Office of Enterprise Assessments Review of the Savannah River Site Emergency Management Exercise Program

November 2015

Office of Emergency Management Assessments
Office of Environment, Safety and Health Assessments
Office of Enterprise Assessments
U.S. Department of Energy

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Acronyms

CAP	Corrective Action Plan
CRAD	Criteria, Review, and Approach Document
DHS	Department of Homeland Security
DOE	U.S. Department of Energy
DOE-SR	DOE Savannah River Operations Office
EA	Office of Enterprise Assessments
EAL	Emergency Action Level
EEG	Exercise Evaluation Guide
EM-44	Office of Environmental Management, Office of Safeguards, Security, and Emergency Management
EPHA	Emergency Planning Hazards Assessment
ERAP	Emergency Readiness Assurance Plan
ERO	Emergency Response Organization
FAQ	Frequently Asked Question
HAZMAT	Hazardous Material
NARAC	National Atmospheric Release Advisory Center
NNSA	National Nuclear Security Administration
NNSA-SRFO	NNSA Savannah River Field Office
OE-1	Operating Experience Level 1
OFI	Opportunity for Improvement
OIG	DOE Office of the Inspector General
OSSES	Office of Safeguards, Security, and Emergency Services
OST	Office of Secure Transportation
NA-41	NNSA Office of Emergency Management and Policy
PA	Public Address
SCD4	Site Exercise Objectives and Criteria Database
SRNS	Savannah River Nuclear Solutions, LLC
SRR	Savannah River Remediation
SRS	Savannah River Site
STAR	Site Tracking, Analysis, and Reporting
TRU	Transuranic

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Emergency Management Exercise Program

EXECUTIVE SUMMARY

The Office of Emergency Management Assessments, within the U.S. Department of Energy (DOE) independent Office of Enterprise Assessments (EA), Office of Environment, Safety, and Health Assessments, conducted an independent review of the Savannah River Site (SRS) exercise program. This review complements EA's severe event response review performed at SRS in 2014 to allow conclusions based on a more complete evaluation of the exercise program. The purpose of this EA assessment was to evaluate the exercise program's effectiveness in validating, through tests and demonstrations, all elements of the SRS emergency management program and fostering continuous program improvements. EA performed this review from February 24 to March 12, 2015. EA also drew on its observations of SRS exercise planning and execution activities from the 2014 site-level exercise to reach conclusions for this review.

Operating contractor Savannah River Nuclear Solutions, LLC (SRNS) manages the site-level emergency management program, while the operating contractors at facilities manages the facility-level exercise program. The DOE Office of Environmental Management and its Savannah River Operations Office (DOE-SR) provide Federal oversight of most of the SRS emergency management program, with the National Nuclear Security Administration (NNSA) Savannah River Field Office (NNSA-SRFO) providing Federal oversight of the remaining operations, such as tritium operations and the Mixed Oxide Fuel Fabrication Facility, which is under construction.

SRNS appropriately uses exercise plans and evaluation results to determine the site's readiness to respond to Operational Emergencies. When findings are made, site organizations use a very robust corrective action tracking system and a well-defined process to support continuous improvement in the emergency management program. EA concluded that DOE-SR and NNSA-SRFO effectively coordinate their contractor oversight activities and perform adequate oversight of the contractor self-assessment program. Recently, DOE-SR has taken positive action to address a recognized decline in the site's emergency management program by issuing a letter of concern advising SRNS to take corrective actions to improve program performance for weaknesses DOE-SR observed.

EA identified weaknesses in the SRNS and DOE-SR implementation of evaluation/validation, improvement, and documentation requirements within the emergency exercise program.

- SRNS has not maintained an exercise program that complies with all DOE Order 151.1C requirements to support a comprehensive test of the emergency management program. The site- and facility-level exercise programs suffer from limitations in the exercise objectives and criteria database used to establish the breadth and depth of exercise evaluations and evaluation of the remaining topics in the readiness assurance program. Further, the facility-level exercise programs have not performed their required annual exercise for the last five years, although the site had recognized this weakness and commenced annual exercises in 2014.

- Some emergency management components have not been validated within the past five years because SRS exercises have not included severe event scenarios that result in bounding consequences and necessitate the use of alternate facilities, evacuations, offsite responses, and deployment of NNSA radiological assets. SRS has not used severe event scenarios, as described in DOE's Operational Experience 1 (OE-1), that make use of lessons learned from the tsunami at Fukushima, Japan in 2011, because SRNS considers these scenarios to be beyond the scope of its

contract.

- The SRS corrective action and lessons-learned programs do not always lead to improvements in the emergency management program. Two significant examples of this are the exercise objectives and criteria database, identified as a finding by EA in 2012, and continuous self-identified weakness in the public address system over many years. Additionally, SRNS makes minimal use of the site's and the DOE corporate lessons-learned programs for sharing or retrieving lessons learned.

- SRNS's ranking of exercise evaluator observations diminishes the exercise program's effectiveness in fostering continuous program improvement. The ranking of observations into deficiencies and weaknesses affected the level of analysis and corrective action used in determining the causes and fixing the problems. EA observed significant conditions, such as public address system failures and communication failures during the exercise, which either were not ranked as findings (requiring significant analysis and formal corrective actions), but were ranked as improvement items (requiring little or no further attention).

- The program description of the SRS emergency management program in the 2015 emergency readiness assurance plan conflicts with observations made by DOE-SR and EA. The 2015 emergency readiness assurance plan states that SRNS continues to maintain a mature emergency management program and that overall, program readiness is acceptable. However, EA documented four findings during the 2014 exercise not observed by SRNS, and DOE-SR sent a letter of concern to SRNS for action to address an overall decline in the site emergency management program. The emergency readiness assurance plan does not reconcile the differences between these exercise results or recognize concerns about the emergency management program.

Overall, SRNS has established and implements a formal site-level exercise program to validate most of the site emergency management program and uses a robust corrective action tracking system to support program improvements for identified deficiencies and weaknesses. However, the exercise program has not validated all elements of the emergency management program over a five-year period and has not been effective in fostering program improvements or using lessons learned. SRNS has recently initiated improvements in the facility-level exercise program and for its exercise objectives and evaluation criteria database. DOE-SR has also taken action to improve the program by issuing a letter of concern to SRNS. Nevertheless, the exercise program has ranked some observed deficiencies at a level that does not require corrective actions and has produced some corrective actions that have not been effective in resolving recurring problems, such as public address system failures. Furthermore, SRNS has not demonstrated emergency preparedness for the type of beyond-design-basis events included in OE-1.

Office of Enterprise Assessments Review of the Savannah River Site
Emergency Management Exercise Program

1.0 PURPOSE

The U.S. Department of Energy (DOE) Office of Environment, Safety and Health Assessments, within the independent Office of Enterprise Assessments (EA), conducted a review of the emergency management exercise program at the Savannah River Site (SRS). This review complements EA's severe event response review performed at SRS in 2014 to allow conclusions based on a more complete evaluation of the SRNS exercise program. The purpose of this EA assessment was to evaluate the exercise program's effectiveness in validating, through tests and demonstrations, all elements of the SRS emergency management program and fostering continuous program improvements.

EA performed this review from February 24 to March 12, 2015. This report discusses the scope, background, methodology, results, and conclusions of the review. The review team's findings and opportunities for improvement (OFIs) are also included.

2.0 SCOPE

This EA review assessed the effectiveness and implementation of the emergency management exercise program established by Savannah River Nuclear Solutions, LLC (SRNS), as well as the oversight of the exercise program provided by the DOE Savannah River Operations Office (DOE-SR) and the National Nuclear Security Administration (NNSA) Savannah River Field Office (NNSA-SRFO). The specific focus of this review is described in the *Plan for the Office of Enterprise Assessments Review of Emergency Management at the Savannah River Site*, dated January 22, 2015. This review evaluated the site's exercise program to determine whether it uses plausible and realistic Operational Emergency event scenarios, validates all elements of the emergency management program, effectively evaluates an emergency response, properly conducts exercises, and provides a means to improve the site's preparedness to respond to Operational Emergencies. The review evaluated key exercise program documents; exercise planning and implementation activities for the 2014 site annual exercise; exercise after-action reports for the past five years; corrective action processes for deficiencies, weaknesses, and improvement items identified during exercises; and use of lessons-learned programs. EA also examined the actions taken in these areas since a review conducted in 2012 by EA's predecessor (referred to as EA in this report for simplicity).

