focused on implementing ISM in its own organization. ID senior managers have embraced ISM and strongly supported the benefits of ISM. ID successfully completed the Phase I and Phase II verification of the DOE-owned and operated Radiological and Environmental Sciences Laboratory (RESL). As part of the ISM effort, ID conducted self-assessments and developed numerous procedures for consistent and standards-based management of ESH&QA.

Following the CO_2 accident, ID took aggressive steps to ensure that the previous contractor made timely improvements in safety management. For example, implementation of ISM was established as a contractual performance objective, which provided incentives for the contractor to accelerate ISM implementation. ID

was particularly effective in ensuring that ES&H initiatives and progress were sustained during the 1999 contractor transition. ID took steps to ensure that the momentum that had been achieved was not lost during the contractor transition, such as directing BBWI to preserve the organizational structure and processes that had proven effective under the previous contractor.

ID has established effective mechanisms to communicate performance expectations to its contractors and provide incentives to meet those expectations. ID uses the Program Execution Guidance (PEG) and Performance Evaluation Measurement Plan (PEMP) process to establish programmatic expectations that are evaluated as part of the contractor's award fee determination. ID has used the performance-based contract effectively to sustain and enhance safety in several instances. For example, ID incorporated a complete set of safety requirements into the INEEL request for proposal and the subsequent BBWI contract, and ID staff members have been diligent in identifying changes to DOE requirements, reviewing them for applicability to BBWI, and initiating contract changes in a timely manner.

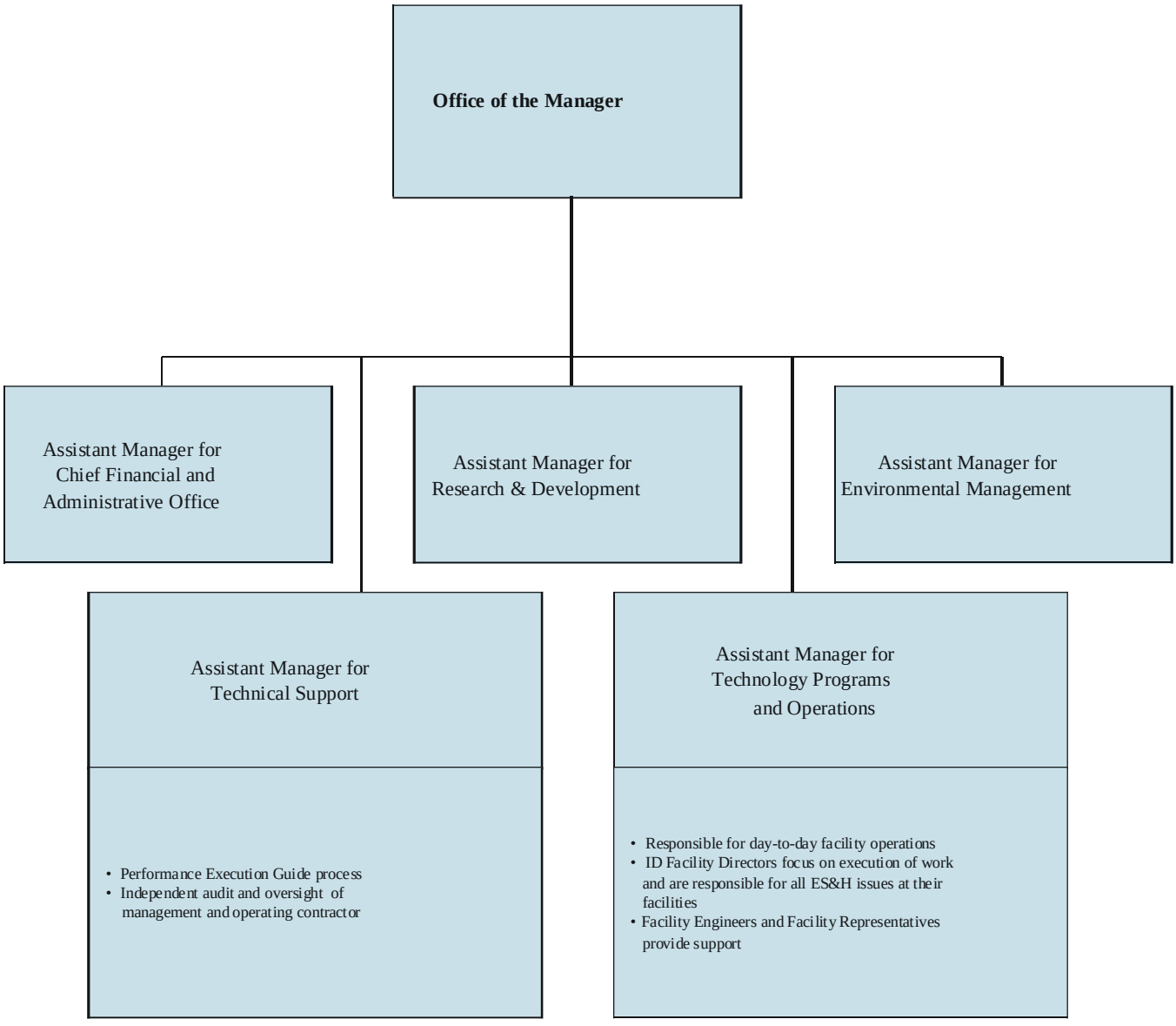


Figure 5. Idaho Operations Office Organization

As part of its ISM effort, ID has developed a comprehensive system for identifying and assigning roles and responsibilities to its managers and staff. The ID FRAM provides a comprehensive definition of the roles and responsibilities for line management organizations and support organizations, including the ES&H and ISM responsibilities. The requirements are clearly defined in various ID documents, such as the ID Program Description Document. For example, ID requires active participation by DOE-ID upper managers in regularly scheduled facility walkdowns to demonstrate to INEEL workers their interest in safe operations.

The ESH&QA Functions, Responsibilities and Authorities Matrix is a particularly effective tool for managing roles and responsibilities at ID. The Matrix is maintained in an electronic database that has extensive sorting capabilities and contains extensive information on DOE directive requirements and the ID organizations with lead and support responsibility for each requirement. Responsibilities identified in the Matrix are reflected in individual employee's position description and their performance agreements.

ID's workforce has substantial experience, education, and qualifications encompassing a broad range of technical disciplines, such as reactor operations and industrial hygiene. In addition, ID recently established a comprehensive, high quality technical qualification program that is soundly based on a systematic approach to training and is consistent with commitments made in response to DFNSB Recommendation 93-3, *Improving DOE Technical Capabilities in Defense Nuclear Facilities*, and Office of Environment, Safety and Health legacy issue 95-6. In general, ID has sufficient staffing and qualifications to effectively implement their safety management and line oversight responsibilities at INEEL. However, ID, like other DOE offices, has undergone significant downsizing (about 25 percent) in the last five years. As a result, shortages have developed in some critical skills, contributing to delays in completing certain responsibilities. For example, as discussed under Guiding Principle #6, 16 SAR revisions/upgrades submitted by BBWI in 1999 and 2000 have not been reviewed or approved by ID. ID has reduced the impact of staff and skill shortages through work prioritization, organizational restructuring, cross-training, and selected new hires.

ID has focused on improving line management oversight of contractor ES&H performance and performance feedback and continuous improvement processes. In general, assessment processes are more formal and rigorous. ID has issued new ID orders and internal implementing procedures providing requirements for oversight functions, and develops an integrated assessment schedule and quarterly line oversight plans. ID has also made significant progress in implementing a self-assessment program, conducting approximately 45 documented self-assessments in FY 2000. The ID issues management system was revised in 1999.

ID was actively involved in all stages of the corrective action process for the CO_2 accident judgments of need and legacy issues, from review of the contractor plan to verification of the adequacy of the corrective actions. ID made appropriate decisions and took sufficient action to verify the completion of corrective actions before closing legacy issues and judgments of need. In a few cases, however, ID closed issues or judgments of need before verifying the effectiveness of actions at other facilities (i.e., other than the facility where the original deficiency was identified). One ID legacy issue related to the training program is still listed as open by ID, pending verification of the effectiveness of ID's new training and qualification program.

Although ID has generally been proactive and effective in the past two years, additional attention is needed in a few areas:

- **The ID process for translating requirements and policies issued by DOE Headquarters into ID policies, programs, and procedures is not institutionalized in a documented procedure**. A documented process is needed to ensure that new and revised DOE directives that apply to the ID staff are formally reviewed and that applicable requirements are clearly communicated to the ID staff for implementation.

- **ID continues to experience delays in its review and approval of authorization basis documents**. Some reports/upgrades submitted in 1999 have not yet been approved, hindering timely implementation of safety basis upgrades by the contractor. ID management is aware that staff shortages are a constraint and is taking action to mitigate the delays.

- **Although ID has significantly enhanced its performance feedback and continuous**

improvement systems, some procedural weaknesses and performance deficiencies remain. FY 2000 surveillance and assessment reports varied in depth and quality. Some ID divisions did not perform the specified minimum number of self-assessments. In several cases, the identification of deficiencies was inconsistent. The new manuals provide generic oversight requirements but do not include specific instructions or planning mechanisms for ensuring comprehensive coverage of all appropriate ES&H areas at the proper frequency based on analysis of risk. Also, management's ability to monitor and manage deficiencies and schedules is hindered by weaknesses in databases, such as the ID issues management corrective action tracking system (ICATS). For example, fewer than 25 of the approximately 35 findings from FY 2000 ID self-assessments could be clearly identified in ICATS, entry of issues into ICATS is sometimes not timely, and some information (e.g., root causes and issue prioritization classification) was not filled in for many issues.

Recent self-assessments of ID oversight program performance have identified a number of program and performance weaknesses and deficiencies, including many of those identified by this evaluation. Corrective actions are being developed to address identified concerns, such as upgrades to databases.

Summary. EM and ID have provided the leadership, direction, and resources to make needed improvements and to enable the successful completion of the ISM verification process. The effective and proactive efforts of EM and ID over the past two years have contributed to major improvements in safety management at INEEL. While some deficiencies remain, EM and ID have a good understanding of the residual deficiencies and have ongoing efforts to address them.

4.0 Overall Assessment and Ratings of Integrated Safety Management

OBJECTIVE OF INTEGRATED SAFETY MANAGEMENT: DOE and contractors must systematically integrate safety into management and work practices at all levels so that missions are accomplished while protecting the public, the worker, and the environment. This is to be accomplished through effective integration of safety management into all facets of work planning and execution. In other words, the overall management of safety functions and activities becomes an integral part of mission accomplishment.

The seven guiding principles and five core functions are interrelated and must be considered collectively with respect to their overall impact on ISM. In evaluating the overall effectiveness of the safety management system, the guiding principles provide the institutional framework for ISM and the core functions provide an indication of whether the institutional processes are effective. Consequently, the overall rating reflects the evaluation of both the core functions and the guiding principles.

In general, INEEL has established effective institutional processes for implementing ISM. Six of the seven guiding principles were evaluated as having effective performance (GREEN). One guiding principle (hazard controls tailored to the work being performed) needs improvement and significant management attention (YELLOW).

