Independent Assessment of Nuclear Criticality Safety Program and Controls at the Savannah River Site L-Area Facility

April 2025

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

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Acronyms

ANSI/ANS	American National Standards Institute/American Nuclear Society
ARM	Area Radiation Monitor
CAAS	Criticality Accident Alarm System
CFR	Code of Federal Regulations
CRAD	Criteria and Review Approach Document
CSE	Criticality Safety Evaluation
CSO	Criticality Safety Officer
CSP	Criticality Safety Program
CSPDD	Criticality Safety Program Description Document
DB	Disassembly Basin
DCP	Double Contingency Principle
DOE	U.S. Department of Energy
DOE-SR	DOE Savannah River Operations Office
EA	Office of Enterprise Assessments
LAF	L-Area Facility
NCS	Nuclear Criticality Safety
NCSE	Nuclear Criticality Safety Engineer
NIM	Nuclear Incident Monitor
OFI	Opportunity for Improvement
SOP	Standard Operating Procedure
SR	Surveillance Requirement
SRNS	Savannah River Nuclear Solutions, LLC
SRS	Savannah River Site
TSR	Technical Safety Requirement

INDEPENDENT ASSESSMENT OF NUCLEAR CRITICALITY SAFETY PROGRAM AND CONTROLS AT THE SAVANNAH RIVER SITE L-AREA FACILITY

Executive Summary

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted an independent assessment of the nuclear criticality safety (NCS) program (CSP) and controls at the Savannah River Site L-Area Facility (LAF) in November and December 2024. The LAF is managed by the site management and operating contractor, Savannah River Nuclear Solutions, LLC (SRNS), which is overseen by the DOE Savannah River Operations Office (DOE-SR). DOE-SR provides oversight of environmental management programs at the Savannah River Site. The primary objective of the assessment was to evaluate the effectiveness of SRNS's activities to manage and maintain an appropriate CSP, controls, and operating practices at the LAF. Additionally, the Federal oversight provided by DOE-SR relating to NCS was evaluated.

EA identified the following strengths:

- SRNS maintains a detailed crosswalk of CSP requirements that provides a high level of traceability to applicable NCS standards and informs decisions on procedure revisions.
- The SRNS criticality assessment program is comprehensive and well documented.
- SRNS conducts a monthly colloquium series to discuss important criticality safety topics, which supports continuing education and professional development of criticality safety staff.
- SRNS has implemented proactive measures to address future staffing needs, including developing an NCS training course at North Carolina State University.
- SRNS has enhanced its standard operating procedures by clearly annotating steps that contain NCS and safety basis requirements.
- SRNS personnel use an electronic tablet to complete operator rounds that include completion of routine surveillance requirements, which is an efficient way to record data from the field and provide information to the control room.

In summary, SRNS has effectively established and implemented a CSP, controls, and operating practices at the LAF. DOE-SR has also performed effective Federal oversight of related SRNS NCS activities. However, several opportunities for improvement were identified that, if addressed, would support the continuous improvement of the NCS program at the Savannah River Site LAF.

INDEPENDENT ASSESSMENT OF NUCLEAR CRITICALITY SAFETY PROGRAM AND CONTROLS AT THE SAVANNAH RIVER SITE L-AREA FACILITY

1.0 INTRODUCTION

The U.S. Department of Energy (DOE) Office of Nuclear Safety and Environmental Assessments, within the independent Office of Enterprise Assessments (EA), conducted an assessment of the nuclear criticality safety (NCS) program (CSP) and controls at the Savannah River Site (SRS) L-Area Facility (LAF). The LAF is managed by the site management and operating contractor, Savannah River Nuclear Solutions, LLC (SRNS), which is overseen by the DOE Savannah River Operations Office (DOE-SR). The assessment was conducted in November and December 2024.

In accordance with the *Plan for the Independent Assessment of the Criticality Safety Program at the Savannah River Site L-Area Facility, November – December 2024*, the primary objective of the assessment was to evaluate the effectiveness of SRNS's activities to manage and maintain an appropriate CSP, controls, and operating practices at the LAF. Additionally, the assessment evaluated the effectiveness of DOE-SR oversight of SRNS's activities with respect to the CSP.

The LAF is hazard category 2 nuclear facility located within the south-central portion of SRS. The LAF was initially constructed as a nuclear reactor for use as a nuclear material production facility in the 1950s. The nuclear reactor was shut down in the late 1980s, and the function of the LAF was changed to support nonproliferation in the 1990s. Its current primary mission is to safely receive, store, handle, and ship spent nuclear fuel assemblies originating from U.S. power and research reactors, DOE reactors, and foreign research reactors. The LAF also receives, stores, handles, and ships moderator materials and has the capability to handle, separate, and transfer wastes generated from LAF operations.

