Independent Oversight Inspection of Environment, Safety, and Health Programs at the

Savannah River Operations Office and Savannah River Site

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Office of Independent Oversight
Office of Health, Safety and Security

HSS
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Abbreviations Used in This Report

AHA	*Assisted Hazards Analysis*
ARRA	*American Recovery and Reinvestment Act of 2009*
CFR	*Code of Federal Regulations*
DOE	*U.S. Department of Energy*
DOE-SR	*Savannah River Operations Office*
EM	*DOE Office of Environmental Management*
ES&H	*Environment, Safety, and Health*
HSS	*DOE Office of Health, Safety and Security*
IBEW	*International Brotherhood of Electrical Workers*
ISM	*Integrated Safety Management*
NNSA	*National Nuclear Security Administration*
NTS	*Nevada Test Site*
OSHA	*Occupational Safety and Health Administration*
PPE	*Personal Protective Equipment*
SRNS	*Savannah River Nuclear Solutions, LLC*
SRS	*Savannah River Site*
SSC	*Structure, Systems, and Components*
STAR	*Site Tracking, Analysis, and Reporting*
SWMF	*Solid Waste Management Facility*
WIPP	*Waste Isolation Pilot Plant*

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1 Introduction

The U.S. Department of Energy (DOE) Office of Independent Oversight, within the Office of Health, Safety and Security (HSS), inspected environment, safety, and health (ES&H) programs at the DOE Savannah River Site (SRS) during August and September 2009. The inspection was performed by the Office of Independent Oversight's Office of Environment, Safety and Health Evaluations to support site management in the execution of the SRS mission. This report discusses the results of the review of the SRS ES&H programs. Concurrently, the HSS Office of Environment, Safety and Health Evaluations and Office of Emergency Management Oversight inspected the nuclear safety program at several National Nuclear Security Administration (NNSA) facilities at SRS and the SRS emergency management program, respectively. The results of those inspections are discussed in separate reports.

Aerial view of SRS

The DOE Office of Environmental Management (EM) is the lead program secretarial office for SRS. As such, it has overall Headquarters line management responsibility for programmatic direction and funding of most activities at SRS. NNSA has line management responsibility for the site's tritium operations. At the site level, line management responsibility for most SRS operations and safety falls under the manager of the Savannah River Operations Office (DOE-SR). DOE-SR provides technical and administrative support to NNSA's Savannah River Site Office, which provides line management oversight for the NNSA Defense Programs operations. EM and DOE-SR are responsible for operations and safety for the activities reviewed by Independent Oversight for this report.

SRS is managed and operated by Savannah River Nuclear Solutions, LLC (SRNS), under contract to DOE. SRNS partners include Fluor Daniel, Northrop Grumman, and Honeywell. Savannah River Remediation, LLC, assumed responsibility for operating the high-level liquid waste facilities on July 1, 2009. Other major SRS contractors include Wackenhut Services, Incorporated (security), Shaw AREVA MOX Services (Mixed Oxide Fuel Fabrication Facility construction), and Parsons (Salt Waste Processing Facility construction). Located near Aiken, South Carolina, SRS encompasses approximately 310 square miles of DOE-owned property.

The SRS management and operating contract includes three key mission areas: environmental cleanup, operation of the Savannah River National Laboratory, and NNSA activities. Environmental cleanup activities include management of spent nuclear fuel, nuclear materials, and non-high-level radioactive waste; deactivation and decommissioning of excess facilities; and remediation of soil and groundwater. In support of the DOE national security and non-proliferation programs, the NNSA activities include operation of the tritium facilities and completion of the plutonium disposition program.

SRS activities involve various potential hazards that need to be controlled. These hazards include exposure to external radiation, radiological contamination, nuclear criticality, hazardous chemicals, and various physical hazards associated with facility operations (e.g., machine operations, high-voltage electrical equipment, pressurized systems, and noise). Significant quantities of radiological and chemical hazardous materials are stored and utilized in various forms at SRS.

The purpose of this Independent Oversight inspection was to assess the effectiveness of ES&H programs at SRS as implemented by SRNS under the direction of DOE-SR. The Independent Oversight team evaluated a sampling of activities that provide perspectives on the safety of current work activities at SRS, including:

- SRS implementation of the core functions of integrated safety management (ISM) for selected aspects of solid waste operations, primarily at the Solid Waste Management Facility (SWMF) and SRNS maintenance at various locations across the site. Independent Oversight focused primarily on ISM implementation at the facility and activity/task levels.

- DOE-SR's and SRNS's effectiveness in managing and implementing selected aspects of the ES&H program that Independent Oversight has identified as focus areas, including the radioactive waste management program and communication of workers' rights in accordance with the parameters of 10 CFR 851, Worker Safety and Health Program. In addition, at the request of DOE-SR, Independent Oversight reviewed the practices implemented by SRNS for ensuring that the large influx of newly hired personnel are properly trained and integrated into the SRNS safety program. DOE awarded approximately $1.3 billion in American Recovery and Reinvestment Act of 2009 (ARRA) funds to SRNS to accelerate environmental cleanup activities. About 1000 new workers have been hired, and about 2000 more new hires are anticipated.

- Selected aspects of EM, DOE-SR, and SRNS feedback and continuous improvement systems. Specifically, the Independent Oversight team focused on EM and DOE-SR oversight of SRNS ES&H programs and feedback and improvement processes as applied to the systems and processes reviewed by the Independent Oversight team on this inspection, and the effectiveness of SRNS corrective actions to address selected findings identified during the 2006 Independent Oversight inspection regarding nuclear safety systems at the SRS H-Canyon and HB-Line.

