Independent Assessment of the 2025 Full-scale Emergency Management Exercise at the Savannah River Site

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U.S. DEPARTMENT of ENERGY | Office of Enterprise Assessments

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Acronyms

AEC	Area Emergency Coordinator
APC	Assessment and Planning Coordinator
CAR	Consequence Assessment Room
CAT	Consequence Assessment Team
CR	Control Room
CRAD	Criteria and Review Approach Document
DIL	Derived Intervention Limit
DMS	Dispersion Modeling Specialist
DOE	U.S. Department of Energy
DOE-SR	DOE Savannah River Operations Office
EA	Office of Enterprise Assessments
EAL	Emergency Action Level
ED	Emergency Director
EDO	Emergency Duty Officer
EEG	Exercise Evaluation Guide
ENF	Emergency Notification Form
EOC	Emergency Operations Center
EOS	Emergency Operations System
EPHA	Emergency Preparedness Hazards Assessment
ERO	Emergency Response Organization
FD	Fire Department
FEC	Facility Emergency Coordinator
GE	General Emergency
HTF	H-Area Tank Farm
IC	Incident Commander
ICP	Incident Command Post
LPDM	Lagrangian Particle Dispersion Model
NARAC	National Atmospheric Release Advisory Center
OE	Operational Emergency
OFI	Opportunity for Improvement
OST	Office of Secure Transportation
PA	Protective Action
PAC	Protective Action Criteria
PAR	Protective Action Recommendation
RAP	Radiological Assistance Program
SAE	Site Area Emergency
SOM	Shift Operations Manager
SRFO	Savannah River Field Office
SRMC	Savannah River Mission Completion, LLC
SRNS	Savannah River Nuclear Solutions, LLC
SRS	Savannah River Site
SRSOC	Savannah River Site Operations Center
SRTE	Savannah River Tritium Enterprise
TEL	Threshold to Early Lethality
TIA	Timely Initial Assessment
WebEOC®	Web-based Emergency Operations Center Software
WINDS	Weather Information and Display System

INDEPENDENT ASSESSMENT OF THE 2025 FULL-SCALE EMERGENCY MANAGEMENT EXERCISE AT THE SAVANNAH RIVER SITE

Executive Summary

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted an independent assessment of emergency management of the 2025 full-scale exercise at the Savannah River Site from June to August 2025. The assessment evaluated the effectiveness of the management and operating contractors, Savannah River Nuclear Solutions, LLC (SRNS) and Savannah River Mission Completion, LLC (SRMC), and Federal offices, DOE Savannah River Operations Office (DOE-SR) and Savannah River Field Office (SRFO), in managing and maintaining emergency response organization performance.

EA identified the following strengths:

- SRNS demonstrated emergency operations system capabilities for centralized information collection, effective site- and facility-level management, and appropriate use of the Web-based Emergency Operations Center Software (WebEOC®).
- SRNS and SRMC issued prompt initial notifications to onsite personnel and appropriately implemented predetermined protective actions for workers and first responders.
- The SRNS consequence assessment team is well staffed with subject matter experts and well equipped with tools to conduct assigned functions.
- The exercise was well designed, safely conducted, adequately controlled, and challenging.

EA also identified several weaknesses, including five findings, as summarized below:

- SRNS did not adequately maintain a common operating picture or consistently disseminate an accurate situational awareness among response components during the exercise. (Finding)
- SRMC did not categorize the Operational Emergency (OE) as promptly as possible, or within DOE's established 15-minute requirement in the Comprehensive Emergency Management System. (Finding)
- SRNS declared a General Emergency (GE) without the exercise scenario meeting the required criteria, and downgraded the GE prematurely, before the event's termination. (Finding)
- SRNS did not provide prompt, accurate, and effective initial and follow-up notifications to all external stakeholders; did not notify the SRFO Manager to request support from the Radiological Assistance Program through the DOE Watch Office; and did not notify local, state, and Federal authorities of a classified OE within 15 minutes of categorization. (Finding)
- SRNS did not reevaluate protective actions based on evolving hazards, particularly regarding the evacuation of personnel within the area where the most severe consequences of an incident could occur. (Finding)

In summary, the SRNS, SRMC, DOE-SR, and SRFO emergency management programs can respond to hazards at the Savannah River Site. However, while the exercise demonstrated some effective capabilities and a well-structured approach to emergency management, significant weaknesses related to situational awareness, classification adherence, timely and accurate notifications, and the reevaluation of protective actions diminished the overall effectiveness of the emergency response. Until the concerns identified in this report are addressed or effective mitigations are put in place, responses to real-world emergencies could be impaired.

INDEPENDENT ASSESSMENT OF THE 2025 FULL-SCALE EMERGENCY MANAGEMENT EXERCISE AT THE SAVANNAH RIVER SITE

1.0 INTRODUCTION

The U.S. Department of Energy (DOE) Office of Emergency Management Assessments, within the independent Office of Enterprise Assessments (EA), assessed the 2025 full-scale emergency management exercise at the Savannah River Site (SRS). This assessment was conducted as part of an ongoing series of assessments of emergency management exercises and programs at DOE sites. Assessment activities were conducted from June to August 2025.

This assessment evaluated the effectiveness of the management and operating contractors, Savannah River Nuclear Solutions, LLC (SRNS) and Savannah River Mission Completion, LLC (SRMC), and Federal offices, DOE Savannah River Operations Office (DOE-SR) and Savannah River Field Office (SRFO), in managing and maintaining emergency response organization (ERO) performance via the July 8, 2025, full-scale emergency management exercise. This assessment evaluated the performance of the ERO at key venues, including the SRS operations center (SRSOC), the emergency operations center (EOC), and the incident command post (ICP), with a focus on decision-making ERO positions, such as the emergency director (ED) and incident commander (IC). Issues identified during the exercise evaluation were further examined to determine possible causes, such as a lack of training or insufficient procedural guidance. This assessment was conducted in accordance with the *Plan for the Independent Assessment of the July 2025 Full-scale Emergency Management Exercise at the Savannah River Site, June – August 2025*.

2.0 METHODOLOGY

The DOE independent oversight program is described in and governed by DOE Order 227.1A, *Independent Oversight Program*, which EA implements through a comprehensive set of internal protocols, operating practices, assessment guides, and process guides. This report uses the terms "best practices, deficiencies, findings, and opportunities for improvement (OFIs)" as defined in the order.

