

# Summary Report

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Inspection of  
Environment, Safety, and Health Management  
and Emergency Management  
at the

## Sandia National Laboratories - New Mexico



February 2003

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Office of Independent Oversight and Performance Assurance  
Office of the Secretary of Energy

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## Abbreviations Used in This Report

AAAHC	Accreditation Association for Ambulatory Health Care
AMPL	Advanced Manufacturing and Processes Laboratory
CFR	Code of Federal Regulations
CPR	Corporate Process Requirement
DOE	U.S. Department of Energy
EAL	Emergency Action Level
EOC	Emergency Operations Center
EPI	Emergency Public Information
ES&H	Environment, Safety, and Health
FY	Fiscal Year
HAD	Hazards Assessment Document
ISM	Integrated Safety Management
KAFB	Kirtland Air Force Base
MDL	Microelectronics Development Laboratory
NNSA	National Nuclear Security Administration
OA	Office of Independent Oversight and Performance Assurance
RMWMF	Radioactive and Mixed Waste Management Facility
SNL	Sandia National Laboratories
SNL/NM	Sandia National Laboratories/New Mexico
SSO	Sandia Site Office

# OVERSIGHT

## Introduction

The Secretary of Energy's Office of Independent Oversight and Performance Assurance (OA) conducted an inspection of environment, safety, and health (ES&H) and emergency management programs at the U.S. Department of Energy's (DOE) Sandia National Laboratories – New Mexico (SNL/NM) site in January-February 2003. The inspection was performed as a joint effort by the OA Office of Environment, Safety and Health Evaluations and the Office of Emergency Management Oversight.



Aerial View of Sandia National Laboratories - New Mexico

### Background

The National Nuclear Security Administration (NNSA) Office of the Deputy Administrator for Defense Programs is the lead program secretarial office for SNL/NM. As such, it has overall Headquarters responsibility for programmatic direction, funding of activities, ES&H, and emergency management at the site. At the site level, line management responsibility for SNL/NM operations and safety falls under the Manager of the Sandia Site Office (SSO). The Albuquerque Service Center provides support to SSO in several areas (e.g., legal, and human resources) and may provide technical ES&H specialists to support SSO. SNL/NM is managed and operated by Sandia Corporation, under contract to NNSA. Sandia Corporation is a Lockheed Martin Corporation entity.

The primary missions of SNL/NM include activities that support the Department's nuclear weapons stockpile maintenance program and the Department's efforts to reduce the proliferation of weapons of mass destruction, the threat of nuclear accidents, and the potential for damage to the environment. SNL/NM also performs research and development to enhance the reliability of energy and critical infrastructures and to address emerging threats to national security. The SNL/NM site is located on a portion of the Kirtland Air Force Base (KAFB) military reservation in Albuquerque, New Mexico.

SNL/NM activities, which include research and testing, industrial operations, facility maintenance, waste management, and environmental restoration, involve various potential hazards that need to be effectively controlled. These hazards include exposure to external radiation, radiological contamination, hazardous chemicals, explosives, and various physical hazards associated with facility operations (e.g., machine operations, high-voltage electrical equipment, pressurized systems, and noise). Radiological and chemical hazardous materials are present in various forms at SNL/NM.

Throughout the evaluation of ES&H and emergency management programs, OA reviewed the role of NNSA organizations in providing direction to contractors and conducting line management oversight of contractor activities. OA is placing more emphasis on the review of contractor self-assessments and NNSA line management oversight in ensuring effective ES&H and emergency management programs. In reviewing NNSA line management oversight, OA focused on the effectiveness of SSO in overseeing SNL/NM contractors, including such management functions as setting expectations, providing implementation guidance, monitoring and assessing contractor performance, and monitoring/evaluating contractor self-assessments. Similarly, OA focuses on the effectiveness of contractor self-assessment programs. DOE orders require contractors to establish self-assessment programs that review all aspects of ES&H and emergency management performance.

## ES&H Review Scope and Overview

The purpose of the ES&H portion of this inspection was to assess the effectiveness of selected aspects of ES&H management as implemented by SNL/NM under the direction of SSO. The ES&H portion of the inspection was organized to evaluate four related aspects of the integrated safety management (ISM) program: SSO and SNL/NM implementation of selected ISM guiding principles; SSO and SNL/NM contractor feedback and continuous improvement systems; SNL/NM implementation of the core functions of safety management for various work activities; and essential system functionality for selected safety-related systems.

The OA inspection team used a selective sampling approach to determine the effectiveness of SSO and SNL/NM in implementing DOE requirements. The approach involved examining selected institutional programs that support the ISM program, such as SSO and SNL/NM assessment programs. To determine the effectiveness of the institutional programs, the OA team focused on the Z Pulsed Power Accelerator (Z-Machine), Advanced Manufacturing and Processes Laboratory (AMPL), and Radioactive and Mixed Waste Management Facility (RMWMF), as well as construction and facility maintenance activities. OA also examined selected SNL/NM initiatives to meet the new 10 CFR 830, Subpart B, requirements for design safety reviews for nuclear facilities and to achieve accreditation for its occupational medical program. The review of essential systems focused on the fire protection systems and systems that handle toxic gases used in experiments.

