

Independent Oversight  
Inspection of  
Emergency Management  
at the

# Savannah River Site

February 2006



---

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

## Table of Contents

1.0 INTRODUCTION.....	1
2.0 RESULTS.....	3
3.0 CONCLUSIONS.....	5
4.0 RATINGS.....	7
APPENDIX A – SUPPLEMENTAL INFORMATION.....	8
APPENDIX B – SITE-SPECIFIC FINDINGS.....	9
APPENDIX C – HAZARDS SURVEYS AND HAZARDS ASSESSMENTS.....	10
APPENDIX D – EMERGENCY RESPONSE.....	15
APPENDIX E – READINESS ASSURANCE.....	22

## Abbreviations Used in This Report

DOE	U.S. Department of Energy
EAL	Emergency Action Level
ED	Emergency Director
EDO	Emergency Duty Officer
EOC	Emergency Operations Center
EPC	Emergency Preparedness Coordinator
EPHA	Emergency Planning Hazards Assessment
EPIP	Emergency Plan Implementing Procedure
EPZ	Emergency Planning Zone
ERG	2004 Emergency Response Guidebook
ERO	Emergency Response Organization
LSPT	Limited Scope Performance Test
NNSA	National Nuclear Security Administration
OST	Office of Secure Transportation
PAR	Protective Action Recommendation
SR	Savannah River Operations Office
SRS	Savannah River Site
SRSOC	SRS Operations Center
WSRC	Washington Savannah River Company

# OVERSIGHT

The U.S. Department of Energy (DOE) Office of Independent Oversight conducted an inspection of environment, safety, and health and emergency management programs at the DOE Savannah River Site (SRS) in January and February 2006. The inspection was performed as a joint effort by Independent Oversight's Office of Environment, Safety and Health Evaluations and Office of Emergency Management Oversight. Independent Oversight reports to the Director of the Office of Security and Safety Performance Assurance, who reports directly to the Secretary of Energy.

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, including 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 provides line management oversight for the NNSA operations. SR provides support to the Savannah River Site Office in many technical and administrative areas, including, through a memorandum of agreement, line oversight of emergency management at NNSA's site tritium facilities. SRS is managed and operated by Washington 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 activities 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. SRS encompasses approximately 310 square miles of DOE-owned property near Aiken, South Carolina, approximately 20 miles south of Augusta, Georgia.

The purpose of this Independent Oversight inspection was to assess the effectiveness of emergency management programs at SRS as implemented by WSRC under the direction of SR. The scope of the emergency management review at SRS considered the results of the February 2004 Independent Oversight inspection, which identified generally effective systems in a number of important emergency management elements, including drills and exercises, offsite interfaces and emergency public information, emergency response procedures and decision-making, and WSRC emergency management assessments and issues management. Consequently, for this 2006 inspection, Independent Oversight focused primarily on areas where programmatic weaknesses were noted in 2004, such as the hazardous material screening process, certain aspects of the process for qualifying emergency response organization

(ERO) personnel, the performance of consequence assessment teams, and the conduct and documentation of SR assessments of the site's emergency management program.

Independent Oversight used a selective sampling approach to assess a representative sample of facilities and ERO responders at SRS. Specifically, the sampling approach was used to evaluate:

- The effectiveness of the hazards surveys and emergency planning hazards assessments (EPHAs) in serving as an appropriate foundation for the SRS emergency management program.
- The effectiveness of the SR and WSRC emergency responders in applying their skills, procedures, and training to make appropriate decisions and to properly execute actions to protect emergency responders, workers, and the public. To evaluate response performance, Independent Oversight conducted limited-scope performance tests (LSPTs) for initial responders and decision-makers. The performance tests were designed to evaluate the ability of responders to effectively execute their assigned duties during postulated site-specific emergencies. Independent Oversight used trusted agents from the site to assist in developing and conducting the LSPT scenarios and validating the results.

These activities, as well as other assessment areas, included a review of corrective actions intended to address weaknesses identified during the 2004 Independent Oversight emergency management inspection. The review of corrective actions provided insights into the effectiveness of WSRC feedback and continuous improvement systems, as well as DOE's emergency management oversight and operational awareness activities at SRS.

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 Independent Oversight's conclusions regarding the overall effectiveness of SR and WSRC management of the emergency management program. Section 4 presents the ratings assigned as a result of this inspection. Appendix A provides supplemental information, including team composition. Appendix B identifies the findings that require corrective action and follow-up. Appendices C through E detail the results of the reviews of individual emergency management program elements.

## 2.0 Results

### 2.1 Positive Program Attributes

SR and WSRC continue to improve the SRS emergency management program to ensure that site responders can effectively respond to a wide range of potential initiating events. Positive attributes of the emergency management program are discussed below.

**WSRC has effectively addressed nearly all aspects of the emergency management findings identified during the 2004 Independent Oversight inspection.** The hazards survey development procedure delineates appropriate criteria for determining which hazardous materials need to be further considered in an EPHA, and the draft hazards surveys that were reviewed appropriately apply these criteria. To ensure that appropriate skills are acquired during the training process, key positions within the emergency operations center (EOC) receive position-specific walkthroughs as a condition for assignment to the ERO roster, and they are expected (although not procedurally required) to participate in an evaluated drill within the next several months. Finally, during LSPTs, consequence assessment staff were effective in providing plume dispersion information and recommendations to the EOC emergency director for use in classifying events and issuing protective actions. As a result of better-defined roles and responsibilities for team members, enhanced tools, and additional training – all corrective action deliverables – the consequence assessment modelers were proficient in using available dispersion modeling programs to develop an initial set of conservative plots and later refining the plots as more information became known.

**With few exceptions, WSRC has established a rigorous basis for the SRS emergency management program.** Beyond the corrective actions taken to strengthen the hazardous material screening process, WSRC has continued to improve the quality of the EPHA development process, as well as the EPHAs themselves. The EPHA development procedure establishes EPHA

ownership at the facility manager level and clearly defines roles and responsibilities for EPHA development and maintenance. This procedure appropriately addresses the major tasks involved in EPHA preparation and is supplemented by a writer's guide to enhance consistency of content among the EPHAs. The EPHAs that were reviewed retain the many positive elements observed during the 2004 Independent Oversight inspection and reflect a variety of improvements, including the addition of the toxicological hazard associated with low-enriched uranium; revision of the K Area Material Storage EPHA to reflect an upgraded analysis of potential malevolent acts; and correction of several self-identified errors in the EPHA for the Defense Waste Processing Facility to improve document clarity and completeness. Finally, the transportation EPHA includes a well-reasoned and documented rationale for adopting the 2004 Emergency Response Guidebook as the principal response tool.

**With few exceptions, key SR and WSRC emergency responders demonstrated effective decision-making during performance-based interviews and LSPTs.** Security and fire department incident commanders were sensitive to the need to protect first responders and co-located workers and were knowledgeable of the necessary response actions, including establishing unified command, recognizing hazards, implementing isolation zones, and identifying safe routes for evacuation and ingress of secondary responders. Emergency duty officers (EDOs), operating out of the continuously manned SRS operations center (SRSOC), and EOC teams effectively classified events, provided initial protective actions for site personnel, generally took conservative actions, and demonstrated overall effective command and control in establishing response priorities and managing resources. However, as discussed below, some weaknesses in process, procedure use, and communications impacted the issuance of onsite and offsite notifications. Finally, an array of communications, mapping, plume dispersion, and display tools in the SRSOC and EOC facilitate an effective emergency response under a variety of conditions.

## 2.2 Program Weaknesses and Items Requiring Attention

The Independent Oversight inspection team identified two areas of programmatic weakness that, under certain circumstances, would challenge WSRC's ability to notify offsite responders of needed protective actions in a timely manner. Continuing concerns regarding SR's ability to systematically oversee the site's emergency management program were noted as well. Specific weaknesses are discussed below.

**SR has not implemented the systematic emergency management assessment program specified in internal requirements and the corrective action plan for the 2004 Independent Oversight inspection.** In March 2005, SR revised the emergency management program procedure to require implementation of a systematic, resource-sensitive assessment program. However, the SR procedure revision does not contain all of the elements specified by the approved corrective action plan, and most of the new requirements identified in the procedure revision have not been implemented; these include development of an overall assessment program plan, a schedule to address the upcoming year's assessments, and an annual report to cover the previous year's activities. SR is performing a variety of line oversight activities, and has conducted some assessments that appropriately identified areas for program improvement. Furthermore, SR performs detailed reviews of and concurs on all WSRC hazards surveys and EPHAs. However, the documented assessments have not been planned or conducted in accordance with either the SR emergency management program procedure or the SR technical assessment program. Most importantly, few of the assessments include documented assessment objectives and criteria, irrespective of whether the assessment was a stand-alone activity or was associated with an annual exercise. The lack of documented objectives

and criteria reduces assurance that assessments include the appropriate scope, and it hampers SR's ability to track which aspects of the program have been evaluated and trend the effectiveness of assessments in identifying weaknesses. Addressing these important assessment program weaknesses, when combined with the other aspects of SR's current line oversight program, would produce an effective SR readiness assurance element.