As identified in the assessment plan, this assessment considered requirements documented in DOE Order 151.1D, *Comprehensive Emergency Management System*. EA used the following sections of EA CRAD 33-09, Revision 0, *DOE O 151.1D Emergency Management Program*: section 4.3, *Emergency Response Organization*; section 4.4, *Emergency Operations System*; section 4.7, *Emergency Classification*; section 4.8, *Protective Actions*; section 4.9, *Consequence Assessment*; section 4.11, *Notifications and Communications*; and section 4.15, *Exercises*.

EA examined key documents, such as the exercise package, exercise evaluation guides (EEGs), emergency plans, checklists, procedures, manuals, analyses, and policies. EA also interviewed key personnel responsible for developing and executing the emergency management program; observed the controller/evaluator pre-exercise brief, the exercise, and the post-exercise hotwashes and debrief activities; and walked down significant portions of selected SRNS/SRMC facilities, focusing on emergency response. The members of the assessment team, the Quality Review Board, and the management responsible for this assessment are listed in appendix A.

EA conducted a previous assessment of emergency management at SRS in 2022, as documented in the EA report *Independent Assessment of Emergency Preparedness Capabilities at the Savannah River Site,*

May 2022. This current assessment examined the completion and effectiveness of corrective actions for the EA findings identified in the previous assessment. Results of the corrective action review are included in section 3.7 of this report.

3.0 RESULTS

SRNS and SRMC designed and conducted a full-scale exercise to evaluate the emergency response and capabilities of key onsite ERO teams. The exercise incorporated appropriate plans, policies, and procedures, and ERO members participating in the management, direction, command, and control functions. SRNS and SRMC conducted the exercise in a realistic, real-time environment in response facilities that necessitated actions by facility workers, the site-level ERO, and some offsite responders. The postulated incident involved consequences from an earthquake that resulted in an Operational Emergency (OE) requiring several classification levels. The SRNS fire department (FD) responded to the incident and assumed IC duties. When the H-area control rooms (CRs) and emergency duty officer (EDO) categorized and classified the initial hazardous material incident, the H-Area CR shift operations managers (SOMs) transitioned to either area or facility emergency coordinators (AECs or FECs). The EOC, technical support rooms, and operations support centers were activated. The exercise involved unplanned releases of radiological material at the H-Area Tank Farm (HTF) and Savannah River Tritium Enterprise (SRTE), which resulted in an Alert and Site Area Emergency (SAE), respectively. SRNS also upgraded the incident classification to a General Emergency (GE) in response to limited onsite resource availability. In addition, the postulated earthquake resulted in three injured workers and one deceased worker (simulated). The exercise included transport of one role-player patient to a local hospital and a coroner response to the deceased worker.

3.1 Emergency Operations System

This portion of the assessment determined whether the SRNS emergency operations system (EOS) provides centralized collection, validation, analysis, and coordination of information related to an SRS incident response, and whether that information is used to obtain and maintain situational awareness and disseminate a common operating picture among response components to achieve a well-coordinated, well-understood, and effective response.

SRNS had adequate EOS capabilities to collect incident information and to provide needed expertise for incident analysis from a centralized EOC and adequately equipped facilities. The EOS was consistent with the operational concepts of the National Incident Management System. In addition, the SRS emergency plan and implementing documents adequately established the EOS to support an ERO structure that consists of a tiered approach for responding to OEs. For example:

- Clear authority was given to the SRNS IC to manage the incident scene.
- The SRTE FEC and the H-Canyon AEC appropriately managed facility responses, including incident categorization and classification and protective action (PA) decision-making, before the EOC was operational.
- SRNS provided adequate management of site-level facilities, organizations, and capabilities, including the SRSOC, EOC, and the joint information center.
- SRNS appropriately used the Web-based Emergency Operations Center software (WebEOC®), a commercially available information management software tool, to enable centralized collection, validation, analysis, and coordination of information among the EOC, technical support rooms, the consequence assessment room (CAR), and the joint information center.

While SRNS demonstrated effective command and control within individual response venues, obtaining and maintaining situational awareness and disseminating a common operating picture among all response components and external partners was not always demonstrated effectively. As a result, contrary to DOE Order 151.1D, attachment 3, paragraph 4, SRNS did not adequately maintain situational awareness or disseminate a common operating picture among response components during the exercise. (See **Finding F-SRNS-1**.) Consequently, performance issues diminished the effectiveness of the overall emergency response, particularly related to PAs, classification decision-making, consequence assessment, and offsite notifications. Observed EOS performance issues that diminished the effectiveness of the overall emergency response are summarized according to importance in the following paragraphs.

Most importantly, inadequate situational awareness resulted in an inaccurate briefing of the SRTE timely initial assessment (TIA) results by the Assessment and Planning Coordinator (APC) to the EOC command room, which negatively impacted PA decision-making. After the TIA models were developed, there was no discussion in the CR about the reported protective action criteria (PAC) or threshold to early lethality (TEL) distances. The SRTE EAL bounding event-calculated dose distance to PAC and TEL was much shorter than the reported dose distances provided to the command room by the APC. The EOC had the understanding for 43 minutes that the projected dose at the site boundary was 1.22 rem, indicating extremely high doses for personnel located in areas around the tritium incident scene as well as the need for immediate issuance of offsite protective action recommendations (PARs) to protect the public. The APC reported that the projected site boundary dose was 1.22 rem; however, this determination far exceeded the SRTE emergency action level (EAL) bounding event PAC distance. The EAL bounding event distance to PAC was only 1.8 miles and TEL was 0.15 miles. If the PAC extended to the site boundary 9.2 miles away, it would have indicated that a 100-rem TEL would extend approximately 0.75 miles, requiring immediate assessment and revision of protective measures for onsite workers and the public. The AEC and FECs were not made aware of the briefing information. While the APC recommended that the EOC command room alert multiple points of contact on the need for PAs, it was determined the TIA information was not shared to provide situational awareness to stakeholders and there was an error in communicating TIA results. This weakness is further discussed in sections 3.4 and 3.5.