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, the criteria used to guide this assessment were based on objectives CS.1, CS.2, and CS.3 of EA CRAD 31-30, Revision 4, *Criticality Safety Program and Criticality Safety Controls Implementation*. In addition, elements of EA CRAD 30-07, Revision 0, *Federal Line Management Oversight Processes*, were used to collect and analyze data on DOE-SR oversight activities. To gather relevant assessment data, EA reviewed SRNS and DOE-SR policies, processes, procedures, calculations, and records supporting the CSP; criticality safety evaluations (CSEs); work planning and execution; implementation and communication of NCS controls (including training); emergency preparedness; and issues management. EA also interviewed key contractor and Federal personnel responsible for developing, implementing, and overseeing the CSP, and walked down significant portions of the LAF, focusing on the implementation of controls. The members of the assessment team, the Quality Review Board, and the management responsible for this assessment are listed in appendix A.

There were no previous findings for follow-up during this assessment.

3.0 RESULTS

3.1 Nuclear Criticality Safety Program and Processes

This portion of the assessment evaluated the effectiveness of SRNS's CSP and associated processes, including policy and program procedures, CSP staff qualification, performance metrics, training, issues management, and assessments.

Nuclear Criticality Safety Policy and Program Procedures

SRNS has established an adequate CSP as required by DOE Order 420.1C, *Facility Safety*, attachment 2, chapter III, and 10 CFR 830.204(b)(6). The SRNS CSP is primarily implemented through SRNS documents N-NCS-G-00136, *Criticality Safety Program Description Document (CSPDD) for the M&O Contractor (Savannah River Nuclear Solutions)*, and SCD-3, *Nuclear Criticality Safety Manual*. The CSPDD appropriately defines the basic elements of the CSP, including roles and responsibilities of NCS staff; audits and assessments; nuclear criticality safety engineer (NCSE) qualification; training; CSEs; and implementation of criticality controls. SCD-3, section 17, provides a detailed crosswalk to show how SRNS satisfies the requirements of the American National Standards Institute/American Nuclear Society (ANSI/ANS)-8 series of NCS standards, including any exceptions taken to specific recommendations or requirements. The crosswalk provides a high level of traceability to NCS requirements and ensures that program and procedure revisions align to requirements. The current version of the CSPDD was appropriately submitted to and approved by the DOE Head of Field Element, DOE-SR, as required by DOE Order 420.1C.

Criticality Safety Program Staff Qualification

SRNS has adequately established training and qualification programs for associate criticality safety engineers (i.e., NCSEs in-training), NCSEs, computational specialists, senior NCSEs, and criticality safety officers (CSOs). The CSPDD appropriately invokes ANSI/ANS-8.26-2007, *Criticality Safety Engineer Training and Qualification Program*, as the requirements basis for the SRNS NCSE qualification program documented in PROGPJCE-PDES-0001-07, *Criticality Safety Engineering (CSE) Training & Qualification Program Description*. PROGPJCE-PDES-0001-07 appropriately defines the training requirements, roles, and responsibilities for NCSE-in-training, NCSE, senior NCSE, and computational specialist positions. Reviewed qualification records for three of seven NCSEs were current and consistent with PROGPJCE-PDES-0001-07 training requirements.

The CSO position responsibilities and qualification requirements are adequately described in N-NCS-G-00189, *Criticality Safety Officer Activities for SRS Facility Support and Training & Qualification Requirements*. This document also establishes the facility-specific requirements for qualification of CSOs under the SRS CSP. Interviewed CSOs were knowledgeable of their facility's processes, NCS limits and controls, and procedures for responding to abnormal NCS conditions. Reviewed qualification records for three CSOs were current and consistent with N-NCS-G-00189 training requirements.

In support of continuing education and professional development, SRNS hosts a monthly colloquium meeting to discuss important criticality safety topics across SRS. While SRNS currently maintains full CSP staffing, proactive measures to address future needs, such as working with North Carolina State University to establish an NCS course to help prepare students for potential future careers in the NCS field, have been implemented.

Nuclear Criticality Safety Metrics

SRNS management has effectively developed and monitored relevant NCS metrics. Procedure U-PP-G-00009, *FA-15 Annual Metrics Plan*, adequately describes how NCS metrics are used to determine the health of the CSP through quarterly metrics self-assessments. Procedure U-PP-G-00010, *FA-15 Metrics Evaluation and Definitions*, defines the metrics, which are appropriately tabulated quarterly and linked to ANSI/ANS-8.19-2014, *Administrative Practices for Nuclear Criticality Safety*, and other requirements. Reviewed quarterly metrics reports from 2023 and 2024 provided thorough status updates and analyses on key performance areas (e.g., staffing, training and professional development, assessment results, and assessment and committee reviews). For example, an adverse trend of recurring criticality safety training findings between 2016 and 2022 resulted in a programmatic finding that was identified in the fiscal year 2022 Q4 quarterly metrics report and adequately resolved in 2023. Interviewed NCS personnel stated that metrics data is routinely communicated to senior leadership and incorporated into NCS performance improvement decision-making.