**The usage and content of some WSRC response procedures and SRSOC communication practices do not fully support effective SRSOC and EOC operations.** During a simulated transportation event involving a large hazardous chemical release near the site boundary, instances of erroneous or informal procedure use and communications on the part of SRSOC and EOC staff resulted in inaccurate onsite event notifications. Similar weaknesses caused most offsite notification messages to include inappropriate recommendations to shelter in place (rather than evacuate) in the affected offsite area. Also of concern is that the WSRC process for completing offsite notifications from the EOC is cumbersome, despite several attempts over the past three years to correct this self-identified weakness, and resulted in most EOC event classification upgrade notifications being delayed beyond the 15-minute requirement. Finally, due to a misunderstanding regarding planning considerations in the emergency planning zone, WSRC has not developed any predetermined protective action recommendations for severe malevolent acts for use by offsite authorities in protecting persons located beyond the emergency planning zone. For these events, the one rem protective action criterion is predicted to be exceeded at the site boundary (which for a portion of the site boundary also defines the emergency planning zone), and significant consequences could be produced even beyond the emergency planning zone.

## 3.0 Conclusions

The 2004 Independent Oversight inspection found that the SRS emergency management program featured many effective programmatic elements and that emergency response decision-making observed during the LSPTs provided confidence that the ERO would respond effectively to an emergency event. Nonetheless, concerns were noted in the completeness of the hazardous material screening process, the rigor of the qualification process for key EOC staff, the performance of consequence assessment teams, and the conduct and documentation of SR assessments of the site's emergency management program. This 2006 Independent Oversight inspection found that nearly all of the WSRC weaknesses from the 2004 inspection have been addressed. However, weaknesses were observed in procedure use and communications during LSPTs and in SR's implementation of its emergency management assessment program.

WSRC continues to improve the SRS emergency management program. Most notably, WSRC implemented a set of corrective actions from the 2004 inspection that effectively addressed nearly all of the previously identified concerns. Actions included implementing a comprehensive hazardous material screening process, strengthening the emergency responder qualification process, and making numerous improvements to the procedures, tools, and training provided to consequence assessment staff. In particular, the attention paid to improving the operation of the consequence assessment teams has been particularly effective, as was clearly demonstrated during LSPTs.

Other strengths were noted as well. The EPHAs have been further improved, and the nearly complete status of the draft hazards surveys and the content of the hazards survey and EPHA development and maintenance procedures provide confidence that the foundation of the SRS emergency management program will be further strengthened. Additionally, during LSPTs, key emergency response decision makers effectively demonstrated their skills in event recognition,

classification, and command and control, although as discussed below, some performances by emergency duty officers were impacted by weaknesses in applying the site's conduct of operations principles. SR also continues to have substantial involvement in several aspects of the SRS emergency management program, particularly hazards surveys and EPHAs and the observation of responder performance during facility drills and the annual exercise.

Of concern is SR's incomplete implementation of corrective actions intended to establish a systematic emergency management assessment program. Assessments are not being performed in accordance with existing SR internal requirements and, consequently, may not include the appropriate scope, do not consistently identify areas that require improvement, and do not have their completion tracked or the results trended. Even though SR is involved in a wide variety of line oversight activities, the absence of a systematic assessment process reduces the likelihood that SR's limited resources can be effectively used to verify WSRC performance across the breadth of the site's emergency management program.

Although generally effective, ERO performance was hampered by weaknesses in procedure use, communications, and the process used to develop offsite notification messages from the EOC. These weaknesses resulted in inaccurate onsite event notification announcements and, for those simulated events that were predicted to have offsite consequences, inaccurate or delayed notification messages to offsite agencies. Additionally, EDOs have not been provided with predetermined protective action recommendations for severe malevolent acts that identify protective actions that might be quickly needed by offsite populations located in areas close to the site boundary but outside the emergency planning zone. These response weaknesses are mostly mitigated by the site's remote location and the availability of alternate offsite communications channels. Nonetheless, they represent important response challenges.

Overall, SR and WSRC have established an emergency management program that is largely consistent with DOE expectations and, under nearly all circumstances, can effectively protect scene responders, site workers, and the public. SR line management attention is needed to fully implement a comprehensive emergency management assessment program that is consistent with internal requirements and effectively

utilizes limited resources. SR and WSRC line management attention is also necessary to ensure that the offsite notification process facilitates timely issuance of event information to offsite authorities and that EDOs are provided all of the information necessary to supply protective action recommendations to offsite authorities after a severe malevolent act until the EOC and consequence assessment team are functioning.



## 4.0 Ratings

This inspection focused on a detailed assessment of three key emergency management programmatic elements, as well as the performance of key emergency response decision-makers and support functions during the annual exercise. 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 rating assigned below to the readiness assurance category is specific to those assessment, corrective action, and performance monitoring mechanisms applicable to emergency management.

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

### **Hazards Surveys and Emergency Planning**

**Hazards Assessments** ..... EFFECTIVE PERFORMANCE

### **Emergency Response**

SR and WSRC Emergency Response Decision-Making ..... EFFECTIVE PERFORMANCE

### **Readiness Assurance**

DOE Line Program Management ..... NEEDS IMPROVEMENT

WSRC Feedback and Improvement..... EFFECTIVE PERFORMANCE

# APPENDIX A

---

## SUPPLEMENTAL INFORMATION

### A.1 Dates of Review

Scoping Visit	November 30 – December 1, 2005
Planning Visit	January 10 – 11, 2006
Onsite Inspection Visit	January 23 – February 1, 2006
Report Validation and Closeout	February 15 – 17, 2006

### A.2 Review Team Composition

#### A.2.1 Management

Glenn S. Podonsky, Director, Office of Security and Safety Performance Assurance  
Michael A. Kilpatrick, Deputy Director for Operations, Office of Security and Safety 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 (Overall Team Leader)

Steven Simonson, Deputy Director, Office of Emergency Management Oversight (Emergency Management Team Leader)

Stephen Kirchhoff  
John Nichols  
Brian Robinson  
Tom Rogers

#### A.2.4 Administrative Support

MaryAnne Sirk

## APPENDIX B

### SITE-SPECIFIC FINDINGS

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

FINDING STATEMENTS	REFER TO PAGES:
1. For analyzed severe malevolent act scenarios where protective action guidelines are expected to be exceeded at the site boundary, the EPHAs do not support the formulation of timely predetermined protective action recommendations, as required by DOE Order 151.1B, <i>Comprehensive Emergency Management System</i> , and the SRS emergency plan.	12
2. During limited scope performance tests, WSRC emergency responders in the SRSOC did not provide accurate onsite notifications and accurate offsite protective action recommendations, as required by DOE Order 151.1B.	17
3. During limited scope performance tests, WSRC emergency responders in the EOC did not provide timely notifications to offsite jurisdictions, as required by WSRC EPIP 6Q-120, “SRS Notifications,” and DOE Order 151.1B.	19
4. SR assessments of the site’s emergency management program are not planned and conducted in accordance with SRIP 100, Chapter 150.3, “SR Emergency Management Program” or SRIP 200, Chapter 223.4, “SR Technical Assessment Program.”	24

# APPENDIX C

---

## HAZARDS SURVEYS AND EMERGENCY PLANNING HAZARDS ASSESSMENTS

### C.1 Introduction

Hazards surveys and emergency planning hazards assessments (EPHAs) are developed to identify and assess the impact of site- and facility-specific hazards and threats and establish an emergency planning zone (EPZ). Based upon the results of these assessments, U.S. Department of Energy (DOE) and National Nuclear Security Administration sites and facilities must establish an emergency management program that is commensurate with the identified hazards.

This evaluation included a review of selected Savannah River Site (SRS) hazards surveys and EPHAs and their treatment of hazards associated with several SRS facilities and transportation activities. This review focused on improvements made in response to weaknesses identified during the inspection conducted by the Office of Independent Oversight in February 2004.

### C.2 Status and Results

The hazards surveys 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 is primarily dependent upon the completeness of the institutional processes for developing the hazards surveys 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.