In addition, classification decision-making was not based on an accurate common operating picture with all stakeholders in accordance with DOE Order 151.1D requirements. The GE declaration requires the need for offsite protective measures, which were not provided by the site to offsite authorities. In accordance with the order, a GE must be declared when incidents are predicted, in progress, or have occurred that result in an actual or credible threat of substantial degradation in the level of control over hazardous materials and is projected to exceed the applicable PAC at or beyond the site boundary. This weakness is further discussed in section 3.2.

The ICP, SRSOC, and the HTF, SRTE, and H-Canyon CRs did not have access to WebEOC or to any of the products produced by the EOC, such as situation reports, plume plots, emergency notification forms (ENFs), EOC messages, or field monitoring team data, resulting in a lack of situational awareness by ERO members in the CRs. Consequently, the ICP, SRSOC, and CRs did not have a complete understanding of the potential radiological plume path or information regarding the possible impacts of the tritium release. In addition, offsite command centers do not have access to WebEOC for maintaining situational awareness. This weakness is further discussed in section 3.3.

Situational awareness weaknesses also resulted in incomplete and inaccurate information in notifications sent to offsite authorities. Some initial and follow-up notifications to offsite agencies were inaccurate, including required information such as providing an accurate description of the incident and current incident conditions. Furthermore, EOC personnel recognized that the offsite notification of the GE declaration did not occur; however, their attempt to correct the situation was not successful. Lastly, Manual-6Q15.1, Procedure 120, *SRS Notifications*, requires notification updates approximately every

hour; however, the EOC command team was unaware that formal offsite notifications were not issued for over three hours following the transfer of command and control. This weakness is further discussed in section 3.3.

Emergency Operations System Conclusions

Overall, the SRNS EOS is structured consistently with the operational concepts of the National Incident Management System, and SRNS had adequate capabilities to collect incident information from centralized and adequately equipped facilities. However, SRNS did not demonstrate an effective EOS that obtained and maintained situational awareness and disseminated a common operating picture among response components and external partners. Observed EOS performance issues diminished the effectiveness of the overall emergency response, particularly related to PA and classification decision-making, consequence assessment, and offsite notifications.

3.2 Emergency Categorization and Classification

This portion of the assessment determined whether SRNS and SRMC responders correctly categorized and classified OEs as promptly as possible, but no later than 15 minutes after identification by the predetermined decision-maker.

SRNS has adequately established plans, procedures, and supporting systems for categorizing and classifying OEs and demonstrated its incident categorization and classification process. During the exercise, SRNS emergency responders used facility-specific and general site EALs to categorize and classify the following three emergencies resulting from consequences of the simulated earthquake that occurred at 0842 hours:

- At 0918 hours, the HTF FEC declared an Alert due to a radiological particulate release resulting from an impact involving a trailer transporting waste containers.
- At 0938 hours, the SRTE FEC declared an SAE due to a radiological release resulting from a ceiling collapse onto tritium reservoirs.
- At 1005 hours, the EDO declared a GE due to the FD being out of response resources and offsite mutual aid being unavailable.

The categorization and classification of all three emergency incidents was done by the predetermined decision-maker using the appropriate facility-specific or general site EALs. However, contrary to DOE Order 151.1D requirements, SRNS did not adequately implement all OE categorization and classification requirements. (See **Finding F-SRNS-2**.) Specifically:

- The EDO declared a GE using an SRS general site EAL because the FD was out of response resources and offsite mutual aid was not available. Contrary to DOE Order 151.1D, attachment 4, paragraph 8.b.(3)(a), SRNS declared a GE in the absence of an incident predicted, in progress, or having occurred that resulted in an actual or credible threat of substantial degradation in the level of control over hazardous materials that was expected to exceed the applicable PAC at or beyond the site boundary. Consequently, offsite authorities would be alerted to the need for time-urgent response actions when receiving the GE declaration notification, but no offsite PARs were issued during the exercise. The GE declaration was not based on measured or estimated health effect parameters at the site boundary, as required by DOE Order 151.1D and the general site EAL did not require any additional onsite PAs or offsite PARs.
- SRNS downgraded the GE contrary to DOE Order 151.1D requirements. At 1315 hours, the ED declared that the GE was terminated and that the SAE for SRTE and Alert for HTF remained in

effect. Contrary to DOE Order 151.1D, attachment 3, paragraph 8.c, SRNS downgraded the GE prior to termination of the event. As a result, the downgrade to a lower significance category would have indicated to offsite agencies that the emergency response was over and emergency conditions no longer existed. DOE Order 151.1D states that emergencies, once categorized, must not be downgraded to a lower significance category unless the original categorization was incorrect.

Additionally, SRMC did not categorize and classify the Alert in a timely manner. The SRMC HTF SOM was notified of an injury resulting from a utility pole falling and striking waste containers being transported. The SOM did not have an adequate means to determine the amount of radioactive material on the trailer, which required retrieval of the manifest by an HTF staff member. Following retrieval of the manifest, the HTF SOM declared an Alert 31 minutes after the injury report. Contrary to DOE Order 151.1D, attachment 3, paragraph 8.b, SRMC did not categorize the OE as promptly as possible, but no later than 15 minutes after identification by the predetermined decision-maker for the categorization. (See **Finding F-SRMC-1** and **OFI-SRMC-1**.) Consequently, the activation of the SRS ERO was delayed.

Emergency Categorization and Classification Conclusions

Overall, the SRNS and SRMC responders categorized and classified three OEs using facility-specific and general site EALs after the responsible decision-maker was informed of the incidents. However, SRNS and SRMC did not fully demonstrate an effective categorization and classification process. Contrary to DOE Order 151.1D requirements, categorization and classification of the Alert was not prompt, the GE declaration was not based on measured or estimated health effect parameters at the site boundary, and downgrade of the GE occurred prior to termination of the event.

3.3 Notifications and Communications

This portion of the assessment determined whether SRNS provided initial and follow-up notifications promptly, accurately, and effectively, and whether the ERO maintained effective communications throughout the response.

3.3.1 Notifications

SRNS and SRMC promptly notified field responders, workers, and the ERO, as required. After the earthquake, the SRSOC immediately notified workers to remain indoors, the appropriate PA per SRNS procedure. Following HTF SOM classification of the initial radiological release in coordination with the EDO and after the two classification upgrades, SRSOC staff implemented the same notification process to reemphasize the existing PAs. In response to a 911 call about an HTF employee injured by a fallen utility pole caused by the earthquake, the FD dispatcher, located in the SRSOC, immediately notified the FD to respond. Finally, the SRSOC quickly notified the ERO via the Rapid Reach paging system to respond to the Alert declaration.