3.0 BACKGROUND

SRS was constructed during the early 1950s to produce the basic materials used in the fabrication of nuclear weapons, primarily tritium and plutonium-239, in support of our nation's defense programs. Five reactors were built to produce these materials. Also built were a number of support facilities, including two chemical separations plants, a heavy water extraction plant, a nuclear fuel and target fabrication facility, a tritium extraction facility and waste management facilities. Although weapons materials are no longer produced at SRS, significant quantities of radioactive material and hazardous chemicals remain, requiring SRS to have an Operational Emergency hazardous material (HAZMAT) program in accordance with DOE Order 151.1C, *Comprehensive Emergency Management System*.

SRNS manages the site-level SRS emergency management program, and the DOE Office of Environmental Management provides Federal oversight of cleanup activities, including the site-level emergency management program. NNSA-SRFO provides Federal oversight for NNSA operations, such as tritium operations and the Mixed Oxide Fuel Fabrication Facility, which is under construction. Savannah River Remediation (SRR) also operates portions of SRS and provides emergency response support to SRNS for Operational Emergencies that affect their onsite jurisdictional boundaries and is responsible for implementing the facility-level exercise program at its facilities. Collectively, one site-level emergency response organization (ERO) and eight facility-level EROs implement the SRS emergency plan. The site-level ERO functions from a building that houses the SRS operations center and the emergency operations center. The facility-level EROs function from facilities within the letter-designated areas (e.g., F-Area) that comprise the 310 square-mile SRS site where they reside. Facility-level EROs are led by a facility and/or area emergency coordinator, who reports event information to the emergency duty officer in the SRS operations center or the emergency director in the emergency operations center (when operational) during Operational Emergencies.

The EA assessment program is designed to enhance DOE safety and security programs by providing DOE and contractor managers, Congress, and other stakeholders with an independent evaluation of the adequacy of DOE policy and requirements, and the effectiveness of DOE and contractor line management's performance in safety and security and other critical functions as directed by the Secretary. The EA program is described in and governed by DOE Order 227.1, *Independent Oversight Program*, and a comprehensive set of internal protocols, operating practices, inspector guides, and process guides.

This EA review evaluated the SRS exercise program to assess how thoroughly the SRS emergency management program was tested by the site-level and facility-level exercises over the past five years and how effective the exercise program has been in fostering continuous improvements and lessons learned. As part of the five-year program review, EA also examined the use of severe event exercise scenarios as delineated by DOE's 2013 Operating Experience Level 1 (OE-1), *Improving Department of Energy Capabilities for Mitigating Beyond Design Basis Events*. EA also examined how the corrective action process was applied to address the external findings from a 2012 EA review and the internal and external findings (e.g., from DOE-SR and EA input) from the SRNS 2014 site-level exercise after-action report. The DOE Office of Environmental Management's Office of Safeguards, Security, and Emergency Management (EM-44) also evaluated the 2014 SRS site-level exercise and issued its own after-action report to document its findings and conclusions. EA considered the results of the EM-44 report and avoided duplicating its findings.

EA's review in 2012 identified two findings associated with the SRS exercise program, which is a component of the site's self-assessment process. One finding was for the lack of joint exercises with NNSA'S Office of Secure Transportation (OST), for which SRS serves as a safe haven whenever a nearby shipment may need protection. The second finding was for omitting some Office of Emergency Operations evaluation criteria from the self-assessment process, including exercises. This 2015 review evaluated the effectiveness of corrective actions associated with these findings by looking at corrective action plans (CAPs); the processes used to rank findings and to track and close out corrective actions; and the records and documents that serve as objective evidence of completed actions.

The SRNS 2014 annual exercise after action report identified one deficiency and four weaknesses entered into STAR as findings for corrective actions.

- Inability to evacuate site security Barricade 9 in a timely manner (deficiency)
- The field monitoring team's failure to survey themselves or their vehicle for radioactive contamination after crossing through a projected plume

- Lack of timely notification to DOE Headquarters
- Failure to provide dispersion modeling results to offsite agencies
- Failure to control a temporary radiological buffer area at the exercise scene violated by a fire fighter.

EA identified the following additional findings in its evaluation report of the 2014 exercise, but SRNS had received them less than thirty days prior to this review, thus corrective action plans were not due and available at the time of this review.

- SRNS did not provide accurate and timely follow-up notifications to offsite officials when conditions changed
- SRNS did not provide effective communications among onsite response organizations throughout the emergency
- Protective actions were not reassessed throughout the emergency and modified accordingly
- SRNS has not fully developed predetermined protective actions.

EA participated in the evaluation of the SRS 2014 site-level exercise, including the SRS evaluation process. In this 2015 review, EA performed follow-up reviews of the SRNS 2014 exercise findings, which SRNS defines as a failure to meet at least one evaluation criterion in which the objective was measured. SRNS rated the 2014 exercise objectives, using the number or significance of findings as input to the rating as follows:

Objective	**Rating**
Safety	Met
Protective Actions	Met
Mitigation	Met
Radiological/Chemical Monitoring	Partially Met
Emergency Event Classification	Met
Staff and Activate	Partially Met
First Aid/Medical	Met
Notifications	Partially Met
Offsite Interactions	Partially Met
Consequence Assessment	Met
Public Information	Met
Recovery	Met
Facilities and Equipment	Not Met
Exercise Control and Conduct	Not Met

In the SRS corrective action process, the site's emergency management corrective action review board develops corrective actions for deficiencies and weaknesses. Corrective actions for improvement items are optional. Corrective actions are included in a CAP, submitted to DOE-SR, assigned to the appropriate functional area manager, and tracked to closure in the Site Tracking, Analysis, and Reporting (STAR) database. STAR treats all deficiencies and weaknesses as findings using the SRNS definitions. For the 2014 exercise, the STAR system has one CAP (2014-CTS-009253) that covers the five findings, which have 15 associated action items. Once all action items in the CAP are completed, the effectiveness review will proceed.

At the time of this EA review, the status of each CAP EA reviewed was:

- The CAP for the 2014 exercise was open, with 11 actions not closed.
- The CAP for the 2012 OST finding was closed.
- The CAP for the 2012 finding on incomplete self-assessment criteria was open, with all actions completed.

4.0 METHODOLOGY

As identified in the EA review plan, this review considered requirements related to the emergency management exercise program issued through DOE Order 151.1C for an Operational Emergency HAZMAT program. The EA review team used key aspects of these requirements as set out in the inspection criteria and lines of inquiry of Criteria, Review, and Approach Document (CRAD) 45-61, *Exercise Program Review and Severe Event Response Evaluation*. EA completed the SRS review under CRAD 45-61 through two inspections and separate reports. In 2014, EA evaluated the site's response to a postulated severe event, as planned and conducted by SRNS for the SRS annual site-level exercise, and issued a report on the site's response. This 2015 report discusses both EA's exercise program review and the site's actions addressing its findings from the SRNS 2014 after action report. This report covers exercise plan development, the conduct of the 2014 exercise, the SRNS 2014 after-action report and associated corrective actions, the completeness of the five-year exercise program, the effectiveness of the corrective action process, the lessons-learned program, and follow-up on EA's 2012 findings.

The EA team examined key documents, such as the SRS emergency plan, exercise program implementing procedures, exercise plans, exercise schedules, the set of exercise objectives and criteria, after-action reports, CAPs, the corrective action tracking system, records associated with corrective action closures, and SRNS's use of the SRS and DOE corporate lessons-learned programs. The EA team also interviewed key personnel responsible for developing and executing the exercise program and used observations made during the 2014 exercise in arriving at its conclusions. The members of the EA team, the Quality Review Board, and EA management responsible for this review are listed in Appendix A. Appendix B provides a detailed list of the documents reviewed and personnel interviewed.

5.0 RESULTS

The results of this review are organized around six principal components of an exercise program: exercise plans and procedures, exercise evaluations, after-action reports, exercise conduct, corrective actions and improvements, and lessons learned. In addition, Section 5.4 addresses the severe event exercise evaluation component described OE-1.