The February 2004 inspection determined that Westinghouse Savannah River Company, now Washington Savannah River Company (WSRC), had implemented a formal, comprehensive process to develop and maintain EPHAs, and the SRS EPHAs included many key elements needed to develop a technically sound basis for the emergency management program. However, the process for screening chemical hazards for impact on site workers and the public was incomplete, and therefore, not all facility and

activity hazards had been appropriately considered. Furthermore, because the EPHAs did not clearly identify and assess the necessary range of emergency events, some EPHA results were not available as an input to other emergency management program elements. The collective impact of these weaknesses was that the technical basis for the SRS emergency management was not sufficiently rigorous to ensure the adequacy of pre-determined protective actions and associated event classification tools. This 2006 Independent Oversight inspection found that WSRC has developed and is implementing a more complete set of hazardous material screening criteria and has made additional improvements in the EPHAs, but some instances of inconsistency were noted among the EPHA documents reviewed.

Since 2004, WSRC has developed a hazards survey development and maintenance procedure and has revised the EPHA development and maintenance procedure. Of these procedures, the new hazards survey procedure, issued in December 2005, is the principal document relied upon to address previously identified weaknesses in chemical screening and hazards survey content. Specifically, the procedure now provides the specificity to ensure that all hazards surveys consistently contain the appropriate content, applies screening criteria that qualitatively examine all hazardous materials for further assessment, and clearly establishes roles and responsibilities for the development and maintenance of hazards surveys. The most significant improvement in the hazardous material screening process is that all chemicals, irrespective of whether they have a threshold quantity published in the Code of Federal Regulations, now undergo a quantitative analysis unless they can be excluded based on their low toxicity, dispersibility, or quantity, or if they are commonly used by the public. The procedure appropriately defines these terms using criteria consistent with pending DOE guidance.

Primarily to reflect the new procedure for developing and maintaining hazards surveys, WSRC has also revised the standard for developing and maintaining facility EPHAs. The EPHA procedure retains all of the positive attributes observed during the 2004 inspection, and it is supplemented by a

writer's guide to enhance consistency of content among the EPHAs. The standard addresses the major tasks involved in EPHA preparation, provides generally adequate guidance to the multi-disciplinary development team that includes facility personnel, and it appropriately addresses the need to review the EPHA whenever other site programs, such as the unreviewed safety question program, indicate a need to do so. Augmenting the standard for performing EPHAs is the practice of having an emergency planner on authorization basis document committees and other company-wide procedures that require the emergency management department to be notified in advance of changes to facility safety basis documentation. Finally, through use of a standard format, the EPHA procedure directs the compilation of information used for the development of emergency action levels (EALs), including the technical basis, a list of EAL indicators, and all EALs resulting from the EPHA process. EAL development is then performed in accordance with a separate EAL development procedure. Similarly, the EPHA procedure provides appropriate instructions for developing the site EPZ using the results of the EPHA process.

Although robust overall, the EPHA standard has not been updated to reflect certain site practices and is incomplete in a few areas. For example, the standard describes the use of precautionary protective action criteria, but a subsequent decision to discontinue the use of these criteria is reflected in some recently revised EPHAs. In addition, the EPHA standard does not stipulate design or administrative controls when using segmentation as the basis for excluding materials for further analysis; such controls would ensure that the exclusion analysis remains valid even for relatively minor facility changes. Furthermore, as in 2004, the standard does not include a specific list of required initiating events that must be considered to represent a full spectrum of emergency events or, as an alternative, require documentation of what events were considered in establishing the scenarios used in the barrier analysis.

The hazards surveys that were reviewed during this inspection had been developed using the new procedure but were still in draft form awaiting facility review and concurrence. Completion of the implementation phase is due in April 2006; consequently, most hazards surveys were sufficiently developed to ascertain their quality for subsequent EPHA development or documentation of hazardous materials that had been screened from further consideration. The draft hazards surveys are consistent with the development procedure and also

contain all the information identified as absent during the 2004 inspection. Beyond such content requirements as summaries of hazardous materials (by facility and building) and potential emergency conditions and event impacts, the hazards surveys include an easy-to-use table that summarizes the screening process. Hazardous materials are comprehensively addressed, including purchased chemicals, process chemicals, waste streams, and radioactive materials, and except for a concern regarding the application of the dispersibility exclusion, as discussed below, the hazards surveys appropriately screen hazardous materials. Furthermore, the Savannah River Operations Office is actively engaged in the hazards survey development process through the review and comment process, periodic meetings with WSRC emergency planners, and the employment of facility representatives for walkdown activities.

Although the hazards survey development procedure and the current condition of the hazards surveys are positive overall, some concerns were noted. The most significant concerns are in the implementation of a new dispersibility exclusion criterion and in ensuring that a complete list of chemicals is used in the hazards survey. WSRC is using a new exclusion criterion, contained in the draft emergency management guide (DOE Guide 151.1), that allows solids greater than 10 microns in size to be excluded from a quantitative assessment. However, WSRC has not provided any procedural guidance that specifies how this condition can be determined, and the current practice is to use a "best judgment" methodology (even for bagged material) by the individual performing the facility walkdown. A second concern is that one of the three draft hazards surveys reviewed was not fully consistent with the chemical inventory database in that some chemicals stored at the facility were not included in the hazards survey table of chemicals. A review of the chemical inventory database that serves as the basis for hazards survey tables determined that the database was accurate and that the hazards survey table itself may have been out of date. Other concerns of lesser significance include incomplete guidance for using Department of Transportation packaging exclusions (overpacks and certifications) for Type B containers, which will have to be carefully evaluated when WSRC formally adopts the revised DOE Order 151.1C, and not requiring a walkdown as part of the hazards survey development process (although a walkdown is implemented through the chemical database maintenance program).

The review of selected EPHAs performed as part of this inspection indicated that the EPHAs retain the positive elements observed in 2004, including appropriate definitions of facility and site boundaries; identification of barriers to hazardous material release; and indicators of barrier failure (instrumentation for EALs) that could be used as thresholds for emergency declarations. These 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. Consequences at receptors of interest are calculated for both average and severe meteorology and are tabularized for ease of use. The EPHAs also provide an adequate technical basis for the facility-based EPZs used to develop the site's EPZ. Additionally, WSRC has improved the H-Area EPHA, where an analysis of the toxicological hazard associated with low-enriched uranium was added; the K Area Material Storage EPHA, which is undergoing revision to reflect a new sabotage analysis; and the Defense Waste Processing Facility EPHA, which was revised to correct a number of self-identified errors to improve document clarity and completeness. The transportation EPHA, which has been significantly revised since the 2004 inspection, contains a well-documented justification for moving to the use of the 2004 Emergency Response Guidebook (ERG) as the principal response tool for events outside of facility boundaries. This approach enables decision-makers to formulate protective actions for a wide range of chemicals and some radioactive materials. Furthermore, EPHA reviews are current, appropriately governed by procedure, managed through use of a published schedule, implemented through use of a checklist, and well documented.

Several areas were identified where the EPHAs are unclear or would benefit from additional detail. The most important of these is that the EPHA process does not lead to the development of technically based, predetermined protective action recommendations (PARs) for the severe malevolent accidents that have been analyzed. Although the EPHAs make appropriate use of security event analysis to represent severe malevolent acts for classification purposes, the EPHAs do not contain the information necessary to develop predetermined PARs for these events. This shortcoming is a result of two factors. The first is that existing DOE guidance directs the exclusion of severe malevolent acts from the EPZ determination process. The second is that WSRC misunderstood DOE's policy regarding the development of predetermined PARs. Consequently, WSRC believed that predetermined

PARs did not have to be developed for areas outside the EPZ, even though the WSRC analyses of severe malevolent acts for five facilities resulted in the potential for General Emergency event classifications and significant consequences, as much as 15 rem for one facility, at the site boundary. Consequently, the emergency duty officers do not have access to any predetermined PARs for timely issuance to offsite authorities for their use in protecting members of the public who are near the site but outside the EPZ. In addition to being inconsistent with DOE expectations, this situation conflicts with expectations in the "Emergency Planning Zone" section of the SRS emergency plan that emergency duty officers and emergency operations center staff have response procedures to provide PARs for locations outside the EPZ.

**Finding #1: For analyzed severe malevolent act scenarios where protective action guidelines are expected to be exceeded at the site boundary, the EPHAs do not support the formulation of timely predetermined PARs, as required by DOE Order 151.1B, *Comprehensive Emergency Management System*, and the SRS emergency plan.**

Other concerns were noted as well. Because the EPHA standard does not clearly address spectrum-of-event requirements, as discussed above, some EPHAs lack the necessary information to clearly indicate that the appropriate spectrum of events has been analyzed. WSRC uses a barrier analysis methodology to determine event consequences from a variety of spill sizes and dispersion mechanisms, such as fires and overpressure conditions. The analyzed conditions are intended to be representative of such initiators as operator errors, failed containers, accidents, earthquakes, and moderate and severe malevolent acts. Although these initiators cover a significant spectrum of events, they are not presented consistently among the EPHAs, and, for vehicle crashes, assumptions and apparent differences are not fully described or reconciled. For example, vehicle crashes are addressed by a single analysis that is supposed to be representative of ground vehicle accidents and aircraft crashes, but the analysis does not reconcile the apparent differences in impact damage caused by projectile mass and dispersions caused by the different fuel loads.