As discussed throughout this report, the SNL/NM ISM program has improved, and most work is performed safely. However, work was not always performed in accordance with established requirements and procedures, and some unsafe work practices were observed. Increased SSO and SNL/NM senior management attention is needed to address weaknesses in several important ISM areas, including processes for analyzing hazards and identifying controls, feedback and improvement programs, and implementation of ES&H requirements.

## Emergency Management Review Scope and Overview

OA evaluated progress since the February 2001 OA program status review (and for one area, the

September 1999 OA exercise evaluation) in addressing key emergency response concerns. The inspection team also conducted tabletop performance tests with a sample of the site's key decision-makers to evaluate their ability to employ available tools and skills when responding to postulated emergency conditions.

The results of this review indicate that, since the 2001 OA program status review, SNL/NM has improved its capability to respond to events that involve the release of a significant quantity of hazardous material. However, progress in most areas has been limited, and in the critical, time-urgent areas of protective action formulation and offsite notifications, longstanding weaknesses in plans and procedures inhibit effective response. Furthermore, significant challenges remain for SNL/NM and SSO to effectively follow through on existing corrective action initiatives, particularly in the areas of training and SSO line management oversight and response. SNL/NM and SSO line management attention is necessary to ensure that programmatic weaknesses are critically examined and effectively addressed, and that sustained effort is employed, to complete the task of establishing a comprehensive emergency response system that effectively protects site workers and the public following a significant event.

## Organization of the Report

Section 2 of this volume provides an overall discussion of the results of the review of the SNL/NM ES&H and emergency management programs, including positive aspects and weaknesses. Section 3 provides OA's conclusions regarding the overall effectiveness of SSO and SNL/NM management of the SNL/NM ES&H and emergency management programs. Section 4 presents the ratings assigned during this review. Appendix A provides supplemental information, including team composition. Appendix B identifies specific findings that require corrective action and follow-up.

More detailed information on the inspection results is contained in two separate volumes of the report, which were provided to SSO management and are available to other DOE sites on request. Volume I provides more detailed information on the results of the review of SNL/NM ES&H programs, and Volume II provides more detailed information on the results of the review of the SNL/NM emergency management program.

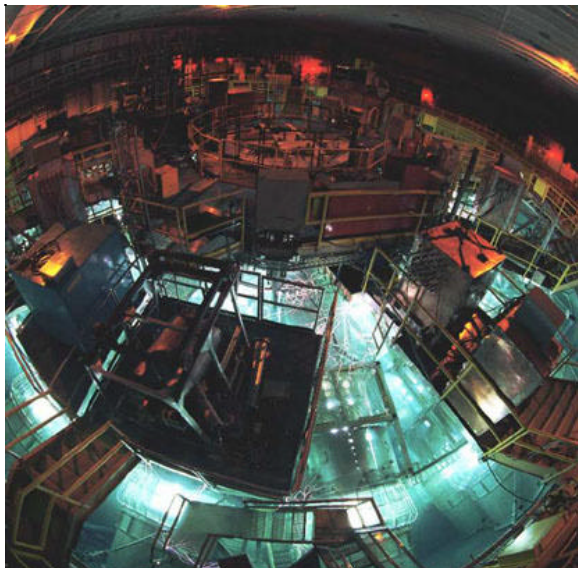


## 2.1 Positive Attributes

### ES&H Positive Attributes

Several positive attributes were identified in the institutional work control systems. Many aspects of ISM implementation at the facility and activity level were also particularly effective.

**Certain aspects of SNL/NM's implementation of the ISM guiding principles are particularly effective.** SNL/NM ES&H program and support team staffing, training, and qualifications are effectively managed. Staff qualifications and experience in radiation protection are significant strengths for several SNL/NM organizations. For example, a high percentage of personnel with radiation protection responsibilities at RMWMF had a significant amount of training, expertise, and experience in health physics, and many also had advanced scientific degrees and/or professional certifications in health physics and related safety disciplines. All workers interviewed at the Z-Machine and AMPL were aware of their stop-work responsibilities and authority and indicated they would not hesitate to stop work if they observed or were asked to perform questionable or unsafe work activities. Processes for flowing ES&H



Sandia's Z-Machine

requirements down to subcontractors are effective. Health and safety plans for construction and service contractors addressed appropriate ES&H hazards and controls required to safely perform work at SNL/NM.

**Certain controls at the Z-Machine and AMPL are particularly effective in ensuring worker and facility safety.** Weapons research work at AMPL is well defined in such technical work documents as safe operating procedures and work instructions. Personnel and equipment resources (e.g., local ventilation and laboratory hoods) for conducting research and customer support work at AMPL are sufficient to perform most work safely. At Z-machine, the facility-level controls are effectively implemented through the safety assessment document, the primary hazard screening process, the facility hazard analysis, and administrative procedures. Most work activities at Z-Machine were safely performed by highly skilled and experienced workers and supervisors using established controls and appropriate personal protective equipment. For example, the Z-Machine coordinator maintained a constant awareness of the status of all subsystems during experiment preparation and effectively ensured the safety of the machine and workers in the affected area. For SNL/NM maintenance activities, several job-site hazard evaluations for higher-risk work in permitted confined space areas were thorough and comprehensive. Ventilation provisions, exposure measurements, physical safety considerations, and personal protective equipment were correct and well specified.

