Volume II

Inspection of
Emergency
Management
at the

Savannah River Site

February 2004

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

INDEPENDENT OVERSIGHT INSPECTION OF EMERGENCY MANAGEMENT AT THE SAVANNAH RIVER SITE

Volume II

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INDEPENDENT OVERSIGHT INSPECTION OF EMERGENCY MANAGEMENT AT THE SAVANNAH RIVER OPERATIONS OFFICE AND SAVANNAH RIVER SITE

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Acronyms

ALOHA	Area Locations of Hazardous Atmospheres
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
DWPF	Defense Waste Processing Facility
EAL	Emergency Action Level
EDO	Emergency Duty Officer
EOC	Emergency Operations Center
EPHA	Emergency Planning Hazards Assessment
EPI	Emergency Public Information
EPIP	Emergency Plan Implementing Procedure
ERG	2000 Emergency Response Guidebook
ERO	Emergency Response Organization
FEC	Facility Emergency Coordinator
HTF	'H' Tank Farm
JIC	Joint Information Center
MOU	Memorandum of Understanding
NNSA	National Nuclear Security Administration
OA	Office of Independent Oversight and Performance Assurance
OST	Office of Secure Transportation
PAC	Protective Action Criteria
SR	Savannah River Operations Office
SRSO	NNSA Savannah River Site Office
SRS	Savannah River Site
SRSOC	Savannah River Site Operations Center
WINDS	Weather Information Data System
WSI	Wackenhut Services, Incorporated
WSRC	Westinghouse Savannah River Company
WSRC-SSES	WSRC Safeguards, Security and Emergency Services

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INDEPENDENT OVERSIGHT INSPECTION OF EMERGENCY MANAGEMENT AT THE SAVANNAH RIVER OPERATIONS OFFICE AND SAVANNAH RIVER SITE

Volume II

1.0 INTRODUCTION

The Secretary of Energy's Office of Security and Safety Performance Assurance, Office of Independent Oversight and Performance Assurance (OA) conducted an inspection of environment, safety, and health and emergency management programs at the U.S. Department of Energy (DOE) Savannah River Site (SRS) in January and February 2004. 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. This volume discusses the results of the review of the SRS emergency management program. The results of the review of the SRS environment, safety, and health programs are discussed in Volume I of this report, and the combined results are discussed in a summary report.

This is the first inspection that OA has conducted since Secretary of Energy Spencer Abraham established the new Office of Security and Safety Performance Assurance in December 2003. This action merged OA and the Office of Security into the new Office of Security and Safety Performance Assurance as part of an effort to improve coordination between these offices in addressing safeguards and security policy issues within DOE. OA and the Office of Security remain independent of one another, ensuring the integrity of the independent oversight functions. Both offices report to the Director of the Office of Security and Safety Performance Assurance, who reports directly to Secretary Abraham.

The DOE Office of Environmental Management is the lead program secretarial office for SRS. As such, it has overall Headquarters responsibility for programmatic direction and funding of most activities, as well as emergency management at the site. The National Nuclear Security Administration (NNSA) Office of the Deputy Administrator for Defense Programs is the cognizant secretarial office 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 (SR). The NNSA Savannah River Site Office (SRSO) provides line management oversight for the NNSA operations. SR provides support to SRSO in many technical and administrative areas. SRS is managed and operated by Westinghouse Savannah River Company (WSRC), under contract to DOE. Wackenhut Services, Inc., is the protective force contractor responsible for site physical security. WSRC has a number of teaming partners and uses subcontractors for some activities, such as construction. However, all of the contractor organizations are required to abide by the SRS institutional policies, manuals, and processes, which were developed by WSRC, to perform activities on the SRS site.

SRS has mission responsibilities in the areas of environmental stewardship, stockpile stewardship, nuclear material stewardship, and non-proliferation. Environmental stewardship involves the management, treatment, and disposal of radioactive and non-radioactive wastes resulting from past, present, and future operations. SRS supports nuclear weapons stockpile stewardship by ensuring the safe and reliable recycling, delivery, and management of tritium resources; by contributing to the stockpile surveillance program; and by assisting in the development of alternatives for large-scale pit production capability. SRS also manages excess nuclear materials, including transportation, stabilization, storage,

and disposition to support nuclear non-proliferation initiatives. SRS encompasses approximately 310 square miles of DOE-owned property near Aiken, South Carolina, approximately 20 miles south of Augusta, Georgia.

SRS activities, which include 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, 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 present in various forms at SRS.

Throughout the evaluation of emergency management programs, OA reviews the role of DOE 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 DOE line management oversight in ensuring effective emergency management programs. In reviewing DOE line management oversight, OA focused on the effectiveness of SR in managing the SRS contractor, including such management functions as setting expectations, providing implementation guidance, allocating resources, monitoring and assessing contractor performance, and monitoring/evaluating contractor self-assessments. Similarly, OA focuses on the effectiveness of contractor self-assessment programs, which DOE expects to provide comprehensive reviews of performance in all aspects of emergency management.

In addition to the OA review of SR's emergency management oversight and operational awareness activities, this portion of the inspection evaluated the status of selected critical elements of the emergency management program that WSRC has implemented at SRS. The OA 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.

Section 2 of this report provides an overall discussion of the results of the review of the SRS emergency management program elements that were evaluated. Section 3 provides OA's conclusions regarding the overall effectiveness of SR and contractor management of the emergency management program. Section 4 presents the ratings assigned as a result of this review. Appendix A provides supplemental information, including team composition. Appendix B identifies the findings that require corrective action and follow-up. Appendices C through F detail the results of the reviews of individual emergency management program elements.

2.0 RESULTS

2.1 Positive Program Attributes

SR and WSRC have established a fundamentally strong emergency management program, particularly in the response protocols that have been developed and the capabilities that reside in the emergency response organization (ERO). Weaknesses were noted within several programmatic areas, as discussed on the following page, but they do not materially detract from the site's ability to respond effectively to a wide range of potential initiating events. Positive attributes of the emergency management program are discussed below.

The SRS emergency plan, sitewide and facility-specific emergency plan implementing procedures, and ERO checklists provide an effective framework and mechanisms for implementing the SRS emergency management program. The SRS emergency plan and facility/area-specific annexes thoroughly document the SRS concept of emergency operations, and the concept is implemented through a hierarchy of well integrated standards, procedures, and checklists. Collectively, these documents provide clear roles, responsibilities, and direction in the critical areas of emergency response decision-making. WSRC has developed symptom-based emergency action levels, which are used for event classification, that facilitate prompt classification without the need to determine the exact nature of the initiating event. WSRC has also developed a site-level response procedure that delineates ERO responsibilities and actions for such events as forest fires and offsite transportation events that require elevated management attention or early, coordinated response, but that do not trigger an emergency classification.

Key emergency response personnel at both the site and facility levels demonstrated effective decision-making in the key areas of event categorization/classification, notifications, and protective-action decision-making. During tabletop performance tests, emergency operations center (EOC) teams exhibited effective teamwork and accomplished their major objectives, including demonstrating concern for and sound approaches to personnel and environmental protection; clear lines of command and control during varying circumstances; and awareness of notification requirements, mutual aid assets, and press release responsibilities. Emergency duty officers performed key emergency response actions in a timely manner, including classifying events, demonstrating effective use of the 2000 Emergency Response Guidebook in implementing protective actions, and notifying offsite agencies. Facility emergency response decision-makers clearly understand their response roles and responsibilities, and they effectively implemented the actions prescribed by the applicable response procedures.

SR and WSRC have implemented well-conceived programs for maintaining effective interfaces with state and local offsite organizations and for communicating emergency information to the public, the media, and other stakeholders. Both SR and WSRC maintain cooperative and informative relationships with offsite organizations. Roles and responsibilities for offsite interfaces are clearly defined, and the program plan, supporting procedures, and memoranda of understanding effectively outline the relationship between onsite and offsite response organizations; establish the lines of communication for use during an emergency; and reflect offsite and onsite expectations. The emergency public information program, through which emergency information is disseminated to the public, the media, and other stakeholders, is appropriately defined by a framework of procedures and is supported by knowledgeable and experienced SR and WSRC staff. With the exception of the initial news release, EOC and joint information center procedures include specific provisions for developing and approving news releases that facilitate the timely release of approved information to the public during normal working hours and coordinating emergency public information efforts with Federal, state, and local organizations.

2.2 Program Weaknesses and Items Requiring Attention

The SRS emergency management program is strong in most areas; however, weaknesses were noted in the process used to screen hazardous chemicals for inclusion in the emergency planning hazards assessment (EPHA). Lesser concerns arising from inadequate definition or inconsistent implementation in several other program elements were noted as well. Specific weaknesses are discussed below.

The EPHAs do not assess all of the materials that may impact the health and safety of co-located workers. The process for developing EPHAs does not evaluate hazardous chemicals that lack Code of Federal Regulations (CFR)-published threshold planning quantities. Therefore, many hazardous chemicals, including significant quantities of formic acid and mercury, have not been evaluated for their potential toxicological impact on site workers following facility-specific events. Consequently, as observed during facility-specific tabletop performance tests conducted as a part of this inspection, facility emergency response decision-makers have not been provided with the necessary response procedures and training to ensure that they can identify chemical hazards, protect workers in a timely manner, and accurately classify chemical-release events.

WSRC consequence assessment teams did not demonstrate the ability to develop accurate and timely assessments of emergency event consequences. The current approach to performing consequence assessments is largely expert-based inasmuch as WSRC has not developed all of the necessary expectations, procedure guidance, or other tools (such as archived EPHA consequence analyses) to support a timely, accurate, and consistent consequence assessment process. The impact of this weakness was indicated during tabletop performance tests in which, for a nitric acid release scenario, the two consequence assessment teams each needed approximately 30 minutes to develop plume plots, the results of which varied widely. The identified performance weaknesses can be attributed in large part to the cumbersome process for entering the necessary information into the consequence assessment computer model, as well as weaknesses in the ERO training, drill, and exercise program that collectively permitted these individuals to serve in their designated capacity without first ensuring that performance expectations were clearly articulated, necessary training was provided, and performance was verified to be satisfactory.

SRS continuous improvement processes, as applied to the emergency management area, are not consistently effective in identifying weaknesses and developing effective corrective actions. With the exception of its involvement in the annual exercise process, SR has not conducted emergency management assessments of WSRC to ensure that all programmatic elements are evaluated, as required by both DOE Order 151.1B and the SR technical assessment program. Additionally, until the June 2003 reorganization, SR had not conducted self-assessments of its emergency management program. Consequently, the absence of programmatic assessment activities by SR has gone unnoticed until recently, and SR was not aware that Facility Representatives were not performing technical reviews of EPHAs, as was assumed. These weaknesses can be attributed in part to the fact that the procedure that SR uses to describe its line management oversight process for emergency management is not sufficiently detailed to ensure that the required oversight activities are appropriately planned, conducted, and documented. Although a variety of assessment activities are occurring and improvements are being identified and implemented, WSRC is not conducting annual sitewide programmatic assessments. Further, largely because of institutional weaknesses in the WSRC corrective action development process, a reduced level of rigor is associated with causal analysis of emergency management weaknesses. As a result, observed weaknesses have recurred during emergency management assessments, drills, and exercises. WSRC has identified repeat performance issues in such areas as consequence assessment, radiological controls, SRS operations center communications, and incident commander command and control, indicating that corrective actions have not been effective in completely addressing the underlying causes of these weaknesses.

3.0 CONCLUSIONS

WSRC has implemented an emergency management program at SRS that exhibits most aspects of a mature, comprehensive program. The programmatic framework and the implementation mechanisms are notable strengths. The SRS emergency plan and implementing procedures are well integrated, and they facilitate the effective coordination of sitewide and facility-specific responsibilities for key decision-making and response actions. The quality of the response procedures and implementing checklists contributed significantly to the effective performance in protecting people and the environment that nearly all SRS ERO personnel demonstrated during tabletop performance tests.