Additionally, the transportation EPHA does not clearly describe the site's responsibilities regarding Office of Secure Transportation (OST) shipments or the PAR cards used by the OST shipment incident

commander. Consequently, OST shipments are not included in the site's formal planning basis, and the site has not developed OST-specific EALs or predetermined protective actions. This omission of OST considerations is largely mitigated by the fact that OST has provided PAR cards, developed from the OST shipment EPHA, for use by the emergency duty officer in classifying OST shipment events and formulating protective actions. This weakness was self-identified during WSRC's annual review of the Transportation EPHA in November 2005; however, WSRC has not yet decided how to incorporate OST PAR cards into the site's classification and protective action protocols. Finally, it should be noted that the EPHAs cannot be updated to reflect the results of the new hazardous material screening process until the hazards surveys have been completed and are approved for use. A schedule for updating the EPHAs to reflect hazards survey results is due in June 2006.

### C.3 Conclusions

WSRC has made significant progress in developing a process that qualitatively examines all hazardous materials. The process for eliminating hazardous materials from a quantitative analysis is now consistent with existing and pending DOE criteria. For those hazardous materials needing quantitative assessment, the material is analyzed using appropriate and well-documented methodologies. Quantitative assessment results provide the necessary input to develop EALs and the EPZ for the purposes of emergency response tools and planning. However, predetermined PARs have not been prepared for potential General Emergency classifications, and some important new program elements are not complete. Efforts to revise hazards surveys to meet the new screening criteria, update EPHAs with hazards survey results, and modify the site's chemical inventory control system are incomplete, although they are in line with the completion schedule. Additionally, an emerging approach to analyzing malevolent acts and the impending implementation of DOE Order 151.1C will require some adjustments to the hazards survey/EPHA process and output documents. Nonetheless, on balance, WSRC has established an appropriate basis for the SRS emergency management program, and the implementation of the unfinished components should produce an emergency response program that comprehensively addresses an appropriate range of postulated events.

### C.4 Rating

A rating of EFFECTIVE PERFORMANCE is assigned to the area of SRS hazards surveys and EPHAs.

### 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 offered to the site to be reviewed and evaluated by the responsible line management and accepted, rejected, or modified as appropriate, in accordance with site-specific emergency management program objectives and priorities.

#### Savannah River Operations Office

- Ensure that all personnel performing walkdowns of chemical inventories to support hazards survey development have a clear understanding of the key conditions and assumptions used in the hazards survey. Specific items to consider when performing walkdowns include:
  - Ensure that the hazards survey contains a current field material tracking system report for the identification and location of chemicals.
  - Ensure that chemicals are in the location and in the form assumed in the hazards survey.
  - Ensure that container type and size and general storage conditions are as assumed in the hazards survey.
  - Ensure that hazardous material exclusions are appropriately applied and recorded.
  - ensure that there are adequate design or administrative controls that will maintain the validity of any segmentation assumptions used to screen hazardous materials based on quantity.

- Ensure that facility physical inventory methods and frequency are adequate for maintaining an accurate field material tracking system. Specifically, verify that methods are included to reconcile differences between chemicals found in the facility but not in the field material tracking system.
- Consider formalizing the review and approval process used to evaluate hazards survey and EPHA documents by developing a procedure to describe the activities of personnel from the Savannah River Operations Office.

### Washington Savannah River Company

- Enhance the hazards survey process procedure by providing additional guidance that is more practical for field implementation and contains more specificity regarding assumed controls. Specific actions to consider include:
  - Convert the 10 micron exclusion criterion to one readily usable by personnel performing screening activities.
  - Require the use of the field material tracking system or stipulate that a method that employs facility walkdown activities be used in identifying chemical inventories at a facility.
- Enhance the EPHA process procedure by ensuring that it is consistent with the hazards survey procedure, accurately reflects EPHA activities, and ensures that EPHAs establish the technical basis for PARs. Specific actions to consider include:
  - Stipulate the requirement that either design features or administrative controls must be developed and implemented when using segmentation principles in the EPHA analyses.
  - Reconcile the use of the precautionary protective action criteria described by the EPHA development procedure with the practice of removing these criteria from EPHAs through the revision process.
  - Specify that EPHAs are to contain the information that is considered in determining selected scenarios and their correlation to equivalent event initiators for the purpose of establishing the spectrum of events analyzed.
  - Specify that EPHAs are to contain distance to protective action criteria and distance to threshold for early lethality information for use in developing PARs.
- Pending final resolution in providing predetermined PARs for General Emergencies, consider an interim corrective action that accounts for wind speed and direction and the amount of time for the consequence assessment team to assemble and produce consequence information. Provide directions for the emergency duty officer to implement the immediate simplified assessment for use in formulating PARs that can be communicated with the classification notification.
- Enhance planning activities being considered in advance of the implementation of DOE Order 151.1C. Specific items to consider include:
  - Evaluate exclusion options for materials stored in Department of Transportation Type B containers that will be impacted by the new overpack and certification requirements.
  - Revise the EPHA procedure to designate the use of acute exposure guidelines as the preferred protective action criteria for chemicals.
- Ensure that the transportation EPHA is updated to conform to the 2004 ERG during the next annual review.



# APPENDIX D

---

## EMERGENCY RESPONSE

### D.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 two sets of emergency management limited scope performance tests (LSPTs) conducted by the Office of Independent Oversight. The first set of LSPTs involved two Washington Savannah River Company (WSRC) emergency duty officers (EDOs) supported by the Savannah River Site Operations Center (SRSOC) teams. The second set of performance tests involved two emergency operations center (EOC) teams, each consisting of a WSRC emergency director (ED), a Savannah River Operations Office (SR) emergency manager, and selected EOC support staff, including a consequence assessment team. Each consequence assessment team consisted of an assessment and planning coordinator, an assessment specialist, a dispersion modeling specialist, and an industrial hygienist.

Two operational emergency scenarios were developed for the LSPTs: a transportation event involving a catastrophic failure of a hazardous chemical tanker, and a facility event that results in release of a hazardous material. The LSPT scenarios, which were developed by Independent Oversight in conjunction with WSRC trusted agents, were presented to the participants by the WSRC trusted agents to ensure scenario validity and delivery of accurate event cues. The trusted agents also played the roles of several positions that were not otherwise staffed, such as the incident commanders. In addition, interviews were conducted with four individuals from the Savannah River Site (SRS) fire department and

the security organization who have on-scene incident command responsibility.

### D.2 Status and Results

In the event of a sitewide emergency, initial direction and control of the SRS emergency response organization (ERO) is provided by the WSRC EDO, who is stationed at the SRSOC, which is staffed 24 hours per day. For such an event, the EDO has responsibility for protective action decision-making, emergency classification, and both onsite and offsite notifications until relieved by the ED 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 ED relieves the EDO of some duties, including notification, classification, and protective action responsibilities, and the ED assumes overall strategic response. The SR emergency manager would 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.

During the February 2004 Independent Oversight inspection, WSRC initial decision-makers demonstrated generally effective response during LSPTs. However, several weaknesses in the procedures for event categorization/classification limited the EDOs' ability to make consistently accurate categorizations and classifications. Furthermore, the consequence assessment process lacked the necessary structure to ensure consistent, timely, and accurate predictions of the consequences of a hazardous material release. This 2006 Independent Oversight inspection found that with few exceptions, incident commanders, SRSOC teams, and EDO teams responded satisfactorily to the postulated events, but that weaknesses exist in procedure use and communications in the SRSOC and EOC and in the process used in the EOC to develop offsite notification messages for upgrading event classifications.

## D.2.1 Incident Commanders

During structured interviews premised on events involving the release of hazardous materials, security and fire department incident commanders quickly recognized a wide variety of hazards, including bomb and toxic inhalation hazards, that required safe standoff distances, and they implemented appropriate isolation zones based on the Department of Transportation's Emergency Response Guidebook (ERG). All of the security and fire department incident commanders who were interviewed took the necessary precautions in identifying the appropriate threat level and hazards, and they correctly prioritized the need to protect first responders. Additionally, the fire department incident commanders recognized that during emergency conditions, direct communication with the EDO and facility emergency coordinator is necessary to implement evacuation or shelter-in-place protective measures.