Nevertheless, SRNS did not effectively provide accurate and complete initial and follow-up notifications to offsite agencies, including DOE Headquarters. SRNS promptly issued the initial ENF via fax to all stakeholders (offsite agencies, the DOE Watch Office, and the EOC), followed by a phone call from the emergency communication specialist to review the ENF with the offsite agencies, with exception of the DOE Watch Office. However, out of the remaining seven attempted ENFs, only two ENFs were successfully transmitted by SRNS to the intended stakeholders. Importantly, SRNS did not notify stakeholders that a GE had been declared or had been terminated. Further, although SRNS called the DOE Watch Office to confirm receipt of the ENF, SRNS did not review all known information at the time of the call, as required. In addition, although SRNS had established an internal requirement to provide

hourly updates via ENFs, updates did not occur for over three hours after the second ENF was transmitted. Finally, the transmitted ENFs did not include some of the required information, such as the onsite PAs implemented. As a result, contrary to DOE Order 151.1D, attachment 3, paragraph 11, SRNS did not provide prompt, accurate, and effective initial and follow-up notifications to all appropriate stakeholders. (See **Finding F-SRNS-3**.) Consequently, offsite agencies, DOE Headquarters, and the ERO were not kept fully informed through the formal notification process of changing site conditions, including that a GE had been declared with potential offsite impacts and PARs.

Importantly, the SRSOC ENF transmission process is burdened by a cumbersome fax/fax server system that delayed notifications. For instance, the intended offsite stakeholders received the second ENF after the SAE incident classification upgrade, well beyond the 15-minute requirement. The SRSOC staff spent approximately 10 minutes developing and approving the ENF. An additional 16-minute delay was caused by a fax server overload. Contrary to DOE Order 151.1D, attachment 4, paragraph 12, SRNS did not notify the local, state, and Federal authorities of classified OE within 15 minutes of categorization. (See **Finding F-SRNS-3** and **OFI-SRNS-1**.) Consequently, SRNS did not keep offsite stakeholders informed through the formal notification process of key SRS response activities and potential offsite impacts.

In addition, SRNS did not promptly notify the SRFO Manager to request the activation of the Region 3 Radiological Assistance Program (RAP) to assist in monitoring a radiologically contaminated patient transported to an offsite hospital. The EDO activated the RAP asset directly to support the offsite patient monitoring instead of following the formal protocol established under a DOE order for an offsite incident involving the actual or potential release of radioactive materials from the site. Contrary to DOE Order 151.1D, paragraph 11.a.(2), SRNS did not promptly notify the SRFO Manager to request support from the DOE radiological asset organization. (See **Finding F-SRNS-3**.) Consequently, offsite agencies, including the State of South Carolina and DOE Headquarters, were not informed that RAP assets were operational within the state.

3.3.2 Communications

Most communications systems, such as radio, WebEOC, and telephones, including ringdown systems, functioned as intended. However, some system configurations were not optimal and, in one case, the ERO was not proficient in equipment use. As discussed in section 3.1, the ICP, SRSOC, CRs, and offsite command centers do not have access to WebEOC presence for important information, such as significant events and plume models, which contributed to lack of situational awareness and a common operating picture. Also, the ERO lacked proficiency in operating a classified phone system, Viper encryption system, needed to obtain the classified source term from SRTE operations personnel. Contrary to DOE Order 151.1.D, attachment 3, paragraph 11.b.(1), SRNS did not provide for continuing effective communications among response organizations throughout an emergency. (See **Deficiency D-SRNS-1**.) Consequently, a classified tritium refined source term could not be provided to the CAR for over 40 minutes.

Notifications and Communications Conclusions

Overall, SRNS and SRMC promptly notified workers of PAs and directed the ERO to respond to the EOC. Nevertheless, SRNS did not effectively notify offsite agencies, including DOE Headquarters, by providing accurate and complete initial and follow-up notifications. Importantly, SRNS did not provide appropriate offsite notifications that a GE had been declared or had been terminated. Of equal importance, the SRSOC ENF transmission process is burdened by a cumbersome fax/fax server system that significantly delayed some notifications beyond DOE order requirements. In addition, SRNS did not follow the formal process for activating the RAP for radiological monitoring assistance as required.

Finally, the ERO lacked proficiency in operating a classified phone system that significantly delayed providing the CAR a refined source term.

3.4 Protective Actions

This portion of the assessment evaluated whether SRNS and SRMC correctly identified and implemented PAs and PARs to minimize the consequences of an emergency and to protect the health and safety of workers and the public.

During the exercise, SRNS and SRMC appropriately issued predetermined PAs to protect workers and first responders. SRNS adequately identifies onsite PAs in SCD-7, *SRS Emergency Plan*, and associated procedures. The SRS emergency plan defines three primary personnel PAs that could be implemented on site: remain indoors, shelter, and evacuation. For an earthquake and a hazardous material release, the SRS emergency plan defines the preferred initial PA as directing personnel to remain indoors, which includes limiting outside air intake if possible. Although the SRSOC EDO did not declare an OE for the earthquake, the SRSOC and H-Area SOM appropriately directed workers to remain indoors in accordance with applicable procedures. When the Alert was declared, the H-Area AEC provided appropriate site announcements directing the predetermined PA for the Alert and later, the SAE. For both the Alert and SAE, the EAL predetermined PA was to direct personnel to remain indoors, which was already implemented, resulting in additional announcements directing personnel to remain indoors due to hazardous material releases. Prior to the EOC becoming operational, the EDO used SRNS procedure 114, *Emergency Response Facility Emergency Categorization and Classification*, for the declaration of a GE as discussed in sections 3.1 and 3.2. The procedure did not include any onsite PAs or offsite PARs for the GE. As exercise incidents occurred, the H-Area AEC appropriately issued population control measure announcements to avoid the area around the incident scenes.