Facility Personnel Nuclear Criticality Safety Training

SRNS has established an adequate NCS training program for personnel who work in areas where controls are instituted to ensure criticality safety. Reviewed course content appropriately incorporated the required training elements defined in ANSI/ANS-8.20-1991, *Nuclear Criticality Safety Training*, section 7. General and facility-specific training are provided as lectures and/or videos and require written examinations. Facility-specific training was appropriately assigned to relevant job positions (i.e., operators, first-line supervisors, fissile material handlers, and engineers). Interviewed operators demonstrated an understanding of NCS terminology and controls. The L-Area training manager and the NCS lead collaborate to incorporate CSE revisions into operator training, as needed. Additionally, NCS personnel are appropriately included in the review and approval process for training content.

Issues Management

SRNS has effectively managed recent NCS-related issues and associated corrective actions. To improve performance, Manual 22Q, Procedure CAP-1, *Corrective Action Program*, establishes and implements an adequate corrective action program to identify, evaluate, and minimize/prevent recurrence of issues. The issues management program includes appropriate processes for managing and tracking issues that were identified during assessments, self-evaluations, or other reviews of project or functional activities and corresponding corrective actions, if applicable. The Site Tracking, Analysis, and Reporting (STAR) system effectively tracks SRNS issues and resultant actions to closure. Five sampled STAR reports generated in the past two years demonstrated that SRNS adequately documents NCS-related issues and has an adequate process for tracking and resolving them at the LAF.

Assessments

The SRNS NCS assessment program is consistent with the requirements of ANSI/ANS-8.19-2014. The NCS assessment program is governed by procedures U-PP-G-00013, *FA-15 Safety Documentation Assessment Plan*, and U-PP-G-00006, *FA-15 Assessment Bases, Criteria, and Suggested Lines of Inquiry*, to ensure that basic program elements meet the requirements of ANSI/ANS-8.19-2014. These procedures adequately define the overall assessment program, including the types of assessments performed, format, required content, lines of inquiry, and periodicity. The SRNS NCS assessment program is well documented and comprehensive; it includes facility self-assessments, CSP manager facility assessments, criticality safety quarterly performance metrics assessments, CSO walkdowns, and annual unit operation reviews. Twenty reviewed assessments were adequately performed in accordance with procedures.

Nuclear Criticality Safety Program and Processes Conclusions

SRNS has established an adequate CSP. The CSP and supporting processes are compliant with applicable DOE and ANSI/ANS requirements.

3.2 Criticality Safety Evaluations

This portion of the assessment evaluated the technical adequacy of SRNS CSEs and their compliance with applicable governing documents, DOE Order 420.1C; DOE-STD-3007-2017, *Preparing Criticality Safety Evaluations at Department of Energy Nonreactor Nuclear Facilities*; and ANSI/ANS 8-series standards.

The CSPDD, section 2.0, appropriately implements ANSI/ANS-8.1-2014, *Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors*, section 4.1.2. This is appropriately achieved through applying the double contingency principle (DCP) (cited in ANSI/ANS-8.1-2014, section 4.2.2) and referencing ANSI/ANS-8.1-2014, appendix B, which provides a discussion of how the DCP may be applied as a robust means of complying with the process analysis requirement. The CSPDD, section 2.1, states: "There are three types of CSEs: (1) a stand-alone CSE that includes calculations, limits, controls, and contingency analyses as necessary for the process or operation under consideration, (2) a CSE that solely reports the results of calculations, and (3) a CSE that performs a double contingency analysis and establishes limits and controls. Type 1 NCSEs satisfy the requirements of DOE-STD-3007. Type 2 and 3 CSEs together also satisfy the requirements of DOE-STD-3007." However, reviewed CSEs did not explicitly specify which of the three types of CSEs defined by the CSPDD were used to meet DOE-STD-3007-2017 requirements. (See **OFI-SRNS-1**.)