5.1 Exercise Plans and Procedures

Review Criteria:
A formal exercise program must validate all elements of an emergency management program over a 5-year period. The exercise program must validate facility and site-level emergency management program elements by initiating response to simulated, realistic emergency events/conditions in a manner that, as nearly as possible, replicates an integrated emergency response to an actual event. Planning and preparation must use an effective, structured approach that includes documentation of specific objectives, scope, time lines, injects, controller instructions, and evaluation criteria for realistic scenarios. (DOE Order 151.1C, paraphrased from CRAD 45-61)

For this portion of the review, EA reviewed the SRS emergency plan, site-level and facility-level exercise and drill standards, the corrective action program manual (Manual 1B 4.23, *Corrective Action Program*),

the 2014 exercise after-action report, the five-year exercise schedule, the exercise evaluation objectives and criteria database (called SCD4), exercise plans from the most recent five-year period, and records of exercise plan approval.

5.1.1 Site-Level Exercise Program

SRNS implements a formal exercise program to validate the site emergency management program. SRNS has documented the exercise program description and implementing processes in the SRS emergency plan (SCD-7, *SRS Emergency Plan*), a site-level exercise and drill standard (EMPP 6Q-007, *Standards for Site Level Emergency Services Drill and Exercise Coordination and Conduct)* and a facility-level exercise and drill standard (EMPP 6Q-006, *Standards for the Development and Conduct of Facility Emergency Preparedness Drills and Exercises*). Collectively, these exercise program documents incorporate the following DOE 151.1C requirements:

- Validating all emergency management program elements over a five-year period
- Using scenarios that are simulated, realistic emergency events/conditions in a manner that, as nearly as possible, replicates an integrated emergency response to an actual event
- Using a structured approach that includes documentation of specific objectives, scope, time lines, injects, controller instructions, and evaluation criteria for realistic scenarios
- Testing communications systems with DOE Headquarters, the DOE-SR office, and offsite agencies at least annually
- Testing and demonstrating the site's integrated emergency response capability annually
- Involving different HAZMAT facilities in site-level exercises from year to year
- Requesting offsite response organizations to participate in sitewide exercises at least once every three years
- Gaining DOE-SR approval of site-level exercise plans.

DOE-SR SRIP 100, *DOE-SR Emergency Management Program*, requires site-level exercise plan approval by DOE-SR and NNSA-SRFO, and submission to the program secretarial officer(s) and the Director, Office of Emergency Operations. The procedure also requires DOE-SR's concurrence on NNSA-SRFO approved exercise plans.

Despite these requirements, EA found that SRNS does not validate the full scope of emergency management program elements over a five-year period. (See **Finding F-SRNS-1**.) DOE Guide 151.1-4, *Response Elements*, calls for the periodic exercises to test the ten program response elements. However, the scope of the evaluation at SRS depends on the completeness of their objectives and criteria database, SCD4, which is currently incomplete because it is based on only a subset of the criteria in DOE Guide 151-1-3, *Programmatic Elements*, as further described in Section 5.6.1 of this report. (See Section 8.0, **OFI-SRNS-1**.) Items missing items from the database include exercise objectives for:

- Alternate command centers
- Periodic testing of all the protective actions (remaining indoors, sheltering, and evacuating)
- Backup power systems
- OST events
- NNSA radiological assets.

Although the SRS exercise program allows for adding exercise objectives to the SCD4 database, these items were not, and no other means used to validate the full scope of program elements. The past five site-level exercises contained no tests of alternate command centers, backup power systems, sheltering or evacuation of workers, OST scenarios, or NNSA radiological assets, except for the radiological assistance

program and part of the National Atmospheric Release Advisory Center (NARAC) plume modeling capabilities (SRNS used NARAC web, but NARAC personnel did not participate in plot development and perform quality checks of it during the exercise). SRNS's current five-year exercise schedule includes participation requests for most NNSA radiological assets and the Federal Bureau of Investigation; however, the ongoing effort to complete a full set of exercise objectives and evaluation criteria has not progressed to the point where these items are included. (See Section 8, **OFI-SRNS-1**.)

Furthermore, SRNS has not conducted exercises that involve severe event or multi-facility HAZMAT release scenarios that correspond to an analyzed bounding event – i.e., a design basis event or a beyond-design-basis event with the highest inventory of a facility's HAZMAT released. (See Section 8.0, **OFI-SRNS-1**.) The last five site-level annual exercises involved a transuranic (TRU) waste drum drop, a TRU waste drum fire, a nitric acid transportation accident, a tritium release, and a small release of plutonium-238. None of these scenarios warranted sheltering as a protective action, participation by NNSA radiological assets, or significant response planning with offsite authorities.

Finding F-SRNS-1: Contrary to DOE Order 151.1C, the SRNS exercise program does not validate all elements of the emergency management program over a five-year period.

5.1.2 Facility-Level Exercise Program

SRNS is in the process of improving the SRS facility-level exercise program, formally established by the SRS emergency plan and the facility-level drill and exercise standard, as a result of self-identified weaknesses. In 2013, SRNS recognized that facility-level drills were not meeting DOE Order 151.1C order requirements for conducting annual facility-level exercises because they were training activities rather than validation activities. In 2014, SRS conducted facility-level exercises to validate responses for all eight SRS EROs for the first time in a single year, and SRNS has an ongoing effort to add tests of the interfaces between operations drills and emergency drills. The facility-level exercise plans are now being developed as exercise documents by including essential exercise information, such as scenario descriptions, message injects, time lines, and evaluation criteria. The facility-level exercise and drill standard provides a template for exercise plans so that users in the different operating contractor companies or areas consistently include this content. However, the exercise plans do not clearly define whether the exercise is a training or validation activity, and ambiguity stems from the different purposes, terms, and approaches used by the facility emergency preparedness coordinators who implement the facility-level exercise program; there is no common, institutionalized understanding (see Section 8.0, **OFI-SRNS-2**) of such items as:

- Evaluated training
- Evaluated drills
- Coached drills
- Training drills
- Exercises that train personnel and evaluate procedures, facilities, and equipment.

In conclusion, SRNS has established a formal exercise program to validate emergency management program elements at the site and facility levels, with some noted weaknesses. The SRS emergency plan and site-level and facility-level exercise and drill standards incorporate the DOE requirements for the contents of an exercise plan. The recent exercise plans were adequately prepared in accordance with the implementing standards, with site-level exercise plans approved by DOE-SR and submitted to the required DOE Headquarters organizations. However, because of weaknesses in the exercise program implementing mechanisms, the site-level exercise program has not validated the full scope of important program elements over a five-year period. Also, the facility-level exercise program is undergoing

corrective actions for a self-identified finding from 2013, and the frequency of facility-level exercises was compliant for the first time in 2014. Although the SRNS facility-level exercise and drill standard has recently improved, the lack of institutionalized definitions to clearly distinguish validation activities from training activities has resulted in ambiguity about whether some exercise plans are for validation or for training.

5.2 Exercise Evaluations

Review Criteria:
Exercises are evaluated and critiqued effectively and reliably and result in corrective actions and program improvements for identified program weaknesses. (DOE Order 151.1C, paraphrased from CRAD 45-61)

For this portion of the review, EA observed the 2014 exercise, some associated player critiques ("hotwashes"), and the critique meeting; and reviewed the 2014 exercise plan and SRNS after-action report, the SRS corrective action program manual, site-level and facility-level exercise and drill standards, the SCD4 database, STAR database entries, and finding closure histories.

EA found that the SRS emergency plan and site-level and facility-level exercise standards adequately implement the order requirements of collecting exercise observations and establishing a critique process for evaluation through:

- Player critiques (hotwashes)
- Evaluator/controller critiques
- Facility evaluation board evaluations
- Use of an exercise objective and criteria database

Additionally, EA found that the player critiques and evaluator/controller critiques for the 2014 site-level exercise were adequate.

Nevertheless, as previously stated and further elaborated in Section 5.5.1, the SCD4 database is missing key criteria. SRNS is currently developing a more comprehensive set of criteria in the form of a spreadsheet; however, the exercise program standards do not reflect this activity, and the criteria in the spreadsheet are not based on site plans and procedures. (See Section 8.0, **OFI-SRNS-1**, **OFI-SRNS-2**, and **OFI-SRNS-3**.) DOE Guide 151-3, *Programmatic Elements*, promotes the use of exercise evaluation criteria based on participating organizations' plans and procedures to provide for an effective evaluation.