Additional actions were taken at the exercise venues to ensure responder safety in response to the radiological releases. Upon notification of the Alert and SAE declarations, the FD referenced a manual entitled *SRSFD Guidance for Distances Incident Command Post*, which provided the maximum distance to PAC for the Alert and SAE, as well as the distance to TEL, using data maintained in an Excel spreadsheet entitled *FD ICP guidance*. Based on the defined maximum distance to PAC for the SAE, the FD appropriately established the ICP at an upwind location outside the predetermined PAC maximum distance. Other actions performed included the FD implementing and using decontamination corridors, the site being cleared of remote workers and visitors, routine radiological habitability surveys being performed at all emergency response venues, and SRNS security implementing barricades and closing public access roads to limit incident area entry.

While predetermined PAs were issued per the applicable EAL, SRNS did not reevaluate PAs based on conditions during the exercise. Importantly, no revaluation of the PAs by the ERO decision-makers occurred for impacted workers inside the maximum distances to PAC and TEL after the plume had passed and prior to field monitoring data being received. As a result, contrary to DOE Order 151.1D, attachment 3, paragraph 9, SRNS did not identify PAs commensurate for the potential hazards of the site as the exercise progressed. (See **Finding F-SRNS-4** and **OFI-SRNS-2**.) Consequently, SRNS did not perform a timely assessment of the hazards in affected areas as necessary to identify, modify, and issue appropriate PAs to minimize the impacts of hazardous material releases and maximize the protection of health and safety for workers and the public. Observed PA performance issues are summarized in the following paragraphs.

ERO decision-makers did not consider the evacuation of impacted personnel from areas where the potential existed for doses exceeding PAC and TEL as calculated in facility emergency preparedness hazards assessments (EPHAs) and provided in the EALs. The potential radiological dose consequences

in the facility EPHAs for both the Alert and SAE incidents indicate the need to consider evacuation of affected personnel at the facilities, and possibly other nearby areas, to a safer location once the plume has passed to avoid a significant intake based on infiltration of contaminants inside buildings, even when ventilation has been secured and outside air intake restricted. Infiltration rates had the potential to be especially high because of possible damage to buildings caused by the earthquake. Although the IC used the PAC maximum distance to establish the ICP at a safe location for responders, the IC did not discuss with the AEC/FECs whether affected employees within the distance to TEL at the scenes he controlled had either been, or needed to be, evacuated to a safe, upwind location. Other ERO decision-makers, particularly in the EOC, also did not discuss or provide any direction on when workers should be required to evacuate the area inside the PAC/TEL maximum distances due to the potential for acute radiological consequences from tritium.

Similarly, the inadequate consideration by the emergency decision-makers of the potential radiological consequences for the affected personnel was also observed as follows:

- As discussed in section 3.1, the APC reported to the command room at 1102 hours that the projected site boundary dose was 1.22 rem. After the TIA models were developed, there was no discussion in the CR about the reported PAC or TEL distances. The SRTE EAL bounding event-calculated dose distance to PAC and TEL was much shorter than the reported dose distances provided to the command room by the APC. The EOC had the understanding for 43 minutes that the projected dose at the site boundary was 1.22 rem, indicating extremely high doses for personnel located in areas around the tritium incident scene as well as the need for immediate issuance of offsite PARs to protect the public. Although the ED considered the inaccurate information reported by the APC to be correct, the ED did not act upon the significance of the reported consequences, and there was no reevaluation or discussion on the adequacy of the issued onsite PAs, offsite PARs, or the need for ingestion pathway advisories. After receiving the inaccurate dose information, the technical support room staff also did not reevaluate or discuss adjusting PAs for the SRTE workers due to the extended distances to PAC and TEL that were beyond the EAL predetermined PAs.
- Upon notification of the incident involving the release of radiological material at the tank farm, the HTF SOM directed a worker to retrieve the container shipping manifest from the affected transporter to obtain information considered necessary to determine the appropriate incident categorization and classification. As a result, the worker could have unknowingly entered inside the maximum distance to PAC without appropriate personal protective equipment.

In addition to the performance issues discussed above, the following programmatic weaknesses pertaining to PAs were identified:

- The SRS emergency plan is unclear about whether the remain indoors PA is appropriate as a dose reduction method in response to a radiological release. The remain indoors PA includes actions to restrict outside air intake versus the shelter PA, which directs personnel to a concrete or permanent structure and is used primarily as a PA for severe weather events. While the SRS emergency plan describes the shelter PA as being appropriate as a dose reduction method for situations such as radiological releases of short duration, and states that onsite exposure control is provided to non-essential workers through sheltering or relocation, the shelter PA was not considered by decision-makers during the exercise. Emergency management personnel stated during follow-up interviews that the remain indoors PA is considered more conservative than the shelter PA and more appropriate for protecting personnel during radiological releases. (See **OFI-SRNS-3**.)
- While the manual *SRSFD Guidance for Distances Incident Command Post*, which is used by all FD shifts, provided the correct maximum distance to PAC, it does not have a formal document control number and is not managed as a controlled document to ensure that information is correct and updated as EALs are revised. (See **OFI-SRNS-4**.)

Protective Actions Conclusions

SRNS and SRMC appropriately issued predetermined PAs to protect workers and first responders during the exercise. The SRSOC and H-Area AEC promptly implemented predetermined onsite PAs directed by the EAL as required. Security personnel appropriately limited access to the affected incident scenes and remote workers/visitors were directed to go off site after the declaration of an emergency. Decontamination corridors were established, and routine radiological habitability surveys were performed at emergency response facilities as required by procedures. However, as the exercise progressed, ERO decision-makers did not reevaluate hazards in impacted areas to identify, modify, or issue appropriate PAs commensurate for the potential hazards, such as evacuating personnel located inside the maximum distances to PAC/TEL after the plume had passed, to avoid potentially significant radiological uptakes.

3.5 Consequence Assessment

This portion of the assessment determined whether SRNS consequence assessment activities provided conservative TIAs, accurate projections using incident conditions, and supportive assessments throughout the emergency.