**SSO and SNL/NM are making good progress toward developing a set of enhanced safety basis documents in accordance with 10 CFR 830, Subpart B, requirements.** SSO and SNL/NM management are devoting significant attention and resources to implementing the 10 CFR 830, Subpart B, requirements. SSO and SNL/NM have allocated sufficient staff and resources to provide for timely development and review of authorization basis packages, although this effort has required drawing on resources from other organizations. SSO has provided clear expectations

for development of authorization basis packages, and is implementing a rigorous review process. SNL/NM has submitted authorization basis packages to SSO for four of the five affected operating facilities for review and approval and is on schedule for the fifth facility. To date, the SSO reviews have resulted in approval of three of the packages and issuance of a conditional safety evaluation report for the fourth. SSO and SNL/NM need to resolve issues regarding the need for revisions to the onsite transportation authorization basis package to ensure that the conditional safety evaluation report is finalized in a timely manner.

**The site occupational medical program, which serves the SNL/NM site, successfully renewed their certification following a site visit by the Accreditation Association for Ambulatory Health Care (AAAHC) in December 2002.** The accreditation program promotes feedback and quality management principles through the application of nationally recognized standards and criteria. Originally accredited in 1999, the health services staff have worked diligently to expand medical program services while maintaining quality program principles. Combining both primary health care and occupational medicine have resulted in the overall workforce achieving better health services at lower cost to the company.

**SNL/NM has implemented an effective pollution prevention program and is addressing legacy wastes.** SNL/NM has successfully implemented a variety of pollution prevention initiatives to reduce and control hazardous waste, radioactive waste, solid waste, water/wastewater, and air emissions. Each generator of hazardous, mixed, radioactive, and municipal wastes is required to identify and analyze the pollution prevention and waste minimization opportunities. Performance measures are used to promote source reduction and resource reuse/recycle. These efforts have resulted in several DOE pollution prevention awards and a White House Closing the Circle award between 1999 and 2002 in the areas of fleet services, affirmative procurement, sustainable design, and energy management. In addition, the Solid Waste Transfer Facility sorts 100 percent of all solid waste to ensure that no unauthorized wastes are offered for disposal. SNL/NM is aggressively working to identify and address legacy wastes.

**SSO management recently took a number of proactive actions to address challenges associated with the transition to a site office.** SSO managers recognize the need to restructure SSO to implement its new and expanded site office

responsibilities while concurrently dealing with numerous changes in organizational interfaces, management expectations, and policies, as well as vacant staff positions and a hiring freeze. SSO is taking positive steps to capitalize on the experience of other NNSA organizations in assessing the status of its current programs and developing plans and procedures for future operations. For example, SSO used external expertise during its recent self-assessment activities and 10 CFR 830, Subpart B, activities. SSO also has actively solicited assistance from other NNSA organizations in developing its line management processes and procedures.



Emergency Operations Center

## Emergency Management Positive Attributes

SSO and SNL/NM are working to improve the site's capability to respond to significant events by establishing an organizational structure for prompt, initial decision-making and systems for prompt notification of site workers. Positive attributes of the emergency management program are discussed below.

**SNL/NM has implemented program improvements in several areas since the 2001 OA program status review.** In response to previously identified weaknesses, SNL/NM hired an experienced emergency management department manager from outside SNL/NM; fundamentally altered its emergency response approach by assigning the key, time-urgent actions of categorization/classification, notification, and protective-action decision-making to the incident commander (IC); and is in the process of

establishing continuous coverage for the emergency operations center (EOC) communications coordinator position. SNL/NM also expanded the breadth of the hazards assessment document (HAD) to include significant scenarios such as fires/explosions, has nearly completed implementing an improved emergency notification system for site workers, and is actively working to improve the quality and definition of the relationship with the KAFB Fire Department, which has primary jurisdiction for fires and significant hazardous material events.

**Facility-specific emergency response plans and procedures comprehensively address facility response planning elements and functions.** Emergency response plans and procedures for such facilities as the Microelectronics Development Laboratory (MDL) include a well-defined set of responsibilities, requirements, and response expectations for facility emergency response supervisors and teams. These documents also include appropriately-detailed descriptions of the onsite emergency notification system and the interactions among facility personnel and the SNL/NM incident command system. Important provisions for actions to protect facility personnel, such as accountability and evacuation processes, are also clearly described.