Significant progress is evident and major improvements have been made in INEEL implementation of the core functions of ISM at the facility and activity level. However, these processes are still evolving and maturing and are not yet consistently effective. One core function (perform work within controls) was evaluated as having effective performance (GREEN). Two of the core functions (define the scope of work and provide feedback and continuous improvement) demonstrate effective performance in some areas but need improvement and significant management attention in other areas (GREEN/YELLOW). Two of the core functions (analyze hazards and develop and implement controls) need improvement and significant management attention (YELLOW).

Overall, significant improvement in safety management has been achieved at INEEL. Although some deficiencies are evident, ID and BBWI managers have provided the leadership to significantly improve safety and implement ISM.

In general, senior management has a good appreciation of the remaining weaknesses and has ongoing or planned programs designed to further enhance safety management. However, continued attention is needed to address the identified safety issues and ensure consistent implementation of work planning and feedback and improvement mechanisms. Particular attention is needed to ensure that longstanding weaknesses affecting activities performed by subcontractors, such as construction, are effectively addressed.

The ratings are summarized in Figure 6.

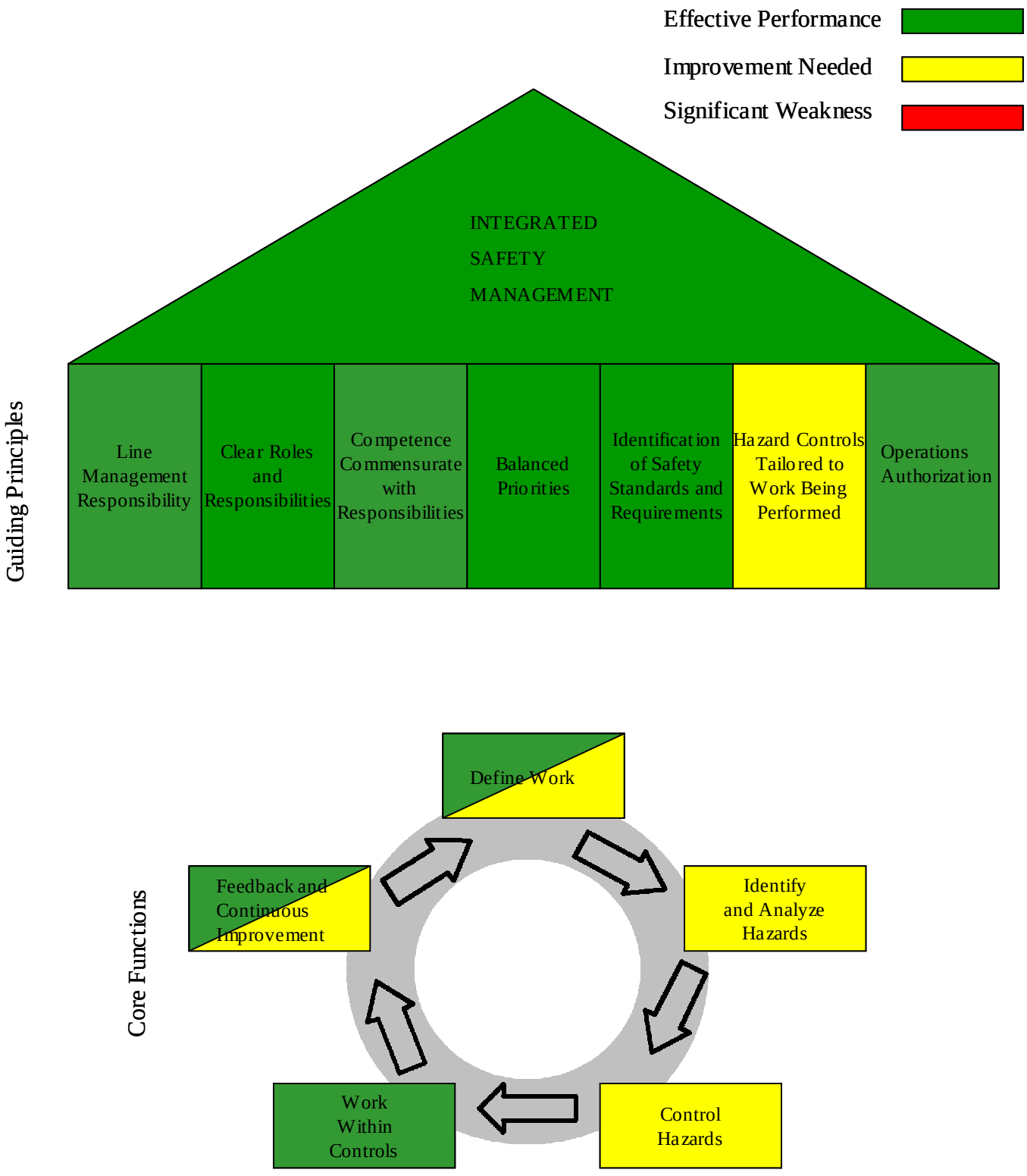


Figure 6. Ratings

5.0 Opportunities for Improvement

Opportunities for improvement are provided to assist line management in identifying options and potential solutions or enhancements to their programs. The responsible DOE and contractor line management should review and evaluate the opportunities for improvement enumerated below, as well as the specific suggested actions listed under each item. However, the opportunities for improvement and suggested actions are not intended to limit the initiative and good judgment of line managers. Line management is ultimately responsible for safety and should use their experience and judgment in developing corrective actions, in accordance with site-specific programmatic and ES&H objectives.

In general, the ISM program and continuous improvement initiatives at INEEL are appropriate to address the residual weaknesses identified on this independent oversight focused safety management evaluation. In most cases, ID and BBWI management have a good understanding of the identified weaknesses and have ongoing initiatives to addressed them. If effectively sustained and supported, the ISM program and ongoing improvement initiatives are appropriate to address the residual weaknesses. The following opportunities are provided to complement the current ID and BBWI initiatives.

1. Strengthen the work planning processes, including the flowdown of ISM hazard analyses and controls to subcontractors, in the following core functional areas: define the scope of work, analyze the hazards, and develop and implement hazard controls.

- Provide continuous assurance that the as-built design, configuration, and operation of systems and equipment essential to safety are consistent with authorization bases and that any deviations are appropriately subjected to the USQ process.
- Expedite development of a planning guide that provides comprehensive guidance to ensure that planners consistently use hazard analysis processes and develop consistent work packages.
- Improve the process for defining construction work, the associated work breakdown structure, and supporting JSAs to allow full identification of hazards and a strong linkage between individual work steps, the hazards, and the controls. Ensure that the process provides for timely updates of the JSAs, work authorization documents, etc., to reflect the changing stages of the construction project.
- Streamline the mechanisms for maintaining up-to-date work planning support processes, such as the facility hazards list, JSAs, chemical inventory list, rescue plans for confined-space work, master equipment list, etc. Implement compensatory measures to ensure that work planners have timely access to identified deficiencies and changes in these documents.
- Ensure that workplace hazards are sufficiently analyzed and documented to technically justify the selection of appropriate controls.
- Integrate and streamline the integrated work control process elements, including the work control form and different versions of the Passport system (radiological control and maintenance), and eliminate unused Passport information from the work package.
- Improve the process for defining and verifying the training required for subcontractors and research personnel to perform work.
- Increase management emphasis on adherence to requirements of the integrated work control and supporting processes.

2. Focus attention on integration of the various documents and procedures that govern construction work involving subcontractors to ensure that they provide coherent direction and guidance.

- Review procedures and modify as needed to reduce the piecemeal direction that causes confusion about assignment of safety responsibility as construction work proceeds through various phases of execution.
- Document project boundaries and organizational interfaces separately for each project, as part of the Project Execution Plan.
- Establish processes for BBWI to verify that subcontractors have a clear understanding of safety boundaries and requirements at project interfaces.

3. Continue management attention and support to ensure that contractor and subcontractor personnel are appropriately trained and qualified commensurate with assigned responsibilities.

- Improve interim, initial, and annual refresher hazards communication training on chemical hazards for hydrofluoric acid and beryllium that is to be provided to all potentially exposed workers and their supervisors, and ensure that course content is reviewed and approved by the INEEL medical department and BBWI subject matter expert.
- Develop facility-specific hazard communication or chemical hygiene plans that describe the specific nature of the chemical hazards as they are used in the facility and the expected manner in which those hazards will be handled.
- Revise the independent hazard review process to ensure that new chemical or biological hazards are not introduced until training requirements are established and implemented.
- Revise program requirement documents to clearly establish subcontractor training requirements identical to those expected of BBWI staff involved in work with similar hazards.
- Require records of all training, qualification, and certification of individual subcontractor employees (e.g., welder certification) to be entered into and accessible from the INEEL Training Records and Information Network (TRAIN) or equally accessible system, before the individual is assigned work requiring those competencies.
- Establish and implement process to utilize TRAIN to record BBWI required training, qualifications, and certifications received from sources external to INEEL, where the competence established can be determined to be equivalent to that which BBWI requires.
- Revise current guidance for BBWI subcontractor technical representatives and subcontractor superintendents to resolve inconsistencies with program requirement documents and to clearly establish expectations for identifying worker training requirements and training status, before workers start the work.

4. Ensure that all BBWI organizations are fully implementing the issues management system as delineated in MCP-598.

- Conduct an assessment to determine whether support/functional organizations such as Site Services and Infrastructure (engineering, construction, and protective services) and EM Programs (environmental restoration, high-level waste, waste management, and spent nuclear fuels) are documenting and dispositioning ES&H deficiencies in accordance with MCP-598.
- Investigate the use of corrective action coordinators, self-assessment coordinators, and review boards to foster better understanding and implementation of the issues management system in non-Site Operations organizations.
- Increase attention to the use of performance data to identify trends and to better focus assessment activities.

5. Improve the rigor and formality of the INEEL lessons-learned program.

- Revise sitewide procedures to specify documentation requirements for the evaluation of

potential lessons learned by subject matter experts, including their applicability to INEEL and any actions deemed necessary. Specify entry of required actions into the ICARE issues management tracking system.

- Revise sitewide procedures to require feedback to the site lessons-learned coordinator and documentation of whether (and what) actions were taken for high-priority lessons learned.

- Develop procedures or instructions at the site area level specifying documentation requirements for the evaluation of potential and issued lessons learned, as well as the corrective actions deemed necessary and corrective actions taken.

- Tailor recommended actions to INEEL organizations, programs, and systems. Designate specific responsible parties.

- Ensure the performance of timely screening, evaluation, and development of complete lessons-learned reports for DOE Type A and B accident investigation reports.

6. Increase efforts to address skill mix and staffing concerns through increased utilization of technical training and qualification programs.

- Within ID, revise the Integrated Safety Management System Guide to resolve inconsistencies resulting from the recent changes in the training program and assignment of roles and responsibilities.

- Use the ID technical qualification program to enhance staff competence and depth in critical skill areas, particularly those where retirements and reassignments are expected.