Sections 2 and 3 discuss the key positive attributes and weaknesses, respectively, identified during this inspection. Section 4 presents a summary assessment of the effectiveness of the major ISM elements that were reviewed. Section 5 provides the Independent Oversight team's conclusions regarding the overall effectiveness of DOE-SR's and SRNS's management of ES&H programs. Appendix A provides supplemental information, including team composition.

In accordance with ongoing DOE management reforms, particularly in the area of worker safety oversight, DOE will rely on site managers to resolve the weaknesses and specific deficiencies identified in this report. Consequently, EM, DOE-SR, and SRNS should ensure that the deficiencies and opportunities identified in this report are evaluated and addressed, as appropriate, in accordance with site issues management

processes. In cases where the Independent Oversight report identifies potential non-compliances with applicable DOE requirements, corrective action plans should be developed in accordance with site corrective action management and quality assurance processes, including extent-of-condition and causal analysis, as appropriate. While this report does not identify findings, the weaknesses identified in Section 3 of this report identify the issues that Independent Oversight believes warrant priority management attention in the site corrective action processes. In most cases, the weaknesses listed in Section 3 were derived from multiple individual deficiencies, which are described and referenced in the detailed results provided to DOE and contractor management in a separate document.

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2 Positive Attributes

Positive attributes were identified in several ES&H programs, particularly in the effectiveness of EM Headquarters line management oversight, the implementation of behavior-based safety and human performance improvement initiatives, the issues management tools that are promoting improved performance, radioactive waste management systems, and the training provided to new site workers being employed for ARRA-funded projects across the site.

EM Headquarters is effectively executing its line management responsibilities for oversight of SRS. EM maintains a detailed and disciplined set of processes for the oversight of DOE-SR and contractor performance. Responsibilities for ES&H are clearly defined for the EM managers who have safety responsibilities. EM teams have conducted numerous, rigorous assessments at EM sites; these assessments are facilitating DOE-SR improvements in their oversight programs and processes, and internal EM processes ensure that their reports are accurate and that corrective action plans are generated, reviewed, approved or rejected, and then tracked to closure. EM Headquarters continues to maintain good operational awareness of field activities through various mature and effective processes. EM continues to improve their technical qualification and operating experience/lessons learned programs, and other Headquarters and field organizations are benefitting from EM's sharing of positive program features such as a detailed criteria and review approach document for the review of operating experience/lessons learned programs elsewhere.

SRNS is enhancing the effectiveness of their baseline assurance systems through implementation of behavior-based safety and human performance initiatives. Management and employees at SRS have embraced the values of proven industry safety programs for behavior-based safety and human performance improvement, which are being promoted by DOE through various DOE initiatives. These programs strengthen the identification and awareness of at-risk behaviors, analyze performance errors to identify underlying contributing organizational and systemic deficiencies and precursors, and result in more effective corrective actions that provide recurrence controls. The management-supported and worker-implemented behavior-based safety observation program, implemented by numerous teams in many organizations and contractors at SRS, provides a no-fault, real-time identification and direct feedback on positive and negative work behaviors and provides data for collective analysis of performance trends and identification of areas needing further evaluation or actions. Human

Transuranic Waste Shipment at SRS Waste Facilities

performance improvement concepts and techniques are used to analyze events and incidents and are integrated into other SRNS issues management processes under the direction of a multi-organizational steering committee of workers and managers. In addition, managers and supervisors conduct and document numerous observation assessments of work activities. These field observations provide an effective mechanism for managers and supervisors to communicate expectations, obtain direct feedback from workers, and assess field conditions and process adequacy and implementation.

The Site Tracking, Analysis and Reporting (STAR) database has evolved into a comprehensive and effective management tool for documenting assessment activities; managing the documentation, evaluation, and disposition of safety issues; and tracking corrective actions to closure and providing data sources and capabilities for trending. SRNS has expanded the capabilities and use of the STAR database to track assessment schedules and document assessment reports (including management field observations). SRNS is using STAR effectively as a robust mechanism for documenting, analyzing, and resolving safety issues using a graded approach to documenting and managing deficiencies and opportunities for improvement identified during assessment activities, operational events, DOE nuclear and worker safety regulation non-compliances, some occupational injuries and illnesses, and the evaluation and implementation of operating experience documents. The broad application of this tracking tool results in an increased level of management control, formality, and consistency in the investigation and resolution of safety issues and operating experience data. Use of this single management tool minimizes the number of processes and forms that persons responsible for implementation need to be trained on, minimizes mistakes, and provides an integrated and consolidated source of performance data for trending and analysis.

SRNS has implemented a rigorous radioactive waste management program that ensures that waste acceptance criteria are met both for onsite disposal and for waste being transported for disposal at the Waste Isolation Pilot Plant (WIPP) or Nevada Test Site (NTS) and that DOE and regulatory requirements are satisfied. Operations conducted at the radioactive and mixed solid waste facilities are governed by detailed procedures that define the steps necessary to meet waste acceptance criteria and regulatory requirements, including using Central Characterization Project procedures for certifying and loading shipments to WIPP. These operations are performed effectively by experienced and trained SRNS workers. For transuranic waste, SRNS waste operators are supported by the national Central Characterization Project waste contractor, and thus SRNS has access to knowledgeable and experienced workers who perform the complex tasks needed to meet WIPP requirements. As a final control, SRNS has offsite shipments overseen by transuranic and NTS certified waste officials.