**SNL/NM and SSO have self-identified some of the weaknesses identified during the OA inspection, and corrective actions have been initiated.** SNL/NM and SSO have assessed their respective emergency management programs and are aware of several of the weaknesses identified by the OA inspection team. For example, as a result of their April 2002 self-assessment, SNL/NM is in the process of hiring a full-time emergency management training coordinator, who is expected to address the generally deficient condition of the SNL/NM emergency management training program. Following SSO's assumption of new roles and responsibilities in the emergency public information (EPI) arena, the SSO public affairs organization is working to formulate an effective approach to significant events having broad media interest. A December 2002 assessment of the SSO emergency response program appropriately identified numerous weaknesses in the SSO emergency response and line management oversight functions. In response, SSO has obtained additional staff through a 120-day detail arrangement to support improvements in defining and structuring the SSO emergency response program.

## 2.2 Program Weaknesses

### ES&H Program Weaknesses

Although the framework for the SNL/NM ISM program is in place, weaknesses were identified in some important aspects of ISM management systems and work control processes. In addition, certain aspects of SSO and SNL/NM feedback and improvement systems need improvement.

**SNL/NM line management systems for communicating ES&H expectations and monitoring performance are not effectively implemented and are not providing sufficient assurance that ES&H expectations are consistently met and that work activities are performed safely.** SNL/NM institutional and division-level systems are not functioning effectively in all cases and thus are not providing the expected degree of assurance that operations will be conducted safely. For example, higher-tier documents, such as the ES&H Manual, often provide broad guidance that is not adequately interpreted and translated to lower-tier requirements. In addition, procedures (or other technical work documents) are not consistently used and are not always followed when used.

**SSO and SNL/NM feedback and improvement processes are not effective.** SSO has made limited progress in addressing weaknesses in SSO assessments of contractor performance and issues management and corrective action processes in the areas of ES&H and emergency management. SSO line management oversight responsibilities are not clearly defined or effectively implemented; established assessment schedules are not being met; and issues management and corrective action management processes are not effective. SNL/NM formal assessments of line ES&H performance lack sufficient frequency, focus, and rigor to provide assurance that safety programs are being adequately implemented, as required by DOE and SNL/NM requirements. For example, assessment processes do not adequately focus on ES&H elements and observing work activities. SNL/NM issue management processes and implementation are insufficient to ensure consistently appropriate and timely identification, documentation, evaluation, resolution, and recurrence control for deficiencies in ES&H and emergency management programs. ES&H deficiencies are not always properly documented, investigated, and reported. Analysis of deficiencies is



not sufficient to identify adverse trends, the extent of condition, causes, and recurrence controls. Further, management has not always ensured that corrective actions are timely and effective. A particular concern is that SSO is planning to reduce the scope and frequency of some line management oversight activities, such as Facility Representatives, based on their expectation that the SNL/NM feedback and improvement programs will provide assurance of safe operations. However, the SNL/NM feedback and improvement programs have longstanding weaknesses that are not being effectively addressed.

**SNL/NM's implementation of the core functions of safety management has weaknesses in several important processes and is not effectively implemented, resulting in several unsafe work practices that place workers at risk unnecessarily.** Incorrect assumptions in the SNL/NM primary hazard screening process have resulted in non-conservative facility/activity hazard classifications; consequently, the appropriate level of hazards analysis, review, and approval is not always performed. SNL/NM work control processes are not sufficiently documented to explain how activity-level hazards and controls are to be identified, analyzed, and documented, and how hazard controls are to be linked to activity-level hazards. Several concerns with institutional controls were identified, including a lack of guidance in some sections of the ES&H Manual, a non-conservative approach to implementing some lockout/tagout requirements, and inadequate waste management controls in the line organizations to ensure an effective characterization of waste type. SNL/NM safety programs are not effectively implemented, and operating procedures are not followed in the areas of lockout/tagout, excavations, fall protection, the confined space, and the pressure safety program. There were several instances of unsafe work practices and failures to follow procedures and implement program requirements. Weaknesses in a number of ES&H programs (e.g., lockout/tagout) could result in serious injuries to workers, and indicates a need for additional management and safety organization involvement in day-to-day work activities and programs.

**The SNL/NM unreviewed safety question (USQ) procedure contains errors that could lead to non-conservative decisions, and the USQ process has not been properly implemented in all cases, resulting in USQ packages that do not include all of the required information and analysis.** The USQ procedure has several logic errors that, if followed verbatim, could lead to non-



Modifications to the Bunker at MDL

conservative USQ disposition. Twelve of 14 USQs performed under the new procedure did not have sufficient information to independently confirm the conclusions. In one case, a correct USQ determination was made (a positive USQ) but the “Potentially Inadequate Safety Analysis” (PISA) process was not entered as required by the SNL/NM procedure and 10 CFR 830 requirements.

**SNL/NM and the waste management subcontractor have not ensured sufficient formality in implementation of the radiological controls at RMWMF consistent with the requirements of the ES&H Manual (e.g., job-specific radiation work permits or equivalent) such that all controls are clearly identified, documented, and understood by workers and all ES&H personnel responsible for radiological safety.** The radiological control process at RMWMF is not being implemented in a manner that ensures that all controls are clearly identified, documented, and understood by workers prior to performing work, as required by the ES&H Manual. In addition, ineffective communications mechanisms between the line and ES&H personnel have affected the ability to properly evaluate some radiological controls, resulting in the potential to adversely affect the ability to make proper decisions in such areas as internal dose assessments, bioassays, and assigned internal dose.