Other program elements contained numerous positive attributes as well. WSRC has developed a transportation EPHA and has taken advantage of extensive installed instrumentation to develop symptom-based emergency action levels, which can facilitate rapid event classification. The offsite interface and emergency public information programs are well conceived and effectively implemented, as indicated by the many positive comments related to issues of offsite interest that were received by the inspection team from various state and local emergency preparedness officials. Site and facility ERO training and drill programs provide an appropriate knowledge base for ERO members through in-depth classroom instruction and an extensive program of drills for the training of ERO personnel. In the area of continuous improvement, SR performs a variety of operational awareness activities related to the WSRC emergency management program. Additionally, following last year's SR reorganization, emergency preparedness staff conducted a self-assessment that identified seven areas of improvement for SR oversight of the WSRC emergency management program. Finally, WSRC is using various assessment activities, management evaluations, and drills/exercises to identify sitewide and facility-specific emergency management weaknesses and improvement opportunities, and to implement improvements.

The most important weakness identified during this inspection is that the WSRC process for screening hazardous materials for subsequent evaluation in facility-specific EPHAs excludes hazardous chemicals that do not have CFR-published threshold quantities, irrespective of the potential adverse health effects that the release of such materials might cause. Consequently, several hazardous chemicals whose uncontrolled release could cause protective action criteria to be exceeded, thus necessitating event classification, were not assessed at the three facilities reviewed. One impact of this weakness is that although WSRC believed that facility response procedures for abnormal events adequately addressed the release of such materials, facility emergency response decision-makers demonstrated during tabletop performance tests that they did not have the procedures and training necessary to ensure an effective response to a release of a hazardous chemical from their facility.

Several other weaknesses were identified in the SRS emergency management program. Some provisions of the training, drill, and exercise program are not effectively implemented. Most important of these is that the process for ERO position qualification does not always verify that the participant can execute all the key tasks necessary to perform the job duties before being placed on the ERO rotation schedule. The consequence assessment teams' difficulty in producing reasonably accurate assessments of event consequences in a timely manner can be attributed in part to weaknesses in the training and qualification program. Additionally, SR has not been conducting programmatic assessments of the WSRC emergency management program, and existing line management oversight processes in the emergency management area lack the structure and formality necessary to ensure that SR can proactively identify programmatic weaknesses. Finally, WSRC's implementation of the existing corrective action process does not ensure that identified weaknesses are subjected to an appropriate causal analysis and that corrective actions are developed to prevent recurrence.

WSRC has implemented a well structured emergency management program that provides a high degree of confidence that site workers and the public will be adequately protected if a significant event occurs.

The identified weakness in the hazardous material screening process will require a carefully considered approach to correction, and additional SR line management attention to SR oversight of the SRS emergency management program is warranted in order to sustain the recent improvement initiatives. Some other elements of the WSRC program will require attention to improve those aspects that limit their effectiveness. Overall, however, the program is strong.

4.0 RATINGS

This inspection focused on a detailed assessment of eight key emergency management programmatic elements, divided into four major element categories. No overall program rating has been assigned. The individual element ratings reflect the status of each SRS emergency management program element at the time of the inspection. The ratings assigned below to the readiness assurance category are specific to those assessment, corrective action, and performance monitoring mechanisms applicable to the emergency management area.

The ratings for the individual program elements evaluated during this inspection are:

Emergency Planning

Hazards Survey and Hazards Assessments ..... NEEDS IMPROVEMENT
Program Plans and Procedures ..... EFFECTIVE PERFORMANCE
Offsite Interfaces ..... EFFECTIVE PERFORMANCE

Emergency Preparedness

Training, Drill, and Exercise Program ..... EFFECTIVE PERFORMANCE
Emergency Public Information ..... EFFECTIVE PERFORMANCE

Emergency Response

SRS Emergency Response Decision-Making ..... EFFECTIVE PERFORMANCE

Readiness Assurance

DOE Assessments and Performance Monitoring ..... NEEDS IMPROVEMENT
Contractor Assessments and Issues Management ..... EFFECTIVE PERFORMANCE

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APPENDIX A

Supplemental Information

A.1 Dates of Review

Scoping Visit	December 16 - 17, 2003
Onsite Inspection Visit	January 26 - February 5, 2004
Report Validation and Closeout	February 18 - 20, 2004

A.2 Review Team Composition

A.2.1 Management

Glenn S. Podonsky, Director, Office of Security and Safety Performance Assurance
Michael A. Kilpatrick, Director, Office of Independent Oversight and Performance Assurance
Charles B. Lewis, Director, Office of Emergency Management Oversight

A.2.2 Quality Review Board

Michael A. Kilpatrick	Dean C. Hickman
Charles B. Lewis	Patricia Worthington
Robert M. Nelson	Douglas Trout

A.2.3 Review Team

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

Steven Simonson (Topic Lead)
JR Dillenback
Stephen Kirchhoff
David Odland
Jeff Robertson
Tom Rogers
David Schultz

A.2.4 Administrative Support

MaryAnne Sirk

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APPENDIX B

Site-Specific Findings

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

FINDING STATEMENTS	REFER TO PAGES:
1. WSRC has not ensured that all hazardous chemicals are identified and then assessed, as appropriate, for potential impact on site workers and the public, as required by DOE Order 151.1B, *Comprehensive Emergency Management System*.	15
2. The WSRC process for training and qualifying ERO personnel does not ensure, through task-specific training and demonstration of required proficiency, that the personnel can perform all of their key ERO position responsibilities, as required by the SRS emergency plan and site training standards.	25
3. During tabletop performance tests, the WSRC consequence assessment teams did not develop accurate and timely assessments of emergency event consequences to support ERO decision-making, as required by DOE Order 151.1B.	37
4. SR is not conducting programmatic assessments of the site emergency management program, as required by the emergency plan and DOE Order 151.1B.	42

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APPENDIX C

Emergency Planning

C.1 INTRODUCTION

Emergency planning consists of identifying hazards, threats, and hazard mitigation mechanisms; developing and preparing emergency plans and procedures; and identifying personnel and resources needed to ensure an effective emergency response. Key elements of emergency planning include developing a hazards survey and emergency planning hazards assessment (EPHA) to identify and assess the impact of site- and facility-specific hazards and threats, and establishing an emergency planning zone. Based upon the results of these assessments, U.S. Department of Energy (DOE) and National Nuclear Security Administration (NNSA) sites and facilities must establish an emergency management program that is commensurate with the identified hazards. The emergency management plan defines and conveys the management philosophy, organizational structure, administrative controls, decision-making authorities, and resources necessary to maintain the site's comprehensive emergency management program. Specific implementing procedures are then developed that conform to the plan and provide the necessary detail, including decision-making thresholds, for effectively executing the response to an emergency, regardless of its magnitude. These plans and procedures must be closely coordinated and integrated with offsite authorities that support the response effort and receive DOE emergency response recommendations.

This evaluation included a review of the Savannah River Site (SRS) hazards survey and EPHA documents, the SRS emergency plan, and associated sitewide and facility-specific implementing procedures, with a focus on the guidance provided to initial decision-makers in the areas of event classification, event notification, and protective action formulation. The Independent Oversight team also evaluated the efforts of Westinghouse Savannah River Company (WSRC) and the Savannah River Operations Office (SR) in coordinating the site's emergency management program with offsite agencies.

C.2 STATUS AND RESULTS

C.2.1 Hazards Survey and Hazards Assessments

The hazards survey and EPHAs serve as the foundation of the emergency management program; consequently, their rigor and accuracy are the key to developing effective emergency response procedures and other elements of the program. The degree to which the EPHAs effectively serve this function depends primarily on the completeness of the institutional processes for developing a hazards survey and EPHAs; the effectiveness of the screening process by which hazardous materials are initially considered; and the rigor and accuracy of the analyses contained within the EPHAs. At SRS, each of these areas contains positive attributes. However, weaknesses in the screening process, the spectrum of events considered, and some aspects of the consequence analyses detract from the adequacy and effectiveness of the hazards survey and EPHAs as emergency planning and response tools, and consequently, these weaknesses impact other elements of the emergency management program.

The SRS hazards survey identifies and describes major site facilities and provides a compilation of sources of more detailed information, such as a listing of all buildings containing hazardous materials and a database of fire preplans. Initial screening results for buildings containing hazardous materials are also documented in a referenced database, but inventory information suitable for preliminary screening of specific materials and the determination of required EPHA activities is not included. Also absent from

the hazards survey is a qualitative description of potential health, safety, and environmental impacts of generic emergencies applicable to facilities and documentation of applicable planning and preparedness requirements. Furthermore, SRS transportation activities, including activities involving Office of Secure Transportation shipments, are not addressed. Collectively, these weaknesses prevent the hazards survey from functioning as an effective emergency planning and response tool.

WSRC has implemented a detailed standard for developing and maintaining facility EPHAs, which is supplemented by a writer's guide to enhance consistency of content among 17 facility- and activity-level EPHAs, including transportation. The standard addresses the major tasks involved in EPHA preparation and provides generally adequate guidance to the multi-disciplinary team members who prepare the documents. A noteworthy strength of the standard is that it establishes ownership of the document at the facility manager level, with clearly defined roles and responsibilities throughout the organization. Additionally, the standard facilitates simplification of the consequence assessment determinations by directing conversion of radioactive isotopes of interest to plutonium-238 equivalents for airborne releases; directs source term calculations utilizing appropriate release fractions; and requires the analysis of both mitigated and unmitigated events based on the safety class ratings of such systems as ventilation. Augmenting the standard for performing EPHAs are other company-wide procedures that require the emergency preparedness group to be notified in advance of changes to facility safety basis documentation. However, the WSRC EPHA development standard inappropriately directs that non-radiological hazardous materials that do not have Code of Federal Regulations (CFR)-published threshold quantities be specifically excluded from consideration in the EPHA. As discussed in more detail below, this negatively impacts the completeness of the hazards screening process and, therefore, the rigor of the EPHA analyses. Furthermore, the standard does not sufficiently define the emergency events and conditions that require assessment to ensure that the full spectrum of emergency events is considered and clearly documented in facility EPHAs.

An effective hazardous material screening process (which establishes the need for a quantitative EPHA) is based on a thorough identification of the hazardous materials present in the facility, which in turn relies to a great extent on an accurate site inventory of hazardous materials. For radioactive materials, the EPHA preparation standard directs the use of such safety basis documentation as safety analysis reports as the source for inventory information. Where appropriate, the facility maximum inventories found in safety documents are utilized in the EPHAs, and WSRC has developed mechanisms to permit facility emergency decision-makers to adjust these maximum quantities of radiological materials to actual inventories in case of a release event involving these materials. However, based on selected facility walkdowns, Independent Oversight determined that the EPHAs do not adequately evaluate the potential risk of chemical releases to site workers. This is because the EPHA development standard inappropriately requires the exclusion of hazardous chemicals that do not have CFR-published threshold planning quantities, irrespective of their potential toxicological consequences if released. Consequently, contrary to the approach used prior to a May 2001 revision to the standard, the SRS EPHAs do not evaluate all of the non-radiological hazardous materials used at SRS that are present in significant quantities and, in some cases, are highly toxic. This screening practice is inconsistent with DOE expectations, as articulated in DOE Order 151.1B and the accompanying emergency management guide, that EPHAs be developed for all materials that may pose a serious threat to affected populations so that the appropriate response plans and procedures can be developed.

To evaluate the effectiveness of the hazards identification process employed in the facility EPHAs and to determine the impact of the above-mentioned weakness in the chemical screening process, walkdowns were conducted at several hazardous material storage locations at the 'H-Area' separations facility, defense waste processing facility (DWPF), and 'H' tank farm (HTF). Where applicable, a small portion of the facility chemical inventories was also reviewed. During these walkdowns, facility managers and staff demonstrated detailed knowledge of the requirements of the EPHA development standard, hazard

locations, possible event initiators, and consequences of postulated emergencies. This is reflective of the high degree of facility ownership of the EPHAs. The site's strict controls on procuring hazardous chemicals have significantly reduced the overall site inventory of these materials. However, no single facility-specific inventory list of potentially-hazardous chemicals exists, in part because of the previously noted exclusion of chemicals lacking CFR-published threshold quantities. The EPHAs therefore do not include an accurate inventory of (or assess) all the chemicals that could cause a classifiable emergency if released. For example, the chemical inventory appearing in the EPHA for the concentration, storage, and transfer facilities, which includes HTF, did not accurately reflect the presence of large quantities of mercury, sodium chromate, and oxalic acid, although these materials constitute a potentially significant toxic hazard. Similarly, the chemical inventory referenced in the 'H-Area' separations EPHA did not accurately reflect the presence of large amounts of both elemental and contaminated mercury, and the DWPF EPHA did not include the large amounts of contaminated mercury and the 5,000 gallons of formic acid stored at the facility. In each case, the release or loss of control of the material could cause protective action criteria (PAC) to be exceeded at critical receptors of interest, such as 30 and 100 meters. The transportation EPHA, for instance, indicates that the release of more than 5,000 gallons of formic acid will cause PAC to be exceeded at approximately one mile. Such a release at DWPF would necessitate issuance of protective actions beyond the facility and declaration of a site area emergency. However, this material was "screened" from consideration in the DWPF EPHA.