SRNS has proactively identified and implemented a number of effective actions to train and integrate ARRA-funded workers into the existing safety culture. During the initial phase to hire 3,000 new employees, SRNS established a priority for hiring experienced instructors to support the additional training workload. Before teaching a course independently, the training department requires that new instructors demonstrate competence through a progressive set of learning and teaching activities that are monitored and evaluated by experienced SRNS training personnel. SRNS established additional training requirements for new ARRA-funded employees to reinforce the concepts of the site's safety culture and communicate acceptable work practices at SRS. Management established a new employee mentoring program for these workers to help familiarize them with SRS facilities and work assignments, and to reinforce the importance of safety and conduct of operations in daily work activities. The training department has also developed and implemented realistic scenarios for training and evaluating work performance in a safe environment, including constructing and operating mockups of some ARRA-funded activities.

With few exceptions, observed work was appropriately authorized, documented in approved work packages or procedures, and conducted in accordance with safety requirements that are specified in work instructions. Operations procedures for operations within SWMF contain the information necessary to effectively perform the relevant tasks. Workers adhere to these procedures, and radiological practices are generally conservative. Work packages are available to workers in the field for their use and reference during their conduct of maintenance work. Maintenance workers are generally knowledgeable of and comply with the standard industrial controls of safety glasses, safety shoes, hard hats, and electrical safety personal protective equipment (PPE).

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3 Weaknesses

Although many aspects of ES&H are effective, there are weaknesses in requirements and implementation in several areas, such as the identification and communication of hazards to workers, the quality of hazard analyses and work instructions, and the rigor of certain issues management practices. In some cases, corrective actions for previous findings were not sufficiently comprehensive to fully address the condition.

1. **While improvements in the sitewide hazard analysis process are evident since the 2006 Independent Oversight inspection, particularly in the development and implementation of the assisted hazard analysis (AHA), further refinement and continued focus on implementation are warranted.** Development of suitable hazard analysis process requirements has presented longstanding challenges for the large and diverse SRS site, and these challenges continue today. Although hazard analysis findings in maintenance and operations from the 2006 Independent Oversight inspection have been formally closed, results of this review indicate that the corrective actions were not fully effective, particularly with respect to integrating the results of the AHAs into operating procedures, and performing hazard analysis for routine maintenance activities, such as work activities encountered in maintenance shops. As a result, the institutional processes are still not fully effective in systematically analyzing and documenting worker safety and health hazards and developing appropriate controls for the work being performed by operations and maintenance line organizations. In several instances, the applicable hazards analysis processes for maintenance activities and operations work in solid waste management were not applied with sufficient rigor to fully ensure that hazards were properly analyzed and controls developed in accordance with requirements. Safety and health and radiological controls were not always properly evaluated and integrated into operations procedures at SWMF as required, and required controls were not always sufficiently defined in work instruction (e.g., procedures) and pre-job briefings to ensure proper implementation. The hazard analysis process and AHA tool are also not required to be systematically used to update AHAs and SWMF operations procedures whenever procedure revisions that impact hazards or controls are undertaken. In the maintenance area, exemption of maintenance shop areas from the AHA process and the use of AHA screens instead of full AHAs for work considered routine has resulted in some hazards and requisite controls being missed for several potential hazards (e.g., lead solder, thoriated tungsten welding rods, sharps, magnetic fields) in the shops. For several field work activities involving such hazards as confined spaces, noise, hot work, and potential heat stress, hazard controls were not in place or not sufficiently defined to ensure that they were understood and effectively implemented by workers. Additionally, some safety and health controls were not adequately integrated into a number of work instructions.

2. **Several aspects of DOE-SR ES&H assessment activities and the employee concerns program have not been effectively implemented.** The DOE-SR baseline assessment program does not provide the rigor and process details necessary to ensure that directive-required and other required ES&H assessments are

conducted effectively. Several ES&H assessments were not accomplished when required, and assessment planning weaknesses limit DOE-SR's ability to ensure that ES&H functional areas are implemented effectively. For example, there is currently no master assessment schedule to define the total scope of directive-required assessments, self-assessments, assessments to meet DOE-SR implementing procedure requirements, or assessments needed to ensure the adequacy of functional area coverage at a reasonable frequency. DOE-SR has not adequately defined the required periodicity for directive-required ES&H assessments that specify "periodic" reviews, and the DOE-SR Integrated Performance Assurance Manual does not include expectations for obtaining agreement between managers and assessment leads about the scope, depth, and breadth of the assessments. Furthermore, DOE-SR has self-identified that the quality of the ES&H assessments is not sufficient to consistently identify and communicate deficiencies to the contractor for corrective action. In addition, the DOE-SR employee concerns program has not been effectively implemented and does not meet some applicable requirements in such areas as timeliness of investigations, quality of procedures, and performance of self-assessments. Corrective actions intended to address deficiencies in the employee concerns program identified during the 2006 Independent Oversight inspection have not been completed. DOE-SR attributes some of the deficiencies in assessment programs to longstanding position vacancies and technical personnel shortages.