The SRNS consequence assessment team (CAT) is composed of an appropriately diverse group of subject matter experts and has tools for responding to the large variety of SRS-analyzed incidents. The CAR is well equipped with procedures, checklists, message forms, dispersion modeling programs, access to meteorological data, and communication systems to execute assigned functions. CAT modeling tools include the Weather Information and Display System (WINDS) program, for projecting PA distances based on DOE criteria; the Lagrangian Particle Dispersion Model (LPDM) to calculate whether U.S. Food and Drug Administration-derived intervention limits (DILs) could be exceeded; and the National Atmospheric Release Advisory Center (NARAC) dispersion modeling program as a backup to WINDS. The WINDS program enables timely assessments via dropdown menus that provide preloaded worst-case source term based on EAL selection and uses real-time meteorological data from the site meteorological towers. CAT position checklists instruct that a TIA, known as a "default" run at SRS, be completed within 20 minutes of a dispersion modeling specialist's (DMS's) arrival at the CAR and the use of the LPDM be completed within 45 minutes of knowing the isotopic breakdown of released material. Additionally, CAT checklists instruct the use of NARAC when a Federal asset is deployed.

The DMSs calculated an accurate TIA using excellent self-checking and independent verification of user model data inputs, although its completion was not timely. TIA results were primarily delayed because of the almost one-hour wait (after EAL selection) to receive the ENFs, which were wanted by the DMSs to start dispersion modeling. Upon receiving the ENFs (which did not provide any additional information than what was in the EAL for use in dispersion modeling), the DMSs quickly developed TIAs for both worst-case source terms, consistent with instructions associated with the EALs selected. A DMS ultimately briefed the APC in the command room of the approved TIA results almost 2 hours after EAL selection, in contrast to DOE Guide 151.1-1B, *Comprehensive Emergency Management System Guide*, which recommends within 30 minutes to 1 hour of EAL selection. The DMSs then made consequence assessment results available to others by placing information on a shared drive and a consequence assessment website. The delay in the TIA did not fulfill the purpose of having results quickly available to ensure that predetermined PAs bound the release under actual weather conditions during early decision-making. Contrary to DOE Order 151.1D, attachment 4, paragraph 10.e, the SRNS TIA did not provide a rapid confirmation of initial classification and PA decisions. (See **Deficiency D-SRNS-2**.) Without this rapid confirmation, the protection of workers and the public under actual weather conditions cannot be confirmed when airborne concentrations are highest to support early decision-making.

The DMSs used WINDS to perform accurate continuous ongoing assessments as new information arrived in the CAR. The DMSs performed refined source term projections upon receipt of incident specific information provided by the technical support rooms via engineering advisor forms. The information provided actual postulated incident source terms and release times and durations for a refined calculation. The CAT also monitored the weather forecast and field activities, such as field monitoring team results and security activities.

While the TIA conservatively used worst-case source terms, the use of unusually high deposition velocities diminished conservative margins. The DMSs used deposition velocities in accordance with instructions that were inconsistent with available user guidance. The EPHAs, which serve as the basis of the EALs, use a deposition velocity of 1 centimeter per second (cm/sec) for Pu-238-equivalent particles and tritium gas as input data for the HotSpot dispersion-modeling program. These instructions are carried forward to consequence assessment modelers using WINDS. In contrast, the HotSpot users guide uses a deposition velocity of 0.3 cm/sec for particulates (to be consistent with Nuclear Regulatory Commission guidance) and 0 cm/sec for tritium because it is a gas. Furthermore, the DOE Office of Health, Safety and Security Safety Bulletin 2011-02, *Accident Analysis Parameter Update*, recommends the use of 0.1 cm/sec for particulates, while not addressing gases. The deposition velocity reflects the hazardous material fallout from the breathable atmosphere, so a higher rate of fallout is a less conservative dose assessment for respiratory and dermal exposures. (See **OFI-SRNS-5**.)

Furthermore, some activities specified in CAT position checklists were not performed and no ERO members made requests regarding their omissions, including the following:

- The calculation of DIL projections using the LPDM: The LPDM is the stated means of assessing consequences from ingestion pathways using U.S. Food and Drug Administration DILs as criteria per the SRS emergency plan. The assessment specialist and DMS position checklists recommend completing LPDM modeling within 45 minutes of availability of the isotopic breakdown of a release. The CAR receives this information via an engineering advisor form from the respective technical support room. While tritium is a radioactive isotope of hydrogen, Pu-238-equivalent is more complicated because it is made up of multiple transuranic and fission products per SRS Manual 6Q-001, *Standards for Development and Maintenance of an EPHA*. The DMSs waited for the technical support rooms to provide this needed data and once received, they saw that the isotopic breakdowns were marked as "N/A" on the forms. Nobody in the CAR pursued the needed information, and the ingestion pathway analysis was not performed. Contrary to SCD-7, paragraph 6.1.1, and the assessment specialist and DMS position checklists, SRNS did not determine whether the releases could exceed DILs. (See **Deficiency D-SRNS-3**.) The omission of DIL projections results in a lack of information to support the states regarding ingestion pathway decision-making.
- The calculations of dose projections using NARAC: The DMS position checklist instructs the use of NARAC when a Federal asset, such as RAP, is deployed. During the DMS briefing of the TIAs to the APC in the command room, the APC misunderstood the briefing information, provided orally and in written form, of 1.22 E+1 millirem to be 1.22 rem at the site boundary. The misunderstood projection is well beyond the EAL predetermined PA distance, which should have bound the consequences. The APC did not direct the DMS to use NARAC data to perform a corroborating calculation and was unaware of the incorrect TIA result for 40 minutes. Furthermore, the DMS briefing form does not solicit distance to TEL information from the TIA calculations. The calculations for distance to TEL are important to protect first responders and workers. (See **OFI-SRNS-6**.)
- The assessment specialist could not contact the South Carolina and Georgia state representatives by phone, as required by the checklist, with the provided phone numbers.
- No CAR response was made to the GE declaration, primarily because the GE was not based on a hazardous material release. Checklist actions for a GE were marked as "N/A."

- A classified tritium refined source term could not be provided to the CAR, because the SRTE CR was unable to complete a call to provide the source term information using the Viper encryption system.

Consequence Assessment Conclusions

Overall, the CAR is well staffed with subject matter experts and well equipped with tools to conduct assigned functions. DMSs conducted accurate dispersion modeling using WINDS in accordance with instructions. However, the TIA results were significantly delayed as modelers awaited ENFs to start dispersion modeling, and the calculations used unusually high deposition velocities for Pu-238-equivalent particulate and tritium gas, making results less conservative. Additionally, some expected consequence assessment functions were not performed, namely LPDM ingestions pathway calculations, NARAC projections, and classified source term projections. Finally, the CAR was unable to contact the Georgia and South Carolina representatives and there was no response to the GE declaration.