The SRNS process for evaluating exercises is similar to the guidance provided in DOE Guide 151.1-3, with some differences in the definition of findings, deficiencies, and weaknesses. (See Section 8.0, **OFI-SRNS-2**, **OFI-SRNS-3**, and **OFI-SRNS-4**.) The DOE guide defines a finding as a negative observation that is either a deficiency or a weakness, whereas SRNS's definition of a finding includes positive and negative observations binned into the categories of deficiencies, weaknesses, improvement items, good practices, and strengths. SRNS does not define deficiencies and weaknesses in its exercise program documents, but emergency planners said they use the definitions in the DOE guide. DOE Order 151.1C also uses the terms deficiencies and weaknesses as the two types of negative findings from exercise evaluations but does not distinguish between them. DOE Guide 151.1-3 defines these terms and the reasons for ranking findings, and defines findings as the negative conditions observed during the exercise. Although the SRNS emergency plan, site-level and facility-level exercise standards, and the corrective action program manual do not define deficiencies and weaknesses, these terms are used in the after-action reports and the site's corrective action tracking system.

DOE Guide 151.1-3 recommends ranking each finding as either a deficiency or a weakness to reflect the significance of the failed criterion in adversely impacting actual or projected performance of the program element. Simply put, the guide differentiates the two by saying that deficiencies result from a failed criterion that has a direct impact on an emergency management activity, while weaknesses result in a contributing or indirect impact. The guide further states that a deficiency has a more significant impact on the program element than a weakness, so a deficiency indicates greater urgency in implementing the appropriate corrective action and fixing the problem than a weakness.

SRNS has not been effective in categorizing ("binning") exercise findings to strengthen the corrective action process. (See Section 8.0, **OFI-SRNS-2**, **OFI-SRNS-3**, and **OFI-SRNS-4**.) Specifically, after-action reports for the past five years of site-level exercises identified only one deficiency and 18 weaknesses. From the 2014 exercise, EA observed two additional findings that meet the DOE emergency management guide's definition of a deficiency; SRNS ranked one of them as an improvement item and did not rank the other. The findings were: (1) the failure of the public address (PA) system to provide protective action information that was clear and loud enough to be heard (ranked as an improvement item by SRNS), and (2) failure to communicate to the first responders that a radioactive material release was in progress at the event scene. During the exercise, the Emergency Duty Officer and the F-Area Emergency Coordinator had jointly classified the event as a Site Area Emergency while first responders were on the way to the scene of a vehicle accident. However, the SRSFD officers received no communications that informed them of the Site Area Emergency declaration or the potential radiological consequences associated with the event. The emergency action level (EAL) in use required protective actions for nearly four miles in all directions and extended to the site boundary in the downwind direction. When protective actions were announced to site workers over the PA system, some speakers were not loud enough, and in some other areas the announcement was not understandable. SRNS graded the facilities and equipment objective as Not Met due to the high number of improvement items (18 items) identified for equipment, including the PA system. As improvement items, none of these are required to be fixed under the SRNS corrective action program.

The SRNS exercise program has frequently identified PA system problems as findings, but this designation has not resulted in a reliable system that effectively communicates protective action information. SRNS identified PA system failures in three of the past five site-level exercises and during some facility-level drills and exercises. SRNS ranked the findings as weaknesses or improvement items, entered them into the SRNS corrective action program, and then closed the findings without fixing the PA system. (See corrective action program discussion in Section 5.6.3.) The primary basis for closing the PA system finding has been the use of alternate means of disseminating protective information, such as radios, telephones, bullhorns, and runners. However, when tested during the 2012 site-level exercise, these alternate means failed too. These alternate methods have their own inherent weaknesses because decision-makers have no way of knowing who did not hear a PA announcement, protective actions or security conditions may prohibit the use of runners and bullhorns, and SRNS has not demonstrated that these methods can be completed in a timely manner. While reviewing the history of PA system finding closure, EA noted that PA system problems at SRS date back to 1993. This old PA system has a history of unreliability and lacks a backup power system throughout the site. In 2012, SRNS considered National Fire Protection Association 72 *National Fire Alarm and Signaling Code*, 2010 edition, as the basis for upgrading the PA system, but ultimately determined that this code was not applicable to any existing or new SRS facilities. (See Section 8.0, **OFI-SRNS-5**.)

SRNS did not consider the unprotected first responders entering a potentially high concentration of airborne plutonium-238 as a finding in the 2014 exercise after-action report; rather, after EA evaluators provided this finding to SRNS as input to the SRNS after-action report, SRNS included it as an attachment for further consideration. Although SRNS has not ranked this deficiency in any of the SRS

categories to date, SRNS included an action item in the 2014 exercise CAP to further evaluate this condition. SRNS is evaluating the appropriateness of using information from the emergency planning hazards assessment (EPHA), which is the basis for the EAL protective actions, during an emergency response and whether protective action distances apply to personnel at an incident command post when they are located upwind from a HAZMAT release point. Because these are DOE policy issues (elaborated on in DOE Guide 151-4, *Response Elements*), SRS personnel are discussing their concerns with the DOE Office of Emergency Management and Policy (NA-41). During the 2014 exercise, the winds were light and variable, sometimes blowing in the face of personnel at the incident command post. These are the conditions the DOE policy is trying to guard against when weather is the sole means of protecting personnel in a protective action zone. Pending SRNS's discussions with NA-41 and any further actions, this action remains open in the SRNS corrective action tracking system.

Based on EA's observations during the 2014 exercise, SRNS's implementation of its finding ranking system did not always reflect the seriousness of the observed conditions. For example:

- The unprotected personnel closest to the release point were initially at the scene and later at the incident command post. DOE policy states that protective actions for unprotected personnel must conform to the EPHA assessments-based EAL in all directions. However, the incident command post was located well within the area under protective actions and within the area for potential exposure to over 100 rem, based on the EPHA analysis. The first responders chose their initial incident command post location based on a vehicle accident scene without the knowledge of a nearby HAZMAT release. The SRNS after-action report does not reflect this communication problem, identifies no deficiencies or weaknesses in communications, and does not include this communication problem in the list of improvement items. Because SRNS is discussing this condition with NA-41, SRNS did not rank this issue.

- SRNS ranked the failure to provide protective action information to all workers, due to PA system problems in the protective action zone, as an improvement item.

- Field monitoring personnel, who were located between the incident command post and Barricade 9, drove through the projected plume plot and then did not survey themselves or their vehicle. SRNS ranked this condition as an improvement item.

In conclusion, SRNS does not evaluate and critique exercises effectively and reliably so as to consistently identify emergency management program weaknesses that lead to program improvements. Contributing causes to this condition include an incomplete set of objectives and evaluation criteria, use of criteria that are not based on site plans and procedures, and binning of deficiencies and weaknesses per DOE criteria into improvement items using SRNS criteria that do not require corrective actions per SRNS procedures.

5.3 After-Action Reports

Review criteria:
Evaluation reports for facility and site exercises must be completed within 30 working days and submitted to the Cognizant Field Element, the Program Secretarial Officer(s), and the Director, Office of Emergency Operations. (DOE Order 151.1C)

For this portion of the review, EA reviewed the site-level and facility-level exercise and drill standards, the EM-44 after-action report, and SRNS after-action reports for the past five years of site-level exercises. EA reviewed only the past year of facility-level after-action reports because SRNS and DOE-SR stated that they had self-identified that some of their earlier facility-level exercises did not meet order requirements for exercises.

The SRNS site-level exercise and drill standard adequately incorporates the order requirements for developing and submitting SRS site-level exercise after-action reports to DOE-SR within 30 working days from the day of the exercise. The standard also requires after-action reports to include the appropriate contents, as recommended by DOE Guide 151.1-3, to serve as an auditable record of the exercise results by:

- Documenting a narrative executive summary with introductory and general statements noting exercise scope, purpose, objectives, participants, and the overall performance rating of the exercise
- Presenting findings correlated with exercise objectives, including positive and negative comments regarding the effectiveness of planning and preparedness
- Providing general recommendations for corrective actions.

The 2014 exercise after-action report contains the appropriate type of information but was transmitted to DOE-SR shortly after the required 30 working days of the exercise. The EM-44 evaluation report notes this missed due date, and the SRNS exercise program is required to enter a finding on timely submission into the STAR database for corrective actions. DOE-SR submitted the site level after action reports to the required DOE Headquarters organizations.

In conclusion, the site-level and facility-level exercise after-action reports adequately document the exercises. The site-level exercise standard gives adequate instructions for developing and submitting site-level after-action reports to DOE-SR within 30 days of the exercise, although the 2014 after-action report submittal was late. The DOE-SR emergency management oversight manual adequately incorporates its responsibility to submit site-level exercise after action reports to the required DOE Headquarters organizations and has done so.