3. **Deficiencies in the management of safety issues identified in several SRNS assurance system elements hinder management goals for continuous improvement in safety programs and performance.** Although the STAR tool provides an excellent framework for managing issues, in each assurance system element evaluated, Independent Oversight identified deficiencies in the rigor applied to categorizing, documenting, and investigating safety problems. Safety issues were sometimes assigned lower significance categorizations than indicated by site corrective action program procedures, so less rigor was applied to the evaluation and management of the issue than required by site procedures. In many cases, problem descriptions on STAR reports were inaccurate or insufficient to support effective evaluation and action plan development. In a number of cases, multiple and diverse safety issues were documented on a single STAR report, preventing accurate and appropriate designation of causes that are the basis for action plan development. Corrective actions did not always fully address causes or were inappropriately canceled or closed without sufficient justification. Corrective actions for several findings from the 2006 Independent Oversight inspection were not fully effective in addressing the safety issues and preventing recurrence.

4. **Several nuclear safety concerns identified at H-Canyon and HB-Line during the 2006 Independent Oversight inspection have not been adequately addressed.** Although most of the individual technical concerns have been appropriately closed, the evaluations of and actions taken to address five technical issues were inappropriate or insufficient. The five technical issues were: (1) H-Canyon and HB-Line supply fan starters should have been classified as safety class but were not; (2) the revised technical safety requirement and associated procedure for testing the safety class canyon exhaust fan damper backup air receiver low-pressure limit did not address some aspects of the functional requirements of the equipment; (3) procedures were not sufficient to ensure that, in an actual event requiring the diesel generators, timely actions could and would be taken to provide fuel before the eight-hour supplies in the day tanks were exhausted; (4) the potential for a seismically induced fire in the H-Canyon exhaust fan building had not been adequately addressed (this concern was subsequently resolved); and (5) the revised technical safety requirements and associated test procedure for the diesel generator load test were non-conservative in some areas. In addition, during the review of corrective actions, Independent Oversight identified two new technical concerns and a concern about calculation control. One new technical concern involved a new procedure that does not require complete isolation of an accumulator during a test, which could non-conservatively bias the test results. The other involved a technical safety requirement for a test that

does not sufficiently address the full range of safety equipment. Neither of these new technical concerns indicates that the systems would not operate as intended. The new calculation control concern addressed inconsistent specification of tank levels in two different calculations that were not clearly explained. Further, the inspection team identified a few examples of inadequate understanding of the relationship of safety equipment inadequacies or inconsistencies in corrective actions with the design and safety bases. While SRNS took or initiated actions to address the five insufficiently resolved technical issues from the 2006 Independent Oversight inspections and the new concerns identified during this 2009 Independent Oversight inspection, these instances indicate a continuing weakness in the rigor, attention to detail, and questioning attitude applied to the generation, review, and approval of some activities and documentation related to engineering and the safety bases for H-Canyon and the HB-Line.

4 Results

The following sections provide a summary assessment of the EM, DOE-SR, and SRNS activities that the Independent Oversight team evaluated during this inspection.

4.1 Work Planning and Control

Maintenance

Maintenance at SRS is managed and conducted by both a centralized site services group and decentralized maintenance groups. Independent Oversight evaluated preventive and corrective maintenance and modification work performed by the SRNS Facility Maintenance Group in selected facilities located throughout the site, including operations areas (i.e., Tritium and Solid Waste Management facilities), maintenance shops, and several other buildings.

The scope of work for SRNS maintenance work activities is, for the most part, adequately defined in work orders and work packages. Maintenance work orders, which are generated after a maintenance request being made by the customer (i.e. facility/building manager, tenant, or operations group), and work packages provide sufficient information about work scopes that the relevant hazards and controls can be identified.

The SRNS AHA screen is used by maintenance planners and supervisors for early hazard identification and analysis and in determining the need for a full AHA. The AHA Screen or AHA (which results in a safe work permit for maintenance activities), Safe Work Rules and Guidelines (used by some of the maintenance shops), maintenance work instructions, and procedures are used together to determine and document discrete tasks associated with the work and the hazards associated with those tasks, and to identify the controls necessary to minimize or eliminate the hazards. Most hazards associated with maintenance work activities are adequately identified and analyzed in work planning and control documents. However, some hazards present during maintenance work activities were not sufficiently analyzed. In part, this condition occurred because site work control procedures specifically exempt shop work from the requirement to conduct AHAs, because these tasks are sometimes incorrectly assumed to be within the skill of the worker and routine in nature. As a result, hazard analyses for some of these activities were not sufficient, and thus appropriate controls were not established.

SRNS maintenance workers apply a variety of controls during the conduct of work. Controls include lockout/tagout, hot work permits, confined space permits, excavation and penetration permits, safe work permits, respirators and other PPE and protective clothing, and fall protection. Appropriate PPE requirements are

specified in most work control documents, and with few exceptions, the required PPE is worn. However, for several observed work activities, the hazard controls were not sufficiently defined in work instructions and thus were not implemented in a manner that fully ensured worker protection. Controls that the inspection team found to be missing or insufficiently defined or communicated included implementation of heat stress work/rest regimes, confined space rescue planning, management of designated hot work areas, verification of required worker training, integration of hazard controls into technical work documents, and a lack of documented controls for some shop activities and/or work considered routine.