**SNL/NM has not established rigorous management and supervisory processes that ensure essential systems are designed and maintained in accordance with applicable codes, standards, and DOE orders, leading to a potential reduction in the reliability of SNL/NM essential systems.** Testing, maintenance, and surveillance of SNL/NM fire protection systems do not fully meet the



applicable DOE requirements and National Fire Protection Association codes and standards in a number of cases. Although these deficiencies do not represent an immediate concern that would prevent the fire protection and alarm systems from performing as designed in the event of a fire, several elements of the SNL/NM fire protection program (inspection, surveillance, testing, maintenance, and configuration management) are not sufficiently rigorous and effective. In addition, there are a number of design weaknesses in the ongoing modifications to the new toxic gas distribution system. Although these weaknesses do not currently have a safety impact because the bunker is not operational, they indicate a need for a more effective design review process.

### **Emergency Management Program Weaknesses**

Despite the improvements noted in Section 2.1, significant weaknesses persist in several aspects of the SNL/NM emergency management program, particularly in the approaches, plans, and implementing procedures for the site's emergency response system. Concerns about the rigor of the drill and exercise program, the completeness of the HAD, and the effectiveness of SNL/NM and SSO feedback and improvement systems were noted as well. Many of these weaknesses are longstanding concerns that were identified in previous OA inspections, but that have not been adequately addressed through past corrective actions. Specific weaknesses are discussed below.

**Significant, longstanding weaknesses exist in the decision-making tools and processes that direct the key, time-urgent actions for categorization/classification, protective action formulation, and offsite notifications.** SNL/NM has not yet developed emergency response procedures and tools that have the necessary content, detail, and usability to ensure prompt and accurate event classification and protective action formulation. Furthermore, SNL/NM has not established an offsite notification process sufficient to ensure that offsite notifications for significant events can be performed within required time limits, particularly during off-hours. The impact of these weaknesses was demonstrated during tabletop performance tests, where SNL/NM ICs did not consistently and correctly classify events; ICs and EOC teams were generally unable to develop appropriate protective actions and protective action recommendations in a timely manner; and notification processes (if strictly followed by the SSO duty officers)

would have unnecessarily delayed offsite notifications. Additionally, the offsite notification forms developed by SSO duty officers and EOC teams were inaccurate, incomplete, and potentially confusing for offsite recipients.



Emergency Management Exercise

**The SNL/NM drill and exercise program is not structured or implemented to effectively evaluate emergency response organization performance or serve as a vehicle for identifying and correcting programmatic weaknesses.** The SNL/NM drill and exercise program is characterized by numerous shortcomings, the most important of which is the lack of clear implementation guidance and expectations. The drill and exercise program guide has been in draft form for several years, and although it contains appropriate guidance in many areas, is not used. As a result, drills are inconsistently documented; many drill packages are not on file; and weaknesses identified during drills and exercises are not developed into findings and tracked to closure. The 2002 annual exercise postulated an event at a facility that does not actually store or use significant quantities of hazardous materials; suffered from a limited set of exercise objectives; and did not provide an unambiguous evaluation of whether the objective was met or an overall performance assessment. Consequently, the exercise feedback and improvement process was ineffective in identifying needed programmatic improvements.

**Despite recent improvements, the HAD does not yet comprehensively establish the foundation for the emergency management program.** The HAD evaluation of onsite transportation and aircraft crash events is incomplete, and the quantitative basis for some emergency action levels (EALs) has not been appropriately established in the HAD. Although

generally conservative, the screening processes used by SNL/NM do not ensure that all appropriate facilities and hazardous materials are adequately considered. In addition, the process for establishing the material-at-risk value (i.e., source term) used in the HAD analyses is not well documented, and it does not ensure that the material-at-risk values are based on conservative assumptions about maximum facility inventories of hazardous materials. Finally, the HAD development and maintenance process is not formally documented. While most of these issues had been identified in previous reviews, they were not effectively addressed by corrective actions.

**SNL/NM has not comprehensively addressed all critical, previously-identified program weaknesses, and SSO has not provided sustained, effective oversight of the SNL/NM program.**

Many of the most significant weaknesses identified during this inspection, including issues related to protective action formulation, EAL content, and the offsite notification process, were identified by OA during the 2001 program status review. Although some of these areas have seen incremental improvement, corrective actions have often been only partially effective, and thus most of the key initial decision-



Ventilation Systems at MDL

making areas are still problematic. Contributing to the slow pace of improvement has been the extended absence of sustained, rigorous SSO oversight of emergency management, which has been addressed only recently by the assignment of an acting SSO emergency management program manager.