Finding #1: WSRC has not ensured that all hazardous chemicals are identified and then assessed, as appropriate, for potential impact on site workers and the public, as required by DOE Order 151.1B, *Comprehensive Emergency Management System*.

The hazards remaining after the screening process is complete are analyzed to determine the consequences of their release on affected populations. The EPHAs include a number of positive elements in this area, including fairly detailed descriptions of the facility and its operations; appropriate definitions of facility and site boundaries; identification of barriers to hazardous material release; and indicators of barrier failure (instrumentation for emergency action levels – EALs) that could be used as thresholds for emergency declarations. The EPHAs document both engineered and administrative controls and some analysis assumptions such as operator response times, that mitigate release consequences. With one exception, the EPHAs adequately characterize such physical properties as material-at-risk quantities, conditions of storage, and the physical form of hazardous materials that remained after screening. The exception is the 'H-Area' separations EPHA, which did not consider the toxicological hazard associated with low-enrichment uranium; however, this omission was recently recognized by the site and will be corrected in the next EPHA revision. The EPHAs also include an appropriate level of detail regarding the identification of affected barriers to the release of hazardous materials and instrument indicators of barrier integrity, and the EPHA results are generally well correlated to the facility implementing procedures for classifying emergency events. Consequences at receptors of interest are calculated for both average and severe meteorology and are effectively tabularized in the EPHAs. Finally, the EPHAs provide the technical basis for the facility-based emergency planning zones and the composite site emergency planning zone (i.e., the site boundary), which have been appropriately determined.

From an analysis and documentation perspective, several weaknesses were noted in the EPHAs. The first is that the spectrum of events does not appear to include certain low-probability, high consequence events. Although barrier analysis is appropriately emphasized in the EPHA, together with the inclusion of symptomatic indicators for determining the severity of the event, the EPHAs for the DWPF and the concentration, storage, and transfer facilities do not contain enough detail to allow direct correlation of the event consequences to such event initiators as natural phenomena. As a result, detailed analyses of safety basis documents are required to identify the spectrum of event initiators that are assessed in the EPHA. Correlation of the consequence analyses with potential event initiators, similar to that contained

in the 'H-Area' separations EPHA, would enhance the utility of the DWPF and H-Tank Farm documents by consequence assessment personnel during an emergency event. Additionally, including this level of detail would formally preserve for future EPHA developers and reviewers the assumptions and rationales used in postulating EPHA scenarios. More importantly, some events, such as aircraft crash, were not specifically assessed in the EPHA, and the EPHAs do not include the technical basis for not assessing this type of event. Furthermore, because the malevolency evaluation document referenced by the EPHAs characterizes malevolent acts as producing releases similar to those that could be caused by other initiators, "severe" malevolency at a level described in the DOE Order 151.1B emergency management guide (i.e., substantive difference in severity between "moderate" and "severe") has not been assessed. Finally, the EPHAs do not include, in a readily available form, several consequence assessment outputs, including elapsed time until arrival of the consequence threshold at the receptor; distances to thresholds for early lethality; duration of the release; and the footprint of the consequence for use in protective action determinations. WSRC is considering changing the EPHA format to enhance usability.

In conclusion, WSRC has been proactive in developing a formal, comprehensive process to formulate and maintain hazards assessments, and in developing institutional mechanisms to track and maintain hazardous material inventories and notify emergency planners of facility process changes. The site is actively reducing hazards through reduction of hazardous material inventories. Many key elements needed to develop a technically sound basis for the emergency management program, such as a good barrier analysis of identified hazards for developing response decision-making tools, are included in the EPHAs. Although the site has prepared a hazards survey, it is of limited value because it does not identify site activities and hazards requiring emergency planning attention. More fundamentally, the process for screening hazardous materials for impact on affected populations is incomplete, and therefore, not all facility and activity hazards have been considered. Furthermore, because the EPHAs do not clearly identify and assess all emergency events, some assessment conclusions are not available for establishing other program elements. The collective impact of these weaknesses is that the technical basis for the SRS emergency management is not rigorous enough to ensure that pre-determined protective actions and associated event classification tools are adequate.

C.2.2 Program Plans and Procedures

The provisions for responding to operational emergencies at SRS are thoroughly documented in the SRS emergency plan. In addition to site-level functions, the emergency plan includes facility/area-specific annexes that identify mechanisms for meeting program requirements at the facility or area level. A hierarchy of lower-tier standards, procedures, and checklists implement the requirements established by the plan. The emergency plan and emergency plan implementing procedures (EPIPs), both at the site and facility levels, are well integrated and provide consistent requirements and direction. Additionally, the emergency plan and supporting procedures address the topical areas discussed in DOE Order 151.1B and the associated emergency management guide.

The SRS emergency plan is implemented by numerous site and facility organizations. To facilitate development and ensure consistency of the EPIPs, WSRC has established standards that govern many elements of the program. Document revisions are reviewed against these standards by the WSRC emergency preparedness group to ensure consistency between facilities and with the sitewide program described in the emergency plan. Although the organization and content of EPIPs vary from facility to facility, the general concept of emergency operations is consistent. However, as discussed previously in Section C.2.1, the WSRC standard used to develop and maintain EPHAs does not fully implement DOE expectations, as articulated in DOE Order 151.1B and the accompanying emergency management guide, for screening and assessing hazardous materials.

EPIPs reflect the integration of facility response with the overall site response. Coordination of responsibilities for decision-making and response actions, such as categorization, classification, notifications, and protective actions, are clearly established and understood. WSRC has implemented effective procedures and processes for notifying facility workers of the need to take such protective actions as sheltering or evacuating, and facility-level EPIPs (and associated checklists) detail the thorough personnel accountability processes. Sitewide and facility EPIPs are well integrated and include both Federal and contractor response actions. Roles and responsibilities are clear, concise and consistent across program documents, and organizational interfaces are adequately described. Emergency response organization (ERO) position-specific checklists, which are incorporated in EPIPs as attachments, are comprehensive and user friendly. Additionally, effective use is made of decision trees and preformatted data forms and messages. EPIPs are required to be reviewed at least annually and, except as noted below, are current with program requirements.

The EALs, which are contained in event classification EPIPs, include several positive attributes. EALs are symptom based, facilitating prompt classification without the need to determine the event initiators. Where available, installed instrumentation is used to determine EAL thresholds, thus minimizing the need for additional interpretation or investigation in order to classify events. Additionally, the HTF EALs incorporate the use of real-time data to accurately determine the classification level based on actual tank inventories. Another noteworthy procedure is the EPIP for a graded ERO response. It provides site-level, ERO core staff responsibilities and expected responses for events that require elevated management attention or coordinated response but have not triggered an emergency classification. This procedure is an effective aid to management decision-making in mitigating the potential consequences of events with anticipated site impacts, such as forest fires, hurricanes, security events, and offsite transportation events.

However, the EPIPs that support protective action decision-making do not address all prompt actions that may be needed to adequately protect workers. "Remain indoors" is specified in sitewide and facility-level protective action EPIPs as the immediate protective action for site workers. The facility-level checklists address reevaluating protective actions based on weather and toxic chemical conditions, as well as on recommendations from the emergency duty officer (EDO), fire department incident commander, industrial hygienists, or radiological control personnel. Facility-level EPIPs also contain announcements directing personnel to stay clear and upwind of known hazards. However, these procedures do not address establishing an isolation zone to immediately protect personnel from life-threatening concentrations of hazardous materials. Instead, the expectation is that the fire department incident commander will identify the appropriate protective actions, in accordance with the 2000 Emergency Response Guidebook, after arriving at the scene and evaluating the situation. Additionally, tabletop performance tests (refer to Section E.2.4) confirmed that facility emergency coordinators consider the "remain indoors" protective action as adequate and appropriate for all area events (even when directly in a radiological or chemical plume), although it is unclear whether this action is always appropriate. The determination of an isolation zone – consistent with the Emergency Response Guidebook for toxic chemicals and the EPHA for radiological dose rates that exceed the threshold for early lethality – may be appropriate to ensure adequate and timely protection of area workers.

The Independent Oversight team noted that WSRC has implemented a Savannah River Site Operations Center (SRSOC) procedure for responding to events involving Office of Secure Transportation (OST) shipments while on site at SRS, but that this procedure is not consistent with OST protocols. The SRS procedure specifies that DOE-Albuquerque (now the OST operations center) will classify OST events that occur on SRS property; however, OST expects the sites to categorize/classify such events. An emergency management inspection at OST conducted by Independent Oversight in November 2003 found that OST has not been proactive in coordinating site and OST-shipment planning considerations. Furthermore, WSRC has attempted to coordinate, through SR, a revision to this procedure with OST, but specific

questions regarding notifications have not been addressed by OST. During this inspection, SR indicated that they intend to pursue this issue directly with OST and other cognizant line management.

Although the SRS emergency management plans and procedures are generally comprehensive and well integrated, the Independent Oversight inspection team identified several instances in the emergency public information and event categorization/classification areas where specific EPIPs are unclear or lack the necessary detail to ensure a consistent and timely response. These are discussed in more detail in Sections D.2.2 and E.2.3. Additionally, not all program documents are current and have not been reviewed and approved annually. For example:

- Not all sections of the emergency plan have been reviewed and updated (as necessary) by WSRC annually, as specified in the emergency plan.

- SR has not reviewed and approved the emergency plan revisions annually, even after WSRC made substantive changes and so notified SR, as required by the emergency plan.

- The EPIP for dispersion modeling has not been reviewed and revised annually, and as a result it is not consistent with the modeling software version in use.

- The SRSOC procedure for responding to emergencies notes that Radiological Operational Emergencies are required by the states of South Carolina and Georgia to identify and report radiological releases at a level of 0.1 mrem total effective dose equivalent at the site boundary. WSRC determined that it was an outdated requirement, and in any case a dose limit that low may not be detectable and is no longer calculated.

- ERO position folders and controlled copies of the emergency plan are not all current with the latest document revisions.

Although the above examples demonstrate the need for increased attention to some program administrative duties and more thorough reviews, they do not represent a weakness that would significantly hinder response actions. Additionally, when these weaknesses were identified during this inspection, WSRC took immediate action to ensure that ERO folders and emergency plan sections in the emergency operations center (EOC) and technical support room were up to date.

To summarize, WSRC has, with few exceptions, comprehensively documented the provisions of the SRS emergency management program in the emergency plan and implementing procedures. These program documents are well integrated and provide consistent requirements and direction. In particular, EALs make extensive use of installed instrumentation for defining classification thresholds, and the EPIP for graded ERO response provides useful guidance for non-classifiable events that require coordinated response. Procedures and checklists contributed to the generally effective performance identified during the tabletop performance tests involving ERO personnel. However, the facility-level protective action procedures do not ensure that the most appropriate protective actions for facility workers are identified and implemented in a timely manner. Additionally, as a result of some weaknesses in program administration, not all program documents are kept current, and are not reviewed and approved annually.

C.2.3 Offsite Interfaces

The integration of site emergency response plans and resources with those of local communities is an important element in establishing an effective site emergency management program. These arrangements also benefit local communities by permitting them to take advantage of resources not otherwise available

for local emergencies. Key to successful integration is the establishment of specific written agreements and the maintenance of continuing dialog with local agencies to establish clear expectations regarding emergency response roles, responsibilities, capabilities, notification procedures, and information needs.

SR and WSRC have established and are maintaining effective interfaces with offsite organizations. The overall offsite interface program is well developed and administered, and it is documented in the emergency plan. The plan and supporting EPIP effectively outline the relationship between onsite and offsite response organizations during an emergency, and establish definitive lines of communication both on and off site. Additionally, the plan clearly defines emergency roles and responsibilities for the offsite interactions coordinator and the offsite communicator in the SRS EOC, and the offsite liaisons sent to each state and local EOC. Tabletop performance tests conducted during this inspection indicate that effective training and procedures for making timely initial notification to offsite officials are in place, and EDOs and EOC staff are well aware of the initial and periodic notification time requirements and the process to make such notifications.