Structured communication protocols have been established among the security and fire department incident commanders and EDOs for implementing an isolation zone, establishing a unified command structure, and identifying safe routes for evacuation of personnel and ingress of secondary responders. Although the fire department incident commanders' proficiency in using the ERG was inconsistent, in all cases they correctly identified the proper isolation zone. The likelihood that security would be the initial first responder has been recognized and is supported by direct communications with responding fire department personnel to support establishing a standoff distance and an isolation zone. Incident commanders place a high priority on securing the site and the event scene after an incident and on establishing upwind holding areas for remote workers, witnesses, and detainees.

It was noted that during separate interviews, the two fire department incident commanders used different site maps. Neither map easily supported the identification of distances and locations for establishing barricades, safe routes, and isolation zones, and the use of different maps to relay information does not facilitate effective communication among the EDO, the facility emergency coordinators, and the incident commanders. Although the personnel who were interviewed have a good working knowledge of the site, the absence of a consistent set of maps increases the potential for miscommunication.

To summarize, security and fire department incident commanders were sensitive to protecting first responders, applied conservative techniques for

developing the isolation zone, and were knowledgeable of the necessary actions as part of their incident commander responsibilities. However, response consistency could be improved by providing fire department incident commanders with identical SRS maps and addressing proficiency differences between the fire department incident commanders in their use of the ERG.

## D.2.2 EDO Teams

During the LSPTs, the EDO teams demonstrated effective command and control during the postulated operational events. EDOs utilized the emergency action levels (EALs) to accurately classify the events, and they demonstrated conservative decision-making in applying the ERG to establish isolation zones following a simulated catastrophic failure of a hazardous chemical tanker during a transportation event. The EDO effectively delegated and coordinated tasks among supporting SRSOC personnel to make the necessary notifications to site facilities, first responders, the ERO, and offsite authorities, resulting in the completion of most initial notifications in a timely manner.

SRSOC operations were well supported by the assigned technical staff (i.e., security, fire dispatch, and communications) and by the center's layout, which provides each SRSOC duty station with the necessary electronic communications equipment to coordinate the site response to emergency events. Furthermore, the SRSOC contains sophisticated computerized resources to support management of an operational emergency. For example, the site mapping computer program, shared among the SRSOC, the consequence assessment room, and the EOC, displays critical emergency management information, including location of remote workers, isolation zones, plume projections from the consequence assessment team, and the "keyhole" protection zone.

The performance of the EDO teams was diminished by weaknesses in applying WSRC conduct of operations requirements and principles to emergency command operations. Errors in procedure use and informal communications during the LSPTs resulted in errors in onsite notifications and offsite protective actions. EDOs did not consistently refer to procedures; ensure that the proper EAL revision was being used (as required by SRSOC protocols) when reviewing an EAL recommendation by a facility emergency coordinator; or use such error-reduction protocols as place-keeping, which are defined in WSRC guidance

on procedure compliance. Examples of procedure usage errors include:

- One EDO did not use critical response procedures during either LSPT scenario and, as a result, issued a shelter-in-place protective action recommendation (PAR) for the offsite area within the isolation zone, even though the SRSOC procedure for responding to emergencies required that area to be evacuated per the ERG. The EDO reviewed some portions of the applicable SRSOC procedure following issuance of the offsite notification form; however, the EDO failed to identify the PAR error.
- One EDO referenced the same SRSOC response procedure but failed to place-keep during the performance of the procedure. When completing the offsite notification form, the EDO did not provide any PARs to the emergency communications technician, and after being prompted by the computerized form completion process, the EDO then provided an incorrect PAR to “shelter out 1.6 miles” without referring back to the SRSOC response procedure.

Inconsistent or inappropriate WSRC institutional guidance regarding use of emergency response procedures may have contributed to the observed weaknesses in procedure use. For example:

- The current emergency management department expectation for procedure use is that all SRSOC response procedures are for reference and may be performed from memory during initial response activities.
- The WSRC conduct of operations manual section on procedure compliance exempts emergency plan implementing procedures (EPIPs) from site requirements for in-hand use during response activities.
- The SRSOC procedure for responding to emergencies (section 5.12, “Operation and Interface Between SRSOC and EOC”) requires mandatory use of checklists and specifies that steps are to be checked off as they are completed.

Additionally, self-checking was not performed by members of the SRSOC team, and the SRSOC members did not routinely validate information provided to them

by the EDO. Lack of self-checking resulted in one of the onsite notification forms being incorrect and one being incomplete. During the facility-based event, both EDOs began to complete the onsite notification form before the facility emergency coordinator could recommend an event classification, and as a result, one EDO marked the form to indicate a Site Area Emergency and the other EDO marked the form as if the event were an operational emergency with no classification. After the facility emergency coordinator provided details of the event and recommended that the event be classified as an Alert, both EDOs stated that they concurred with the Alert declaration. However, neither EDO checked the onsite notification form before printing it and distributing it to the SRSOC staff. Furthermore, even though both EDOs briefed the SRSOC staff that the event was an Alert, no members of the SRSOC staff provided feedback to the EDO that the onsite notification form was incorrect. The form was used as is, resulting in an incorrect public address announcement to the site, and in one case, incorrectly setting onsite protective actions at the Site Area Emergency level.

**Finding #2: During LSPTs, WSRC emergency responders in the SRSOC did not provide accurate onsite notifications and accurate offsite PARs, as required by DOE Order 151.1B.**

Finally, communications practices in the SRSOC do not follow WSRC expectations as described in the communications section of the WSRC conduct of operations manual, which describes methods and attributes of good communications and includes examples of repeat-backs, phonetic alphabet, and acronyms. Communication between the members of the SRSOC was informal and few repeat-backs were used. During some communications (mostly with security and fire dispatch), the SRSOC team member would state “copy” when an order was issued by the EDO. However, no confirmation of understanding was used (e.g., repeat-back). Additionally, EDO briefings in the SRSOC were inconsistent in formality; one EDO reviewed status and tasks assigned, the other did not. During the briefings, neither EDO had the full attention of the SRSOC members, as evidenced by side conversations during the briefings. This informality contributed to one EDO being unaware that, during the course of the LSPT, a second tanker truck had been reported by the driver to have an explosive device.

To summarize, the WSRC SRSOC teams demonstrated their ability to consistently classify operational emergencies in accordance with EIPs, apply conservative decision-making to the use of the ERG, and make most initial notifications in a timely manner. The EDO effectively utilized SRSOC resources, such as security, fire, and communications professionals to coordinate response during the LSPTs. However, EDOs did not make onsite notifications and offsite PARs in accordance with the SRSOC response procedures. In half of the LSPTs, the EDOs made inaccurate onsite protective action notifications because they filled out the notification form before the facility emergency coordinator provided a classification recommendation, and then did not check the form prior to issuance. Additionally, EDOs did not properly execute SRSOC procedures regarding PARs associated with a transportation event having offsite impacts. These response weaknesses are largely mitigated by the fact that few site hazards can reach off site, and by the protection afforded by the shelter-in-place measures that EDOs typically issue for almost any event that affects the site. Nonetheless, the procedure use and communications concerns are important and warrant attention.

### D.2.3 EOC Teams

During the LSPT scenarios, the EOC teams demonstrated effective overall command and control of the postulated operational emergencies. The EDs effectively utilized the EOC command team and other staff resources to consistently classify the emergency events, assess onsite protective actions, and ensure the safety of onsite personnel. EDs utilized a variety of teamwork-enhancing strategies to facilitate conservative decision-making and to ensure that tasks were properly assigned and completed. Almost all critical decisions were reviewed by the EDs, and the EDs challenged assumptions, requiring team members to support their positions for classifications and protective actions. Tasks were assigned to specific team members, and the EDs frequently followed up to ensure timely completion. The assessment planning coordinators and emergency management coordinators worked closely with the EDs to verify correct classification. These interactions included detailed discussions on source terms, protective actions, and “what-if” scenarios. The EDs demonstrated conservative decision-making in response to both the site earthquake and transportation events. Decisions

included shutting down all site processes, limiting vehicular traffic until roads were verified safe, and immediately securing special nuclear material.

The EOC teams were well supported by sophisticated computerized resources in managing the response to the emergency events. An electronic task tracking program has been developed to allow tracking of both routine tasks for EOC operation and other tasks as specified by the ED. This program’s output is displayed on a large screen in the front of the EOC and is easily visible to all EOC members. As with the EDO teams, the site mapping computer program and associated displays were used effectively to present critical emergency management information.