APPENDIX A
CORE FUNCTIONS OF SAFETY MANAGEMENT

This appendix provides the detailed results of the Oversight evaluation of each of the five core functions.

Core Function #1 - Define the Scope of Work

Missions are translated into work, expectations are set, tasks are identified and prioritized, and resources are allocated.

INEEL has established standard sitewide work control processes for construction, maintenance, research, and operations. These processes include the integrated work control system (STD-101) for construction and maintenance and MCPs for research and operations and environmental considerations. Additional manuals and MCPs support the major work processes and provide additional requirements and guidance.

TAN operational activities are well defined by project plans and approved technical procedures. TAN activities consisted of storing TMI material, dewatering TMI canisters, loading canisters into dry storage containers (DSCs), and performing closure welds on the DSCs, in addition to infrastructure maintenance activities for buildings and grounds. The TMI project scope, goals, and requirements were clearly defined and executed in accordance with project plans. It was evident from management meetings, shift turnover meetings, production meetings, and plan-of-the-day meetings that all personnel clearly understood the scope and limitations of operational work. Managers, foremen, supervisors, and workers were involved in planning walkdowns to ensure that work was properly defined. TAN effectively prioritizes operations and other work activities through numerous daily and weekly meetings.

For maintenance and construction activities, TAN has implemented sitewide STD-101, *Integrated Work Control Process*. Use of the integrated work control process is evolving as the site gains experience and has resulted in six revisions within the past year and a half, with planned major revisions within the next several months. Implementation of the process was not consistent for some maintenance work activities and resulted in work not being fully defined. Inadequate work definition resulted in the need to re-plan some work, including packages that were approved and released for work. Deficiencies in work definition included:

- The defined work scope and work instructions were not always clearly stated in work packages or were too broad. Examples: Work order instructions to cut up a polyethylene tank and another to cut up a wooden box in a high contamination area were not sufficiently defined.

- The work order form and Passport work order system are not well integrated. Radiological control and maintenance/construction use a different, non-compatible version of Passport, contributing to unclear work scopes and lack of integration of radiological control and work instruction requirements.

- The master equipment list for TAN equipment is neither fully up to date nor fully compliant with applicable MCP-2795, *Master Equipment List*, and DOE Order 4330.4B, *Maintenance Management Program*, making it difficult for planners to correctly determine equipment identification, proper nomenclature, quality class, and location.

At INTEC, the sitewide work planning processes for operations, construction, maintenance, and research are well defined in MCPs, and are being implemented. Definition of research and operations work as described in operational technical procedures and research-related independent hazard reviews (IHRs) is thorough and well defined. Processes for defining, prioritizing, managing, and disposing of hazardous waste have also been improved by the consolidation of over 60 environmental procedures into MCP-3480, the establishment of the Waste Generator Services organization, and the implementation of an integrated waste tracking system. Definition of maintenance work at INTEC through the Passport work order system is generally good, although work definition conflicts similar to those at TAN were also evident.

For INTEC construction projects, the definition of work performed by BBWI subcontractors is often too general or too broad to clearly define the work, and associated hazards and controls, for all stages of the construction project. For example, the work scope for the Building 651 upgrade, which consisted of a series of work evolutions (excavation, forming, ironwork, finishing, etc.), was contained in a single work order and construction work authorization. The failure to further define individual tasks resulted in overlapping controls such as RWPs and Health and Safety Plan training that appeared to apply to the entire project rather than a subtask within the project. The lack of a detailed work breakdown and detailed JSAs, which are routinely updated to reflect changing conditions, resulted in hazards and controls that were neither clearly defined nor applicable to the work observed.

As discussed under Guiding Principle #6, as a result of inadequate work definition and the lack of system configuration controls, the FM-200 system was inadvertently placed in service for two to three weeks without the knowledge of the subcontractor, BBWI management, or workers in the protected area. During a wiring change, directed by verbal instructions from a supervisor, a subcontractor worker incorrectly performed a component connection that placed the system in service. The system had not yet passed the acceptance test, and management and workers in the area were not aware that the system was in service. The system remained in service for two to three weeks before a BBWI fire protection engineer discovered the problem. The subcontractor did not implement adequate controls to ensure that newly installed systems remain out of service until they are tested and formally turned over to operations. The FM-200 tanks had no administrative or physical controls to prevent premature connection to the fire protection system. The corrective action from the BBWI investigation—placing BBWI impairment tags on the tanks—was not in accordance with the BBWI impairment procedure because the tanks were still under the control of the construction subcontractor. Additionally, the construction subcontractor did not adequately address causes for the lack of configuration control on energized or in-service equipment and did not implement corrective actions to implement a formal configuration control process.

In summary, work is generally appropriately defined and prioritized, and resources are allocated. However, deficiencies were identified in definition of work for a few facility activities, and some work breakdown structures were too broad or not well defined. These deficiencies were most pronounced in construction subcontractor activities.

Core Function #2 - Analyze the Hazards

Hazards associated with the work are identified, analyzed, and categorized.

INEEL has established processes for analyzing hazards at the site, facility, and activity levels that are implemented at INTEC, TAN, and the Scoville substation. INEEL programs that address hazards across the site are established and implemented in company manuals, MCPs, and the integrated work control system. There are three primary processes for hazard identification and analysis: MCP-3562 for operation activities; STD-101 for maintenance, modifications, and construction; and MCP-3571 for research and development activities. MCP-3480, *Environmental Instruction for Facilities, Processes, Materials, and Equipment*, provides guidance for integrating environmental activities with work control processes. Other MCPs give additional requirements and guidance for specific needs, such as RWPs, confined space entry, safe work permits (SWPs), and JSAs.

TAN effectively uses the hazard identification and analysis processes. The Hazard Identification Matrix (HIM) and the Hazard Evaluation Group (HEG) provide comprehensive guidance for identifying and analyzing work activity hazards. Planning walkdowns, pre-job briefings, and workability walkdowns performed by work planners, foreman, supervisors, and workers provide redundant mechanisms to verify and ensure identification of hazards in the field and to assess and review planned hazard controls. The TAN ES&H staff has been proactive in performing building assessments and piloting a facility hazards mapping database, a second generation facility hazards list (FHL). ES&H support functions are adequately staffed, and personnel are trained and experienced and provide continuous coverage for TMI activities.

Notwithstanding positive efforts to pilot the mapping database, the current TAN FHL, used by work planners, does not include all hazards. Like the FHL, the computerized sitewide chemical inventory for TAN does not accurately reflect all chemicals and compounds stored in some locations. For example, a paint storage room, containing various chemicals including a

carcinogenic paint stripper, was not identified on the FHL, and gallon quantities of lacquer thinner and naphtha stored in Building 636 were not on the chemical inventory list. TAN does not centrally manage other hazard analysis information, such as JSAs, in a manner that ensures that the latest revisions of JSAs are readily available to work planners. Industrial Hygiene has 27 JSAs that are not within the document control system. A central index of all TAN JSAs was not available, nor were there local procedures to guide this process or to address filing and storage of JSAs, how work planners receive information on revised JSAs, and who is responsible for JSA management at TAN.

In addition to planning backlogs and a limited number of work planners, some planners do not have extensive experience and have not had some discipline-specific training. For example, some planners assigned to plan electrical work activities have not had electrical training or training on Occupational Safety and Health Administration (OSHA) electrical requirements.

The planning of TAN radiological work requires more rigor and accountability to ensure appropriate identification of all hazards. During work conducted in the hot shop, TAN radiological control technicians identified unexpected neutron radiation levels. Following an investigation, it was determined that these readings resulted from an unexpected 300 Curie startup americium neutron source from TMI-2 fuel. Although records acknowledged the presence of the source, which was included in the safety basis, the hazard analysis and technical procedures for drying and loading the affected canister did not address the need for additional neutron monitoring or controls. A subsequent revision of the technical procedure included a requirement for neutron surveys of loaded casks.

At INTEC, INEEL processes for analyzing hazards for operations and environmental activities are being implemented at the activity level. The HEG meets regularly at INTEC, and their efforts to identify hazards are thorough, although time-consuming and labor-intensive. For example, the HEG review of the INTEC procedure for the New Waste Calcining Facility scrub system was very detailed and included all applicable disciplines, including operators and the procedure writers. INTEC analytical lab activities also follow institutional hazard analysis processes. Hazards were identified, analyzed, and documented in JSAs and Analytical Laboratory Control Procedures (ACLPs).

Most INTEC research-related hazards are identified, analyzed, and documented using MCP-3571, *Independent Hazard Review*. There are several concerns with the IHR packages. For example:

- The IHR package for beryllium coupon cleaning did not include or reference the SWP, resulting in potential conflicts between the IHR and the SWP. Evidence of similar conflict was also identified by ID staff.

- The authorization basis document for Building 637, issued in 1994, has not been adequately updated. The bounding accident remains a criticality event, although fissile material was removed from the building more than two years ago. However, a moderate hazard facility SAR has been developed in accordance with ID Order 420.D. This SAR, which is in the approval process, downgrades the facility hazard level.

- The authorization basis document does not identify beryllium in Building 637. However, the USQD screening for the beryllium coupon project lacked technical justification to support that the project had not "introduced materials other than those described in the authorization basis for the facility." This concern is typical of the USQD screening deficiencies for other research projects at INTEC.

- There is no documented post-job review process for research work. Elements of post-job reviews may be achieved through the peer review process. A Program Requirements Documents (PRD) on the peer review process is being drafted.

For some industrial hygiene and radiological exposure hazards for INTEC operations, there was insufficient analysis and/or documentation. For example, the technical basis documents for opening waste boxes at the INTEC 1617 contamination control tent did not adequately document that air monitoring and breathing zone air sampling were not required. That type of operation had been previously monitored, yet there was no documented basis for discontinuing the practice, particularly since the Environmental Protection Agency (EPA) waste codes affixed to the boxes indicated that the boxes contained volatile organic compounds. In another example, the risks associated with potential and inadvertent discharges of radioactivity-contaminated water to the INTEC percolation pond have not been fully analyzed.

For maintenance work at INTEC, the hazard identification and analysis process established by STD-101 is comprehensive and effectively used, with some exceptions. Guidance to work planners is lacking for

reviewing or including JSAs, material safety data sheets (MSDSs), and data from the FHLs in the work packages. A number of JSAs are not current. One JSA book used in Building 606 contained several discontinued JSAs and other JSAs that did not have required five-year reviews. As at TAN, some FHLs are not current.

For construction, safety professionals at INTEC routinely perform hazard analyses at construction sites. However, some hazard evaluations, when required by a PRD, are not sufficiently documented in the construction work package using JSAs, SWPs, or other forms of hazard evaluations. For example, some industrial hygiene hazard analyses were not documented to support construction controls at the Building 651 vestibule project. The vestibule project JSA did not identify the potential dust hazard, nor was it evaluated by industrial hygiene as required by procedure. Workers chose to use dust masks for comfort during concrete forming operations. In another example at the same site, an SWP, hot work permit, or suitable hazard evaluation was not documented to support the welding activities as required by PRD-2010, *Welding, Cutting and Other Hot Work*.