Several notable initiatives characterize the offsite interface program. These initiatives provide the basis for a cooperative and supportive relationship with a host of state and county organizations in both South Carolina and Georgia, as well as the Vogtle Electric Generating Plant, which is operated by Southern Nuclear Operating Company. Particularly noteworthy is SR and WSRC management involvement in the Quarterly Issues Meeting and the related development of the courtesy notification program. Since inception, the issues meeting has become an ongoing quarterly activity made up of a consortium of offsite and onsite organizations. At each meeting, SR and WSRC address issues raised at the previous meeting and present agendas to keep offsite agencies apprised of the site concept of operations and programmatic updates. Interviews during this inspection with offsite officials revealed that previous offsite concerns regarding SRS notification issues and protective action measures have been effectively addressed. Additionally, offsite representatives from South Carolina Emergency Management Division, Aiken County Emergency Services Department, and Barnwell County Emergency Management are now confident that the offsite program is effective and that the site will respond to their needs in the event of an incident.

In addition to the issues meeting, WSRC has affiliations with three local emergency planning committees and participates in the South Carolina Emergency Management Conference and the Georgia Radiation Working Group. The WSRC offsite interaction liaison provides daily support to SR, both states, and numerous local offsite agencies. The liaison responsibilities include coordinating the SRS emergency concept of operations and the onsite response to an incident with state and local emergency management officials and response organizations. The WSRC fire department has also taken the initiative to expand mutual aid by offering offsite-training support in such areas as emergency bus extraction, mass casualty, and radiological issues for transportation.

Emergency support relationships with state and local organizations are pre-arranged and formally documented in the emergency plan. There are numerous memoranda of understanding (MOUs) and agreements for mutual aid, medical assistance, and other emergency response support for SRS. These MOUs are comprehensive; clearly reflect offsite and onsite expectations; and include provisions for periodic review, coordination, and participation in training, drills, and exercises. WSRC maintains the MOUs, which are reviewed and updated every five years.

While the offsite interface program is well developed and administered, there are a few weaknesses related to the plan. The most important of these is that the plan does not describe the day-to-day roles and planning activities (e.g., Quarterly Issues Meeting) associated with the SR or WSRC interface program. Thus, although these activities form the current basis for the program's effectiveness, the plan does not formally convey SR's or WSRC's expectation or requirement to continue these activities. Additionally,

the MOUs that cover the three health care providers stipulate the coordination of all news releases that reference each hospital's support to SRS. Because WSRC has not ensured that SR and WSRC public affairs organizations are aware of these news release requirements, this requirement has not been implemented.

To summarize, SR and WSRC have institutionalized a sound offsite interface program. Both SR and WSRC have initiated and are maintaining cooperative and informative relationships with offsite organizations, and the WSRC designation of an offsite liaison facilitates an effective, ongoing relationship with offsite officials. However, day-to-day offsite programmatic activities are not described in the applicable section of the emergency plan, and the news release stipulation in hospital MOUs is not being implemented.

C.3 CONCLUSIONS

WSRC has established comprehensive processes for developing and maintaining EPHAs, and the EPHAs contain many of the key elements needed to establish a clear technical basis for developing response approaches and procedures. Planning is well executed at both the site and facility levels in the SRS emergency plan and implementing procedures; with few exceptions, these documents are clearly written and provide a consistent approach to emergency response functions. Additionally, the offsite interfaces program has established strong relationships with offsite agencies and effectively integrated the resources of those agencies into site emergency response planning. However, because many toxic chemicals are inappropriately screened out during the EPHA development process, the EPHAs do not provide the analysis necessary to plan all emergency response actions, such as classifying events and establishing the optimum set of protective actions.

C.4 RATING

A rating of NEEDS IMPROVEMENT is assigned to the area of hazards survey and hazards assessments.

A rating of EFFECTIVE PERFORMANCE is assigned to the area of program plans and procedures.

A rating of EFFECTIVE PERFORMANCE is assigned to the area of offsite interfaces.

C.5 OPPORTUNITIES FOR IMPROVEMENT

This Independent Oversight inspection identified the following opportunities for improvement. These potential enhancements are not intended to be prescriptive. Rather, they are intended to be reviewed and evaluated by the responsible DOE/NNSA and contractor line management and prioritized and modified as appropriate, in accordance with site-specific programmatic emergency management objectives.

Savannah River Operations Office

- Consider establishing a process for the timely review and approval of emergency plan revisions.
  - Establish clear requirements for SR and NNSA-Savannah River Site Office technical reviews and approvals.
  - Document any delegation of approval authority for annual revisions and interim approvals for individual sections.

- Define a timeframe keyed to the WSRC annual emergency plan submittal for completing the reviews and approval.

- Consider addressing issues related to response to onsite events involving OST shipments through formal correspondence with senior NNSA line management to provide the visibility and accountability necessary to facilitate timely resolution.

Westinghouse Savannah River Company

- Improve the hazards survey and EPHA development and maintenance process by incorporating survey activities and providing additional specificity to the EPHA development procedure. Specific actions to consider include:

  - Perform a detailed review of DOE Guide 151.1-1, *Emergency Management Guide*, to identify provisions that should be incorporated into the EPHA development process (e.g., perform qualitative screening of accurate facility inventories and include results in the hazards survey).

  - Document the hazardous material identification and screening process employed at SRS. For materials not screened, fully characterize the hazards in EPHAs to ensure that a technical basis is available for preparing response tools.

- Enhance the quality of the site hazards survey and facility EPHAs by including additional details and assumptions. Specific actions to consider include:

  - Include transportation activities in the site hazards survey. Include assessment documentation in the transportation EPHA for movement of radioactive materials on the site.

  - Compute "surrogate" threshold planning quantities (i.e., determine the amount of hazardous material required to exceed protective action criteria at critical receptors) for materials of concern that do not have CFR-published values. Include these quantities in applicable site databases.

  - Analyze a more complete spectrum of emergency events and conditions. Clearly correlate event initiators with barrier failure analysis to ensure that the full spectrum is addressed. Provide additional consequence analysis results to ensure that a technical basis for preparing protective actions is available and considered.

- Enhance the document reviews conducted by the WSRC emergency preparedness group to ensure consistency between facilities.

  - Consider standardizing the facility emergency preparedness coordinator responsibilities in the facilities' emergency preparedness program administration procedures.

  - Ensure that the emergency preparedness program administration procedures provide the necessary detail for meeting all requirements contained in the emergency plan that are not directly response-related. Defining administrative processes will help to ensure the long-term consistency of program documents that are controlled at the facility level. Examples include the process for ensuring that emergency plan-related procedures receive WSRC emergency preparedness group reviews, and the conduct of emergency management self-assessments that are initiated by the WSRC emergency preparedness group but performed by facility emergency preparedness coordinators.

- Ensure that the SRS emergency management plans and procedures are current and are reviewed and approved annually.

  - Expedite a review of those sections of the emergency plan that have not been reviewed and updated (as necessary) annually.

  - Update the EPIP for Area Locations of Hazardous Atmospheres (ALOHA) dispersion modeling consistent with the software version in use. Consider making the procedures for ALOHA, Hotspot, and Weather Information Data System (WINDS) all part of the same procedure set. For example the ALOHA dispersion modeling procedure is a sitewide EPIP and Hotspot is an SRS operations center procedure.

  - Consider including an activity in the emergency management self-assessment to ensure that emergency plan sections are reviewed annually and that all controlled copies of the emergency plan and EPIPs in the ERO position folders are the latest document.

- Enhance the offsite interface descriptions in Section 3 of the emergency plan.

  - Describe SR and WSRC involvement in and planning activities for the Quarterly Issues Meeting.

  - Describe the courtesy notification program.

  - Describe SR and WSRC involvement in the local emergency planning committees, the South Carolina Emergency Management Conference, and the Georgia Radiation Working Group.

  - Provide consistent MOU information (Section 3 and Attachment III).

- Incorporate news release stipulations from the hospital MOUs into procedures and checklists belonging to SR and the WSRC public information staff, as appropriate.

- Clarify the responsibilities of WSRC joint information center staff for notification and emergency update for all government officials. Ensure that each organization's responsibilities are documented in Sections 3 and 10 of the emergency plan, and EPIPs 6Q-300 and 6Q-600.

APPENDIX D

Emergency Preparedness

D.1 INTRODUCTION

A coordinated program of training, drills, and exercises is necessary to ensure that emergency response personnel and organizations can effectively respond to emergencies impacting a specific facility or the site as a whole. This response includes the ability to make time-urgent decisions and take action to minimize the consequences of the emergency and to protect the health and safety of responders, workers, and the public. To be effective improvement tools, exercises should be used to validate all elements of an emergency management program over a multi-year period using realistic, simulated emergency events and conditions, and to provide ERO members an opportunity to practice their skills. An effective emergency public information (EPI) program provides the public, media, and U.S. Department of Energy (DOE) employees with accurate and timely information during an emergency event. In part, effectiveness is based on having in place a long-term, documented program to educate the public and the media about actions that may be required during an emergency response.

The Office of Independent Oversight and Performance Assurance (OA) team evaluated the training, drill, and exercise program used to support the emergency response organizations at the institutional and facility levels. As part of the programmatic review of the training, drill, and exercise elements, the OA team evaluated the plans and procedures that support these elements and reviewed training and proficiency records for key site emergency responders. Drill and exercise reports were also reviewed for indications that they are being used effectively to enhance responder proficiency and evaluate the level of the site's response preparedness. The team also evaluated EPI plans and applicable processes for an emergency at the Savannah River Site (SRS).

D.2 STATUS AND RESULTS

D.2.1 Training, Drill, and Exercise Program

Training

Westinghouse Savannah River Company (WSRC) has developed an SRS emergency plan that appropriately establishes roles, responsibilities, and requirements for the ERO training and qualification program. Training requirements are established for general employee training/consolidated annual training on emergency management, site ERO training, area/facility ERO training, and drill and exercise controller/evaluators. The WSRC Safeguards, Security and Emergency Services director has the principal responsibility for implementing and overseeing the WSRC site emergency management program, and individual operating division managers are responsible for implementing the facility emergency preparedness programs.

The emergency plan commits WSRC to performance-based training for ERO personnel, including the development of knowledge and performance/skill lists; the evaluation of post-training performance (i.e., in drills, exercises, or actual events) in order to assess emergency management training programs; and notification of ERO training staff of procedure changes that need to be factored into the training materials. The plan addresses initial training and qualification, as well as requalification, for ERO personnel. It also describes the training methodology used to develop the training program and implementing training materials, and refers to the sitewide training standards for some of the details on

implementing this requirement. The training section of the emergency plan describes a systematic approach that is to be implemented sitewide for identifying training needs, developing appropriate learning objectives, providing task-specific training and qualification of personnel, and evaluating training programs. Annexes to the emergency plan contain additional information regarding training at the individual facilities. To ensure consistency, the Savannah River Operations Office (SR) relies on WSRC to train SR personnel who have ERO responsibilities.

Through these documents, WSRC has established clear expectations for training and drill participation for ERO personnel. The ERO training program has several other positive attributes. These include the development of matrices, for both site and facility positions, that identify the training courses and drill/exercise participation required for qualification; the development of a comprehensive set of training courses and student study guides tailored to the ERO position; appropriate examinations; a requirement for annual drill or exercise participation to maintain ERO qualification; and computer-based systems that track the qualification status of each WSRC and SR ERO member.

However, weaknesses were noted in WSRC's implementation of emergency management training and qualification program requirements in several important areas. Examples include:

- The training matrices developed for ERO positions address classroom training and drill/exercise participation, but do not address specific practical training directed toward the tasks and skills required to perform the duties associated with the position.

- The WSRC requirement that each ERO member participate in a drill or exercise for qualification or requalification is not implemented with sufficient detail to ensure that individuals actually practice required skills or receive an evaluation of their performance before being granted credit for drill participation.

- The controller/evaluator training course addresses the role of the evaluator in the drill but does not provide instruction on the process for evaluating the drill, including the newly developed lines of inquiry, or the performance of the individual ERO position that is being evaluated.

- A computer-based test is used as the "classroom" portion of requalification training. This test has not been revised to reflect changes in the organization or procedures, or to evaluate different knowledge areas, for over two years.