3.6 Exercise Design and Conduct

This portion of the assessment evaluated the ability of the SRNS/SRMC exercise programs to validate emergency response capabilities and test and validate emergency plans and procedures for hazards identified in EPHAs.

SRNS Manual 6Q, Procedure 006, *Standards for the Development and Conduct of Drills and Exercises*, adequately governs the design, conduct, and evaluation of emergency management exercises at SRS. Per its five-year exercise plan, SRNS/SRMC developed a scenario package to meet its severe-event exercise requirement. Two credible EPHA hazardous material scenarios were selected that appropriately challenged decision-makers. The exercise also validated multiple functions of key onsite capabilities and provided adequate opportunity to demonstrate the adequacy of important aspects of the emergency management program. The exercise was designed to validate corrective actions for more than 100 issues identified in previous assessments and exercises.

The scenario was challenging, with multiple releases and multiple injuries occurring simultaneously at different facilities, and there was no availability of mutual aid to support responders due to the postulated earthquake's regional impacts. Actual meteorological conditions were used. Eight Federal, state, and local agencies participated in the exercise and the coroner responded to a simulated fatality, testing site protocols for handling and processing a deceased, contaminated employee. Simulated hazardous material releases were timed to require multiple classification upgrades. In addition, the scenario included appropriate exercise injects, radiological data, medical data, and public information messages. To promote realism, props were used at incident scenes, including photoshopped poster boards used to simulate collapsed structures and photos of actuated alarm panels. Adequate exercise safety and communication plans were also developed.

In addition to being well designed, the exercise was safely conducted and adequately controlled. In accordance with procedures, SRNS held player hotwashes at all venues immediately following the exercise and a controller/evaluator debrief the next day. The objectives and evaluation criteria chosen for evaluation aligned with the Office of Emergency Operations Policy (NA-41) CRAD, and evaluators fully completed EEGs at all venues. However, based on completed EEGs, evaluators did not identify some significant performance issues. For example:

- Evaluators failed to identify that PARs were not considered during the 40 minutes that the command room staff believed doses at the site boundary exceeded 1 rem.
- EEGs inaccurately indicated that notifications were made promptly, accurately, and effectively.

- EEGs inaccurately indicated that modelers completed the required TIA within 20 minutes.
- Evaluators did not identify that DIL models were not produced within 45 minutes as required.
- Even though NARAC was not used, credit was given for demonstration of NARAC capabilities.

Consequently, contrary to DOE Order 151.1D, attachment 3, paragraph 14, the SRNS evaluation of the exercise was not sufficient to ensure that all significant performance issues were identified. (See **Deficiency D-SRNS-4**.) Accurate and thorough exercise evaluations are necessary to identify weaknesses and make improvements to ensure that the ERO can mitigate emergencies effectively and that workers and the public are protected.

Finally, although the minimum DOE Order 151.1D requirements for a severe event exercise were met, the scenario did not disrupt site infrastructure, such as communication and/or power systems, and did not cause widespread building damage, such as broken windows or gas lines, which would be expected consequences of a severe event such as an earthquake. The scenario package included U.S. Geological Survey data indicating minimal SRS damage expectations from a regional earthquake; however, a beyond-design-basis scenario with worse-than-anticipated infrastructure damage is a reasonable expectation in a once-in-five-year test of severe-event capabilities, and widespread damage would have provided additional challenges for the ERO, such as multiple facility evacuations and full-site personnel accountability. (See **OFI-SRNS-7**.) The exercise director noted during an interview that the design team decided not to disrupt communication systems because improvements are being made but are not yet ready for testing.

Exercise Design and Conduct Conclusions

Overall, SRNS/SRMC designed and conducted a full-scale exercise in accordance with their plans, procedures, and checklists that met DOE requirements for a severe event and challenged ERO capabilities and resources. However, some significant performance issues were not self-identified by evaluators. In addition, although the exercise was a severe event, as designed it did not test mitigation of widespread damage to site infrastructure.

3.7 Follow-up on Previous EA Findings

This portion of the assessment determined whether corrective actions were effective for the two findings identified in EA report *Independent Assessment of Emergency Preparedness Capabilities at the Savannah River Site - May 2022*.

In 2022, EA conducted an independent assessment of the emergency management exercise program effectiveness and validated the SRS response capabilities during the previous five-year period. The EA assessment identified two findings: 2022 EA Finding F-Ameresco-1 and 2022 EA Finding F-SRNS-1.

The 2022 EA Finding F-Ameresco-1 identified that Ameresco had not evaluated its facility-level emergency response capabilities and proficiency annually. (DOE Order 151.1D, attachment 4, paragraph 15). Ameresco addressed the issue by performing the following actions:

- Ameresco conducted an annual facility-level exercise, participated in a site-level exercise during this five-year period, and the Ameresco Safety Manager evaluated the remainder of work shifts that did not participate in the exercise.
- Ameresco established a virtual technical support representative using WebEOC.

- Ameresco completed shift drills and an annual exercise and submitted the after-action report to DOE-SR for approval, which DOE-SR approved. SRNS conducted an assessment of Ameresco and concluded that the exercise met DOE Order 151.1D requirements.
- The finding was closed after the determination that Ameresco had adequately completed all corrective actions for the 2022 EA Finding F-Ameresco-1.

The 2022 EA Finding F-SRNS-1 identified that SRNS had not maintained an adequate site-level exercise program to validate some important offsite interface emergency response capabilities based on the hazards identified in EPHAs. (DOE Order 151.1D, attachment 4, paragraph 15). SRNS addressed the issue by performing the following actions:

- SRNS developed and approved a formal corrective action plan.
- SRNS formally invited offsite agencies that have established agreements with SRNS and Radiation Emergency Assistance/Training Site, RAP, and the Office of Secure Transportation (OST) to participate in a tabletop drill, and those that accepted the formal invitation participated in the tabletop drill and site tour.
- SRNS modified the exercise plan template by incorporating a participant list, level of participation, and simulations, and developed a five-year matrix to monitor the validation of site-level and facility-level response capabilities.
- All corrective actions for the 2022 EA Finding F-SRNS-1 were completed with the exception of the OST-focused exercise, which OST has agreed to conduct at SRS during fiscal year 2027. This finding is still open.