In summary, site hazard identification and analysis processes are established and generally result in appropriate analyses for developing hazard controls. However, deficiencies were identified in hazard identification mechanisms, such as the FHLs, the chemical inventory database, JSAs, equipment lists, and the USQ screening and determination process. These deficiencies could impact safety of operations and work activities.

Core Function #3 - Develop and Implement Hazard Controls

Safety standards and requirements are identified and agreed upon, controls to prevent/mitigate hazards are identified, the safety envelope is established, and controls are implemented.

Standard sitewide processes, such as the integrated work control process, operational procedural processes, and research processes, establish facility-level controls at TAN, INTEC, and the Scoville substation. These processes rely on requirements and guidance contained in a number of other MCPs. In part, these include ES&H procedures (lockout/tagout, confined space, etc.), design and engineering controls, configuration management, facility- and activity-level hazard control procedures, SWPs, JSA procedures, and others.

At TAN, the processes for identifying and implementing controls provide an adequate framework for performing work safely. However, weaknesses in the work planning and control processes result in deficient work packages, causing overreliance on pre-job briefings, workability walkdowns, and supervisors/craft to identify work activities that are not ready for work to proceed. Deficiencies in approved work packages that were on the plan of the day and ready for work to proceed resulted in delaying or stopping some work activities for additional planning. This situation challenges the redundant safety barriers that are being relied upon to keep unsafe work from starting.

During work observation and facility walkdowns, general postings and signage (radiological, criticality safety, industrial safety, and conduct of operations) were good. Operator aid postings are current and dated, and they have approval signatures. With few exceptions, TAN technical procedures for controlling TMI operations are detailed, comprehensive, properly formatted, and written in a logical, systematic sequence. Recent management focus on the accuracy and usability of procedures has resulted in the revision of most technical procedures. However, Oversight evaluators identified some deficiencies in the procedure for loading TMI-2 canisters into DSCs, and TAN management took prompt action to correct these deficiencies. A concern was also identified with a TAN local procedure (MCP-3737) that allow the shift supervisor to delete steps in an approved technical procedure without the multi-level approval process dictated by the sitewide procedure governing operational procedures (MCP-2985).

TAN has implemented controls for corrective and preventive maintenance in accordance with STD-101, *Integrated Work Control Process.* Review of work packages indicated that content was consistent with STD-101 requirements and that in-process review and approvals were completed at the appropriate level based on the complexity and risk of the work. Controls specified in most work packages were adequate to mitigate the identified hazards. However, the implementation of the integrated work control process is still evolving, and several programmatic and implementation weaknesses have resulted in deficient work packages being approved and declared ready to work. Collectively, these deficiencies could allow unsafe work to proceed if barriers such as pre-job briefings, supervisory oversight, workability walkdowns, and others do not detect all errors. The deficiencies include:

- Work packages did not contain adequate or complete controls, forcing TAN personnel to stop or delay jobs during the pre-job briefing or workability walkdowns.

- The Passport computerized maintenance management system version for maintenance is different from and not compatible with the radiological controls version, resulting in a lack of integration of work instructions with RWP controls.

- Packages may not be fully job-specific, resulting in the potential for errors during work. Work packages include several parts of Passport modules that are not being used and left blank, even though STD-101 requires completion of those fields. Work packages contain excessive boilerplate hazard information, some of which may not apply to the actual work to be performed.

- Development and application of radiological controls did not always result in controls being tailored to the work being performed. In some cases, there was too heavy a reliance on general RWPs written to cover a broadly defined scope of work.

- Some controls, such as minimizing the generation of airborne activity and contamination control techniques specific to decontamination work, were not adequately addressed by the general RWPs or supporting work instructions. Some general RWPs are used more than planned. One RWP for TAN resulted in a collective dose nearly five times greater than the original authorized RWP estimate.

- Maintenance-related tasks (MRTs) and operation-related tasks (ORTs) are used during radiological work when a documented work authorization or technical procedure may be more appropriate. The Building 666 radiation area monitor calibrations were performed under an MRT with a job-specific RWP, contrary to STD-101 requirements. Hot shop decontamination work was performed in a high contamination area (HCA) using respirators under a general RWP as an ORT. ORTs should be used only where hazards can be mitigated by training and qualification.

- For radiological work in HCAs, respirators and air monitoring are required. However, for contaminated non-HCA areas that may still contain considerable contamination, guidance or thresholds have not been established. Job-specific radioactive air sampling requirements, in some cases, were inconsistent with procedural guidance.

- Some job-specific RWPs are being approved for use without verification and review of requisite documented and approved work instructions. Transport of a spent fuel pool sample to INTEC was delayed due to inadequate integration of operational and radiological considerations in the technical procedure.

- RWPs have a pre-authorized collective dose limit as part of the site's As Low As Reasonably Achievable (ALARA) program. The Radiation Control Information Management System allows workers to continue using RWPs that have exceeded the pre-authorized RWP collective dose. For example, an RWP authorized a 475-mrem total dose but allowed users to sign in even when the accumulated collective dose was nearly 2000 mrem. The accumulated dose also resets to zero when an RWP is revised.

At INTEC, the controls for operational activities are also well defined in technical procedures and are implemented in accordance with established requirements. Controls identified in technical procedures are easy to identify and understand, and they are reviewed by workers, support personnel, and the INTEC ES&H staff. Housekeeping throughout the INTEC facilities is excellent, and inactive buildings are being maintained. Recent improvements in waste management systems, such as the integrated waste tracking system, have increased the rigor of controls for waste handling, tracking, storage, and disposal. Consequently, INTEC met or exceeded the ID waste reduction goals for 1999 and is on track to meet the 2000 goal. For radiological controls, some job-specific controls were deficient due to an increasing reliance on general rather than job specific RWPs. For the Rover (Parker) fuel in the Integrated Fuel Storage Facility (IFSF), the controls under the general RWP were inconsistent with the radiological controls for hold points, job coverage, and monitoring requirements specified in the technical procedure. Additionally, some controls in RAL procedures are not clearly defined.

Controls for INTEC research and development activities are well defined in most research procedures, laboratory methods, and IHRs. For research operations observed in Building 637, most controls were

appropriate for the hazards identified in the IHRs, and the IHR controls were properly implemented. However, some controls were deficient. For example, some waste (e.g. respirators) used in the beryllium coupon testing in Room 137 was not labeled as a potential beryllium hazard in accordance with the intent of MCP-50, *Chronic Beryllium Disease Prevention*. Although a best management practice, fume hoods were not posted as a beryllium operation area. Based on air sampling, the hazard was negligible. However, equipment that could concentrate beryllium dust (respirator filters and fume hood surfaces) and cause potential exposures to maintenance and respirator-cleaning personnel was not posted with sufficient warnings.

Some training programs for research work were deficient. There was no sitewide beryllium training course for workers, and interim training requirements were not adequately documented. BBWI is implementing corrective actions for this deficiency. Although beryllium workers receive a safety briefing and watch a video on beryllium, the training measures are not clearly identified and documented as a company-recognized training course. Additionally, the INTEC training group and the site physician had not evaluated the training. There are also chemical training deficiencies for hydrofluoric acid (HF), used by some researchers in Building 637. Some training on HF is given during the training module on corrosives, but it does not sufficiently address HF hazards or the use, precautions, and limitations of HF Gel kits provided in most laboratories. The site physician was not in the review cycle for HF training. During the Oversight evaluation, this physician reviewed the HF training and found it to be unacceptable.

Controls for maintenance activities at INTEC were clearly identified and implemented through work packages, JSAs, safety permits, radiological permits, and MRTs. Evaluators identified deficiencies in the lack of instructions to maintenance planners for integrating some controls (i.e., JSAs and MSDSs) into the work order packages and MRT. Most hazard controls are implemented as described in construction work packages, JSAs, and permits. The BBWI subcontractor technical representative program has sufficient resources at INTEC to devote significant time to oversight and mentoring of ES&H controls implemented by subcontractors. With some exceptions, subcontractors properly implemented industrial hazard controls for construction activities.

Construction work packages and JSAs are too broad and are not kept current with changing construction tasks to clearly define the work and identify specific controls for each work step that involves a hazard. The lack of integration between work instructions and RWP controls could lead to errors affecting safety. For example, a job-specific RWP had previously been used for excavation activities under a work order, but the specific activities observed were not covered under the RWP. Also, the JSA for electrical work included several hazards (i.e., confined spaces, excavation, and heat stress) that were not applicable at the current stage of the project. Rescue plans for confined-space work had not been updated to reflect construction progress and could not be implemented as written. Although most pre-job briefings are thorough, a pre-job briefing for utilities work involving asbestos removal did not address waste management requirements (a standard item on the pre-briefing checklist that was not checked or initialed).

Deficiencies are evident in some aspects of requirements management for subcontractors. PRDs that govern construction projects are inconsistent with MCPs that govern other sitewide work activities that have the same hazards. For example, the JSA for the Building 651 vestibule requires the subcontractor to utilize PRD-3001, *Radiological Controls*. However, PRD-3001 is a Lockheed Martin Idaho Technologies Company document, last revised on September 1, 1998, and does not reflect the current radiological control program specified in MCPs. PRD-2107, *Heat and Cold Stress*, dated January 30, 1998, does not incorporate lessons learned from a 1999 heat stress incident at INTEC. Corrective actions from this investigation were included in MCP-2704, *Controlling Exposure to Heat and Cold Stress*. The PRDs are not updated as often and do not typically receive the same level of ES&H subject matter expert review as MCPs, creating the potential for inadequate flowdown of requirements and lessons learned to construction subcontractors.

The current documentation of training and qualification records for construction subcontractors is cumbersome and does not allow construction project superintendents to readily assess workers' training and qualification status prior to performing work. For example:

- The computer-based training records do not incorporate some types of training (e.g., INEEL welder test facility training and qualification and union training). Construction project superintendents must maintain and check several training databases to verify subcontractor worker training.

- The PRD training requirements are too vague. For example, PRD-2010, *Welding, Cutting, and Other Hot Work*, requires that workers complete "awareness training," but does not specify which of the many awareness training courses at INEEL is appropriate. Some PRD training requirements do not clearly correlate with an INEEL training course, and line management cannot verify required training.

- Some offsite training courses have not been evaluated for equivalency by the INEEL Training Department. Some project superintendents accept the offsite courses and others do not.

- Some subcontractor workers at the Building 651 vestibule did not have a record of training for required courses for current work activities. A fire watch had no record of training as required by PRD-2010. In addition, the "Construction Work Authorization" required that workers "follow guidelines from heat and cold stress training." Several workers did not have heat and cold stress training. Furthermore, Section SC-26, Training Requirements, of the "Special Conditions for Security Facilities Consolidation LICP (CPP-651, *Door Modifications*) requires hazard communication training, confined space training, lockout/tagout training, Radiation Worker II training, 40-hour hazardous waste operations (HAZWOPER) training, and Health and Safety Plan awareness training. Several construction workers were missing contractually required training .