- Seven of 36 SR personnel on the ERO rotation schedule, including two personnel on the primary rotation, have not completed their annual requalification requirements.

The drill program and the ERO All Call newsletter process give personnel ample opportunity to identify changes in the ERO program and procedures. However, there are no annual prepared lesson plans for the classroom phase of requalification training, no updates of the requalification test, and no training/briefings on changes to the program and emergency plan implementing procedures (EPIPs) in conjunction with the drills and exercises. Collectively, these shortcomings will likely diminish the level of ERO preparedness over time.

Of the above weaknesses, the absence of a structured approach to training ERO personnel on the practical aspects of their assigned tasks and a formal evaluation of their competence to perform those tasks prior to qualification or requalification is the most significant. ERO personnel are given in-depth initial classroom training, including practical examples for their positions. However, task-specific training is not identified and tracked to ensure that all ERO personnel receive the necessary practical skills training.

Under a structured approach, required skills training would be provided either through an additional training requirement or a position-specific practical requirement. These skills would then be evaluated and performance problems corrected as part of the qualification process. Such an approach would ensure that all ERO personnel receive the training they need before being assigned to work independently as part of the ERO. Additionally, this approach could lead to the identification of a need for structured team training, such as that required at the incident scene or in consequence assessment. To a large degree, the training received through the drill program, described below, compensates for the weaknesses in position-specific task training, as was demonstrated by the generally strong performance of participants during the tabletop performance tests. Nonetheless, drills and exercises are most effective when they allow participants to utilize knowledge and skills obtained during training, rather than having the drills serving as the primary learning mechanism. Furthermore, proficiency should be rigorously and consistently validated before personnel are assigned to the ERO rotation.

Finding #2: The WSRC process for training and qualifying ERO personnel does not ensure, through task-specific training and demonstration of required proficiency, that the personnel can perform all of their key ERO position responsibilities, as required by the SRS emergency plan and site training standards.

Drills and Exercises

The WSRC emergency plan establishes the roles, responsibilities, and requirements for a sitewide drill and exercise program. The program is an integral part of the ERO training program both at the site and facility level. At the facility level, the drill program is integrated with the operations drill program. Site procedures have been established for developing, implementing, and following up on all drills and exercises. By requiring approved drill manuals and post-drill critiques, the program provides structure and formality for both facility and site-level drills, which involve multiple response organizations. WSRC has conducted over 300 drills since January 2003 in order to achieve its objective of exercising all ERO responders on an annual basis.

With some exceptions, the process for conducting, evaluating, and following up on the results of drills and exercises is adequately defined by the emergency plan. The site procedures contain specific guidance for the types and frequencies of the required drills. WSRC emergency preparedness staff maintain and monitor the drill and exercise schedule to ensure that all of the performance requirements are identified and met. These individuals are also responsible for the exercise manuals and participate in the development or review of all facility drill manuals. Both the drill and exercise manuals are developed using standard templates specified in emergency plan management program procedures. Recently, the site has implemented a master list of objectives, criteria, and lines of inquiry that encompass the critical ERO response elements. To ensure adequate support, controllers and evaluators are recruited from both the facility and site organizations, and the controllers are provided with appropriately detailed classroom instruction. All drills and exercises are followed by critiques and follow-up reports that identify good practices, opportunities for improvement, and deficiencies.

At the facility level, follow-up actions are entered into the facility's commitment or management tracking system, while site-level follow-up actions are entered into the sitewide emergency preparedness commitment tracking system. Facilities conduct annual reviews of their programs and develop improvement plans, including scheduled training drills. The site drill organization reviews the drill reports and provides feedback to the facilities on common problems. However, there is little evidence that evaluations and critiques conducted in the drill and exercise program are analyzed in an integrated process to provide feedback and correction to the overall ERO training program.

The WSRC standard for exercises establishes a structured approach for the planning, conduct, evaluation, critique, and reporting of exercises. Exercises are designed and scheduled to address all the elements of the emergency program at the required frequency. The full participation exercise that was conducted in September 2003 contained meaningful exercise objectives and, consequently, represented a thorough test of the site ERO. The exercise evaluation, including SR input, identified a number of performance weaknesses and opportunities for improvement, which are being addressed in a corrective action plan.

WSRC implements an extensive drill and exercise program in accordance with the applicable plans and procedures. However, several weaknesses were noted in the evaluation of drills and follow-up of the identified deficiencies and opportunities for improvement:

- Facility drill controllers/evaluators do not always use the drill objectives or provide drill evaluation comments to the players or the lead drill evaluator.

- While the site organization reviews facility drill reports for common issues or trends, WSRC has not implemented a systematic drill follow-up process to address the items through training or procedure changes.

- Weaknesses observed in the 2003 annual site exercise, such as those associated with protective actions, radiological controls, and incident command, are similar to those observed in a number of prior drills. However, the corrective action plan does not indicate that improvements in site ERO procedures or training, including the possibility of team training, will be reviewed for applicability to other affected parties, such as facility ERO personnel.

In conclusion, the training, drill, and exercise programs have well-defined procedures for developing and maintaining the ERO's ability to respond to emergencies. The initial classroom training program, coupled with a very active drill and exercise program, has been successful in providing a baseline of proficiency for the ERO, as demonstrated during the tabletop performance test conducted as part of this OA inspection. WSRC's recent implementation of a standardized set of drill objectives and evaluation criteria is also a notable improvement. However, some training and qualification process requirements are not being effectively implemented. The training program does not adequately address specific, task-oriented training, and the classroom portion of the requalification program consists solely of an examination that has not been revised for over two years. Furthermore, the qualification process does not ensure that an individual clearly demonstrates the required level of proficiency before being assigned to the ERO rotation. As a result, the training and qualification system does not ensure that all ERO personnel receive the skills they need to carry out the specific tasks for their assigned duties. Although WSRC has minimized the potential collective impact of these weaknesses through its program of frequent drills, which provide numerous opportunities for ERO members to obtain and practice the necessary response skills, correcting these weaknesses will help sustain ERO effectiveness over the long term.

D.2.2 Emergency Public Information

The SR Office of External Affairs and the WSRC Public Affairs Department are responsible for disseminating emergency information to the public, the media, and other stakeholders. This function is conducted in accordance with the emergency plan and the associated EPIP that describes program elements and provides processes and supporting checklists for activating and managing the EOC public information organization and the joint information center (JIC). During an emergency, SR provides interactive oversight and WSRC is responsible for providing and developing the information necessary to accomplish the EPI function and for providing technical advisors to the JIC. Both SR and WSRC provide senior spokespersons to the JIC.

The OA inspection team noted several strengths in the SRS EPI program. The EPI section of the emergency plan and the associated EPIP are well conceived and provide direction to the public affairs organization based on the nature and potential severity of an emergency. The plan includes definitions of key EPI personnel positions; news release templates for use during emergencies; an approval process to facilitate the timely release of approved information to the public during normal working hours; and a process to monitor for and correct misinformation. Checklists include specific provisions for the timely development of most news releases, they identify the SR emergency manager as the sole individual authorized to approve the release of information to the public, and they include requirements for security classification review of all information prior to release. Emergency operations center (EOC) and JIC procedures also include detailed provisions for coordinating EPI efforts with Federal, state, and local organizations. In addition, the plan adequately addresses the SRS public education program, which includes distribution of an annual brochure to residents in the surrounding counties and invitations to the media to participate in drills and exercises and tour facilities.

In 2003, SRS took the initiative to move the JIC from onsite facilities to the city of Aiken. This action resulted in better assurance of safety for site workers and the media, and provided them with a more capable facility. The JIC now has ample room for the media, and the layout and onsite equipment are adequate for JIC operations. Additionally, to address an ongoing concern about timely transmission of news releases and notification forms between the EOC and the JIC, WSRC is installing a high-speed access line between the EOC and the JIC. This is an important initiative for two reasons: installation should eliminate delays in information sharing between these facilities, and the senior SR and WSRC managers who need to remain at the JIC to support the spokespersons will be able to readily communicate with the SR emergency manager and WSRC emergency director at the EOC.

While most of the EPI processes are well planned and appropriately documented, a few weaknesses were noted. The most important is that while the emergency plan calls for the initial release of information within "about one hour" from the time public affairs receives notification of an incident, the procedures contain no mechanism to implement this requirement. Although the EPI training program references the development of the initial news release within one hour of the emergency declaration, neither the plan nor the checklists include provisions to ensure the timely development, approval, or distribution of the initial news release from the EOC. Additionally, there are no provisions for such development during off hours, when the public information coordinator cannot be in the EOC in a timely fashion. Thus, the plan does not ensure the timely release of information.

Several other weaknesses were noted as well. Some processes and activities documented in the EPI section of the emergency plan and associated EPIP do not reflect current WSRC and SR practices and expectations. These processes/activities include:

- The approval process for press releases as described in the plan (text and flowchart) does not clearly reflect the desired chain of reviews and approvals.

- Descriptions within the ERO and EPI sections of the emergency plan and attachments 2A and 2C of the EPI EPIP either do not address or are inconsistent regarding the activation of the JIC at the Alert or Site Area Emergency level. Additionally, the EPIP on facility activation does not address how and when the JIC is to be activated.

- The EPI section of the emergency plan has not been updated since 1999, and the current draft revision is incomplete.

- The plan has no provisions for coordinating news releases with the hospitals as agreed upon through their memoranda of understanding (MOUs), as detailed in Section C.2.3.

- The EPI training program contains the necessary elements to prepare EPI personnel for their emergency response roles and responsibilities, but is not being kept current.

The emergency plan also contains an apparent duplication of responsibilities between EPI and offsite interface organizations regarding notification and updates to elected officials. The EPI section gives the telephone response team responsibility for performing notification and updates to local government and legislators, whereas the offsite interface section designates the offsite interaction coordinator as the point of contact for executive-level government officials. As demonstrated during the 2003 exercise, in the absence of appropriate prior planning and interdepartmental coordination, notification or updates to offsite can be overlooked or incorrect.

To summarize, SRS has implemented a well planned and documented EPI program. The program is appropriately defined by a framework of procedures, and the knowledge and experience of the SR and WSRC EPI staff contribute significantly to the program's success. However, some of the processes require additional definition. In particular, the initial news release process is not documented; there is no specific provision for developing a news release during off hours; and position-specific checklists do not reflect a clear division of responsibilities for notifying and updating offsite officials. While these weaknesses require correction, they do not significantly detract from the overall effectiveness of this element.

D.3 CONCLUSIONS

The training, drill, and exercise programs are well defined, and initial classroom training, coupled with an aggressive drill program and exercise program, have been successful in providing a baseline of proficiency for the ERO. Additionally, the EPI program at SRS is based on a well conceived process and is supported by a knowledgeable staff. However, some requirements of the ERO training, drill, and exercise programs are not being effectively implemented. Most importantly, the programs do not ensure that all ERO members are provided with the appropriate training on specific tasks and are subsequently evaluated on those tasks to ensure that they can perform their assigned duties. This weakness has been mitigated to a great extent by the strength of the drill program, which allows ERO members to gain and practice essential skills. Also, the news release development and review processes are not adequately formalized to ensure that press releases can be issued in a timely manner irrespective of when the event occurs.

D.4 RATING

A rating of EFFECTIVE PERFORMANCE is assigned to the area of SRS training, drills, and exercises.

A rating of EFFECTIVE PERFORMANCE is assigned to the area of emergency public information.

D.5 OPPORTUNITIES FOR IMPROVEMENT

This OA inspection identified the following opportunities for improvement. These potential enhancements are not intended to be prescriptive. Rather, they are intended to be reviewed and evaluated by the responsible DOE/National Nuclear Security Administration and contractor line management and prioritized and modified as appropriate, in accordance with site-specific programmatic emergency management objectives.