### ES&H Program

NNSA, SSO, and SNL/NM senior management are supportive of safety, understand and accept their line management responsibility, and have adequately defined most aspects of their roles and responsibilities. In most cases, SSO and SNL/NM personnel have good experience, qualifications, and training, although SSO needs to continue addressing staffing shortages. The DOE/Sandia Corporation contract identifies an appropriate set of requirements, which have been incorporated into higher-level policies for SNL/NM.

Many aspects of work at SNL/NM were performed consistent with the core functions of ISM. Some of the engineering controls and many administrative controls were well designed and effectively implemented. SSO and SNL/NM are making good progress toward developing a set of enhanced safety basis documents in accordance with 10 CFR 830, Subpart B, requirements and have met all schedule milestones to date. Some engineering controls, such as ventilation systems and hoods, were effectively designed and maintained to protect workers. Safety processes for Z-Machine operations were comprehensive and rigorous. SNL/NM has effectively communicated ES&H requirements to subcontractors through subcontract provisions and safety plans. The site medical program has achieved renewal of its initial accreditation from an external association. Several aspects of the pollution prevention program are notable and have received awards. The overall material condition of the fire protection systems appears adequate, and the recent upgrades enhance system reliability and performance.

However, weaknesses were identified in the SNL/NM processes for analyzing hazards and identifying controls. Further, work was not always performed in accordance with established requirements and procedures, and several unsafe work practices were observed. SSO and SNL/NM have not been fully effective in ensuring that requirements are effectively communicated and

implemented at the working level consistent with ISM requirements. Weaknesses were identified in several aspects of SNL/NM ES&H programs, including the ES&H Manual, the primary hazard screening process, the USQ process, work control processes for programmatic work and maintenance, radiological work control processes at RMWMF, and procedural adherence. Deficiencies were also identified in the implementation of such ES&H programs as lockout/tagout processes, excavations, fall protection, the confined space program, and the pressure safety program. For fire protection systems, some applicable DOE requirements, fire protection codes and standards, and testing and maintenance requirements are not fully met, reducing assurance that the systems will operate reliably.

SSO and SNL/NM implement several feedback and improvement processes. Many assessments and inspections are performed, corrective actions are taken to address assessment findings, and lessons learned are developed and communicated to workers. However, there are weaknesses in SSO line management oversight processes and SNL/NM assessment and issues management processes that hinder their effectiveness, especially in reporting and managing the evaluation and resolution of safety deficiencies. Increased management attention is needed to ensure that SSO and SNL feedback and improvement programs are enhanced and that longstanding weaknesses and obstacles to success (e.g., interface between ES&H and line organizations) are resolved. Although limited in scope, SNL/NM has piloted a promising comprehensive program for conducting ES&H functional area and program self-assessments that could serve as a model for other organizations.

In most cases, SSO and SNL/NM have a good understanding of the identified weaknesses and have initiated corrective actions for some. However, a number of weaknesses in ES&H processes and programs warrant management attention, with particular attention on enhancing worker safety and addressing longstanding

weaknesses in assessments and issues/corrective action management.

## Emergency Management Program

OA first assessed the SNL/NM emergency management program in April 1998 as part of a Secretary of Energy directive to perform an independent review of the status of emergency management programs within the DOE complex. That review identified several fundamental deficiencies in the SNL/NM program. Subsequent appraisals in 1999 and 2001 each identified some improvements in the program, but many of the fundamental shortfalls remained and continued to limit the overall effectiveness of the program. Similarly, this review found that further improvements have been made, but the persistence of significant weaknesses continues to challenge the site's ability to adequately protect workers and the public in the event of a serious incident.

The most significant improvement in the SNL/NM emergency management program is in the approach used for initial emergency response. The key, time-urgent actions of categorization/classification and protective action decision-making have been reassigned to the full-time IC position, and SNL/NM has nearly completed the initiative to hire and train EOC communications coordinators in order to establish continuous EOC coverage. In addition, implementation of an improved worker notification system, including the identification and training of facility emergency response teams and installation of tone alert radios in approximately 150 facilities, is well advanced. Collectively, these efforts are intended to promote effective and timely initial response, regardless of the initiating event and time of day.

Other improvements have been made within both SNL/NM and SSO. SNL/NM hired a new emergency management department manager from outside of SNL/NM who has substantial experience with the DOE emergency management system. The HAD has been broadened to include more severe initiating events, such as fires and explosions, to strengthen the program's foundation; the drill program is active; and well-defined EPI procedures were developed that appropriately address most events. SNL/NM is in the early stages of implementing a more critical feedback and improvement process (which is an area of historical weakness), as demonstrated by a programmatic self-assessment that identified most of the issues identified by the OA team and resulted in a comprehensive corrective action plan that is under way. SSO also

took the initiative to have its emergency management function evaluated by NNSA personnel. As a result, weaknesses were appropriately identified in emergency response and line management oversight, and SSO has developed a suitable set of corrective actions.