5.4 Severe Event Exercises

Review criteria:
Severe event exercises include events that impact multiple facilities that cause the loss of infrastructure and primary capabilities and introduce secondary or compounding severe events that occur during critical stages of the initial response or during later remediation efforts. (OE-1 and CRAD 45-61)

When SRNS was planning its 2014 annual exercise, EA asked SRNS to include severe event components from a list of EA focus areas that were consistent with the OE-1 scenarios. SRNS did not add any of the requested focused areas, so EA reviewed the past five years of site-level exercise plans and after-action reports to determine the extent of testing of severe event capabilities.

SRNS has conducted severe event exercises, but not to the extent proposed in the OE-1 guidance. The SRNS severe event exercise at the Tritium Facility in 2012 postulated an earthquake resulting in significant infrastructure damage and a tritium release. In 2014, EA observed the planning and conduct of an exercise in F-Area that SRNS considered a severe event scenario, initiated by a severe thunderstorm with high winds causing downed trees and an isolated power outage. During the initial exercise planning meetings, SRNS planned to simulate a large area losing power, and EA requested the addition of some objectives to demonstrate and evaluate responses to conditions reflected in OE-1, such as the loss of a command center. SRNS declined the introduction of any new objectives and scaled back the simulated loss of power to a smaller area that presented no immediate conditions or consequences for emergency responders to mitigate. SRNS has not conducted any exercises that postulate a severe beyond-design-basis event as described in OE-1, because SRNS considers such events to be outside the scope of its contract. SRNS and DOE-SR are now evaluating the contractual basis for implementing severe event

planning.

In conclusion, SRNS has not validated its capabilities for responding to the types of severe events described in OE-1. DOE-SR and SRNS are currently evaluating the contractual basis for implementing OE-1 severe event planning.

5.5 Exercise Conduct

Review Criteria:
Each exercise must be conducted and `controlled effectively and reliably. (DOE Order 151.1C, paraphrased from CRAD 45-61)

For this portion of the review, EA observed the conduct of the 2014 site-level exercise and reviewed the EM-44 and SRNS after-action reports.

Although SRNS conducted and controlled the 2014 site-level exercise within the framework of the order and guides, the exercise conduct was not fully effective. SRNS provides controllers and evaluators appropriate training, identifying vests, an adequate controller communications network, and message injects. However, weaknesses in exercise conduct and control observed at several exercise venues led SRNS and EM-44 to grade the exercise objective for the conduct of exercise as Not Met. EA observed additional weaknesses in the consequence assessment room, in the emergency operations center command center, and at the incident scene. Control weaknesses included responders not adhering to an exercise hold; an insufficient number of personnel to minimize the need for evaluators to also perform controller functions; and in one case, a responder violating a radiological buffer area (attributed to the absence of a controller in that location). The common practice of tasking evaluators with exercise controller duties distracts them from evaluation duties.

In conclusion, exercises are conducted and controlled within the framework of DOE requirements, but numerous control weaknesses diminished the effectiveness and reliability of the exercise. SRNS and EM-44 self-identified these weaknesses during the 2014 exercise for corrective actions.

5.6 Corrective Actions and Improvements

Review Criteria:
Lessons-learned must be developed, resulting in corrective actions and improvements. (DOE Order 151.1C, paraphrased from CRAD 45-61)

5.6.1 Contractor Self-assessment and Response Element Validation

For this portion of the review, EA reviewed CAPs, the STAR database entries, the SRNS self-assessment manual, the corrective action program manual, and the self-assessment evaluation criteria database, as well as observing the 2014 site-level exercise.

EA examined selected aspects of the emergency management self-assessment process, particularly the integration of the exercise program to validate the program response elements. A full validation of the response elements consists of program reviews, examination of key planning and preparedness documents, and performance evaluation activities, such as an exercise. DOE Order 151.1C requires contractors to conduct an annual self-assessment of their emergency management programs. Program and exercise evaluations (including appraisals and assessments) are required to be based on specific standards and criteria issued by the Director, Office of Emergency Operations.

SRNS continues to develop a full set of self-assessment criteria to correct EA's finding in 2012 that SRNS had not fully developed a self-assessment process for the emergency management program that met the requirements of DOE Order 151.1C. Overall, SRNS had not included an appropriate combination of programmatic and exercise evaluations in its self-assessment process, and relied almost solely on the drill and exercise evaluation process to identify and facilitate improvements in the site emergency management program. Additionally, EA noted that because SRNS's self-assessment criteria were not as inclusive as or equivalent to, the criteria issued by the DOE Office of Emergency Operations and used by DOE-SR and NNSA-SRFO, the scope and detail of the SRNS self-assessments were insufficient. Before the 2012 EA review, DOE-SR made SRNS aware of the need to improve the SRNS self-assessment program; however, SRNS did not implement improvements.

During this 2015 review, EA found that SRNS had developed a CAP for the 2012 finding (reference STAR No. 2013-CTS-000990) and had completed all of the corrective actions; however, the finding remains open pending an effectiveness review. Importantly, SRNS exempted the EA 2012 finding from formal root cause analysis because:

- Limited emergency management resources could not support the effort needed to design, develop, and implement such a capital-intensive assessment program.
- The assessment criteria referenced in the order are contained in a DOE emergency management guide, so SRNS does not consider compliance contractually required.
- On a previous inspection in 2010, EA considered use of the DOE Guide 151.1-3 criteria as an opportunity for improvement and did not issue a finding for failing to use those criteria.
- SRNS considers that its many program processes (drills, exercises, document reviews, and other evaluations) provide adequate feedback on the overall health of the program.

During the 2014 site-level exercise, EA observed that SRNS had made minimal progress in resolving the longstanding issues associated with the 2012 self-assessment finding. Additionally, SRNS had not improved exercise evaluation criteria to appropriately integrate programmatic and performance criteria by including facility/site program capabilities and measurable standards based on existing SRS plans and procedures. (See Section 8.0, **OFI-SRNS-6** and **OFI-SRNS-7**.) Without measurable standards, SRNS exercise controller/evaluators relied mostly on an experience-based approach for the exercise evaluation, so they did not identify several concerns that EA considers significant. EA also observed that although the SRS ERO had numerous response procedures and checklists available for key emergency response functions during the 2014 exercise, ERO personnel did not use them. Instead, they used an experience-based approach to decision-making for many tasks. An experience-based response approach relies heavily on the ERO to implement the emergency plan and to make time-urgent decisions using the decision-makers' knowledge of a given situation. Likewise, an experience-based exercise evaluation relies heavily on the evaluators' experience in recognizing ERO performance weaknesses. The limitations in SRNS's experience contributed to the differences between the conclusions of the EA and SRNS evaluators, as discussed in Section 5.2 of this report. SRNS tries to increase evaluators' knowledge of response tools by assigning them to programmatic reviews, but such assignments are not required.

Soon after SRNS completed its evaluation of the 2014 exercise, the Director of the DOE-SR Office of Safeguards, Security and Emergency Services (OSSES) sent a letter to SRNS concerning the recognized decline in the overall performance of the SRS emergency management program. The letter included an action for SRNS to perform a fully integrated review of all aspects of the emergency management program's implementation. Additionally, the letter stated that the review should be broad in scope, include all required elements from DOE Order 151.1C, and address the adequacy of the resources available and the disciplined conduct of operations needed to effectively respond to and mitigate

Operational Emergencies. On receiving this letter, SRNS initiated numerous self-assessments and formed an Independent Assessment Team to validate the self-assessment results. To inform DOE-SR of SRNS's approach, SRNS briefed OSSES on the methodology and the scope of the review beforehand. During the data collection period, SRNS gave DOE-SR updates on the status of the review and formally transmitted the final results of the independent review and self-assessments to OSSES on December 17, 2014.

At the request of DOE-SR, EA agreed to review SRNS's self-assessment results, focusing on exercise program related data, during this 2015 EA review. EA found that SRNS used only a subset of the DOE Guide 151-3 evaluation criteria, which SRNS considered a "smart sample" set of the criteria. SRNS subject matter experts developed lines of inquiry to determine the program status for the selected evaluation criteria. The *SRNS Emergency Management Programmatic Assessment*, 2014-SA-005279, dated October 10, 2014, documents the results for most program elements, including sitewide emergency preparedness (training, drills and exercises), readiness assurance (self-assessment, performance validation, corrective actions, and lessons learned), and recovery. The report identifies several opportunities for improvement and provides recommendations for emergency management program enhancements, but does not identify any findings (weaknesses or deficiencies). The SRNS Independent Assessment Team validated the results of the self-assessments and concluded that the SRNS emergency management program was compliant with DOE Order 151.1C. However, EA determined this conclusion was not valid because the basis of the assessment was an incomplete set of evaluation criteria and performance evaluations were not included. This resulted in the self-assessment not identifying the shortcomings discussed throughout this 2015 report.