Westinghouse Savannah River Company

- Ensure that training materials remain current and that ERO personnel are informed of important changes to the program and procedures.
  - Review and revise training materials when changes are made in the program or procedures.
  - Regularly develop and deliver lessons or briefings on changes in the ERO program and procedures.
  - Update the computer-based requalification training to emphasize recent, important changes in the program and procedures.
- Enhance the effectiveness of the training and drill program by increasing the level of training for personnel serving as evaluators. Provide the drill evaluators with training in such areas as:
  - On-the-job instruction and evaluation techniques
  - The use of drill objectives, criteria, and lines of inquiry
  - Drill evaluation techniques
  - Non-confrontational methods for conducting critiques.
- Enhance the effectiveness of the drills, particularly training drills, by providing clear direction for the role of the controller/evaluator in a given drill.
  - Brief the participants on the role the evaluator will be playing.
  - Clearly identify the critical training objectives for a training drill.
  - Ensure that the controller/evaluator is prepared to provide any required training.
  - Allot time as necessary for the training activities.
- Improve evaluators' efficiency in supporting the drill program by providing tools for the evaluator, such as a checklist of objectives and criteria for the evaluated area and/or a checklist of items (with expected performance standards) to be demonstrated by ERO personnel.
- Improve the effectiveness of the training, drill, and exercise programs by establishing a formal process for reviewing overall drill and exercise performance, identifying common and recurring deficiencies, and adjusting the training and drill programs to address those deficiencies.
- Document the process for ensuring the timeliness of the initial news release in Section 10 of the emergency plan and the public information coordinator and public information writer checklists. Emphasize the use of a pre-formatted, pre-approved initial news release to rapidly disseminate initial information during normal working hours and for an off-hours incident.

- Clarify expectations for the news release approval process in Section 10 of the emergency plan. Redesign or remove Figure 10-A of the plan and associated checklists.

- Consider the following to improve the effectiveness of media monitoring:

  – Develop a process for media monitoring, including the identification of misinformation, trends, analysis of issues, and public and media perceptions needing resolution.

  – Media and public inquiries require different sensitivities and information. Consider creating distinctive telephone numbers for media and public inquiries.

  – Expand media monitoring to include print media.

- Consider the following to improve the effectiveness of the JIC:

  – Review the emergency plan and accurately document JIC activation for classifications at the Alert and Site Area Emergency levels in Sections 2 and 10, procedure 6Q15.2/.5, and EPIP 6Q-600.

  – Compare the number of telephone operators currently specified in the plan to the potential needs during an incident. Document the process for gaining more staff and equipment during an emergency.

- Clarify with the offsite interactions coordinator the required notification and emergency update responsibilities for all government officials. Ensure that these responsibilities are documented in Sections 3 and 10 of the emergency plan and EPIPs 6Q-300 and 6Q-600.

- Ensure the consistency and functionality of EPI plans and procedures.

  – Consider conducting a crosswalk of all EPI procedures to ensure consistent definition of roles and responsibilities and integration of the procedures.

  – Ensure that each procedure has specified mechanisms linking the movement of questions, answers, and/or issues to and from all positions involved.

- Implement the agreement for news release coordination with the three health providers.

  – Review the MOUs requiring the coordination of news releases.

  – Coordinate MOU expectations with each health provider.

  – Detail the coordination mechanisms in the plan.

  – Incorporate agreements into applicable procedures and checklists.

- Update the emergency plan and EPIPs to reflect current expectations and practices.

  – Review EOC and JIC interrelationships as depicted in Section 2, Figure 2-H.

  - Develop a mechanism to convey news releases to the media monitoring room.

- Update Student Study Training Guide, TERPII.1.H0102 regarding recent changes to the EPI program, including titles, communications, logistics of the EOC and JIC, and use of the EOC emergency management information room.

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APPENDIX E

Emergency Response

E.1 INTRODUCTION

The ultimate objective of emergency planning and preparedness is to prepare emergency responders so that they can apply their skills, procedures, and training to make appropriate decisions and to properly execute actions to protect emergency responders, workers, and the public. Critical elements of the initial response include formulating protective actions, categorizing and classifying the emergency, and notifying onsite personnel and offsite authorities. Concurrent response actions include reentry and rescue, provision of medical care, and ongoing assessment of event consequences using additional data and/or field monitoring results.

Most of the information provided in this section is based on observations from tabletop performance tests conducted by the Office of Independent Oversight and Performance Assurance (OA) with two Westinghouse Savannah River Company (WSRC) emergency duty officers (EDOs) supported by their emergency communications technicians; four WSRC facility emergency management response teams, two each from the Defense Waste Processing Facility (DWPF) and the H Tank Farm (HTF); two emergency operations center (EOC) command room teams; and two consequence assessment teams. The facility emergency management response teams included facility managers and designated shift technical engineers. The EOC teams included the WSRC emergency director, the Department of Energy (DOE) Savannah River Operations Office (SR) emergency manager, the Wackenhut Services, Inc. (WSI) site security commander, the SR security oversight representative, and the WSRC emergency management coordinator. The consequence assessment teams consisted of an assessment and planning coordinator, an assessment specialist, a dispersion modeling specialist, and an industrial hygienist.

Collectively, three operational emergency scenarios were presented to the participants: a vehicular accident that produces a spill of a hazardous chemical; an equipment failure that results in a release of radiological material concurrent with a medical emergency; and a malevolent act resulting in a release of a hazardous chemical and a hostage situation. The scenarios, which were developed by OA in conjunction with several WSRC trusted agents, were presented to the participants by the WSRC trusted agents, who also acted as the balance-of-plant personnel, to ensure scenario validity and delivery of accurate event cues. In addition, interviews and walkdowns were conducted with four individuals with on-scene incident command responsibility representing the Savannah River Site (SRS) fire department and WSI.

E.2 STATUS AND RESULTS

In the event of an emergency, initial direction and control of the SRS emergency response organization (ERO) is provided by the WSRC facility/area emergency coordinator (for events originating at some facilities) or the EDO (for site events), with support from the on-shift emergency communications technician. The EDO is stationed at the SRS operations center (SRSOC), which is staffed 24 hours per day. Depending on the event, either the emergency coordinator or the EDO has responsibility for protective action decision-making, emergency classification, and notifications until relieved by the WSRC emergency director as part of the EOC activation process. An incident commander from either the fire department or the security organization, depending on the type of emergency, leads the on-scene response; this individual directs tactical operations. After the EOC is activated, the emergency director may relieve the EDO or facility/area emergency coordinator of some duties, including notification,

classification, and protective action responsibilities, and the emergency director assumes overall strategic response. The SR emergency manager may assume overall strategic response for security events. Consequence assessment personnel in the EOC support event response by identifying areas that could be affected by a hazardous material release and by providing associated recommendations to the EOC command staff.

E.2.1 Incident Commanders

Fire department incident commanders are knowledgeable of their on-scene roles and responsibilities to protect personnel and responders in the immediate area and are able to use the communications systems and other available tools to implement a response to an SRS emergency event. The incident commanders understand the SRS unified command protocols, are aware of potential facility hazards, and are knowledgeable of the methods used to identify hazards and avoid personnel exposures. Fire department incident commanders are familiar with the principles and processes for identifying hazardous materials, establishing exclusion zones, performing accountability of response personnel, and selecting appropriate personal protective equipment and extinguishing agents.

Likewise, WSI zone lieutenants are knowledgeable of their roles and responsibilities in the area for security emergencies as well as emergencies involving hazardous material releases. For security events, familiarity was demonstrated with on-scene command, “war room” command, and command from the mobile tactical operations center. Additionally, they are familiar with procedures and equipment for classifying security events, determining credible threats, formulating protective actions (for a postulated confirmed bomb event), conducting rescue operations, and using communication systems among the on-scene command and facility personnel, the EDO, and the EOC. For process operational emergencies, WSI zone lieutenants understand their support role under unified command with the facility emergency coordinator and fire department incident commander.

E.2.2 EOC Teams

The EOC teams effectively accomplished major objectives in responding to the postulated emergencies; demonstrated appropriate concern for protective measures for responders, site workers, the public, and the environment; and provided accurate and timely notifications to offsite authorities during postulated events. EOC personnel used the available procedures and response tools, such as position checklists, logs, consequence assessment information, and maps, to develop and implement an effective emergency response strategy. EOC personnel demonstrated a clear understanding of their roles and responsibilities, and clear lines of command and control were established during varying circumstances. EOC emergency management coordinators were particularly effective in assisting the WSRC emergency directors in ensuring that major objectives were accomplished, including subsequent event classifications, periodic notifications, protective actions, and protective action recommendations. A formal conduct-of-operations approach was used in declaring the operational status of the EOC; making classifications; transferring classification, notification, and protective action responsibilities; and communicating personnel accountability status. The emergency directors and SR emergency managers demonstrated awareness of differing roles and responsibilities by transferring command and control as appropriate for a process event and, later, a security event, and the necessary authority regarding the use of deadly force.

EOC members were knowledgeable of their responsibilities related to obtaining the necessary response assets available to SRS through written agreements, such as the Federal Bureau of Investigation, local law enforcement, and explosive ordnance disposal units, and the need to inform DOE Headquarters, state, and local authorities. The EOC staff prepared and approved press releases and activated the joint information center to facilitate accurate information transmittals to the media.

E.2.3 Emergency Duty Officers

EDOs performed key emergency response actions in a timely manner. EDOs demonstrated effective teamwork with personnel in the SRSOC and at other simulated locations. The EDOs provided initial support to the facility emergency coordinator (FEC) by providing meteorological data for use at the event area for local consequence assessment and protection of responders and local ERO members who are recalled from the incident area. EDOs consistently demonstrated the ability to consult with the FECs to determine event categorization and classification. Additionally, EDOs promptly contacted and dispatched site response assets, such as medical and hazardous material teams, and external assets, such as local law enforcement and explosive ordnance disposal units, with which SRS has existing mutual aid agreements. The EDOs coordinated a safe approach for site asset deployment and linkup with local responders. Additionally, EDOs understand their interfacing roles and responsibilities with EOC members for classification and protective action formulation before and after the WSRC emergency director assumes strategic command and control.

EDOs demonstrated efficient use of response tools in formulating protective actions, making categorization and classification decisions, and notifying ERO members and other authorities of event occurrence and any protective actions implemented or recommended. The EDOs effectively used their response procedures, supplemented by the 2000 Emergency Response Guidebook (ERG) in making categorization/classification decisions and formulating protective actions. The EDO transmits this information with the help of an emergency communications technician using computer-driven electronics, pagers, radios, facsimile machines, and telephone systems to contact workers, responders, and local authorities. The EDOs are aware of their responsibilities for ensuring accurate and timely notifications through approval of the notification form developed by the emergency communications technician.

One performance weakness was identified in that the two EDOs classified the same events differently because of differing interpretations and applications of the categorization/classification procedure. In one case, an EDO declared an Operational Emergency (not further classified) while another EDO classified the event as an Alert. In both cases the EDOs apparently complied with the procedure actions, but because some steps are unclear in their intent, and because the term “transportation event” is not clearly defined in the procedure or clearly applicable to a transportation event that occurs wholly inside a facility, they reached different conclusions. For the postulated event, the Alert would have been the appropriate classification because, according to the ERG, the specified protective actions reached beyond a point 30 meters from the release point, which satisfies the Alert definition.

Additionally, WSRC emergency management staff, EDOs, and WSRC offsite interface personnel have differing interpretations of the conditions necessary to activate the SRS emergency management protocols for hazardous material releases that occur within the DOE property boundary but outside a site vehicle access barricade. One EDO indicated that such an event would be the responsibility of local jurisdictions. However, the agreements and understanding by WSRC offsite interface personnel, who facilitate the agreements, indicate that the SRS emergency management program will activate for all hazardous material releases within property boundary lines. This condition is not addressed by the categorization/classification procedure. Approximately ten miles of highway are on site property but outside the barricades, and further clarification of response roles and responsibilities would ensure that the appropriate response agency (i.e., either SRS or offsite jurisdictions) will be involved if a hazardous material release occurs in this area.

E.2.4 Facility Emergency Response Decision-Making

Facility emergency response decision-makers demonstrated that they understand their differing roles and responsibilities in responding to an event within or outside the boundaries of their area, as well as their

interfaces with other emergency management decision-makers. During the tabletop scenarios, the FECs responded to postulated events in accordance with SRS plans and procedures as they performed categorization and classification decision-making and implemented the default protective action of "remain indoors" for area workers. The FECs promptly contacted the EDOs to consult in categorization/classification decisions, obtain site response assets, and ensure that adjacent areas are protected and appropriate authorities are notified. The FECs implemented sound approaches to protect both incoming responders and area personnel exiting to relocate to the EOC. Using the area public address system, the FECs periodically warned personnel remaining in the area to keep away from and upwind of the hazardous material release location. When responder entry into a hazardous atmosphere was necessary, FECs ensured that appropriate personal protective equipment was donned.