Most maintenance work evolutions were performed in accordance with controls that were specified in work instructions. For example, electrical maintenance activities were performed in accordance with the current procedure and National Fire Protection Association 70E requirements, followed good electrical safety practices, and used sufficient personnel and supervision. With few exceptions, workers demonstrated a good understanding of and a willingness to follow ES&H requirements that were specified in the work package. Readiness to perform work and work authorization were sufficiently verified and performed, respectively, for the observed maintenance work activities. Maintenance pre-job briefings were detailed, comprehensive, and effective. With some minor exceptions, workers followed controls when clearly established. However, in several instances, controls were not specified with sufficient clarity and thus were not implemented in a manner consistent with the safety requirements.

Overall, most maintenance activities are performed with a high regard for safety, and most hazards are adequately controlled. However, improvements are needed in some aspects of the institutional processes and application of those processes by maintenance organizations, particularly for such hazards as noise, heat stress, and confined spaces.

Solid Waste Management Operations

Most solid waste operations at SRS occur at the E-Area Solid Waste Management Facility, but transuranic waste repackaging operations are planned for implementation at F-Canyon. The Independent Oversight team reviewed work planning and control activities and documents and observed a variety of operations work, including transuranic waste retrieval and characterization, transuranic waste container mining and sampling, low-level waste trench disposal, low-level waste vault operations, packaging for offsite disposal of transuranic and low-level waste, and related operations.

Operations procedures are used to govern the conduct of solid waste management work. These procedures are generally adequate to define the scope of work to be performed and the steps needed to accomplish the activity. However, in some cases the scope and span of control of operations procedures are too broad to facilitate fully effective hazard analysis and incorporation of safety and health controls required by the institutional hazard analysis process.

The analysis of hazards associated with operations procedures is accomplished through use of the site hazard analysis procedure and AHA tool. The 2006 Independent Oversight inspection identified concerns about the lack of sufficient requirements to ensure systematic use and application of site hazard analysis processes for operations work performed to procedures. Corrective actions taken in response to these concerns were not fully effective, as evidenced by continuing concerns in this area. For solid waste management operations, weaknesses in the application of site-level hazard analysis processes result in hazards and controls being missed. Institutional requirements associated with the AHA process are not sufficient to ensure that AHAs are properly reviewed and revised during procedure revisions, and the AHA process is not applied with sufficient rigor to ensure that all activity hazards are properly analyzed in accordance with site requirements.

Administrative controls are used extensively to mitigate hazards associated with solid waste management operations and are generally robust. In many cases, operations procedures that govern operations within SWMF are well written and contain the appropriate information and level of detail to perform the assigned tasks. Postings and boundary controls are used appropriately across the facility to control access to operational areas, and operations training is implemented effectively. Radiological practices are generally conservative and include the use of alarming dosimetry and extensive contamination monitoring to verify container integrity during work. However, safety and health controls associated with activity-level operations work in some cases have not been properly integrated into operations procedures, and radiation work permits do not always contain sufficient specificity and linkage with these procedures to ensure that radiological controls are properly understood and implemented.

Readiness to perform work is verified using plan-of-the-day schedules, plan-of-the-day meetings, shift turnover meetings, crew briefings, and pre-job briefs. For the most part, these mechanisms are used effectively for solid waste management activities. However, pre-job briefings do not always adequately cover all the controls designated by the AHA for the work.

Overall, hazards associated with observed solid waste operations were adequately controlled. However, improvements to institutional processes have not been fully effective, and application of those processes by Solid Waste Management has not always been sufficiently rigorous to ensure that controls are adequate and clearly communicated to workers.

4.2 Focus Areas

Radioactive Solid Waste Management

SRNS performs radioactive waste management operations within the radioactive and mixed solid waste facilities. These operations involve receiving waste from onsite generators, storing and/or packaging waste for offsite disposal, and disposing of low-level solid waste. The procedures that govern these operations provide clear guidance on precautions and limitations regarding radioactive waste and ensure that site, DOE, and regulatory requirements are met. An experienced and trained staff, augmented for waste being certified and shipped to WIPP by the national Central Characterization Project waste contractor, performs these operations in accordance with the step-by-step procedures in facilities that are well engineered and maintained. Computer-based tracking systems accurately maintain information on received-waste characterization, storage and disposal locations, and inventory amounts used to ensure that regulatory limits are not exceeded. Observed solid waste operations were performed in accordance with requirements, and the required data was recorded. SRNS has obtained certification for waste officials overseeing shipments destined for WIPP or NTS. Additionally, the DOE-approved Site Treatment Plan is used appropriately to obtain approval from external regulators for mixed waste items that are being stored beyond regulatory limits and to inform the regulators when expected paths for disposal will become available.

Worker Rights and Responsibilities

Communication of workers' rights and responsibilities is an important element of 10 CFR 851, *Worker Safety and Health Program*. The Independent Oversight team evaluated the mechanisms used by SRNS to communicate rights and responsibilities under 10 CFR 851 and the degree to which workers and first-line supervisors understand those rights and responsibilities.

As part of its worker safety and health program, SRNS has developed several effective approaches to inform workers of their 10 CFR 851 rights and responsibilities. These mechanisms include General Employee Training, posting of the "It's the Law" poster and the safety commitment memo, and reinforcement of the work timeout and stop-work concepts through numerous examples during course instruction.

The Independent Oversight team interviewed numerous workers throughout the site and found that virtually all employees had an adequate, basic knowledge of worker rights and responsibilities. All workers knew that they could stop work if they had concerns about safety, although most workers did not recognize that this right has a regulatory foundation in 10 CFR 851. The SRNS employees who are represented by a union are members of the International Brotherhood of Electrical Workers (IBEW). A senior IBEW local representative demonstrated a detailed understanding of worker rights, indicated that worker rights had been well communicated, and indicated general satisfaction with the SRNS safety program.