Follow-up on Previous EA Findings Conclusions

The corrective actions for the 2022 EA Finding F-Ameresco-1 were adequately completed and the finding is closed. All corrective actions for the 2022 EA Finding F-SRNS-1 have been completed with one exception, namely the conduct of an OST exercise; as such, the finding is still open. OST has agreed to conduct an exercise at SRS during fiscal year 2027.

4.0 BEST PRACTICES

No best practices were identified during this assessment.

5.0 FINDINGS

Findings are deficiencies 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. DOE line management and/or contractor organizations must develop and implement corrective action plans for findings. Cognizant DOE managers must use site- and program-specific issues management processes and systems developed in accordance with DOE Order 226.1, *Implementation of Department of Energy Oversight Policy*, to manage the corrective actions and track them to completion.

Savannah River Mission Completion, LLC

Finding F-SRMC-1: SRMC did not categorize the OE as promptly as possible, but no later than 15 minutes after identification by the predetermined decision-maker for the categorization. (DOE Order 151.1D, att. 3, par. 8.b)

Savannah River Nuclear Solutions, LLC

Finding F-SRNS-1: SRNS did not adequately maintain situational awareness or disseminate a common operating picture among response components during the exercise. (DOE Order 151.1D, att. 3, par. 4)

Finding F-SRNS-2: SRNS did not adequately implement all OE categorization and classification requirements. Specifically:

- SRNS declared a GE in the absence of an incident predicted, in progress, or having occurred that resulted in an actual or credible threat of substantial degradation in the level of control over hazardous materials that was expected to exceed the applicable protective action criterion at or beyond the site boundary. (DOE Order 151.1D, att. 4, par. 8.b.(3)(a))
- SRNS downgraded the GE prior to termination of the event. (DOE Order 151.1D, att. 3, par. 8.c)

Finding F-SRNS-3: SRNS did not effectively provide notifications to all appropriate stakeholders, as required. Specifically:

- SRNS did not provide prompt, accurate, and effective initial and follow-up notifications to all appropriate stakeholders. (DOE Order 151.1D, att. 3, par. 11)
- SRNS did not promptly notify the SRFO Manager to request support from the DOE radiological asset organization. (DOE Order 151.1D, att. 4, par. 11.a.(2))
- SRNS did not notify the local, state, and Federal authorities of a classified OE within 15 minutes of categorization. (DOE Order 151.1D, att. 4, par. 12)

Finding F-SRNS-4: SRNS did not reevaluate conditions as the exercise progressed to identify PAs commensurate for the potential hazards of the site/facility/activity. (DOE Order 151.1D, att. 3, par. 9)

6.0 DEFICIENCIES

Deficiencies are inadequacies in the implementation of an applicable requirement or standard. Deficiencies that did not meet the criteria for findings are listed below, with the expectation from DOE Order 227.1A for site managers to apply their local issues management processes for resolution.

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Deficiency D-SRNS-1: SRNS did not provide for continuing effective communications among response organizations throughout an emergency. (DOE Order 151.1D, att. 3, par. 11.b.(1))

Deficiency D-SRNS-2: The SRNS TIA did not provide a rapid confirmation of initial classification and PA decisions. (DOE Order 151.1D, att. 4, par. 10.e)

Deficiency D-SRNS-3: SRNS did not determine whether the releases could exceed DILs. (SCD-7, par. 6.1.1, and the assessment specialist and DMS position checklists)

Deficiency D-SRNS-4: SRNS's evaluation of the exercise was not sufficient to ensure that all significant performance issues were identified. (DOE Order 151.1D, att. 3, par. 14)

7.0 OPPORTUNITIES FOR IMPROVEMENT

EA identified the OFIs shown below to assist cognizant managers in improving programs and operations. While OFIs may identify potential solutions to findings and deficiencies identified in assessment reports, they may also address other conditions observed during the assessment process. These OFIs are offered only as recommendations for line management consideration; they do not require formal resolution by management through a corrective action process and 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 issues identified during the assessment.

Savannah River Mission Completion, LLC

OFI-SRMC-1: Consider establishing a process that requires waste shipment manifests to be provided to the facility CR prior to waste being moved.

Savannah River Nuclear Solutions, LLC

OFI-SRNS-1: Consider updating the current SRNS technology to that used by other DOE/National Nuclear Security Administration sites, which includes an integration of Everbridge with WebEOC to reduce the reliance on a fax server-based system.

OFI-SRNS-2: Consider developing formal guidance for ERO decision-makers as to when affected workers should be required to evacuate the area inside the maximum distances to PAC and TEL due to the potential for acute radiological consequences.

OFI-SRNS-3: Consider adding language for clarification in the SRS emergency plan that the identified PA of directing affected personnel to remain indoors is an acceptable dose reduction method for radiological releases of short duration.

OFI-SRNS-4: Consider issuing the manual *SRSFD Guidance for Distances Incident Command Post* as a controlled document to ensure that the maximum distances to PAC and TEL are available for use by all FD shifts during a response, and that the documents are accurately updated when facility EPHAs/EALs are revised.

OFI-SRNS-5: To provide a more conservative set of predetermined PAs, PARs, and TIAs, consider using the deposition velocities recommended in the HotSpot users guide or the DOE Office of Health, Safety and Security Safety Bulletin 2011-02.

OFI-SRNS-6: Consider using NARAC as a corroborating dispersion when WINDS produces unexpected results and add distance to TEL information to the DMS briefing form.

OFI-SRNS-7: Consider incorporating the disruption of site infrastructure in future severe event exercises to test the ability of the site ERO to mitigate communication system failures, power loss, and/or widespread building and road damage.

Appendix A
Supplemental Information

Dates of Assessment

June 24 to August 26, 2025

Office of Enterprise Assessments (EA) Management

John E. Dupuy, Director, Office of Enterprise Assessments
William F. West, Deputy Director, Office of Enterprise Assessments
Kevin G. Kilp, Director, Office of Environment, Safety and Health Assessments
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Brent L. Jones, Acting Director, Office of Nuclear Safety and Environmental Assessments
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