Nonetheless, critical problems persist. As demonstrated during tabletop performance tests, the most significant programmatic deficiency is the challenge posed to effective initial decision-making by the current set of plans, implementing procedures, and EALs. As a result of an incomplete set of EALs and poorly defined predetermined protective actions, in concert with various weaknesses in the content and usage of associated implementing procedures, ICs were unable to accurately classify events, and ICs and EOC teams experienced significant difficulty in formulating appropriate protective actions (for site workers) and protective action recommendations (for the public) in a timely manner. Furthermore, the current approach for conducting offsite notifications does not ensure that protective action recommendations, even if correctly determined, can be received and quickly understood by offsite agencies. Finally, due in large part to weaknesses in the approach used for generating plume dispersion plots, plume modelers were unable to generate dispersion plots in a timely manner.

Other notable weaknesses exist as well. The HAD still does not include a sufficiently broad spectrum of events or a well-defined and documented process for determining the hazardous material source term to provide assurance that the HAD event consequences are bounding. Beyond the significant weaknesses in the emergency management training program that were already known to SNL/NM, the drill and exercise program does not facilitate the systematic identification of emergency response or programmatic issues. Additionally, longstanding weaknesses in the treatment of the joint information center concept by the Albuquerque Operations Office (for which roles and responsibilities were recently assumed by SSO) make it unlikely that the EPI function of providing accurate and timely information to the public can be satisfactorily executed following a significant event requiring activation of the joint information center.

The evolving nature of the SNL/NM emergency management program reflects an improved awareness by site personnel of the fundamental precept of the DOE emergency management system, which is to act as a last line of defense in the protection of site workers and the public. However, the site is still not adequately prepared to respond to a serious incident involving the release of hazardous materials. Persistent weaknesses



in SNL/NM feedback and improvement processes impede continuous improvement of the program; hence corrective actions implemented in response to previous reviews have frequently been ineffective in resolving deficiencies. Sustained emphasis and attention by senior NNSA, SSO, and SNL/NM managers are

necessary to ensure that current initiatives are effective; that expectations are met; and that root causes of programmatic deficiencies are rigorously determined and appropriately addressed in order to maintain the necessary level of preparedness.

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## 4.0 Ratings

The ratings reflect the current status of the reviewed elements of the SNL/NM ES&H and emergency management programs:

### **Safety Management System Ratings**

Guiding Principle #1 – Line Management Responsibility for Safety ..... EFFECTIVE PERFORMANCE  
Guiding Principle #2 – Clear Roles and Responsibilities ..... EFFECTIVE PERFORMANCE  
Guiding Principle #3 – Competence Commensurate with  
Responsibilities ..... EFFECTIVE PERFORMANCE  
Guiding Principle #5 – Identification of Standards and Requirements ... EFFECTIVE PERFORMANCE

### **Feedback and Improvement**

Core Function #5 – Feedback and Continuous Improvement ..... NEEDS IMPROVEMENT

### **SNL/NM Implementation of Core Functions for Selected Work Activities**

Core Function #1 – Define the Scope of Work ..... EFFECTIVE PERFORMANCE  
Core Function #2 – Analyze the Hazards ..... NEEDS IMPROVEMENT  
Core Function #3 – Develop and Implement Hazard Controls ..... NEEDS IMPROVEMENT  
Core Function #4 – Perform Work Within Controls ..... NEEDS IMPROVEMENT

### **Essential Systems Functionality**

Design ..... NEEDS IMPROVEMENT  
Configuration Management ..... NEEDS IMPROVEMENT  
Surveillance and Testing ..... NEEDS IMPROVEMENT  
Maintenance ..... NEEDS IMPROVEMENT

### **Emergency Planning**

Hazards Survey and Hazards Assessment ..... NEEDS IMPROVEMENT  
Program Plans and Procedures ..... SIGNIFICANT WEAKNESS

### **Emergency Preparedness**

Training, Drill, and Exercise Program ..... NEEDS IMPROVEMENT  
Emergency Public Information ..... NEEDS IMPROVEMENT

### **Emergency Response**

SNL/NM Emergency Response Decision-Making ..... NEEDS IMPROVEMENT  
SSO Emergency Response ..... NEEDS IMPROVEMENT

### **Readiness Assurance**

NNSA Assessments and Performance Monitoring ..... NEEDS IMPROVEMENT  
Contractor Assessments and Issues Management ..... NEEDS IMPROVEMENT

# APPENDIX A

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## SUPPLEMENTAL INFORMATION

### A.1 Dates of Review

Scoping Visit	October 15 - 17, 2002
Onsite Inspection Visit	January 27 - February 7, 2003
Report Validation and Closeout	February 18 - 20, 2003

### A.2 Review Team Composition

#### A.2.1 Management

Glenn S. Podonsky, Director, Office of Independent Oversight and Performance Assurance  
Michael A. Kilpatrick, Deputy Director, Office of Independent Oversight and Performance Assurance  
Patricia Worthington, Director, Office of Environment, Safety and Health Evaluations  
Thomas Staker, Deputy Director, Office of Environment, Safety and Health Evaluations  
Charles B. Lewis, Director, Office of Emergency Management Oversight  
Kathy McCarty, Deputy Director, Office of Emergency Management Oversight