In conclusion, while SRNS has taken recent steps to improve, its self-assessment process does not include a complete set of evaluation criteria and lines of inquiry or measurable standards based on site plans and procedures, further SRNS corrective actions do not always lead to program improvements. Additionally, SRNS's programmatic and exercise evaluation processes are not integrated to produce a more complete self-assessment.

5.6.2 DOE and NNSA Line Oversight

For this portion of the review, EA reviewed the SRS emergency plan, DOE-SR implementing procedures, schedules and plans, approval records of contractor-prepared documents, and reports of DOE-SR and NNSA-SRFO oversight activities.

EA reviewed the DOE-SR and NNSA-SRFO emergency management program oversight processes related to the SRS exercise program. DOE-SR appropriately reviews and evaluates SRNS's ability to meet the requirements of the exercise program. As discussed in Section 5.6.1, these reviews led DOE-SR to send SRNS a letter in June 2014 about the recognized overall performance decline within the SRS emergency management program.

DOE-SR and the NNSA-SRFO have a well-established concept of operations for directing, documenting, and overseeing implementation of the emergency management program at SRS. The physical and programmatic boundaries controlled by the DOE Office of Environmental Management and NNSA are used to establish which site office has oversight responsibility. The *DOE-SR Emergency Management Program* procedure tasks DOE-SR and NNSA-SRFO with their responsibilities and gives adequate instructions on the processes DOE-SR is to use in its oversight of the entire SRS emergency management program. DOE-SR provides further inter-office guidance on how to implement program requirements, such as emergency plan reviews and emergency readiness assurance plan (ERAP) preparation. DOE-SR also recognizes that the *SRS Emergency Plan* is the principal document establishing the framework of the SRS emergency management program, with annexes describing facility-specific implementation of the plan. The DOE-SR manager, the NNSA-SRFO manager, the SRNS president, and the Centerra

protective force general manager have approved the *SRS Emergency Plan*, indicating their agreement with the plan.

DOE-SR and NNSA-SRFO perform oversight assessments of their contractors and submit the results of these reviews to the appropriate Headquarters organizations, as required by DOE Order 151.1C. DOE-SR and NNSA-SRFO assess site- and facility-level emergency management programs at least once every three years and review SRNS self-assessments annually to ensure compliance with DOE directives and policy. DOE-SR and NNSA-SRFO submit the results of these reviews to the program secretarial officer and the NNSA Associate Administrator for Emergency Operations. DOE-SR has established several procedures and processes for performing contractor oversight and has implemented an assessment program that establishes its responsibilities in conducting both contractor oversight assessments and DOE-SR/NNSA-SRFO self-assessments. The *Integrated Performance Assurance Manual* (SRM 226.1.1E) provides the structure for planning, scheduling, and implementing the principal DOE-SR assessment program, and the STAR database adequately supports tracking of findings and the status of corrective actions. As described in Section 5.1, DOE-SR performs its required site-level pre- and post-exercise documentation approvals and submittals.

DOE-SR adequately performs most oversight of SRNS as instructed in its procedures. DOE-SR conducted numerous programmatic assessments and operational awareness activities during the last three years. DOE-SR oversight activities include frequent observation of facility drills and exercises, participation in evaluating the annual site exercise, technical review and approval of emergency planning hazards surveys and EPHAs, and review and approval of the *SRS Emergency Plan* and SRS ERAP. DOE-SR uses an appropriate set of objectives and criteria to perform its assessments, but the effectiveness of its reviews of contractor self-assessments is limited because the SRNS self-assessment program uses a reduced scope and less detailed criteria than DOE-SR (see Section 5.6.1). Although DOE-SR expressed concern about SRNS's scope and criteria in 2012 and 2014, SRNS has not implemented the needed improvements. In the absence of a single, consistent set of programmatic and exercise evaluation criteria, SRNS, DOE-SR, and NNSA-SRFO are unlikely to have a common understanding of program performance. (See Section 8.0, **OFI-SRNS-8**, **OFI-DOE-SR-1**, and **OFI-NNSA-SRFO-1**.) For example, in the most recent SRNS programmatic self-assessment, SRNS concluded that it is fully compliant with DOE Order 151.1C, while DOE-SR concluded that the overall performance of the SRS emergency management program had declined.

5.6.3 Corrective Actions

For this portion of the review, EA reviewed the corrective action program manual, the STAR database, and corrective action closure evidence.

The corrective action program manual contains the essential and required elements for an effective corrective action program, supported by a robust corrective action tracking system. DOE Order 151.1C requires continuous improvement in the emergency management program from the implementation of corrective actions for findings in all types of evaluations, both internal and external. The order also requires independent verification of implemented corrective actions for findings (deficiencies and weaknesses, per the order) before finding closure. For all deficiencies and weaknesses and some improvement items, SRNS, DOE-SR, and NNSA-SRFO use the STAR system for tracking and closing corrective actions. In addition, DOE-SR and NNSA-SRFO personnel conduct follow-up assessments to validate the closure of the actions, including follow-on actions and interactions with contractor personnel, as a means to verify the effectiveness of completed actions. DOE-SR and NNSA-SRFO also track and verify completion of corrective actions resulting from oversight assessments of their contractors' emergency management program.

SRNS has been ineffective in managing some significant issues and corrective actions identified through some external and internal assessments. (See **Finding F-SRNS-4** and Section 8.0, **OFI-SRNS-8**.) For example:

- EA identified a finding in 2012 that SRNS had not coordinated emergency response plans and procedures with NNSA OST and had not validated, through an SRS exercise, the effectiveness of SRS in responding to an onsite OST emergency event. This validation is required by DOE Order 151.1C and NNSA Associate Administrator for Emergency Operations guidance issued in April 2005. SRNS developed a CAP to address this 2012 finding (reference STAR No. 2013-CTS-000998), and DOE-SR verified finding closure based on the completion of operations drills in April 2014. However, those drills only involved communications with the OST transportation emergency control center in Albuquerque, New Mexico and did not validate an integrated emergency response to an OST event at SRS. Although SRNS closed the finding in STAR, SRNS had not developed and coordinated response plans and procedures with OST and did not conduct an exercise with OST.

- As discussed in Section 5.6.1, SRNS has not adequately addressed the other 2012 EA finding on the absence of an adequate self-assessment process. Although SRNS developed a CAP and completed all of the corrective actions, the finding remains open pending an effectiveness review. Additionally, SRNS's completed corrective actions have made minimal progress in eliminating some longstanding issues associated with the finding, nor did SRNS verify corrective actions implementation.

- As detailed in Section 5.2, the longstanding problem with the PA system has never been resolved.

Finding F-SRNS-2: Contrary to DOE Order 151.1C, completed corrective actions for some internal and external evaluation findings were not effective in resolving the original finding.

In conclusion, completion of some CAPs has not been effective in resolving the original finding, and effectiveness reviews have been inadequate in that they did not identify that the corrective actions were ineffective.

5.7 Lessons Learned

Review Criteria:
Lessons-learned must be developed, resulting in corrective actions and improvements. (DOE Order 151.1C, paraphrased from CRAD 45-61)

For this portion of the review, EA reviewed the SRNS lessons-learned program manual and after-action reports from exercises and drills for the past year.