However, some programmatic weaknesses limited the FECs' ability to identify chemical hazards and promptly protect area workers. The area emergency plan implementing procedures do not address all hazardous chemicals or a spectrum of potential events to provide a method for the FEC to promptly formulate and issue protective actions for local area workers. For example, FEC procedures do not address chemical fires or consider the differences in formulating protective actions to address the consequences of a puff release as compared to a continuous release. Consequently, the FEC must rely on out-of-area responders or EDO guidance to adequately protect area workers, which may not be timely. When area chemicals were postulated to have been released, the FECs were aware that some level of hazard existed, but they were uncertain as to its significance and did not make a determination by reviewing available references such as material safety data sheets or the ERG. As a result, area workers remained within isolation zones until evacuated by a simulated hazardous materials team. Additionally, FECs consider the "remain indoors" protective action as adequate and appropriate for all area events, even when the sheltering area is directly in a radiological or chemical plume. However, it is unclear whether this protective action is always appropriate because of the limited hazards analyses associated with site chemicals, as discussed in Section C.2.1.

E.2.5 Consequence Assessment Teams

The consequence assessment teams provided significantly different decisional information to the emergency director for the same event. Differences resulted partially from the teams' use of an expert-based process rather than a systematic approach in performing consequence assessments and determining direct and indirect (from chemical reactions) hazards. In addition, SRS uses the Weather Information Data System (WINDS) to perform dispersion modeling for consequence assessment purposes. The expert-based process and modeler discretion in entering some data into WINDS can produce a significant degree of variability in consequences assessment results, as illustrated by the following variations between the teams:

- The teams approached the consequence assessment of a postulated nitric acid tanker truck explosion quite differently. One considered only the airborne consequences resulting from evaporation, while the other considered the evaporation effects to be negligible and determined the consequences based on an estimated airborne release fraction resulting from the explosion.

- The consequence assessment team that applied an airborne release fraction did not consult a reference to determine an appropriate fraction and used a suggested fraction.

- The WINDS program requires some data input, such as chemical cloud size, that is at the discretion of the modeler.

- Chemical hazard information was provided by industrial hygienists, primarily based on their different levels of individual experience with the chemicals involved in the scenario.

The collective result of these discretionary decisions was that one consequence assessment team informed the emergency director that protective action criteria was exceeded up to 24 meters from the event site, while the other team concluded that it was exceeded at over two miles from the event site, for the same event. Furthermore, the consequence assessment results provided to the emergency director were not timely. The consequence assessment teams do not have a predetermined set of bounding consequence determinations for SRS potential accidents and, therefore, must develop one at the time of the event. Except for possible use of the ERG, the SRS consequence assessment process, as demonstrated during the postulated events, did not include an initial prompt, conservative consequence assessment for use in initial decision-making, but instead developed a more refined consequence assessment using WINDS. To develop a WINDS chemical release plume plot, the modeler first obtained output data from the Area Locations of Hazardous Atmospheres (ALOHA) dispersion model, referred to applicable chemical data, and performed some manual calculations. This required use of several reference handbooks. Although the data is available, the research and development of input data to develop a WINDS plume plot becomes cumbersome when developing an initial estimate of event consequences for the EOC staff in a rapidly unfolding event. In the nitric acid explosion scenario, over 30 minutes were needed to obtain an initial plume plot, and the results indicated that a protective action criterion was exceeded offsite before the emergency director would have received the information.

Finding #3: During tabletop performance tests, the WSRC consequence assessment teams did not develop accurate and timely assessments of emergency event consequences to support ERO decision-making, as required by DOE Order 151.1B.

E.3 CONCLUSIONS

During tabletop performance tests, interviews, and walkdowns, decision-making personnel assigned to the facilities, the SRSOC, the EOC command center, and the event scene demonstrated an appropriate degree of response proficiency and familiarity with their roles and responsibilities, consistent with the SRS emergency management concept of operations. They executed sound approaches for protecting personnel and the environment, demonstrated effective teamwork, and were proficient and disciplined in using available procedures, checklists, and equipment. In particular, the WSRC emergency directors and SR emergency managers in the EOC demonstrated effective command, control, and communications as the primary emergency concern transitioned from a hazardous material release to a security threat. However, several weaknesses in the procedures for event categorization/classification limit the EDO's ability to make consistently accurate categorizations and classifications. Furthermore, the expert-based consequence assessment process exhibited several weaknesses that caused the consequence assessment predictions to vary widely between the two teams and resulted in a significant delay in making critical information available to decision-makers in the EOC. Finally, facility decision-makers have not been given the necessary training and information to identify chemical hazards and provide appropriately conservative protective actions for area workers in a timely manner. Therefore, facility decision-makers must rely on decision-makers from outside the area to make these determinations, creating the potential for unnecessary delays in protecting workers. Nonetheless, as a whole, the level of performance demonstrated during tabletop performance tests provides confidence that the SRS ERO can respond effectively to a wide variety of emergency events.

E.4 RATING

A rating of EFFECTIVE PERFORMANCE is assigned to the area of SRS emergency response decision-making.

E.5 OPPORTUNITIES FOR IMPROVEMENT

This Independent Oversight review identified the following opportunities for improvement. These potential enhancements are not intended to be prescriptive. Rather, they are intended to be reviewed and evaluated by the responsible DOE/National Nuclear Security Administration and contractor line management and prioritized and modified as appropriate, in accordance with site-specific programmatic emergency management objectives.

Westinghouse Savannah River Company

- Consider the following program improvements to facilitate timely, accurate, and consistent assessments of event consequences.

  – Establish a single source document for onsite chemical data needed to obtain a WINDS plume plot, such as ERPG-2/TEEL-2 values, density, and molecular weight.

  – Develop bounding consequence assessments using worst-case source terms for hazardous chemicals used on site. Consider preparing a hazards assessment document or pre-load SRS dispersion models that are integrated with the current weather conditions to provide the ERO decision-makers with bounding information while a refined assessment is prepared.

  – Develop guidance, such as a checklist, on how to proactively approach assessment of event consequences that promotes consultation with material safety data sheets and other needed references.

  – Develop tables that enable the prompt conversion from the units of measure typically used for reporting spill information from the scene to the units needed for input to the modeling program.

  – Ensure that consequence assessment teams possess the required security clearances to perform assessments covering the full spectrum of potential SRS events.

  – Prepare a document, such as a checklist or logic diagram, that directs the consequence assessment team to a systematic approach for assessing event consequences. Through the logic, consider such things as chemical volatility, consequences from fires or explosions, and reactions with surrounding materials.

  – Provide guidance to modelers on how to make estimates of necessary program input data, such as airborne release fractions or chemical cloud size.

  – Formalize the review and approval process for plume plots to ensure that the emergency director receives high-quality information.

  – Review the chemical and radiological input data needed for developing plume plots to identify items that are discretionary, such as airborne release fractions or chemical cloud size. Develop

guidance on how to determine discretionary input data for modeler use, with emphasis on reports from the event scene.

  - Consider adding features to the dispersion model program to eliminate manual calculations. Where manual calculations are necessary, ensure that another team member reviews them for accuracy.

  - Establish, through procedures, clear roles and responsibilities for each consequence assessment team member. Include expectations on how roles and responsibilities will be implemented.

  - Ensure that all enabling tasks, such as the use of the ERG, are formally included in the consequence assessment team training program. Include performance evaluations for initial qualifications to ensure that team members are capable of executing required tasks.

- Strengthen the local area/facility decision-making process by enabling facility and area emergency coordinators to adequately and promptly protect local workers through the following recommendations.

  - Provide training on the use of the ERG and make it available to help FECs establish protective isolation zones around and downwind of a hazardous material release.

  - Consider incorporating isolation zones into facility emergency action levels, protective action procedures, and/or spill procedures, as applicable.

  - Develop and equip the FECs with emergency action levels and protective actions for hazardous materials expected to be in their areas. Include a spectrum of events (size, including tankers, and considerations for fire and explosions) that can be directly related to appropriate protective actions.

  - Ensure that all structures used for "remain indoors" protective actions will adequately protect personnel. Identify by procedure those structures that do not, or provide additional mitigating equipment and the necessary training to adequately seal those structures if the need arises.

  - Consider revising the guidance on the "remain indoors" protective action to first consider whether the event is a puff release or a continuous release.

- Enhance the event classification process by promoting consistent classifications through the following actions.

  - Provide clarification through training and/or written definitions as to what constitutes the SRS boundary as it applies to activating the SRS emergency management program.

  - Define, in the classification procedure, whether a vehicle accident at a facility is a transportation event or a facility event so that the appropriate classification matrix is applied.

  - Clarify, in the classification procedure, how to classify transportation-related events when considering various circumstances such as vehicle ownership, cargo ownership, and right-of-ways.

- Integrate the Office of Secure Transportation's protective action card system into the SRS classification process.

APPENDIX F

Readiness Assurance

F.1 INTRODUCTION

The readiness assurance program provides the Department of Energy (DOE)-wide framework and multi-year planning mechanism for ensuring that program plans, procedures, and resources are adequate and sufficiently maintained to mount an effective response to an emergency. Readiness assurance activities include implementation of a coordinated schedule of program evaluations, appraisals, and assessments. Key elements of the readiness assurance program include the active involvement of DOE line organizations in monitoring program effectiveness, contractor self-assessment programs, and timely implementation of corrective actions for identified weaknesses. For exercise evaluations, readiness assurance includes assessment of the effectiveness of the exercise as a means of demonstrating and continuously improving a site's integrated response capability.

This inspection examined the processes by which the Savannah River Operations Office (SR) provides direction to and maintains operational awareness of the Savannah River Site (SRS) emergency management program. The inspection also included a review of the Westinghouse Savannah River Company (WSRC) emergency management self-assessment and issues management processes.

F.2 STATUS AND RESULTS

F.2.1 DOE Assessments and Performance Monitoring

SR has primary responsibility for providing programmatic line management oversight of the SRS emergency management program. The SR emergency management and protection team, within the Office of Safeguards, Security and Emergency Services, is responsible for the day-to-day operations of the SR emergency management program and for ensuring the effectiveness of the WSRC emergency management program. This programmatic responsibility was established in June 2003 following an SR reorganization that combined the emergency management and fire protection functions with safeguards and security functions.

SR is performing a variety of operational awareness activities related to the WSRC emergency management program. These activities include observation of a large percentage of drills conducted at SRS by the SR Facility Representatives and emergency preparedness staff, and feedback is provided to WSRC during the post-drill critiques and through more formal Facility Representative mechanisms. SR is also actively involved in monitoring activities related to public information and offsite interfaces. Monthly program review meetings are conducted between SR and WSRC; action items are documented and tracked to ensure follow-up of commitments. Additionally, SR reviews emergency planning hazards assessments to ensure consistency with both the WSRC standard for developing these documents and DOE Order 151.1B. SR emergency management program requirements are specified in a procedure that establishes broad expectations for providing direction and oversight of the SRS emergency management program, as well as accomplishing key SR emergency management program responsibilities.

During 2003, SR actively monitored the development, conduct, and evaluation of the annual emergency management exercise, as required by the DOE-SR emergency management oversight procedure. This included designating an emergency management specialist as the lead SR exercise evaluator to coordinate with WSRC throughout the exercise process and to ensure that an SR multidisciplinary team actively

participates in the exercise as players, controllers, and evaluators. Following the exercise, SR reviewed both the exercise report and the resulting corrective action plan to ensure that the noted weaknesses were adequately addressed. This review resulted in improvements to the corrective action plan as well as senior SR management correspondence to WSRC identifying several concerns regarding corrective action effectiveness. The SR review of the 2003 exercise identified program improvements that are necessary based on the apparently limited effectiveness of some past corrective actions. These include improved feedback at the monthly program reviews; improved monitoring of drill/exercise findings, corrective action implementation, tracking, trending, and effectiveness; and the need for SR to determine the effectiveness of corrective actions.