The consequence assessment team provided accurate and timely plume information to the EOC command staff. Using a computer display system that integrates plume model information with the site mapping display used by the EDO and ED, the consequence assessment team provided a live model of the projected release, including the applicable measurements (radiation dose or percentage of the Emergency Response Planning Guideline thresholds). The consequence assessment team included secondary and tertiary reactions from chemical spills as part of the plume calculations. Newly developed tools, including a chemical assessment guidebook and a spreadsheet of conversion calculations, were used effectively by the consequence assessment personnel to reduce the time required to develop plume plots. The consequence assessment team modeler was proficient in using available dispersion modeling programs for meteorological data, dispersion plume plotting, and determination of ingestion pathway limits. Predictive plume plots were initially conservative and later refined as more information became known. One weakness noted was that the plume tracking software defaults to site average meteorology (rather than actual local conditions), which, in one exercise where winds were light and variable, resulted in some confusion in the EOC. The local meteorology was more accurately representative, indicating that the plume might impact offsite areas, whereas the site average wind direction indicated that the plume had no offsite impact. The consequence assessment teams did not have procedural guidance or training on how to address this condition and were unsure whether the software could be made to consider information from a specific meteorology station.

Although many aspects of the EOC teams’ performance were positive, the EOC teams were hampered by a cumbersome offsite notification

process that resulted in most EOC EAL upgrade notifications exceeding 15 minutes. The notification process uses a computerized form that is completed in a line-by-line fashion during a teleconference that includes key members of the EOC and the emergency communications technician in the SRSOC. Both EOC teams recognized that the 15 minute notification requirement would be exceeded, and in three of the four EOC scenarios they took compensatory actions in the form of a directive to the offsite communications coordinator to call the states and inform them of an impending classification upgrade. However, this is not part of the official site notification process, and using such a work-around without some control over the information passed over the telephone can lead to the communication of erroneous information or additional confusion at the offsite level.

**Finding #3: During LSPTs, WSRC emergency responders in the EOC did not provide timely notifications to offsite jurisdictions, as required by WSRC EPIP 6Q-120, “SRS Notification,” and DOE Order 151.1B.**

Also of concern was that although the EOC teams appropriately reviewed the onsite protective actions for accuracy, one offsite protective action was incorrect. One LSPT scenario resulted in an ERG isolation zone exceeding the site boundary; consequently, evacuation was required in that area in accordance with the provisions of the flowchart appearing in the protective action response procedure (i.e., EPIP-103), which the ED is required to review. However, one ED issued a shelter-in-place PAR for that area. During the completion of the offsite notification form, the ED became distracted by a discussion with the security group and was not aware of the basis for the assessment and planning coordinator’s recommendation to evacuate that area. The emergency management coordinator briefed the ED on the form, but because the ED was not aware of the germane discussions, he approved shelter-in-place.

As in the SRSOC, communications practices in the EOC are informal and do not follow the expectations delineated in the WSRC conduct of operations manual. This informality led to several instances of confusion and logging of incorrect data. In addition, EDs did not clearly brief the EOC teams regarding significant events or changes in event classification. Lack of clarity in briefings led to several errors during the LSPTs, including a press release that incorrectly described the general emergency as a radioactive event

when it was a chemical release and inconsistencies between the actual time of classification upgrade (as declared by the ED) and various EOC logs. That there were communications issues was clearly demonstrated by one public information specialist’s statement that they were “working in a vacuum.”

To summarize, during LSPTs, EOC teams demonstrated effective command and control of the operational emergency. The EDs effectively utilized EOC resources to consistently classify the postulated operational emergencies, ensure the safety of onsite personnel, and manage the site’s response. However, the cumbersome nature of the WSRC process used to complete offsite notifications from the EOC resulted in most EOC EAL upgrade notifications exceeding 15 minutes, and weaknesses in some communications resulted in EOC personnel not having a consistent, accurate understanding of the event status. Although these concerns warrant attention, particularly those related to the notification process, the EOC teams have the expertise and equipment to adequately communicate the necessary information to onsite and offsite personnel following potential emergencies at SRS. Consequently, the response weaknesses do not materially detract from the overall effectiveness of this program element.

### D.3 Conclusions

During the LSPTs, key WSRC responders demonstrated their ability to consistently classify operational emergencies in accordance with EIPs and apply conservative decision-making in establishing isolation zones and ensuring the health and safety of site personnel. In both the SRSOC and EOC, resources such as security, fire, consequence assessment, and communications personnel were effectively utilized to coordinate responses to simulated events. Security and fire department personnel were sensitive to protecting first responders, applied conservative techniques, and were knowledgeable of the necessary actions as part of their incident commander responsibilities. However, weaknesses in the conduct of emergency operations in the areas of procedure usage and self-checking in the SRSOC resulted in inaccurate onsite notifications and incorrect offsite PARs. Furthermore, the cumbersome process used for completing offsite notifications from the EOC resulted in most EOC EAL upgrade notifications exceeding the 15 minute requirement, and communications weaknesses within the EOC hampered the effectiveness of some

response activities, such as the issuance of accurate press releases. Notwithstanding these weaknesses, emergency response decision-makers demonstrated their ability to adequately manage emergency events and protect at-scene responders, site workers, and the public.

## D.4 Rating

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

## D.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 offered to the site to be reviewed and evaluated by the responsible line management and accepted, rejected, or modified as appropriate, in accordance with site-specific emergency management program objectives and priorities.

### Washington Savannah River Company

- Enhance EDO response procedures by providing additional guidance for formulating the most appropriate protective actions and PARs. Specific actions to consider include:
  - Add a process to enable the EDO to make a timely determination regarding whether personnel under immediate shelter-in-place protective actions should be evacuated. In doing so, consider such variables as type of release (i.e., heavy gas or not, puff or continuous release), proximity and elevation differences of shelters to release point, and robustness of structures used for sheltering.
  - Add more detail to EDO guidance for implementing controlled evacuations, consistent with the ERG.
  - Add supplemental guidance for formulating PARs for transportation events.
- Consider formalizing the conduct of operations in the SRSOC and EOC by utilizing current expectations contained in the WSRC conduct of operations manual including:
  - Require in-hand procedure use for all SRSOC checklists. When a checklist refers to a critical procedure or flowchart, it should be required to be utilized in-hand. This change may require procedure revisions to facilitate timely formulation of protective actions and PARs.
  - Require in-hand procedure use for all position checklists. When a checklist requires a critical decision be made per a procedure (e.g., determine PARs per EPIP), that procedure should be required to be used in-hand.
  - Revise the emergency management coordinator checklist to streamline the completion of the offsite notification form.
  - Emphasize the use of such communication protocols as repeat-backs and the phonetic alphabet during drills, exercises, and actual events.
  - Formalize the EDOs' and EDs' briefings by using a pre-formatted briefing sheet that guides users through key event topics and germane information (e.g., classification, time of classification, status of protective actions, status of the facility/event). End each briefing by asking SRSOC/EOC members for any known information not discussed.
  - To ensure accurate notifications, require the EDO to complete the onsite notification form and distribute it to all members of the SRSOC before conducting the SRSOC briefing. Once this form is distributed, the EDO should use it to brief the SRSOC on event status.
- Consider building upon the existing emergency management knowledge base of the ERG by documenting and providing training on the purpose and scope of WSRC's conservative decision methodology when responding to large spills or catastrophic failures. Include in the documentation a discussion of the impact of large isolation zones on safe evacuations and how to manage and set priorities when evacuating large areas.

- Consider enhancing guidance and training for first responders in order to:
    - Reduce the variance in incident commanders' knowledge of the ERG.
- 
- Identify lessons learned from deficiencies based on past performance.
  - Ensure understanding of the conservative decision-making process and evacuation procedures.

# APPENDIX E

---

## READINESS ASSURANCE

### E.1 Introduction

Emergency management program administration includes elements of readiness assurance as well as performance of some planning and response functions. Readiness assurance activities ensure that emergency management program plans, procedures, and resources of the Savannah River Operations Office (SR) and Washington Savannah River Company (WSRC) will facilitate an effective response to an emergency at the site. Site readiness assurance activities include implementation by both SR and WSRC of a coordinated schedule of program evaluations, appraisals, and assessments and the effective use of issues management systems to effect program improvement. Key elements of the readiness assurance program include the active involvement of Department of Energy (DOE) line organizations in monitoring program effectiveness; implementing self assessment programs; and ensuring that timely corrective actions for identified weaknesses are identified, implemented, and appropriately closed. DOE field elements also have direct responsibility for performing some emergency response activities, including oversight of the site's emergency response and activities related to the release of emergency public information to site workers and the public.

As a follow-up to the February 2004 inspection conducted by the Office of Independent Oversight, this inspection examined the processes by which SR provides guidance and direction to and maintains operational awareness of the Savannah River Site (SRS) emergency management program. The inspection included a review of the SR emergency management program assessment process, selected aspects of the WSRC emergency management self-assessment and issues management processes, and the status of actions taken to address findings identified in the previous Independent Oversight inspection.