American Recovery and Reinvestment Act Employee Training

SRNS has taken a number of positive actions to support the training of ARRA-funded workers. Site management recognized that a planned approach would be necessary to effectively train and integrate 3,000 new hires into the existing safety culture. During the initial hiring phase, SRNS appropriately focused on hiring instructors to support the additional training workload and ensuring that they were qualified and capable of providing training to new workers. SRNS recently established and implemented additional training requirements for new ARRA-funded employees. A senior manager responsible for a significant portion of ARRA-funded projects conducts a new-employee briefing for workers to reinforce the concepts of the site's safety culture and review acceptable work practices at SRS. Behavior-based safety awareness training is also required. In addition, SRNS established a new employee mentoring program for these workers to help them familiarize themselves with SRS facilities and work assignments, and to reinforce the importance of safety and conduct of operations in daily work activities.

SRNS has also developed and implemented realistic scenarios for training and evaluating work performance in a safe environment, including using mockups of some ARRA-funded activities. Although they have not focused these efforts solely on ARRA-funded work activities and workers, mockup usage directly and positively impacts the quality of training provided to these individuals, and there are opportunities to further involve safety professionals during these activities to enhance ergonomics and worker safety. In addition to periodic reviews and revisions of training courses, SRNS has recently taken steps to analyze student performance to identify and correct potential weaknesses in the quality of course offerings. Although this initiative is commendable, the training department did not clearly define management expectations for the necessary corrective actions by course owners, and as a result, three of the four courses reviewed during this inspection were not rigorous and the corrective actions did not result in course improvements.

Waste Container Being Prepared for Shipment

The Independent Oversight team noted two concerns associated with the processes that supervisors use to determine whether a worker is "qualified" for a task. First, because ARRA-funds are required to be tracked and reported separately, the funding codes for ARRA-funded employees do not align with the organization

codes where the employees are assigned. This situation caused some problems in tracking and managing employee training records for ARRA-funded employees. The second concern, which applies to all site workers, is that training course owners do not consistently apply expiration dates to the courses. As a result, workers and supervisors cannot always use the record query function to accurately determine whether workers have the requisite training or when worker training has expired. SRNS recently self-identified and is correcting some problems in this area, but continued attention is needed to ensure that the training record database accurately supports supervisor efforts to ensure that workers have the requisite training and qualifications for work assignments.

4.3 Feedback and Improvement

DOE Headquarters and DOE-SR Oversight

EM Headquarters managers and staff are actively engaged in executing their line management oversight function. EM managers and staff continue to facilitate improvement through effective assessments, the conduct of operational awareness activities, and implementation of technical qualification processes.

At the site level, DOE-SR conducts a variety of line management oversight activities and has several effective programs. The DOE-SR Facility Representative program is mature and well documented, and it is being further improved by recent efforts to fill vacancies. DOE-SR has made significant progress in addressing Facility Representative position vacancies that were impacting DOE-SR's line management oversight responsibilities; DOE-SR has identified five experienced individuals who are expected to report by the end of the calendar year. The operating experience program, the differing professional opinions program, and the technical qualification program are also functioning adequately. While some additional refinements would further improve these programs, no significant deficiencies were noted in these programs and several aspects were particularly effective, such as the qualifying official and related database elements of the technical qualification program.

DOE-SR has accomplished a large number of assessments. DOE-SR self-assessments have identified needed corrective actions in several areas, such as the Facility Representative program, and several aspects of the assessment program are being improved. However, the value of assessment activities is hindered by weaknesses in institutional assessment planning mechanisms (e.g., required assessments were missed) and the technical quality and rigor of the assessment reports. Weaknesses in the technical quality of DOE-SR assessments have resulted in a situation where only a small fraction of the assessments that have been performed were approved by the management review board for inclusion in a monthly assessment report and for formal transmission to contractors.

Collectively, DOE-SR doe not effectively integrate its trending analysis (which is essentially limited to that done at the end of the year) with assessment planning. For example, although DOE-SR identified adverse trends in scaffolding, lockout/tagout, and hazard identification, no assessments for these areas were specified in the 2009 annual assessment plans. This 2009 Independent Oversight inspection also identified several instances in which DOE-SR effectiveness reviews for findings associated with the 2006 Independent Oversight ES&H inspection did not adequately identify weaknesses in corrective action construction or implementation.

The Independent Oversight review of the DOE-SR employee concerns program indicated that the program had not been reviewed within the past two years as required, is inconsistent with several internal and external

requirements, does not meet program requirements for investigation timeliness, and is implemented through an informal standard operating procedure that does not clearly describe the relevant processes and roles. These weaknesses are very similar to those identified during the 2006 Independent Oversight inspection, and corrective actions intended to address identified longstanding deficiencies in the employee concern program have not been completed.

DOE-SR has made some improvements in corrective action tracking and issues management. For example, DOE-SR recently declared the new Savannah River Integrated Management Total Accountability System corrective action module operational, and most of the staff has been trained on module use. However, implementation of the system is in its infancy, and additional experience will be required to use the system effectively to trend issues and monitor performance.