BBWI construction has also identified a number of construction deficiencies and initiated corrective actions. These initiatives focus on enhancing construction and operations interfaces, addressing construction subcontractor training deficiencies, and revising STD-101 to reflect the incremental nature of construction work and other issues.

JSAs used for work on the FM-200 system addressed most industrial hazards. However, INEEL did not adequately implement some controls associated with maintenance of the authorization basis, and some hazards associated with essential systems were not adequately analyzed. In addition, JSAs did not fully address hazards associated with Halon and FM-200. The JSAs did not address the cryogenic properties of liquid FM-200. Additionally, although the BBWI fire system impairment and lockout/tagout procedures addressed the physical hazards associated with close proximity work to a Halon or FM-200 discharge nozzle during an inadvertent discharge, the JSA process does not address cryogenic hazards. BBWI life safety systems personnel routinely electronically disable the building Halon system to prevent an inadvertent discharge whenever construction personnel are working in the area. The BBWI lockout/tagout procedure requires positive isolation of the energy source rather than just electronically disabling the system whenever a personnel hazard exists from work in close proximity to a nozzle. The construction subcontractor never analyzes this hazard because they believe that the system is sufficiently disabled.

The Halon and FM-200 hazard-training course was comprehensive and covered the hazards of the gases used for fire suppression systems at the site and lessons learned from the CO_2 accident. The course was required for workers in the Scoville substation. Videotapes of actual site Halon and FM-200 discharges (taped during system tests) were used to effectively illustrate the pre-discharge alarms and the environment in the rooms during a discharge.

In summary, work planning processes produce work packages that are deficient in identification and control of hazards, resulting in overreliance on other administrative barriers, such as pre-job briefings and workability walkdowns, to prevent unsafe work. The processes have significantly improved. Management and workforce involvement, conduct of operations, site safety culture, and organizational involvement are good. However, construction, maintenance, and research work control processes are still evolving and require additional improvement.

Core Function #4 - Perform Work Within Controls

Readiness is confirmed, and work is performed safely.

INEEL has effective processes at the project, facility, and activity level to confirm readiness to perform work prior to authorization. Employees are qualified through training and experience to perform assigned tasks and are required to follow established procedures and work documents when executing work. MCP-553, *Stop Work Authority*, provides requirements and expectations for workers to stop work when they recognize safety concerns or unsafe conditions. Facility

managers are responsible for authorizing all work that takes place within a facility, and line supervision is responsible for ensuring that controls remain in place during work execution.

TAN operations and maintenance work approvals and authorization to start work are rigorously controlled using signed work packages and approved technical procedures, listing approved work on the plan of the day, morning production meetings, and plan-of-the-week meetings. Emergent work is approved and formally added to the plan of the day. Additionally, the operations/facility managers perform conduct of operations reviews before giving approval to start work, and the job supervisor/foreman performs a workability walkdown with workers. These extra steps, along with detailed pre-job briefings, have been effective in stopping jobs that require additional review and planning.

Operations and maintenance pre-job briefings at TAN provide detailed discussion of items such as procedural steps, cautions and notes, precautions and hazards, job responsibilities, radiological and quality control hold points, and emergency situations. Supervisors verified required training as part of the briefings. Senior management attended and participated in observed pre-job briefings. The comprehensive pre-job briefings resulted in identification and correction of material, procedural, work package, and logistical deficiencies that could have affected work performance. In a few cases, foremen, supervisors, and craft workers did not thoroughly review the work package and supporting documentation before coming to the pre-job briefing. The lack of knowledge of work package contents by personnel preparing to work on the package detracted from briefing critical steps and associated hazards.

Work is being performed safely at TAN. TAN management has instilled a strong safety culture that is evident at all levels within the organization. TAN managers, including the Site Area Director and deputy, are heavily involved in overseeing day-to-day operations and work activities. Facility personnel complied with all postings and warnings, indicating that safety was accepted and practiced at the working level. Conduct of radiological operations at TAN was generally good, with a few exceptions. Radiological housekeeping in the hot shop and associated boundary control stations was delinquent to the point where it needed correction before scheduled work could start. Full waste receptacles and scattered contaminated tools obstructed work areas.

INTEC maintenance and construction work activities were performed safely and were generally within the controls specified in the work packages. For example, maintenance craft performing a paint-stripping job conducted work safely, within established controls, and with a purposeful intent to minimize the generation of hazardous lead-based paint waste. Likewise, construction work was performed within established controls. A few minor exceptions were noted in the area of ES&H procedural compliance. For example, no signs were posted to designate welding activities and requirements to wear eye protection as required by procedure at the Building 651 vestibule construction site. No SWP or other hazard evaluation for welding activities had been completed. Although dust masks had been in use, no documentation could be found to indicate that the dust hazard and prescribed controls had been rigorously evaluated.

Most technical and analytical lab work, waste management operations, radiological control activities, and routine operator rounds at RAL and at inactive facilities were performed safely and in accordance with requirements. Evaluators observed some deficiencies. For example, operator rounds in RAL Building 684, while disciplined and well documented, failed to correctly identify the status of the building heating, ventilation, and air conditioning (HVAC) fans. The operator/chemist performing the rounds incorrectly assumed that unlighted HVAC fan bulbs implied that the lights were burned out, when the HVAC fans were actually out of service. The team also observed minor decontamination work at IFSF being performed under a job-specific RWP before radiological coverage was in place as required by the RWP.

There were deficiencies with the operation of the INTEC sewage treatment plant. The plant has exceeded the allowed total nitrogen discharge limit for at least 11 of the past 36 months. The ICPP Sewage Treatment Plant Operation and Maintenance Manual has not specifically discussed the operational procedures for nitrogen removal, and the Manual has not been updated or revised since it was drafted in July 1995. Furthermore, the site has made limited progress in addressing the numerous nitrogen discharges in excess of the limits in the past three years. The Site Technical Procedure was not originally designed for nitrogen removal, and INTEC failed to identify and isolate the high nitrogen wastewater source(s) since 1997. The corrective actions to date were not able to bring nitrogen within limits. Neither DOE nor INEEL adequately considered the long-term consequences or potential stakeholder concerns of continued nitrogen discharges in excess of limits. Corrective actions for nitrogen discharges, agreed to by the State of Idaho, have also slipped for several months.

At all facilities observed, supervisor involvement in work activities was evident. Workers were competent and adequately demonstrated knowledge of specific hazard controls. For example, at RAL, operators adequately demonstrated simulated operation of the hot cell fire extinguishing system. At the INTEC fire pumps, utility operators performed rounds in accordance with instructions and performed a diesel fire pump run surveillance safely and in accordance with the procedure. The operators demonstrated adequate knowledge of hazard controls and procedures when questioned about hypothetical abnormal situations.

In summary, all physical work observed by the evaluation team was performed in a safe manner. Management and supervisor involvement in work activities was evident at all facilities. Pre-job briefings and workability walkdowns to confirm readiness to start work were comprehensive. The team identified a few concerns with work performance.

Core Function #5 – Provide Feedback and Continuous Improvement

Feedback information on the adequacy of controls is gathered, opportunities for improving the definition and planning of work are identified and implemented, line and independent oversight is conducted, and, if necessary, regulatory enforcement actions occur.

Assessment Programs

BBWI has made significant progress in establishing and implementing an integrated program providing sitewide consistency in the planning, performance, and documentation of ES&H performance assessments. The descriptions and requirements for the BBWI integrated assessment program are contained in draft Program Description Document (PDD)-1064, Development and Implementation Plan PLN-672, and several implementing MCPs. Numerous assessment vehicles are used to evaluate ES&H programs and performance through self-, management, and independent assessments. A formal process is used to identify assessments mandated by regulations, DOE orders, and BBWI directives. In addition, elective assessments, as deemed necessary, are identified to adequately evaluate ES&H programs and performance. These assessments, as well as scheduled external assessments, are compiled into an integrated schedule that facilitates coordination and consolidation and provides more assurance that sufficient assessment-based feedback is occurring at all levels.

Self-assessments performed by all organizations and functional areas at INEEL form the foundation of the BBWI integrated assessment program. Self-assessments are performed in many different ways, with varying amounts of rigor: surveillances, formal assessments, document reviews, observation of work, and walkthroughs. Self-assessments are performed by individuals, teams, workers, supervisors, and managers. Self-assessment coordinators assigned at each site area provide assistance and direction in the planning, execution, and tracking of assessment activities. A sitewide self-assessment coordinator, reporting to the Site Operations Director, monitors the overall program and promotes consistency and compliance through the site area coordinators. The independent oversight organization performed more than 20 independent assessments of crosscutting subjects in FY 2000. A new independent assessment element, the facility evaluation board, will perform a comprehensive multi-disciplinary review of each site area by teams and is planned for FY 2001. The facility evaluation board will conduct one-week evaluations of ES&H performance using interviews, drills, work observation, document reviews, area inspections, and proctored examinations on the principles of ISM.

Although the integrated assessment program results in a broader based and coordinated feedback system, it is still evolving. The evaluation team identified weaknesses in the rigor and quality of self-assessment planning and execution. Organizations do not have a rigorous process for identifying areas that should be evaluated during elective assessments, or for selecting the schedule and frequency of assessments based on risk and site/facility-specific circumstances. Not all scheduled self-assessments are completed, and many assessments are not substantial. Management has focused attention on monitoring and completing scheduled assessments, but has not devoted sufficient attention to the quality of the products. Many assessments did not have clear lines of inquiry, did not clearly describe what was inspected or reviewed, and did not clearly or consistently describe and categorize findings. Assessment reports did not always indicate whether deficiencies were entered into the deficiency tracking system, ICARE. Several assessment reports were identical except for the dates and signatures. Supervisors are not consistently documenting the review

or approval of assessments before they are transmitted to the self-assessment coordinator. Assessors receive little formal instruction, guidance, or training on the fundamentals and techniques for conducting effective assessments.

Issues Management/Deficiency Tracking and Trending

The framework for an effective issues management system has been established in PDD-1007 and Issues Management Excellence Plan PLN-660. MCP-598 requires deficiencies in INEEL ES&H programs and performance to be documented and processed using ICARE. Separate MCPs detail the requirements for processing issues related to material non-conformance and event reporting. Corrective action coordinators for each area, supported by coordinators in each division, promote consistency and quality in ICARE data input and corrective action plans. Corrective action review boards (CARBs) have been chartered and are functioning at each site area. These CARBs, chaired by the Site Area Director and composed of site managers and the issues management coordinators, meet regularly to critically review and approve proposed corrective actions for deficiencies and to monitor issues management performance. ES&H performance analysis has been enhanced by an extensive and rigorous trending report issued quarterly, with input and oversight by ID.

INEEL has devoted substantial attention and resources to addressing legacy issues and judgments of need from the CO_2 accident, and most have been adequately addressed. For example, the significant weaknesses in the area of requirements management identified in legacy issue EH-95-3 have been properly addressed through ISM and completion of specific corrective actions that involved developing procedures and programs, training employees, and correcting deficiencies identified in a gap analysis. Corrective actions for most of the judgments of need from the 1998 CO_2 accident were also effectively implemented. However, in some cases, the corrective actions were too narrowly focused to fully address the root causes, resulting in recurrence of similar deficiencies at other facilities (see Appendices B and C). The corrective actions for the judgments of need have resulted in major improvements in training, requirements management, hazard analysis, and work planning. However, some work planning deficiencies persist, resulting in events and near misses. These deficiencies indicate that more work is needed to verify that the judgments of need have been fully addressed and that corrective actions have been comprehensive and effective.