Overall, SRS response organizations make minimal use of site and DOE corporate lessons-learned programs. DOE Order 151.1C requires the readiness assurance program to include a system for incorporating and tracking lessons learned from training, drills and exercises, actual responses, and a sitewide-lessons-learned program. Additionally, the site must participate in the DOE/NNSA corporate lessons-learned program. Although some after-action reports identify lessons learned, SRNS stated that it does not always distribute lessons learned for use by others. SRNS self-identified that facilities and functional groups on site do not share emergency management lessons learned effectively. However, SRNS did not address this shortcoming by consistently documenting deficiencies in STAR to enable sitewide rollup and identification of cross-cutting or common issues that require corrective actions. SRNS also self-identified that it had not consistently followed up on corrective actions and validation of corrective action effectiveness. SRS does not contribute much to the corporate lessons learned process, as evidenced by only one DOE Headquarters and four SRNS lessons learned in emergency management during 2012 and 2013, compared to the 14 emergency management lessons-learned entered by EA for just 2013. Importantly, the *SRNS Emergency Management Programmatic Assessment*, 2014-SA-005279, did not indicate any reviews of the EA 2012 and 2013 lessons-learned reports related to emergency management in the DOE complex. Furthermore, the site has never entered lessons learned from its emergency response exercises into the DOE/NNSA corporate lessons-learned program. (See Section 8.0, **OFI-SRNS-9**, **OFI-DOE-SR-2**, and **OFI-NNSA-SRFO-2**.)

6.0 CONCLUSIONS

SRS has established a formal exercise program documented in the SRS emergency plan, site-level and facility-level exercise and drill standards, and DOE-SR and NNSA-SRFO oversight procedures, and uses a robust corrective action tracking system to support program improvements for exercise findings. The site-level exercise program complies with DOE requirements of having adequate exercise plans, using plausible and realistic (but limited in scope) scenarios, and preparing after-action reports over the past five years. SRNS uses a structured approach in developing exercise plans, and each year SRNS uses a different location and postulates a variety of HAZMAT types, forms, and dispersion mechanisms in the site-level exercises to increase the number of validated program elements.

However, EA identified weaknesses in the SRNS and DOE-SR implementation of evaluation/validation, improvement, and documentation requirements within the emergency exercise program.

Evaluation/Validation. For the evaluation element to be effective, evaluators must use comprehensive and rigorous criteria to critically determine the adequacy of procedures and performance. However, the site- and facility-level exercise programs suffer from limitations in the SCD4 database in achieving validation of all emergency program elements in a five-year period. During a 2012 emergency management review, EA identified a finding regarding the scope of the exercise objectives and criteria, and SRNS has still not completed the corrective actions. This weakness extends to the entire SRS readiness assurance program, including the exercise program. The database is limited because SRNS did

not implement the complete set of objectives and criteria from a DOE emergency management guide and did not update the guide's generic criteria to produce measurable standards based on SRS emergency plans and procedures. Further, the facility-level exercise program has not exercised all facility-level EROs annually until 2014.

SRS exercised did not validate some emergency management components because SRS exercises have not included severe event scenarios with bounding consequences that necessitate the use of alternate facilities, evacuations, offsite responses, and deployment of NNSA radiological assets. SRS has also not used beyond-design-basis event scenarios in its exercises, as recommended by OE-1, because SRNS determined that those events are beyond the scope of its contract.

The SRNS exercise evaluation processes are within the framework established in the DOE emergency management guides, but weaknesses in the SCD4 database detract from an effective and reliable evaluation. Without measurable standards based on the SRS program requirements, exercise evaluators must rely on their own experience, which tends to vary among evaluators. Further diminishing exercise evaluations is the common practice of tasking evaluators with exercise controller duties, distracting them from evaluation duties.

Corrective Actions and Improvement. The SRS corrective action and lessons-learned programs do not always lead to emergency management improvements. SRNS has not maintained an exercise program that complies with all DOE Order 151.1C requirements over the past five years and has not been effective in validating all program elements, identifying findings, and fostering continuous improvement. SRS has not fully addressed external and internal findings from 2012 and 2013 targeting aspects of the exercise program. Although SRNS has made progress in correcting facility-level exercise program weaknesses, other findings since 2012 remain open or, in one case, closed but not corrected. Additionally, SRNS makes minimal use of the site's and the DOE corporate lessons-learned programs for sharing or retrieving lessons learned.

SRNS's method of ranking of exercise observations does not ensure that they receive an appropriate level of analysis and corrective action, diminishing the exercise program's effectiveness in fostering continuous program improvement. Significant conditions, such as PA system failures and communication failures during the exercise, either were not ranked as findings or were ranked as improvement items for which the SRS corrective actions program is optional. Further, because SRNS does not consider emergency planning for beyond-design-basis events, as described in OE-1, to be within the scope of its contract, SRNS has not included such events in exercise scenarios as recommended. DOE-SR and SRNS continue to deliberate the scope of the contract for OE-1 implementation.

The SRNS descriptions of its emergency management program in the 2015 ERAP conflicts with EA and DOE-SR conclusions. The 2015 ERAP states that SRNS continues to maintain a mature emergency management program and that overall, program readiness is acceptable. However, EA documented four findings during the 2014 exercise not observed by SRNS, and DOE-SR sent a letter to SRNS to address an overall decline in the site emergency management program. The ERAP does not reconcile the differences between these exercise results or recognized concerns about the emergency management program.

Overall, SRNS has a well-established site-level exercise program that meets most DOE requirements. However, the exercise program has not been effective in validating all program elements over the past five years, identifying findings, and fostering program improvements and the facility-level exercise program had not been performing required annual exercises until 2014. SRNS has recently implemented improvements in the facility-level exercise program and has an ongoing effort to improve the SCD4 database. DOE-SR has also taken action to improve the program by issuing a letter to SRNS noting the

overall decline in the emergency management program for SRNS action. Nevertheless, the exercise program has ranked some observed deficiencies at a level that does not require corrective actions and has produced some corrective actions that have not been effective in resolving recurring problems, such as PA system failures. SRNS also has not demonstrated emergency preparedness for beyond-design-basis event scenarios, as described in OE-1.

7.0 FINDINGS

As defined in DOE Order 227.1, *Independent Oversight Program*, findings are significant deficiencies or safety issues that warrant a high level of attention from management. If left uncorrected, findings could adversely affect the DOE mission, the environment, the safety or health of workers and the public, or national security. Findings may identify aspects of a program that do not meet the intent of DOE policy or Federal regulation. CAPs must be developed and implemented for EA appraisal findings. Cognizant DOE managers must use site- and program-specific issues management processes and systems developed in accordance with DOE Order 227.1 to manage these corrective action plans and track them to completion.

SRNS

Finding F-SRNS-1: Contrary to DOE Order 151.1C, the SRNS exercise program does not validate all elements of the emergency management program over a five-year period.

SRNS does not validate all elements of the emergency management program within a five-year period as required by DOE Order 151.1C. Because the SRNS exercise program requires only a sample of each response element for validation, some significant items, such as alternate command facilities, backup power systems, sheltering of workers, evacuation of workers, and most NNSA radiological assets, have not been validated in the past five years.

Finding F-SRNS-2: Contrary to DOE Order 151.1C, completed corrective actions for some internal and external evaluation findings were not effective in resolving the original finding.

SRNS has ineffectively managed significant issues and corrective actions identified through some external and internal assessments. For example, SRNS has not adequately addressed a finding from 2012 regarding the lack of a comprehensive set of criteria and lines of inquiry for use during programmatic evaluations and has not implemented planning and preparedness requirements associated with OST. Additionally, the SRNS exercise program has had recurring findings on PA system problems over a very long period but has not yet acquired a reliable system for communicating protective action information.

8.0 OPPORTUNITIES FOR IMPROVEMENT

This EA review identified 13 OFIs. These potential enhancements are not intended to be prescriptive or mandatory. Rather, they are suggestions that may assist site management in implementing best practices, or provide potential solutions to minor issues identified during the conduct of the review. In some cases, OFIs address areas where program or process improvements can be achieved through minimal effort. It is expected that the responsible line management organizations will evaluate these OFIs and accept, reject, or modify them as appropriate, in accordance with site-specific program objectives and priorities.

DOE-SR

OFI-DOE-SR-1: Consider forming a task team with representatives from DOE-SR, NNSA-SRFO, and SRNS to tailor a single SRS CRAD to ensure that all organizations use the same standard when looking at the same element. The resulting CRAD should incorporate Appendix D of DOE Guide 151.1-3, EA inspection protocols, and CRADs prepared by the Chiefs of Nuclear Safety.

OFI-DOE-SR-2: Enhance continuous improvement derived from the lessons-learned program by:

- Using the SRNS Lessons Learned Program Information System to send appropriate information to the SRS ERO
- Sharing emergency management lessons learned between SRS facilities and functional groups, including performance weaknesses with cross-cutting or common issues requiring corrective action
- Effectively participating in the DOE/NNSA corporate lessons-learned program related to emergency management issues.