Longstanding position vacancies and personnel shortages in critical technical positions have impacted DOE-SR's ability to provide sufficient numbers of individuals with the required experience and training to conduct the operational awareness and assessments activities specified by DOE directives and the DOE-SR oversight program and processes. Continuing management attention will be needed to address the current weaknesses in line oversight programs and processes, particularly in the assessment and employee concerns programs, and to sustain ongoing improvement initiatives while also considering current DOE management reform efforts and the evolving DOE expectations for DOE oversight and contractor accountability for safe operations.

SRNS Feedback and Improvement

SRNS has continued to improve on established contractor assurance system elements and effectively implement the feedback and continuous improvement processes specified in DOE Order 226.1A, *Implementation of Department of Energy Oversight Policy*. The requirements and processes for implementation of the SRNS ISM program and contractor assurance system elements are delineated in comprehensive policies, programs, and implementation processes. The SRNS safety assessment program is comprehensive and includes safety inspections/walkthroughs, management work observations, topical self-assessments, functional area and facility/organizational management evaluations of performance, and comprehensive independent facility and organization assessments. Numerous self-assessments are performed by line and support organizations that identify process and performance deficiencies and opportunities for continuous improvement.

Many issues, including event-based and assessment-based problems, are being effectively managed by SRNS. The STAR issue tracking system has been enhanced, thereby providing a source of much data for analysis and an effective tool for managing issues. Corrective action review boards provide an effective management oversight function, and the continuing expansion and integration of human performance initiative concepts and evaluation methods are strengthening issue analysis. However, implementation deficiencies in the description, categorization, and analysis of safety issues detract from the effectiveness of this program in fully addressing some safety problems. Although managed under previous revisions of the site corrective action program, similar weaknesses contributed to instances where corrective and preventive actions and recurrence controls taken in response to several findings from the 2006 Independent Oversight inspection were not fully effective in addressing the safety issues.

The Occupational Safety and Health Administration (OSHA) recordable and restricted/days away occupational injury and illness case rates for SRNS employees and contractors are some of the lowest in the DOE complex and much lower than rates in general industry. Although injuries and illnesses are logged, categorized, and reported as required by OSHA and DOE requirements, investigation reports continue to reflect deficiencies

in information related to ISM and work planning elements, inaccurate causal analysis and extent-of-condition determinations, and insufficient corrective actions and recurrence controls.

Operational events are documented and reported as required by DOE directives. Timely fact-finding meetings are used to identify conditions, actions, and other details about events/incidents and human performance improvement analyses of the events to support subsequent analysis and action plan development. Additionally, the SRNS operating experience program continues to provide a robust mechanism for screening, developing, and applying lessons learned from internal and external operating experience, although additional rigor is needed in screening thresholds for distribution and in documentation of screening decision bases.

SRNS employees have numerous means to report concerns, anonymously if desired, and these concerns are addressed in an appropriate and timely manner. Formal employee concern investigations are thorough, generally timely, and well documented. However, a few evaluations and final resolutions by responsible organizations were not sufficiently rigorous to clearly document the rationale for disposition or determine what actions would be necessary to prevent recurrence, or they were not compliant with the site corrective action program.

Overall, SRNS has established and implemented a generally effective contractor assurance system. However, Independent Oversight identified deficiencies in the rigor applied to categorizing, documenting, and investigating some safety problems in each assurance system element evaluated. Management attention is warranted to further strengthen this area to better accomplish the site goals and objectives of a safe workplace and continuous safety performance improvement.

Follow-up on 2006 Independent Oversight Nuclear Safety System Findings

The 2006 Independent Oversight inspection of safety management at SRS included an evaluation of the nuclear safety system ventilation and explosion prevention structures, systems, and components (SSCs) at the H-Canyon Facility and the HB-Line. The area of engineering design and safety basis was rated as a significant weakness, and 3 findings and 20 technical concerns were identified with respect to safety basis weaknesses, design weaknesses, and translation of the safety bases and designs into technical procedures and practices. This 2009 Independent Oversight inspection reviewed the corrective actions related to these findings and the underlying technical concerns.

Most of the technical concerns have been satisfactorily resolved. The corrective actions have resulted in improved technical rigor and configuration management in such areas as document control and identification, tagging, and procedural controls for safety SSCs.

However, as noted in Section 3 under Weakness #4, five technical concerns had not been adequately addressed through the corrective actions taken by SRNS in response to the 2006 Independent Oversight inspection findings. For these issues, SRNS took action to resolve the concern during the inspection or identified appropriate additional actions they planned to take. In addition, as discussed under Weakness #4, during the review of corrective actions Independent Oversight identified two new technical concerns, a concern about calculation control, a continuing concern about implementation of the unreviewed safety question process, and a few examples of inadequate understanding of the relationship of safety equipment inadequacies or inconsistencies of corrective actions to the design and safety bases.

Several of the corrective actions taken in response to the 2006 Independent Oversight findings adequately identified and addressed root causes, such as inadequate management communications of expectations,

inadequate role-specific engineering training, and inadequate translation of analyses and safety bases into technical procedures and processes. However, the causal analysis for several findings did not adequately identify all of the relevant causal factors. For example, in several instances, the identified causes were simply summary statements of technical concern elements and did not document the analysis of the problem and the causes of the concern.

Overall, SRNS's effectiveness in resolving the previously identified technical and programmatic concerns regarding essential system functionality has been mixed. While some improvements have been implemented since the 2006 inspection, the nature and number of technical concerns that were not adequately resolved indicate that further improvements in rigor, attention to detail, and questioning attitude are needed.