### E.2 Status and Results

#### E.2.1 DOE Line Program Management

The February 2004 Independent Oversight inspection determined that SR was 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 had recently identified several areas in which the rigor of SR line management oversight needed to be improved. However, SR had not been conducting the full program reviews required by DOE Order 151.1B; corrective actions to address the improvements needed in the SR oversight process had not been formally developed; and SR had not scheduled any programmatic assessments for that fiscal year. This 2006 Independent Oversight inspection found that although SR has defined the structure for a systematic assessment program, continued to perform its line oversight function, and improved efforts to document the associated activities, SR's implementation of a systematic emergency management assessment program is incomplete.

SR is actively engaged in line oversight of the SRS emergency management program, primarily through the conduct of a variety of activities, including involvement in the development of the annual exercise; the development, approval, and subsequent implementation of exercise-related corrective actions; detailed review of and concurrence on all hazards surveys and emergency planning hazards assessments (EPHAs); and observation of a wide variety of facility drills. Furthermore, SR participates in monthly meetings with WSRC to review emergency management program status, issues affecting the SRS emergency preparedness program, and such performance metrics established by SR as facility drill frequency and results. SR has also tracked the completion and verified closure of several corrective actions from the February 2004 Independent Oversight inspection, and with the exception of the finding assigned to SR (discussed below) and one element of the qualification-related finding assigned to WSRC (discussed in the next section) adequately documented closure in evidence packages. Additionally, personnel directly responsible for SR's line oversight of the emergency management program have completed the appropriate technical qualification program qualification standard and related training. The Headquarters Office of Environmental Management (EM-3.1) provides support to SR through routine communications,



observation of annual exercises, and limited review of emergency management program documents, such as the Emergency Readiness Assurance Plan.

In response to the 2004 Independent Oversight emergency management inspection, SR appropriately revised the emergency management program procedure (SRIP-100, Chapter 150.3) to require the implementation of a systematic assessment program that would meet the requirements of the SRS emergency plan and DOE Order 151.1B and, more importantly, would facilitate a line oversight approach that appropriately balances limited resources with the need to periodically verify WSRC performance across the breadth of the site's emergency management program. These requirements include:

- Annual assessments to ensure that individual functions or requirements are assessed at least once every three years, as required by DOE Order 151.1B
- An approved plan to formalize the assessment process, which was required by July 1, 2005
- An assessment schedule for the upcoming fiscal year, issued by September 30 of each year
- Assessment evaluation criteria, developed prior to the start of each assessment
- An annual report of the assessment results, issued by November 30 of each year.

However, the Independent Oversight team identified a number of weaknesses in the approach SR used to address the original finding, and in its implementation of internal assessment requirements. The SR procedure revision is not fully in accordance with the corrective action plan. For example, the corrective action plan indicates that the revised procedure will identify the resources needed to complete the various actions and will establish a process for conducting a technical review of program documentation, such as emergency plan implementing procedures. However, the revised procedure does not contain these elements. Consequently, SR inappropriately closed the corrective action that addressed the procedure revision. Furthermore, only a few of the new requirements identified in the procedure revision have been implemented. For example, SR has established a three-year schedule that appropriately identifies all

of the applicable program elements. However, no program plan has been developed, assessments are not consistently conducted in accordance with the three-year assessment schedule, there is no evidence of any assessment evaluation criteria being developed or identified, and no annual report was issued to describe fiscal year 2005 assessment results, as required.

In practice, SR's primary emergency management assessment methodology is to review activities performed by WSRC, and in some instances, such as observations during drills and exercises, this approach is appropriate. Furthermore, since the 2004 Independent Oversight assessment, SR has improved the degree to which assessments are documented. However, there are few examples of an independent assessment of the adequacy of individual program elements. The documented assessments include a variety of reports, ranging from comments on meetings and review of the WSRC annual exercise report to a review of corrective action closure packages, but they are of mixed quality and utility in supporting SR's line oversight function. In several instances, SR assessments appropriately identified areas for program improvement. For example, SR's assessment of the 2005 annual exercise included value-added feedback regarding WSRC's exercise evaluation by reporting weaknesses that were not fully developed by WSRC. However, few of the assessments had documented objectives or criteria; consequently, the reports do not clearly indicate what was evaluated. Furthermore, SR does not formally track the completion of assessments. For example:

- A February 2005 assessment of the notifications and communications element does not contain specific assessment objectives or criteria. Consequently, although the assessment report indicates that the site emergency plan and emergency plan implementing procedures were reviewed, there is no indication that the notification process used in the emergency operations center (EOC) was assessed, even though both SR and WSRC stated that this has been a persistent weakness over the past several years.
- SR uses the annual exercise to assess certain programmatic elements, such as emergency public information. However, the SR assessment of the annual exercise does not specifically identify which assessment elements are addressed or provide insight as to which programmatic (as opposed to response) aspects were evaluated.

- SR does not use a formalized process to document assessment completion. Instead, completed assessments reside in a notebook maintained by the emergency management team leader. Four assessments originally scheduled for completion in 2005 were not filed, and it could not be determined whether these assessments had been performed or deferred until 2006, and if they were performed, what weaknesses or improvement items were identified.
- SR validation of closure of the WSRC corrective actions to address the February 2004 Independent Oversight inspection was well documented. However, one corrective action associated with verification of proficiency before an individual is assigned to the emergency response organization (ERO) rotation was inappropriately closed because this requirement (as stated in the corrective action) was not incorporated into the training procedure to ensure continued implementation.

Finally, the documented assessments are not consistent with the requirements of the SR technical assessment program, which specifically identifies emergency management as one of the covered functional areas. This program delineates the process to be used for planning, conducting, reporting, and tracking the results of assessments, and as with the SR emergency management procedure, the technical assessment program requires a formal, planned approach to performing assessments. Meeting the technical assessment program requirements would provide assurance that SR is utilizing its limited resources effectively to assess programmatic areas based on established priorities (e.g., level of hazards, risk, operational need, change in facility operations, identified problems) using defined assessment objectives and criteria and also to provide a formalized, computer-based process for reporting and tracking assessment results.

**Finding #4: SR assessments of the site’s emergency management program are not planned and conducted in accordance with SRIP 100, Chapter 150.3, “SR Emergency Management Program” or SRIP 200, Chapter 223.4, “SR Technical Assessment Program.”**

Although this is not a repeat finding, it is similar to the finding identified in the February 2004 Independent Oversight inspection report, which states, “SR is not

conducting programmatic assessments of the site emergency management program, as required by the SRS emergency plan and DOE Order 151.1B.”

To summarize, SR has continued its active engagement in the SRS emergency management program in a variety of day-to-day line oversight activities, including frequent communications with WSRC to review program status and issues and observations of a variety of facility drills and exercises. SR also performs detailed reviews of hazards surveys and EPHAs and has tracked and verified closure of several corrective actions from the February 2004 Independent Oversight inspection. In response to the 2004 inspection, SR defined an appropriate structure for a systematic assessment program, and SR has improved the degree to which assessment activities are organized and documented. However, SR’s implementation of the emergency management assessment program is incomplete, and SR is not adhering to internal assessment program requirements. As a result, few assessments are appropriately planned, with clearly defined evaluation criteria, and assessment completion is not formally tracked. Together, these shortcomings limit the effectiveness of emergency management assessments. Furthermore, SR inappropriately closed or validated closure of corrective actions intended to address the 2004 SR finding and the 2004 WSRC finding related to the emergency response qualification program, respectively. Although the impact of these weaknesses is partially offset by SR’s other line oversight activities, these weaknesses could diminish SR’s effectiveness in sustaining a strong site program.

## E.2.2 WSRC Feedback and Improvement

The February 2004 Independent Oversight inspection determined that WSRC was effective in using assessments and management evaluations and issues management systems to identify and track sitewide and facility-specific emergency management weaknesses and improvement opportunities, and was using this information to make program improvements. However, WSRC was not effective in implementing defined, institutional processes to ensure that emergency management program weaknesses were identified. Furthermore, key issues management processes, such as causal analysis, had not been effective in ensuring that corrective action development and implementation were effective in preventing recurrence. This 2006 Independent Oversight inspection found that the 2004 findings have been largely addressed and WSRC is

continuing to use programmatic assessments, facility drills, and exercises to identify areas for continued improvement.

The 2004 Independent Oversight inspection identified three WSRC emergency management findings in response to weaknesses in the WSRC hazardous material screening process, the absence of position-specific training and evaluation as a condition for assignment to the ERO cadre, and performance weaknesses by consequence assessment teams observed during limited scope performance tests (LSPTs). The resulting corrective actions that WSRC developed and implemented were well-managed and have been broadly effective in addressing all three findings. All of the corrective actions were managed using the WSRC sitewide issues management process. The information contained in the issues tracking database is comprehensive and includes historical records of corrective actions, SR verification activities, and files of such corrective action deliverables as training plans, revisions of plans and procedures, and records of correspondence.