Although SR emergency management staff are engaged in a number of oversight activities, the process as a whole is not structured to facilitate the proactive, systematic identification of programmatic weaknesses and improvement areas. The emergency management program oversight procedure does not contain the specific assignment of roles and responsibilities or the operational details necessary to ensure that the required oversight activities are appropriately planned, conducted, and documented. For example, with the exception of the monthly program review meetings, the results of operational awareness activities are infrequently documented, and it is therefore difficult to ensure follow-up and trending. Furthermore, with the exception of the annual exercise process, SR has not conducted the periodic emergency management programmatic assessments specified in DOE Order 151.1B, the SRS emergency plan, and the SR technical assessment program procedure to ensure that all programmatic elements are evaluated. For example, neither the SR emergency services staff nor the Facility Representatives perform a technical review of facility emergency planning hazards assessments to ensure that they provide an adequate basis for the construction of the emergency planning zone and other elements of the emergency program. Additionally, except as noted below, SR has not conducted self-assessments of its emergency management program for several years, which is also contrary to the SR oversight procedure. Consequently, the absence of programmatic assessment activities by SR has gone unnoticed until the January 2004 program review.

Finding #4: SR is not conducting programmatic assessments of the site emergency management program, as required by the SRS emergency plan and DOE Order 151.1B.

Following the SR reorganization in June 2003, the newly formed emergency management team conducted an internal program review. This review, completed in January 2004, identified seven areas for improvement of DOE oversight of the WSRC emergency management program, including an annual assessment of all elements of emergency management and assessing the effectiveness of SR oversight. When implemented, these areas for improvement will increase the formality and rigor of SR oversight.

To summarize, SR is appropriately conducting several different types of activities to maintain operational awareness of the WSRC emergency management program, including active involvement in evaluating WSRC drills and exercises, and has recently identified seven areas in which the rigor of SR line management oversight needs to be improved. However, existing line management oversight processes in the emergency management area lack the structure and formality necessary to ensure that SR can proactively identify programmatic weaknesses. SR is not conducting program reviews; the corrective actions to address the improvements needed in the SR oversight process have not been formally developed; and the SR oversight role remains a concern due to the absence of planned programmatic assessments for fiscal year 2004.

F.2.2 Contractor Assessments and Issues Management

Self–Assessment

WSRC is responsible for conducting assessments of the emergency management program at the facility, site, and programmatic level. Organizationally, overall program responsibility resides with the WSRC Safeguards, Security and Emergency Services (WSRC-SSES) organization. WSRC is effectively utilizing assessments, including the annual exercise, facility and site-level drills, and management evaluations, to identify both sitewide and facility-specific emergency management weaknesses and improvement opportunities. In October 2002, the WSRC facility evaluation board independently evaluated the emergency management program, and the identified deficiencies were subsequently addressed through corrective actions; one action item remains open and is on schedule for completion. Additionally, emergency preparedness performance metrics have been established to measure such focus areas as drills conducted versus scheduled, emergency response organization qualification status, results of pager testing, and closure of findings.

The facility emergency preparedness coordinators implement the required elements of the emergency management program at their facility. Following the WSRC reorganization in 2003 that reassigned the facility coordinators from the emergency preparedness group to the facility managers, WSRC assigned facility liaisons to work with the facility coordinators to maintain program continuity across the site. The WSRC self-assessment process relies heavily on the drill and exercise program to provide a performance-based evaluation of the facility and site-level programs. To ensure a more consistent evaluation of drills and exercises across the site, WSRC recently implemented a sitewide drill database that includes objectives, criteria, and lines of inquiry, to be used by all facility coordinators. The facility-level drill results are provided to the emergency preparedness group for review and trending, and the results of the trending analyses are provided to the facility coordinators on a quarterly basis for their use. Currently, there is an expectation by emergency preparedness staff that the trending information will be used by the facility coordinators to improve the facility-level programs. However, this process is not formalized and is dependent on each facility coordinator (with the support of the facility coordinator liaisons) to ensure that improvements are put in place.

The facility emergency preparedness coordinators conduct facility-level assessments annually using sitewide objectives and criteria; however, the level of detail varies from facility to facility. For example, at one facility, the annual facility emergency preparedness programmatic assessment was “augmented” with a separate, comprehensive assessment of the program that identified opportunities for improvement, good practices, improvement items, deficiencies, controller issues, and planned actions for calendar year 2004. Facility-level assessments containing this level of analysis are not routinely shared with emergency preparedness staff, thereby limiting the site’s ability to identify and correct systemic deficiencies.

WSRC is not effectively utilizing existing processes (e.g., the WSRC assessment manual and the assessment performance objective and criteria for emergency preparedness) to ensure that all programmatic elements are reviewed on a periodic basis, as required by DOE Order 151.1B and the SRS emergency plan. This weakness was self-identified by WSRC in 2003; however, the WSRC emergency services fiscal year 2004 self-assessment plan specifies that assessments will be scheduled on an “as-needed basis,” and while the criteria for programmatic assessments have been selected, no such assessments have been scheduled. Existing processes ensure that an annual emergency preparedness management evaluation is conducted and the Emergency Readiness Assurance Plan is submitted to SR as required. However, the July 2003 management evaluation, while identifying some areas for improvement, did not contain the level of analysis in such areas as drill results necessary to drive improvements or corrective actions in all areas. For example, in evaluating drill performance, WSRC identified that over 40 percent of the repetitive weaknesses involved a lack of understanding of roles,

interfaces, and proficiency. However, no additional analysis was conducted to drive corrective actions to resolve this weakness. Additionally, the most recent management evaluation, which used numerous data sources for analysis, did not identify that site-level programmatic elements have not been assessed at the required frequency.

Issues Management

Emergency management issues are being effectively captured and tracked to completion using sitewide and facility-specific systems. Site-level drill and exercise deficiencies and improvement items are entered into a sitewide emergency preparedness commitment tracking system and tracked to completion. Facility-level drill deficiencies are entered into facility-level commitment tracking systems and tracked to completion by the facility coordinators. Emergency preparedness staff monitor the status of corrective action implementation through plan-of-the-week meetings, with periodic status reports provided to management for follow-up. For example, the deficiencies and corrective actions from the September 2003 annual exercise have been entered into the site-level commitment tracking system and are being implemented as scheduled. Notably, the tracking system also contains the actions for all improvement items from the annual exercise. However, the WSRC corrective action development and closure process does not ensure that corrective actions are effective in addressing identified issues. There has been a recurrence of noted weaknesses, such as consequence assessment, radiological controls, SRS operations center communication, and incident commander command and control (self-identified by WSRC), indicating that actions have not been effective in addressing the underlying causes of these weaknesses.

The emergency preparedness program uses the WSRC sitewide corrective action procedure for developing corrective actions. This procedure contains specific requirements to ensure problem identification; determination of problem significance; problem analysis; lessons-learned evaluation; corrective action development, implementation, closure, and effectiveness reviews; and data analysis. However, based on the threshold for categorizing deficiencies as having significant or moderate impact, all emergency preparedness deficiencies are determined to have only minor or some impact, which, due to the graded approach of the procedure, has the effect of reducing the level of rigor associated with causal analysis and lessons-learned evaluation, as well as corrective action development, closure and effectiveness. As a result, there is limited evidence that a causal analysis is being used to analyze deficiencies identified through assessments, drills, or exercises. The weaknesses noted above are not unique to the emergency management area. Rather, they are indicative of broader weaknesses in integrated safety management reflected in the SRS feedback and improvement program. Because this deficiency is not limited to emergency management, it is addressed more broadly in the associated finding appearing in Volume I of this report.

The need for a more rigorous causal analysis approach in developing corrective actions is supported by the recurrence of the weaknesses noted above, and was self-identified by WSRC. The development of the corrective action plan for the September 2003 annual exercise was completed using the causal analysis tree contained in the WSRC problem analysis manual. At the same time, WSRC emergency preparedness staff recognized the need to verify the closure of corrective actions, and recently established a corrective action committee to ensure that corrective actions are appropriately determined and implemented.

To summarize, WSRC is effectively using assessments and management evaluations to identify sitewide and facility-specific emergency management weaknesses and improvement opportunities, and is using this information to make program improvements. Additionally, emergency management issues are being effectively captured and tracked to completion using sitewide and facility-specific systems. However, WSRC is not effectively implementing institutional processes to ensure that emergency management program weaknesses are identified, and issues management processes have not been effective in ensuring that corrective action development and implementation are effective in preventing recurrence. WSRC has

begun to address this problem, and while these weaknesses require correction, WSRC has implemented substantive improvements in the SRS emergency management program.

F.3 CONCLUSIONS

SR has implemented effective mechanisms for providing direction and feedback to WSRC on the SRS emergency management program and for maintaining awareness of program status. However, SR is not conducting the emergency management programmatic assessments that are required by the SRS emergency plan and DOE Order 151.1B; although this weakness was self-identified, specific corrective actions have not been developed. WSRC is effectively using assessments, management evaluations, drills, and exercises to identify sitewide and facility-specific emergency management weaknesses. Identified improvement opportunities and deficiencies are being effectively captured and tracked to completion. However, in many cases corrective actions have not prevented recurrence of performance weaknesses and program deficiencies. WSRC has self-identified this issue and has chartered a corrective action committee to improve causal analysis processes.

F.4 RATING

A rating of NEEDS IMPROVEMENT is assigned to the area of DOE assessments and performance monitoring.

A rating of EFFECTIVE PERFORMANCE is assigned to the area of contractor assessments and issues management.

F.5 OPPORTUNITIES FOR IMPROVEMENT

This Independent Oversight review identified the following opportunities for improvement. These potential enhancements are not intended to be prescriptive. Rather, they are intended to be reviewed and evaluated by the responsible DOE/National Nuclear Security Administration and contractor line management and prioritized and modified as appropriate, in accordance with site-specific programmatic emergency management objectives.

Savannah River Operations Office

- Clarify and strengthen the oversight program by revising the SR emergency management program procedure to clearly define SR responsibilities for the SRS emergency management program to ensure that all programmatic oversight responsibilities (e.g., reviews of hazards assessments for technical content) are adequately addressed.

- Ensure that the oversight program described in the SR emergency management program procedure is effectively implemented by developing a detailed program review implementation plan or program management plan as an aid. Specific actions to consider include:

  – Develop a formal, structured assessment plan to ensure that all elements of the SRS emergency management program are reviewed on a three-year basis.

  – Identify the tasks needed to implement individual requirements, such as developing assessment schedules, assessment plans, evaluation criteria, and reporting mechanisms.

- Identify the resources needed to complete each action, and for activities that may require additional expertise, identify how that expertise will be obtained.

- Coordinate with WSRC to establish a schedule and process for conducting a technical review of such program documentation as emergency plans, implementing procedures, and emergency planning hazards assessments.

- Ensure that recently-assigned emergency services staff complete the appropriate technical qualification program and related training to ensure an adequate understanding of the technical aspects of the emergency preparedness program.

Westinghouse Savannah River Company

- Strengthen emergency management corrective action and issues management processes to promote continuous improvement in the emergency management program.

  - Consider reviewing deficiencies at the site and facility level for the past several years to identify recurring deficiencies. Critically evaluate the deficiencies to verify that all have been appropriately addressed, and formally document the evaluation results.

  - Consider performing a causal analysis of recurring deficiencies to determine what additional actions are necessary to prevent recurrence.

  - Ensure that all problems (deficiencies) having at least a minor impact, as defined by the WSRC corrective action program procedure, have a cause identified and documented and that actions to correct the cause are implemented.

  - Consider enhancing the WSRC issues management process for closing and validating completed corrective actions by including a requirement for WSRC-SSES to validate a sample of corrective actions.

  - Consider including specific elements within the annual management evaluation of the emergency management program focusing on how effectively previously-identified deficiencies were resolved.

- Consider establishing clear expectations for facility-level annual evaluations, including:

  - Analyzing past performance to identify good practices, lessons learned, improvement items, and deficiencies

  - Providing the analysis results to WSRC-SSES for sitewide analysis, trending, and lessons-learned sharing

  - Formalizing processes to help the emergency planning coordinators and liaisons conduct or assist with evaluations or drills at other WSRC facilities, thereby encouraging the sharing of lessons learned and process improvements across the site.

- Consider enhancing the WSRC-SSES self-assessment plan to ensure that all elements of the WSRC emergency management program are reviewed annually at an appropriate level of detail.

- Consider reviewing and revising the WSRC performance objectives and criteria used for assessing the emergency management program to include the appropriate evaluation criteria from Volume VI of the draft Emergency Management Guide, DOE Guide 151.1, to ensure that effective emergency management programmatic assessments are conducted.

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