NNSA-SRFO

OFI-NNSA-SRFO-1: Consider forming a task team with representatives from DOE-SR, NNSA-SRFO, and SRNS to tailor a single SRS CRAD to ensure that all organizations use the same standard when looking at the same element. The resulting CRAD should incorporate Appendix D of DOE Guide 151.1-3, EA inspection protocols, and CRADs prepared by the Chiefs of Nuclear Safety.

OFI-NNSA-SRFO-2: Enhance continuous improvement derived from the lessons-learned program by:

- Using the SRNS Lessons Learned Program Information System to send appropriate information to the SRS ERO
- Sharing emergency management lessons learned between SRS facilities and functional groups, including performance weaknesses with cross-cutting or common issues requiring corrective action
- Effectively participating in the DOE/NNSA corporate lessons-learned program related to emergency management issues.

SRNS

OFI-SRNS-1: Consider developing a comprehensive set of objectives, criteria, and lines of inquiry to use during programmatic and performance evaluations by:

- Reconciling the existing criteria in the source and compliance document with those published in DOE Guide 151.1-3
- Incorporating criteria from the DOE Order 151.1C FAQs and DOE/NNSA policy memorandum into the source and compliance document, as appropriate
- Incorporating the DOE Guide 151.1-3 assessment criteria (or equivalent) into the assessment program, and providing a rationale for omitting any criteria that were not adopted
- Improving programmatic evaluation criteria by including facility/site program capabilities derived from existing plans and procedures
- Adding objectives for scenarios with bounding consequences that test such items as alternate facilities, NNSA radiological asset deployment, sheltering and evacuation protective actions, and offsite interface response planning.

OFI-SRNS-2: Consider improving the facility-level exercise and drill standard by:

- Establishing consistent terms to define and clearly distinguish between training and exercise activities for sitewide use
- Adding a reference, for use by all site exercise planners, to the objectives and exercise evaluation criteria that are not in the SCD4 database
- Adding the definitions for exercise deficiencies and weaknesses provided in DOE Guide 151.1-3.

OFI-SRNS-3: Consider improving the site-level exercise and drill manual by:

- Adding a reference, for use by all site exercise planners, to the objectives and exercise evaluation criteria that are not in the SCD4 database
- Adding the DOE Guide 151.1-3 definitions for exercise deficiencies and weaknesses.

OFI-SRNS-4: Consider improving the corrective action program manual and the SRS emergency plan by adding the DOE Guide 151.1-3definitions for exercise deficiencies and weaknesses.

OFI-SRNS-5: Consider improving the reliability of the PA system by adopting the latest edition of National Fire Protection Association 72, *National Fire Alarm and Signaling Code*, as the basis for the PA system capabilities and maintenance and test programs.

OFI-SRNS-6: Consider improving the site's ability to recognize response implementation issues and hold responders accountable for adhering to approved plans and procedures by:

- Fully implementing a DOE-produced computer-based tool, *Exercise Builder* Version 8 (EBv8), for developing emergency exercises; this tool enables the generation of consistent and detailed exercise plan documents using Microsoft Word-based customizable templates
- Implementing *Exercise Builder* for both exercises and emergency management drills, delineating the individual component requirements for development of a drill or exercise plan
- Developing a baseline of ERO and response organization objectives, response steps, and evaluation checklists and criteria
- Ensuring that each drill or exercise objective has associated evaluator information that includes the stated objective, the applicable evaluation criteria selected from the DOE emergency management guide, and an evaluator checklist
- Tying the evaluation criteria to the evaluator's checklist, which should include the verbatim reference from the applicable SRNS plan or procedure inserted into the exercise evaluation guide (EEG)
- Updating the EEGs following each change in emergency management-related plans and procedures
- Ensuring that organizations responsible for completing the objective's action statement have concurred with the EEGs.

OFI-SRNS-7: Consider forming a task team with representatives from DOE-SR, NNSA-SRFO, and SRNS to tailor a single SRS CRAD to ensure that all organizations use the same standard when looking at the same element. The resulting CRAD should incorporate Appendix D of DOE Guide 151.1-3, EA inspection protocols, and CRADs prepared by the Chiefs of Nuclear Safety.

OFI-SRNS-8: Once performance is measured, consider improving the corrective action process by:

- Ensuring that problems are subjected to formal scrutiny to provide assurance that the cause or causes of the shortcoming have been accurately identified and that responsibility for correcting the shortcoming within an established schedule has been assigned
- Institutionalizing a formal requirement for a causal analysis for all external findings
- Instilling a system that will eliminate longstanding issues in verifying that corrective actions are effective in resolving the original finding and that measures are actually in place, rather than just closed out in a reporting system
- Ensuring that line management provides proper oversight and closure, with independent verification of the implementation of corrective actions.

OFI-SRNS-9: Enhance continuous improvement derived from the lessons-learned program by:

- Using the SRNS Lessons Learned Program Information System to send appropriate information to the SRS ERO
- Sharing emergency management lessons learned between SRS facilities and functional groups, including performance weaknesses with cross-cutting or common issues requiring corrective action
- Effectively participating in the DOE/NNSA corporate lessons-learned program related to emergency management issues.

Appendix A
Supplemental Information

Dates of Review

Onsite Review: February 24 – March 12, 2015

Office of Enterprise Assessments

Glenn S. Podonsky, Director, Office of Enterprise Assessments
William A. Eckroade, Deputy Director, Office of Enterprise Assessments
Thomas R. Staker, Director, Office of Environment, Safety and Health Assessments
William E. Miller, Director, Office of Nuclear Safety and Environmental Assessments

Quality Review Board

William A. Eckroade
Thomas R. Staker
William E. Miller
Karen L. Boardman
Michael A. Kilpatrick

Enterprise Assessments Site Lead

Phil Aiken

Enterprise Assessments Reviewers

Randy Griffin – Lead
John Bolling
Tom Rogers

Appendix B
Key Documents Reviewed and Interviews

Documents Reviewed

- EM-44 *Independent Assessment of the SRS 2014 ERO Evaluated Exercise*, July 2014
- EMPP 6Q-006, *Standards for the Development and Conduct of Facility Emergency Preparedness Drills and* Exercises, Rev. 4, 3*/4/2014*
- EMPP 6Q-007, *Standards for Site Level Emergency Services Drill and Exercise Coordination and Conduct*, Rev. 5, 5/5/2014
- F4161041.DRSC000100, *FY2011 Site ERO Emergency Preparedness Evaluated Exercise Report*, 6/23/2011
- F60611019.DRSC000102, Solid Waste Management Facility Emergency Preparedness Drill Summary, Rev. 02, 9/23/2014
- F9220040.DRSC000101, *FY2010 Site ERO Emergency Preparedness Evaluated Exercise Report*, 5/18/2010
- K-Area Evaluated Drill Report, 10/6/2014
- Manual 1B 4.23 *Corrective Action Program*
- SCD-7, *SRS Emergency Plan*
- SRIP 100, Chapter 150.3, DOE-SR *Emergency Management Program*, Rev. 6, 4/7/14
- SV-PLN-002, SRSO Annual Assessment Plan, Rev. 9, 12/14/11
- SV-PRO-008, Vital Safety System Assessments, Rev. 5, 2/22/11
- SRNS RP 2014-00507, *FY2014 Site Evaluated Exercise After Action Report*, 6/30/2014
- F9210053.DESC000100, *FY2013 Site Evaluated Exercise After Action Report*, 10/23/2013
- SRNS-RP-2012-00332, *FY2012 Site Evaluated Exercise After Action Report*, 6/26/2012
- SRR-TRN-2014-00069, DWPF Evaluated Drill Report, 12/15/2014
- SRR-TRN-2014-00050, F Tank Farm Evaluated Drill Report, 7/16/2014
- Savannah River National Laboratory Drill Report, 7/15/2013
- Savannah River Tritium Enterprise, Emergency Preparedness Drill Full Scope, 4

Interviews

- Director of DOE-SR OSSES
- DOE-SR Emergency Management Specialists
- SRNS Emergency Services, Manager
- SRNS Emergency Management Conduct of Operations Advisor
- SRNS Emergency Management, Manager
- SRNS Emergency Preparedness Program Support
- SRNS Emergency Preparedness Program Support, Lead
- SRNS Emergency Preparedness Program Support, Assessment Coordinator
- SRNS Emergency Preparedness Program Support, Drill and Exercise Coordinator
- SRNS Special Projects, Manager
- NNSA-SRFO Emergency Management Specialist