#### A.2.2 Quality Review Board

Michael A. Kilpatrick	Patricia Worthington
Charles B. Lewis	Dean C. Hickman

#### A.2.3 Review Team

Patricia Worthington, Director, Office of Environment, Safety, and Health Evaluations (Team Leader)

##### **Safety Management Systems and Feedback and Improvement Systems**

Ali Ghovanlou (Topic Lead)  
Bob Freeman  
Al Gibson  
Bernie Kokenge  
Tim Martin  
Bob Compton

##### **Emergency Management**

Steven Simonson (Topic Lead)  
Al Cerrone  
James O'Brien  
J.R. Dillenback  
Michael Lloyd  
Jeff Robertson  
Tom Rogers

##### **Core Function Implementation Team**

Bob Freeman (Topic Lead)  
Vic Crawford  
Mike Gilroy  
Ching-San Huang  
Marvin Mielke  
Mark Good  
Jim Lockridge  
Michael Shlyamberg  
Edward Stafford  
Mario Vigliani

##### **Essential Systems**

Brad Davy (Topic Lead)  
Charles Campbell  
Don Prevatte

#### A.2.4 Administrative Support

Mary Anne Sirk	Tom Davis
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## APPENDIX B

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### SITE-SPECIFIC FINDINGS

**Table B-1. Site-Specific Findings Requiring Corrective Action Plans**

<b>ES&amp;H FINDING STATEMENTS</b>
1. SNL/NM line management systems for communicating ES&H expectations and monitoring performance are not effectively implemented and are not providing sufficient assurance that ES&H expectations are consistently met and that work activities are performed safely.
2. SSO has made limited progress in addressing weaknesses in SSO assessments of contractor performance and issues management and corrective action processes in the areas of ES&H and emergency management.
3. Formal assessments of line ES&H performance lack sufficient frequency, focus, and rigor to provide assurance that safety programs are being adequately implemented, as required by DOE and SNL/NM requirements.
4. SNL/NM issue management processes and implementation are insufficient to ensure consistently appropriate and timely identification, documentation, evaluation, resolution, and recurrence control for deficiencies in ES&H and emergency management programs.
5. Incorrect assumptions in the SNL/NM primary hazard screening process have resulted in non-conservative facility/activity hazard classifications; consequently, the appropriate level of hazards analysis, review, and approval is not always performed.
6. The SNL/NM unreviewed safety question (USQ) procedure contains errors that could lead to non-conservative decisions, and the USQ process has not been properly implemented in all cases, resulting in USQ packages that do not include all of the required information and analysis.
7. SNL/NM work control processes are not sufficiently documented to explain how activity-level hazards and controls are to be identified, analyzed, and documented, and how hazard controls are to be linked to activity-level hazards.
8. SNL/NM and the waste management subcontractor have not ensured sufficient formality in implementation of the radiological controls at RMWFMF consistent with the requirements of the ES&H Manual (e.g., job-specific radiation work permits or equivalent) such that all controls are clearly identified, documented, and understood by workers and all ES&H personnel responsible for radiological safety.
9. SNL/NM safety programs are not effectively implemented, and operating procedures are not followed in the areas of lockout/tagout, excavations, fall protection, the confined space program, and the pressure safety program, resulting in several unsafe work practices that place workers at risk unnecessarily.
10. SNL/NM has not established rigorous management and supervisory processes or systems that ensure that essential systems are designed and maintained in accordance with applicable codes, standards, and DOE orders, leading to a potential reduction in the reliability of SNL/NM essential systems.

**Table B-1. Site-Specific Findings Requiring Corrective Action Plans (continued)**

<b>EMERGENCY MANAGEMENT FINDING STATEMENTS</b>
1. The SNL/NM HAD does not comprehensively or conservatively evaluate the potential consequences of onsite and offsite hazards, and the process for maintaining the HAD does not ensure that facility and process changes that could affect emergency planning are captured and adequately addressed, as required by DOE Order 151.1A, <i>Comprehensive Emergency Management System</i> .
2. The SNL/NM notification process does not ensure that the appropriate protective actions, protective action recommendations, and other required event information are communicated in a timely manner to site workers and offsite jurisdictions, as required by DOE Order 151.1A.
3. SNL/NM emergency action levels do not support timely and accurate emergency classification or protective action formulation for affected populations, as required by DOE Order 151.1A.
4. The SNL/NM drill and exercise program is not effective in validating the site's emergency management posture or in identifying and addressing programmatic weaknesses, as required by DOE Order 151.1A.
5. SSO and SNL/NM have not implemented an integrated set of EPI plans and implementing procedures that ensure that accurate and timely information is provided to site workers and the public during emergency events having wide media interest, as required by DOE Order 151.1A.
6. SNL/NM plume modelers did not demonstrate the ability to make timely assessments of event consequences, as required by DOE Order 151.1A.
7. SNL/NM and SSO emergency responders did not demonstrate the ability to accurately identify and communicate offsite protective action recommendations, as required by DOE Order 151.1A.