Observations during the LSPTs, record reviews, and discussions with key personnel validated the correction of nearly all previously identified weaknesses. The performance of the consequence assessment team has improved significantly; the improvement can be attributed to four specific corrective action deliverables – defined roles and responsibilities for team members, a chemical assessment notebook, a computerized method for performing unit conversions, and additional training. The improvements in the hazardous material screening process have effectively addressed the gaps in the previous process, as described in Appendix C of this report. To ensure that appropriate knowledge and skills are acquired during the ERO training and qualification process, WSRC has identified key positions within the EOC and at the facilities that receive position-specific, checklist-directed walkdowns followed by a graded drill. Facility personnel must pass the graded drill before being assigned as emergency coordinators, whereas EOC staff are added to the ERO rotation after the position walkdown with the understanding that they participate in an evaluated drill as soon as possible. This last provision is not consistent with the associated corrective action, which requires that key ERO responders be evaluated before being added to the ERO roster. However, this inconsistency is mitigated by the emergency management training coordinator's awareness of which newly-assigned personnel need to participate in a drill, and by the availability of monthly

ERO drills to meet this need (each of the three ERO shift rotations has a quarterly drill). Nonetheless, institutionalizing a requirement for an evaluated drill before assignment to the ERO roster would ensure that this important qualification element is not reliant on the active involvement of the training coordinator.

In addition to evaluating the effectiveness of correction actions, this review confirmed WSRC's continued effective use of programmatic assessments and emergency preparedness drills and exercises to identify areas for continued program improvement. In November 2004, the Facility Evaluation Board independently evaluated the emergency management program and identified deficiencies that were subsequently reevaluated in June 2005 to determine corrective action progress. Additionally, WSRC emergency management department staff conduct an annual assessment of each facility's emergency management program, and corrective actions are documented and tracked to completion using the sitewide issues management process. Emergency preparedness metrics are maintained and reviewed by WSRC monthly (and provided to SR) to monitor such parameters as facility-level drill performance, drill frequency, and ERO training status to provide a snapshot of program status. Metrics data that deviates from the norm, including facility drill performance, is further investigated by WSRC. Additionally, a review of selected facility drills, the 2004 and 2005 annual exercises, identified deficiencies, and related corrective actions indicates that emergency management issues are being captured and tracked to completion using sitewide and facility-specific issues management systems.

The facility emergency preparedness coordinators (EPCs) implement the required elements of the emergency management program at their facilities. EPCs at the Defense Waste Processing Facility, the Tritium facility, and the K/L facilities, which were focus areas for this inspection, administer their facility drill programs satisfactorily. The EPCs are knowledgeable of drill and training requirements, and all three use the sitewide drill evaluation criteria in drill preparation and also use the issues tracking database to report drill deficiencies. Program implementation is monitored by the emergency management program liaison, who maintains some degree of consistency in program administration across the facilities through frequent contact with the EPCs and quarterly meetings. However, not all EPCs utilize the site drill database to develop drills or generate the subsequent drill report,

thereby limiting WSRC's ability to review drill results and increasing the difficulty of tracking and trending results.

In a few cases, WSRC continues to have difficulty in effectively implementing institutional issues management processes to ensure that emergency management program weaknesses are identified and causal analyses are consistently effective in ensuring that corrective actions prevent recurrence. For example, in 2003 WSRC identified a weakness regarding the EOC's ability to complete offsite notifications within 15 minutes of an event classification upgrade. Since then, several sets of corresponding corrective actions have been entered and closed in the issues tracking system; the final corrective action was closed in March 2005. Although some procedure changes were made to address this repeat weakness, there is no evidence of a root cause analysis being conducted to identify the reason for this recurring weakness. This performance weakness was recognized again later in 2005 and during the LSPTs conducted as part of this inspection. Additionally, drills and exercises have not always identified weaknesses in procedure use and communications on the part of Savannah River Site Operations Center and EOC responders, and corrective actions have not always been effective.

To summarize, WSRC continues to be mostly effective in using assessments, facility drills, and exercises to identify sitewide and facility-specific emergency management areas for continued program improvement. Additionally, implementation of the issues management process, as it specifically relates to the closure of corrective actions taken to resolve the findings from the 2004 Independent Oversight inspection, was found to be largely effective. However, the corrective action associated with verification of proficiency before an individual is assigned to the ERO rotation was inappropriately closed. Additionally, corrective actions intended to address weaknesses in the EOC offsite notification process have not effectively prevented recurrence of associated performance weaknesses. A more rigorous causal analysis and corrective action validation process is needed to ensure that corrective actions effectively prevent problem recurrence. Finally, although not specifically discussed in this section, it should be noted that WSRC's recent sitewide workforce restructuring initiative resulted in emergency management department staffing being cut by approximately 25 percent. However, the remaining staff continue to fulfill all responsibilities, including conducting the training, drill, exercise, and assessment

programs that are so important to sustaining a strong emergency management program. Management will need to be sensitive to the potential impact of these personnel changes on program effectiveness.

### **E.3 Conclusions**

SR's emergency management line oversight program includes a variety of largely effective, day-to-day operational awareness activities, but the program assessment element needs substantial improvement. SR has not implemented a systematic process, in accordance with internal SR requirements, that utilizes such program indicators as longstanding weaknesses and repeat findings or corrective actions to help focus their assessments to make best use of their limited resources. Consequently, although somewhat improved, SR's documented assessments are of mixed usefulness in identifying areas for program improvement, and assessment scheduling and completion are not tracked effectively. Furthermore, some of SR's corrective action closure and validation activities lack rigor. WSRC is effective in using assessments, drills, and exercises to identify sitewide and facility-specific emergency management areas for continued program improvement. However, in some cases, corrective actions have not prevented the recurrence of performance weaknesses, indicating that additional emphasis is needed in the corrective action development and closure process.

### **E.4 Ratings**

A rating of NEEDS IMPROVEMENT is assigned to the area of DOE line program management.

A rating of EFFECTIVE PERFORMANCE is assigned to the area of WSRC feedback and improvement.

### **E.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 offered to the site to be reviewed and evaluated by the responsible line management and accepted, rejected, or modified as appropriate, in accordance with site-specific emergency management program objectives and priorities.

## Savannah River Operations Office

- Strengthen the oversight program by providing more rigor and formality in implementing the SR emergency management program procedure. Specific items to consider include:
  - Develop an emergency management assessment plan that describes the key elements for conducting a resource- and priority-based assessment program and that is consistent with existing SR assessment requirements.
  - Develop clear objectives and evaluation criteria for each SRS emergency management program element that focus on established priorities.
  - Establish a process for reporting and tracking assessment results to enable the development of an annual report containing all of the assessment results.
- To enhance the SR emergency management assessment process using established methodologies, consider utilizing the Savannah River technical assessment program as a basis for planning, conducting, reporting, and tracking the results of assessments.
- Strengthen the SR emergency management assessment program by verifying that it contains all the requirements of DOE Order 226.1, *Implementation of the Department of Energy Oversight Policy*, dated September 15, 2005. Specific actions to consider include:
  - Conduct a gap analysis to identify any differences between existing processes and the new requirements. For example, ensure that the existing processes are updated to conform to Attachment 3 of DOE Order 226.1, which requires:
    - Establishment of documented program plans by DOE Headquarters and field line management, describing their oversight activities, and development of an annual schedule of planned assessments and focus areas for operational awareness

- Implementation of a baseline line management oversight program
  - Implementation of DOE oversight programs and assurance systems that evaluate performance against requirements and performance objectives
  - Establishment of requirements and performance objectives that are interpreted through an approved process to ensure that they are relevant to the site and mission.
- Develop and implement an action plan to address the results of the gap analysis that will support meeting the September 15, 2006, implementation date for DOE Order 226.1.

## Washington Savannah River Company

- Enhance the facility-level drill program by standardizing the processes and products used to promote continuous improvement. Specific actions to consider include:
  - Establish drill reporting criteria to provide a consistent process that will facilitate identification of program weaknesses for further analysis.
  - Implement a consistent method at all facilities for developing, evaluating, reporting, and tracking and trending the results of drills.
  - Provide a consistent format and establish clear expectations and methodologies for sharing lessons learned among all facilities.
- Improve the effectiveness of emergency management corrective action management process by focusing on reducing the recurrence of similar deficiencies. Specific actions to consider include:
  - Conduct a more rigorous causal analysis, as is done for more significant deficiencies per the WSRC corrective action program procedure (WSRC-1-01 5.35), for deficiencies that are less significant, but recurrent.

- Analyze past deficiencies to help develop lessons learned, and ensure that lessons learned are communicated to all appropriate ERO members and facility personnel.
- Use the self-assessment process to monitor the effects of the 2005 emergency management reorganization on program performance by evaluating skill or resource gaps and the adequacy of staffing levels.