Despite the improvements in procedural and organizational administrative controls, deficiencies were observed in documentation, evaluation, and corrective actions that were often inconsistent and incorrectly performed. There are indications that functional and support organizations outside of the site operations organization (e.g., high level waste, construction, engineering, environmental restoration) may not be implementing the site corrective action program as required by MCP-598 and as committed to in CO_2 accident Judgment of Need 3.19. For example, the October 17, 2000, event involving the inadvertent energizing of the FM-200 fire suppression system was not included in the ICARE system, even though a critique was held, a lessons-learned report was prepared, and various corrective actions were taken and planned outside the formal BBWI corrective action system. Site construction management personnel indicated to the evaluation team that the use of ICARE had not been considered and that ICARE had not been used for addressing previous construction-related deficiencies. Failure to capture all deficiencies in the ICARE system hinders and distorts trending efforts and bypasses the procedural controls on classification, management review, tracking, corrective action plan reviews, and verification/validation.

Some self-assessment reports identified concerns that met the criteria for entry but were not entered into ICARE. In addition, some concerns described in the text of the report met the BBWI definition of a deficiency (a deviation from requirements) but were not identified as findings. Weaknesses in the documentation and analysis of deficiencies in the ICARE system were evident, including inadequate description of the deficiency, which can hinder development of complete and effective corrective actions. In some cases, the root causes were incorrect and the specified corrective actions did not address recurrence controls. Some ICARE data fields were not complete, including sitewide implications, potential for enforcement action, near misses, and identification of similar previous occurrences.

The CARB at TAN has identified deficiencies in approximately half of the recent corrective action plans, indicating a need for further training of INEEL managers (and others responsible for developing corrective action plans) in root cause analysis and recurrence control.

Extensive quantitative trending data exists at a sitewide level. MCP-598 requires several types of trending and analysis of issues for recurrence. MCP-3521, *Trending Center*, calls for identifying systemic and crosscutting issues at the INEEL. BBWI has analyzed the issues identified by MCP-3449 health and safety walkdowns (mostly housekeeping concerns) and INEEL Occurrence Reporting and Processing System (ORPS) near misses for adverse trends. However, the required site area and sitewide analysis of ICARE deficiencies to identify adverse trends is not performed, and INEEL is not making sufficient use of the data to identify trends and better focus its assessment activities and training.

ID and BBWI management are aware of most of the weaknesses in the issues management program. They are working toward resolution through the PEMP and the Issues Management Excellence Plan.

Other Feedback Mechanisms

In addition to the assessment program, other feedback mechanisms have been established to provide continuous improvement. The VPP and employee safety teams provide effective vehicles for worker involvement. Other mechanisms providing feedback and continuous improvement information to contractor management include meetings of union safety committees, Site Area Director counterparts, the Executive Council, the Site Maintenance Management Council, the Facility Operations Review and Implementation Board, and the Senior Operations Review Board.

Although substantially improved, pre-job briefings and post-job reviews do not consistently provide the intended level of feedback to improve performance. Formal, documented post-job reviews by workers and supervisors are specified in MCP-3003, *Performing Pre-Job Briefings and Post-Job Reviews*, to provide feedback to work package planners and management after completion of maintenance and modification work. Similarly, a formal post-performance review form is used for operators to document problems and suggestions for improvements identified during the execution of operating procedures. However, MCP-3003 does not address research work activities, and no formal post-job reviews are being documented. TAN does not have a tracking system for post-job reviews as required by MCP-3003, and documentation of evaluations and resolutions at TAN was not consistently maintained or timely. In addition, construction post-job review practices provide for only one post-job review, which occurs at the end of the project. Projects, however, can last for months and include several stages (excavation, forming, finishing, etc.). One post-job review for a long-duration construction project is not sufficient to provide timely feedback. Similarly, post-job ALARA reviews at TAN are not being conducted for a number of repetitive jobs because RWPs are being left open for future use, resulting in less feedback for improving radiological work planning. Further, pre-job ALARA reviews at TAN do not typically document the basis for computing pre-job dose estimates, thus hindering effective evaluation of performance. Also, the rationale for making multiple revisions of RWPs is not maintained to aid in post-job ALARA reviews, and the original ALARA reviews are not updated to reflect RWP revisions.

Lessons-Learned Program

The contractor lessons-learned program has improved, especially with regard to the development and communication of lessons learned at the site area level. Site area lessons-learned coordinators share lessons learned at CARB and all-hands meetings and in local ES&H training. MCP-192, *Lessons Learned System*, now requires that company-level and site area subject matter experts evaluate the applicability and needed corrective actions for urgent lessons learned. Lessons-learned reports are generally thorough. The computerized lessons-learned management system has been enhanced with more user-friendly and functional search capabilities. All BBWI personnel are trained on using the lessons-learned system, and use of the system is steadily increasing.

Although the system has improved, a lack of rigor and formality in the implementation and documentation of the lessons-learned program hinders its effectiveness. The recommended actions detailed in the lessons-learned reports are not specific or tailored to INEEL, and personnel responsible for taking corrective actions are not designated in the reports. Although MCP-192 delineates a variety of operational experience information sources for lessons-learned screening, only the DOE central list server database is being screened. In addition, documentation (e.g., subject matter expert applicability evaluation, the actions deemed necessary, and the actions taken) is lacking, and records are not maintained in a structured manner. Furthermore, Type A investigation reports, which typically more clearly define root causes and lessons

learned, are not consistently evaluated and distributed as lessons learned. MCP-73, issued in 1995, specifies requirements for incorporating lessons learned into training for operations, maintenance, technicians, and ES&H. The training department indicated that although they review lessons learned, they keep no records of their review or actions taken, and they provide no feedback to the site lessons-learned coordinator.

In summary, feedback and continuous improvement processes have significantly improved and provide an effective means for proactive identification and correction of ES&H program and performance deficiencies. However, these processes are still not fully mature, and implementation is inconsistent. Weaknesses in self-assessment, issues management, and lessons learned are impeding effective feedback and continuous improvement at INEEL.

APPENDIX B
ISSUES FOR CORRECTIVE ACTION AND FOLLOW-UP

Line management is responsible for correcting deficiencies and addressing weaknesses identified in Office of Independent ES&H Oversight reviews. Following each review, line management prepares a corrective action plan. The Office of Independent ES&H Oversight follows up on significant issues as part of a multifaceted follow-up program that involves follow-up reviews, site profile updates, and tracking of individual issues.

This appendix summarizes the significant issues identified in this focused safety management evaluation of INEEL. The issues identified in Table B-1 will be formally tracked in accordance with DOE Order 414.1A, *Quality Assurance*, which addresses follow-up of independent oversight findings. ID and BBWI need to specifically address these issues in the corrective action plan.

Table B-2 summarizes the status of legacy issues identified during the 1995 Office of Independent ES&H Oversight safety management evaluation. ID has closed six of the seven issues (INEEL 95-6, which deals with training and qualification of ID staff is listed as open by ID, pending validation of the new program). For each issue, the Office of Independent ES&H Oversight summarized the status of INEEL corrective actions (reported in a 1995 INEEL memorandum to EM-1) and provided comments on the adequacy of the corrective actions. In some cases, new issues were identified during this Oversight focused safety management evaluations that were closely related to the legacy issues; these new issues are referenced in the Oversight comments.

Table B-1. Issues Identified During the Focused Safety Management Evaluation at INEEL

IDENTIFIER	ISSUE STATEMENT	REFER TO PAGES
INEEL-FSME-00-01	INEEL has not complied with the provisions of DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, relating to phasing out existing soil column discharges. In addition, INEEL does not have a defensible technical basis for a new percolation pond, which could create a new contaminated soil column.	25-26
INEEL-FSME-00-02	BBWI and construction subcontractor work planning processes and organizational interfaces have not always been effective in ensuring that all work is adequately defined, that all hazards are identified, and that necessary controls are specified before work documents are issued, as required by DOE Policy 450.4, *Safety Management System*.	29-31
INEEL-FSME-00-03	ID and BBWI have not ensured that the process for performing unreviewed safety question determinations meets the requirements and standards of DOE Order 5480.21, *Unreviewed Safety Questions*, with respect to screening criteria and guidance for documenting safety evaluations. BBWI has not consistently implemented the unreviewed safety question process, thereby compromising the authorization bases for nuclear and applicable non-nuclear facilities as stipulated by procedure MCP-123, *Unreviewed Safety Questions*.	32-33
INEEL-FSME-00-04	BBWI has not maintained configuration control of the essential systems at the INEEL Remote Analytical Laboratory consistent with the provisions of DOE-approved authorization bases as required by DOE Order 5480.23, *Safety Analysis Reports.*	34

Table B-2. Status of INEEL Legacy Issues

IDENTIFIER	LEGACY ISSUE STATEMENT AND OVERSIGHT COMMENTS
EH-95-1	Unclear Roles, Responsibilities and Authorities for Subcontractors: ID and Lockheed Martin Idaho Technologies Company (LMITCO) have not clearly defined roles and responsibilities for personnel evaluating and providing technical assistance to subcontractors. ID and LMITCO have not provided sufficient attention to assure that contracts adequately address ES&H issues and that subcontractors line management can be held accountable for safety performance. Although progress has been made to establish processes for subcontracting, differences in subcontractor work practices and reporting relationships complicate the flowdown of ESH&QA requirements. Consequently, these requirements are not adequately addressed using current mechanisms. Additionally, meaningful information to clearly demonstrate improvement in this subcontracting area does not currently exist. Recent near-miss occurrences show continuing weakness in this area. New issue INEEL-FSME-00-02 identifies concerns specific to subcontractor work.
EH-95-2	LMITCO Safety-Related System Modification Weakness: LMITCO has not ensured effective management control of modifications to safety-related systems. For example, LMITCO has not completed modifications to the Advanced Test Reactor (ATR) safety systems, include heating, ventilation, and air conditioning backup dampers and firewater injection system piping. The accident analysis calculation and assumptions that LMITCO uses are insufficient to support new and updated safety analysis reports at the ATR and Idaho Chemical Processing Plant. BBWI has taken several steps to address this issue. The specific weaknesses identified at the Test Reactor Area (TRA) were addressed by the corrective action plan. Facility managers at INEEL were trained on maintaining the safety basis documentation current for nuclear facilities. A major effort is under way to identify, prioritize, and upgrade nuclear facility SARs. The revised MCP-2811 and Project Management Guide require reviewers to verify that the original design inputs, design modifications, and final design meet applicable codes and worker protection requirements. A program has been implemented to periodically assess the effectiveness of the engineering control process. Notwithstanding the significant programmatic improvements associated with the modification process, the Oversight evaluation found significant deficiencies in the USQD process and in keeping the INTEC facility consistent with the descriptions in the authorization basis. These deficiencies indicate continuing management problems in specific areas of the modification process at nuclear facilities. The deficiencies are identified as new issues, INEEL-FSME-00-03 and INEEL-FSME-00-04. Oversight will continue to monitor implementation progress in these areas.
EH-95-3	Compliance with Standards Weakness: ID and LMITCO have not ensured that the managers, supervisors, and workers understand the importance of complying with DOE orders and other applicable policies necessary for an effective safety management program. Three specific concerns were identified: 1) Direction to “push back” on draft DOE orders has contributed confusion; 2) ID has provided premature direction for implementing the “necessary and sufficient” process; 3) Confusion about “necessary and sufficient” and a perception that compliance with DOE orders is optional. ID has incorporated applicable DOE directives into the DOE-BBWI management and operating contract, and BBWI has taken appropriate steps to translate these requirements into INEEL procedures. The “necessary and sufficient” process is no longer being used. A strong commitment to compliance was evident at all levels of the BBWI organization. Oversight concludes that appropriate actions have been taken to address this issue.