5 Conclusions

This 2009 Independent Oversight inspection was conducted during a period in which ARRA-funded efforts had begun to drive increases in the pace of many SRS work activities and an associated significant ramp-up of site employment. EM, DOE-SR, and SRNS recognize the challenges that a large number of new employees present to the site safety programs, which have historically benefited from an experienced workforce that is accustomed to DOE's expectations for safety excellence. With the support of EM and DOE-SR, SRNS has taken appropriate actions to address those challenges, including proactive approaches to ensure the effectiveness of training programs for new employees and the behavior-based safety and human performance initiatives.

EM provides effective program office line oversight and has effective and mature processes for maintaining operational awareness. For the most part, DOE-SR adequately executes its line oversight responsibilities and implements effective Facility Representative, technical qualification, and operating experience programs. Through their assessments, EM and DOE-SR have self-identified the need for further improvement in several areas, and improvement efforts are ongoing. However, weaknesses in DOE-SR's assessment program are impacting DOE-SR's ability to accurately evaluate the status of SRS ES&H programs, processes, and important functional areas. Also, DOE-SR efforts to monitor and ensure the effectiveness of SRNS and DOE-SR corrective actions have not always been effective, as evidenced by DOE-SR's limited progress in completing corrective actions for longstanding deficiencies in its employee concerns program and several SRNS corrective actions for nuclear safety system concerns that were not adequately validated by DOE-SR. Recent DOE-SR efforts to improve corrective action and issue management processes are appropriately focused but are in the early stages of implementation and warrant continued EM and DOE-SR attention to ensure that they achieve their intended benefits. Continued management attention will be also needed to address the weaknesses in DOE-SR assessment and employee concerns programs.

SRNS has made improvements in several areas since the 2006 Independent Oversight inspection, and many aspects of ES&H programs are effective. Notably, SRNS has achieved injury and illness case rates that are among the lowest in the DOE complex and are much lower than rates for comparable industries. SRNS work activities are adequately defined, and in most cases, hazards have been analyzed and the requisite controls have been effectively implemented. Although continued improvements are warranted in a number of areas, SRNS has established and implemented an effective contractor assurance system, which includes an extensive assessment program and uses a comprehensive and effective issues management tool. Furthermore, SRNS is aggressively pursing continued improvement in safety performance through behavior-based safety and human performance initiative concepts. However, there are weaknesses in several important site programs that limit their effectiveness. Although SRNS has improved the AHA process since the 2006 inspection, continued weaknesses in institutional processes and insufficient rigor in application of various AHA process requirements have resulted in instances in which hazards were missed or controls were not tailored to the

work activity, not adequately specified, or lacked rigorous implementing mechanisms. Furthermore, although SRNS has made significant progress since the 2006 Independent Oversight inspection in improving the exposure assessment program, significant work remains to adequately characterize workplace exposures, even though the corrective actions associated with the 2006 finding have all been closed. Weaknesses in the management of safety issues identified in several SRNS assurance system elements hinder management goals for continuous improvement in safety programs and performance. Finally, most of the 2006 technical concerns identified in H-Canyon have been addressed, but the remaining issues indicate insufficient rigor, attention to detail, and questioning attitude by engineers.

EM, DOE-SR, and SRNS have a good understanding of the remaining weaknesses, and in many cases, ongoing initiatives are appropriately targeted on current weaknesses. Continued management attention will be needed to ensure that ongoing efforts are effectively implemented and achieve the intended safety benefits. Increased management attention is warranted for a few SRNS ES&H program areas, primarily: (1) further refinement of the institutional hazard analysis and control processes and monitoring of the effectiveness of the implementation of those processes by the various SRNS line organizations, and (2) further improvements to SRNS feedback and improvement elements, with a particular focus on issues and corrective action management processes. In addition, increased EM and DOE-SR management attention is warranted to improve DOE-SR assessments, the DOE-SR employee concerns program, and monitoring and validation of the effectiveness of corrective actions. In designing and implementing program improvements in line management oversight, EM and DOE-SR should also consider monitoring the progress of the ongoing DOE management reform efforts and be aware of the changes being considered to the approach to DOE regulatory and oversight processes, including the associated implications for EM and DOE-SR oversight programs and staffing and resources needs.

APPENDIX A
Supplemental Information

A.1 Dates of Inspection

Planning Visit	August 4-6, 2009
Onsite Inspection Visit	August 17-27, 2009
Report Validation and Closeout	September 22-24, 2009

A.2 Review Team Composition

A.2.1 Management

Glenn S. Podonsky, Chief Health, Safety and Security Officer
William Eckroade, Deputy Chief for Operations, Office of Health, Safety and Security
John Boulden, Acting Director, Office of Independent Oversight and Office of Enforcement
Thomas Staker, Director, Office of ES&H Evaluations
William Miller, Deputy Director, Office of ES&H Evaluations
Steven Simonson, Director, Office of Emergency Management Oversight

A.2.2 Quality Review Board

William Eckroade	John Boulden	Thomas Staker	William Miller
George Armstrong	Dean Hickman	Robert Nelson	William Sanders
Pete Turcic			

A.2.3 Review Team

Steven Simonson, Overall Team Leader

Phil Aiken	Vic Crawford	Larry Denicola	Bob Compton
Joe Lischinsky	Jim Lockridge	Don Prevatte	Mario Vigliani

A.2.4 Administrative Support

Laura Crampton
Tom Davis