Table B-2. Status of INEEL Legacy Issues (Cont'd)

IDENTIFIER	LEGACY ISSUE STATEMENT AND OVERSIGHT COMMENTS
EH-95-4	ID and LMITCO Assessment Weakness: Weakness exists in ID and LMITCO ES&H assessment programs. Some of the ID compliance assessment programs are not sufficiently formalized or systematic to ensure appropriate review of all important areas. ID has not implemented a self-assessment program. Within LMITCO, safety-related audits and self-assessments are not comprehensive and have not been established at some facilities. Both ID and BBWI have made significant progress in the development and implementation of assessment programs. Some areas of weakness in implementation of these programs were known by site management, and improvement actions are under way.
EH-95-5	LMITCO Procedure Weakness: Has not aggressively consolidated program documentation and procedures. Most of the facilities and ES&H functions are still operating under drafts or procedures and documentation developed by previous contractors. The continued use of procedures from the previous five operating contractors is a concern because these procedures may not continue to receive the appropriate review or continue to be updated as the new procedure system is developed. A sitewide set of ES&H procedures—management control procedures (MCPs)—has been developed and implemented to provide consistent requirements to INEEL facilities. Oversight concludes that appropriate actions have been taken to address this issue.
EH-95-6	ID Training Program Weakness: ID has not assured that the existing training program is sufficient to ensure that competence will be maintained and that additional competence will be developed to support the strategic vision for INEEL. Further, ID management commitment to the training program has been inconsistent, as evidenced by the year-long vacancy in the ID Training Manager position. ID has not yet conducted validation of this issue. However, all committed corrective actions have been completed. A comprehenbeen established with strong management support. Oversight concludes that appropriate actions have been taken to address this issue.
EH-95-7	LMITCO Training Program Weakness: Has not completed a major transition associated with the integration of the facility-specific training program into a consolidated sitewide program. Existing training programs, which were developed and implemented primarily by the previous contractors, ran a spectrum from excellent to marginal. Facility-specific programs were inconsistent in their approach, and there were some gaps in training (e.g., lack of training in waste management requirements contributed to some compliance issues at Auxiliary Reactor Area). INEEL has established and is implementing a comprehensive, formal, and well documented systematic approach to sitewide training characterized by strong management involvement and associated processes. Oversight concludes that appropriate actions have been taken to address this issue.

APPENDIX C
STATUS OF JUDGMENTS OF NEED FROM 1998 TYPE A ACCIDENT INVESTIGATION

The Board that investigated the CO_2 accident identified 22 judgments of need (JONs), which were documented in a final report, *Type A Accident Investigation Board of the July 28, 1998, Fatality and Multiple Injuries Resulting from a Release of Carbon Dioxide from Building 648, Test Reactor Area, Idaho National Engineering and Environmental Laboratory.* A corrective action plan was submitted to DOE Headquarters in October 1998. The site reported that it has implemented the proposed corrective actions and verified that the each of the actions has been completed. The JONs and Oversight's assessment of the effectiveness of the implemented corrective actions are provided in Table C-1.

This Oversight focused safety management evaluation determined that most of the JONs had been adequately addressed through ISM and other INEEL corrective actions. However, four JONs (3.3, 3.5, 3.9, and 3.19), were not adequately addressed. For some other JONs (e.g., 3.18), INEEL had completed the specific corrective actions listed in the corrective action plan, but the Oversight team identified closely related problems indicating that the corrective actions were not sufficiently comprehensive to address the root causes and prevent recurrences. In most cases, INEEL has ongoing initiatives designed to address the identified weaknesses. The Office of Independent ES&H Oversight will follow up on these JONs in future appraisals.

Table C-1. Judgments of Need from the CO_2 Type A Accident Investigation of 1998

JON	Judgment of Need (JON)	INEEL Status	2000 Office of Oversight Focused Integrated Safety Management Review	
			Evaluation	Comment
JON 3.1	LMITCO needs to establish and implement a program that complies with and incorporates all applicable worker protection requirements contained in OSHA regulations, National Fire Protection Association (NFPA) codes and standards, and DOE orders for CO_2 fire suppression systems and other systems with hazardous gases into applicable manuals, SARs, procedures, and work planning and control processes to ensure that employees are protected from releases of toxic agents from energized systems.	Closed	JON satisfied	LMITCO has identified and revised all applicable work planning and control procedures and processes. Detailed requirements associated with these procedures and processes has been incorporated into applicable and management control procedures and program requirements documents; workers have been trained on these requirements.
JON 3.2	ID and LMITCO need to ensure that effective quality assurance practices are in place to independently verify that system design modifications are accomplished in accordance with all applicable codes and requirements.	Closed	JON satisfied	Engineering design process and procedures have been revised to establish effective quality assurance practices. Deficiencies identified in the design of the FM-200 system at Scoville Substation No. 1 were attributed to the original manufacturer design. Substantial field modifications required to correct system deficiencies identified during the acceptance test procedure were implemented under the new design process improvements.

Table C-1. Judgments of Need from the CO_2 Type A Accident Investigation of 1998 (Cont'd)

JON	Judgment of Need (JON)	INEEL Status	2000 Office of Oversight Focused Integrated Safety Management Review	
			Evaluation	Comment
JON 3.3	ID, in its capacity as the "Authority Having Jurisdiction" with respect to fire protection, needs to strengthen its review of fire protection design and design modifications to ensure compliance with applicable requirements, codes, and standards.	Closed	JON not satisfied	The ID fire protection organization is understaffed, as it has delayed hiring a qualified fire protection engineer for a year and has not developed a succession plan for this important position. However, ID has incorporated all mandatory criteria for INEEL design into the architecture and engineering manual, and BBWI established the Fire Marshall position as directed by ID.
JON 3.4	LMITCO needs to verify the qualifications of its fire protection design personnel, ensure that all fire protection contracts address required contractor submittals, ensure that those submittals receive qualified review prior to acceptance, reevaluate acceptance testing procedures, and ensure that all required re-acceptance testing is in fact performed.	Closed	JON satisfied	Corrective actions were implemented and validated as part of the corrective action implementation plan. Qualification and training requirements have been clearly established, and requirements have been documented for fire protection submittals, qualified reviews, acceptance testing, and re-acceptance testing and verification. A review of the acceptance tests for the Scoville Substation No. 1 life safety upgrade revealed that the responsible fire protection engineer exceeded the requirements and expectations for acceptance testing and review.
JON 3.5	LMITCO needs to ensure that safety basis documentation and procedures for inactive facilities are updated, maintained, and appropriately used.	Closed	JON not satisfied	Safety bases for inactive facilities have not yet been updated. Plans have been put in place and priorities established to complete those upgrades in 2002. Additionally, some corrective actions do not satisfy the JON, including outdated facility hazard lists, USQs that do not fully address the safety basis, and USQ screening and evaluation processes that do not meet the requirements of DOE Order 5480.21, *Unreviewed Safety Questions*. New issue INEEL-FSME-00-02 discusses the USQ concerns.
JON 3.6	ID and LMITCO management need to expedite the implementation of ISM policy, including the need for organizational behavior change, increased leadership and management presence, and accelerated application of core functions to all work activities on site.	Closed	JON satisfied	ID and BBWI management have effectively implemented ISM and are actively providing leadership and field presence through a variety of mechanisms.

Table C-1. Judgments of Need from the CO_2 Type A Accident Investigation of 1998 (Cont'd)

JON	Judgment of Need (JON)	INEEL Status	2000 Office of Oversight Focused Integrated Safety Management Review	
			Evaluation	Comment
JON 3.7	LMITCO needs to strengthen the contribution of procedures to safety management and consistent implementation of safety requirements and policies through accelerated updating and quality improvement, field validation, and a deliberate approach to assure consistent use and application.	Closed	JON satisfied	BBWI has established work standards through integration of conduct of operations and conduct of maintenance. Employees are trained on work processes and performance expectations for procedural compliance. Requirements are flowed down to procedures, and the site training department has been effective in identifying and implementing improvements to the worker training program.
JON 3.8	LMITCO needs to verify that all gaseous agent fire extinguishing systems (CO_2, Halon, FM-200, Inergen, etc.) are monitored for discharge in accordance with NFPA Standard 72, National Fire Alarm Code. This monitoring should be configured to assure positive notification to building occupants in sufficient time to allow evacuation of the protected area prior to system discharge. With respect to total flooding CO_2 systems, the combination of a discharge pressure switch and a mechanical discharge delay should be considered.	Closed	JON satisfied	All CO_2 fire suppression systems, except portable fire extinguishers, have been removed from the INEEL site. The ID architectural engineer standard has been revised to incorporate the referenced requirements. All gaseous suppression systems have been analyzed for hazards. A review of selected gaseous suppression systems indicates that they are monitored for discharge.
JON 3.9	LMITCO needs to update fire protection systems drawings and keep them updated to reflect modifications for the as-built plant.	Closed	JON not satisfied	A process to ensure that modifications are incorporated into essential drawings before making in-plant changes has not been effectively implemented at INTEC.
JON 3.10	LMITCO needs to determine the specific mechanism by which the CO_2 system in TRA-648 discharged on July 28, 1998, and take actions as appropriate to avoid a recurrence in the future. Until this is done, the CO_2 system in TRA-648 should remain out of service and compensatory fire protective measures implemented, as appropriate.	Closed	JON satisfied	An independent testing laboratory engaged by LMITCO determined that a defect in equipment design caused the CO_2 system to inadvertently trip and bypass the pre-discharge alarm. The three remaining INEEL CO_2 systems were removed from service. Other similar control panels at INEEL were evaluated, and compensatory measures were implemented and documented.
JON 3.11	DOE Headquarters needs to actively campaign to improve consensus standards and in the interim should consider strengthening orders and policies related to fire protection and worker safety to clearly define lockout, to limit occupancy in CO_2 flood areas, and to prevent use of fire system impairments as a means of personnel protection.	Does Not Apply	JON satisfied	INEEL architecture and engineering requirements documents have been revised to require a positive, supervised mechanism for worker protection while working near, on, or in the system. This is consistent with the recently revised NFPA 12, the standard for CO_2 protection.

Table C-1. Judgments of Need from the CO_2 Type A Accident Investigation of 1998 (Cont'd)

JON	Judgment of Need (JON)	INEEL Status	2000 Office of Oversight Focused Integrated Safety Management Review	
			Evaluation	Comment
JON 3.12	LMITCO needs to ensure that all total flooding gaseous fire suppression systems at INEEL are equipped with an OSHA-compliant positive lockout mechanism that is electrically supervised by the releasing system. DOE needs to consider implementing a similar policy across the complex. This JON is listed as the second contributing cause of failure to use physical (lockout/tagout) and administrative (current procedures and work planning and control processes) barriers that implemented regulatory requirements.	Closed	JON satisfied	All CO_2 fire suppression systems, except portable fire extinguishers, have been removed from the INEEL site. The ID architectural engineer standard has been revised to require a positive lockout mechanism with electrical supervision for any future CO_2 systems. LMITCO determined that current Halon systems and configurations are adequate for lockout/tagout in accordance with OSHA. The INEEL site standard for CO_2 systems has been revised to reflect the NFPA standard, which requires a positive shutoff valve.
JON 3.13	LMITCO needs to improve the work control system by providing additional guidance on the performance of hazard evaluations to include the importance of capturing all potential and credible hazards associated with the work or workspace and the significance of risks created by the hazards; requiring utilization of the Job Requirements Checklist process for applicable preventive maintenance tasks that have not yet been through the process; and expediting the training and qualification program for work planners. (In the interim, ensure that only qualified personnel are used for this function.)	Closed	JON satisfied	BBWI has revised the pre-job briefing checklist to include discussion of escape paths from the area where work is being performed, with a requirement to ensure that clear escape paths are maintained throughout the job. Requirements have been developed and implemented to maintain a controlled list (hazards analysis database) of known building- or area-specific hazards and standardized mitigation barriers for each INEEL site building and facility. An integrated site maintenance manual has been developed and implemented, and a site maintenance council routinely meets to constantly improve the manual. Workers are involved in identifying and resolving workplace hazards.
JON 3.14	LMITCO needs to provide additional management attention to assure the effectiveness of the work control system. This includes direct involvement of knowledgeable managers in reviewing work and coaching individuals on implementation of the system.	Closed	JON satisfied	BBWI has provided the Site Operations Manager and Site Area Directors with focused line management responsibilities for work. Training of management and workers on work control systems, integrated safety management, and the voluntary protection program is ongoing. Management and supervision are involved in pre- and post-job briefings. Management and supervisors are performing self-assessments.

Table C-1. Judgments of Need from the CO_2 Type A Accident Investigation of 1998 (Cont'd)

JON	Judgment of Need (JON)	INEEL Status	2000 Office of Oversight Focused Integrated Safety Management Review	
			Evaluation	Comment
JON 3.15	LMITCO needs to provide additional guidance in the outage request procedure to assure documentation of any controls associated with outages that may impact safety and to provide additional guidance to assure that appropriate personnel such as the fire protection engineer are included in the outage planning process when appropriate.	Closed	JON satisfied	Applicable management control procedures have been revised and linked to both sitewide standards and control procedures for maintenance work and operational activities.
JON 3.16	LMITCO needs to institutionalize training and incorporate information about CO_2 hazards into INEEL training programs. This should include: CO_2 hazard recognition (including pre-discharge alarm recognition); emergency preparedness and immediate response and rescue for CO_2 discharges; egress requirements and CO_2 evacuation drills for all personnel performing work in buildings protected with CO_2 flood systems; and clarification on the limitations of system impairments for personnel protection, and the use of lockout/tagout.	Closed	JON satisfied	INEEL has institutionalized training and incorporated information about CO_2 hazards into its training programs. Subsequently, all CO_2 fire protection systems were disconnected.
JON 3.17	LMITCO needs to provide training for work planners, fire protection engineers, and safety engineers in industry requirements related to CO_2, including personal protection, warning signs, clear exit pathways, and preparations for immediate rescue.	Closed	JON satisfied	INEEL provided training in industry requirements related to CO_2 for work planners, fire protection engineers, and safety engineers. Subsequently, all CO_2 fire protection systems were disconnected.
JON 3.18	LMITCO needs to conduct sitewide lessons-learned training on the root causes and corrective actions associated with this accident, including those related to the level of hazard, protective lockout, emergency preparedness, and immediate response.	Closed	JON satisfied	Specific JON action regarding the CO_2 accident was conducted satisfactorily. However, remaining corrective actions to restructure and implement the site lessons-learned program have not been satisfactorily completed. Identification of specific INEEL actions required for external lessons learned is inadequate. Documentation and assurance that appropriate reviews have been conducted and required actions taken are inadequate.

Table C-1. Judgments of Need from the CO_2 Type A Accident Investigation of 1998 (Cont'd)

JON	Judgment of Need (JON)	INEEL Status	2000 Office of Oversight Focused Integrated Safety Management Review	
			Evaluation	Comment
JON 3.19	ID and LMITCO need to strengthen the INEEL issues management process to ensure effective prioritization and tracking of issues, identification and resolution of management system weaknesses, and field follow-up, performance-based validation, and closure of corrective actions.	Closed	JON not satisfied	Weaknesses remain in implementation of the issues management program. The ICARE system is still not being used to document and track all ES&H deficiencies and corrective actions. Root causes are not consistently, correctly identified, and recurrence controls are not consistently specified. Qualitative analysis of deficiencies for adverse trends is not yet effective.
JON 3.20	LMITCO needs to ensure the ability to accomplish immediate rescue and response for planned and unplanned CO_2 discharges, including the capability to deal with mass casualties having insufficient oxygen.	Closed	JON not reviewed – outside of EH scope	The DOE Office of Independent Oversight and Performance Assurance (OA) is responsible for independent evaluation of this JON.
JON 3.21	ID and LMITCO need to improve analysis and control of incremental reductions in funding for safety infrastructure, including individual as well as cumulative impacts on safety management and emergency preparedness.	Closed	JON satisfied	ID and BBWI have established effective management controls and processes to monitor maintenance of the ES&H infrastructure to ensure that it receives adequate management attention.
JON 3.22	LMITCO needs to conduct a risk-benefit analysis of the continued need for CO_2 is of the continued need for CO_2 fire suppression systems at INEEL and to evaluate the necessity of using total flooding CO_2 for fire suppression in occupied spaces. Where alternatives are not practical for cost or other reasons, facilities should comply with NFPA 101, Life Safety Code, requirements for high hazard industrial occupancies, and all safety-related requirements of NFPA 12, CO_2 Extinguishing Systems, should be strictly enforced. DOE needs to consider implementing a similar policy across the complex, including reevaluation on a risk-benefit basis as the mission or status of facilities changes.	Closed	JON satisfied	ID and BBWI have conducted appropriate risk-benefit analysis on continued use of the CO2 systems and other special hazard fire suppression systems. With one exception (capping CO2 supply lines per EDF-TANO-98-18), they have implmemented appropriate actions based on the risk-benefit analysis. Additionally, ID and BBWI have established institutional requirements for the conduct of risk-benefit analysis as part of the design process.

APPENDIX D
EVALUATION PROCESS AND TEAM COMPOSITION

The evaluation was conducted according to formal protocols and procedures, including an Appraisal Process Guide, which provides the general procedures used by the Office of Independent ES&H Oversight program for conducting inspections and reviews, and the Focused Integrated Safety Management Evaluation Plan, which outlines the scope and conduct of the evaluation process. The planning process considered previously-identified weaknesses (including the judgments of need from the 1998 CO_2 accident), current INEEL activities, and DOE and BBWI management initiatives. The evaluation team collected data through interviews, document reviews, walkdowns, observation of activities, and performance testing. Interviews were conducted with DOE Headquarters, ID, and contractor managers, technical staff, hourly workers, and union representatives.

Team Composition

The team membership, composition, and responsibilities are as follows:

Deputy Assistant Secretary for Independent ES&H Oversight

S. David Stadler, Ph.D.

Associate Deputy Assistant Secretary for Independent ES&H Oversight – Operations

Raymond Hardwick

Director, Office of ES&H Evaluations

Patricia Worthington, Ph.D., Director
Tom Staker, Deputy Director

Team Leader

Tom Staker

Safety Management System Evaluators

Ali Ghovanlou, Ph.D.
Bob Freeman
Tim Martin
Al Gibson
Bob Compton
Dave Berkey

Technical Evaluators

Brad Davy – Lead
Mike Gilroy
Marvin Mielke
Charles Campbell
Ching-San Huang
Vic Crawford
Ron Stolberg
Carl Caves
Ivon Fergus
Pranab Guha
Ed Stafford
Jim Lockridge
Mark Good
Dolan Falconer
Joe Lischinsky
Mario Vigliani

Communications and Support

Mary Anne Sirk
Tom Davis

Quality Review Board

S. David Stadler
Raymond Hardwick
Frank Russo
Patricia Worthington

This page intentionally left blank.

Abbreviations Used in This Report (Cont'd)

DWP	Detailed Work Plan
EM	DOE Office of Environmental Management
EM-41	EM Idaho Office
ES&H	Environment, Safety, and Health
ESH&QA	Environment, Safety, and Health and Quality Assurance
FHL	Facility Hazards List
FRAM	Functions, Responsibilities, and Authorities Manual
FSAR	Final Safety Analysis Report
FY	Fiscal Year
HCA	High Contamination Area
HF	Hydrofluoric Acid
HEG	Hazard Evaluation Group
HIM	Hazard Identification Matrix
ICARE	Issue Communication and Resolution Environment
ICATS	Issue and Corrective Action Tracking System
ID	DOE Idaho Operations Office
IFSF	Irradiated Fuel Storage Facility
IHR	Independent Hazard Review
INEEL	Idaho National Engineering and Environmental Laboratory
INRA	Inland Northwest Research Alliance
INTEC	Idaho Nuclear Technology and Engineering Center
ISM	Integrated Safety Management
JON	Judgment of Need
JSA	Job Safety Analysis
LMITCO	Lockheed Martin Idaho Technologies Company
MCP	Management Control Procedure
MRT	Maintenance-Related Task
MSDS	Material Safety Data Sheet
NFPA	National Fire Protection Association
ORT	Operation-Related Task
OSHA	Occupational Safety and Health Administration
PDD	Program Description Document
PEG	Program Execution Guidance
PEMP	Performance Evaluation Management Plan
PRD	Program Requirements Document
RAL	Remote Analytical Laboratory
RWP	Radiation Work Permit
SAR	Safety Analysis Report
SWP	Safe Work Permit
TAN	Test Area North
TMI	Three Mile Island
TRA	Test Reactor Area
TRAIN	Training Requirements and Information Network
TSR	Technical Safety Requirement
USQ	Unreviewed Safety Question
USQD	Unreviewed Safety Question Determination
WASP	Worker Applied Safety Program
VPP	Voluntary Protection Program