SCD-3, section 6.1.4, adequately documents the content expectations of CSEs, as specified in DOE-STD-3007-2017. All six reviewed CSEs were performed in accordance with the CSP and other supporting documentation (CSPDD, SCD-3, and SRNS-IM-2009-00035, *Criticality Safety Methods Manual*). The reviewed supporting criticality calculations and computer models were adequate to demonstrate that processes involving fissile materials will remain subcritical under normal and credible abnormal conditions, including those initiated by design basis events. Additionally, the reviewed CSEs were consistent with WSRC-SA-2004-00002, *L Area Facility Documented Safety Analysis*. Specifically, each reviewed CSE adequately demonstrated the following:

- The CSE purpose was identified.
- A description of the evaluated process was included, and, where appropriate, interfacing analysis was referenced.
- Normal and credible abnormal conditions were identified.
- Documented abnormal conditions were concluded to be not credible, beyond extremely unlikely, or unlikely.
- Methodologies employed as a means for demonstrating subcriticality were identified.
- When computations were used to demonstrate subcriticality, the model descriptions, reference to the appropriate case, case results, and uncertainties were presented.
- Code validation was referenced, and an area of applicability (AOA) comparison was made between the models and validation. Adjustments to criticality limits were made for situations outside the validation AOA.
- Models contained appropriate conservatisms (e.g., bounding enrichments and reflection conditions).
- The necessary controls to ensure subcriticality were derived and listed.

By demonstrating that unshielded criticality scenarios were not credible or beyond extremely unlikely, the reviewed CSEs appropriately determined that a criticality accident alarm system (CAAS) was not needed for the specified fissile material operations, in accordance with ANSI/ANS-8.3-1997, *Criticality Accident Alarm System*, section 4.2.1. Additionally, within the reviewed CSEs, the same sections were being used to document the conclusions of meeting process analysis (and/or DCP) and the CAAS needs analysis. This practice can cause confusion regarding the intent of the analysis for each credible abnormal condition. Further, it was not clear in the reviewed CSEs and associated postulated abnormal conditions that the residual risk of inadvertent criticality was reduced to trivial. (See **OFI-SRNS-2**.)

The reviewed validation reports (N-CLC-G-000164, *MCNP 6.1 Validation for SRNS Personal Computers*, and N-CLC-G-000166, *SCALE 6.1 Validation for SRNS Personal Computers*) met the requirements of DOE Order 420.1C and ANSI/ANS-8.24-2017, *Validation of Neutron Transport Methods for Nuclear Criticality Safety Calculations*. Additionally, selected supporting criticality calculations of CSEs N-NCS-G-00073, *Nuclear Criticality Safety Evaluation: SRS Mark 18A Target Tube Handling and Storage Requirements*, and N-NCS-L-00225, *Nuclear Criticality Safety Evaluation: Storage, Handling, and Loading Limits for the 70-Ton Cask Loaded with EBWR Followers*, and the models associated with the calculations, were consistent with the upper safety limits cited in the validation reports.

Criticality Safety Evaluations Conclusions

Reviewed CSEs were compliant with the procedural requirements governing their implementation. The reviewed CSEs demonstrated that processes involving fissile materials will remain subcritical under normal and credible abnormal conditions, including those initiated by design basis events. The reviewed validation reports and the corresponding CSEs met the requirements of DOE Order 420.1C and ANSI/ANS-8.24-2017.

3.3 Criticality Safety Control Implementation

This portion of the assessment evaluated SRNS's incorporation of criticality safety controls and technical safety requirements (TSRs) into standard operating procedures (SOPs), operator implementation of those procedures, and the adequacy of completed TSR surveillance documents.

SRNS adequately implements criticality safety controls as required by the TSR document (S-TSR-L-00002, *Technical Safety Requirements L Area Facility*), section 5.7.2.1, and N-NCS-L-00135, *Criticality Control Review of N-NCS-L-00007 and N-NCS-L-00018*. For example, at the LAF disassembly basin (DB) area, observed SRNS operations staff appropriately implemented criticality safety controls and TSR surveillance requirements (SRs) during a cask unload of fuel assemblies in accordance with SOP-DHS-060-L, *Cask Unloading and Processing of offsite Fuel – Disassembly*. The SOP clearly annotated steps that incorporated criticality safety controls and safety basis requirements (e.g., criticality safety controls were marked with asterisks [*], and TSR SRs were marked with a dollar sign [$]). This practice enhanced operator awareness in identifying and implementing important safety controls. SOP-DHS-095-L, *Fuel Criticality Rules – Surveillance Requirements and Review Data – Disassembly*, provides criticality rules and TSR SRs applicable to specific operations and is required to be performed in conjunction with several SOPs for the LAF DB area. During an observed evolution, SRNS staff followed and properly implemented SOP-DHS-095-L.

Eleven reviewed SR records were complete, accurate, and within the allowed TSR periodicity for the LAF DB. Reviewed records included DB water-level indication verification (SR 4.1.1.1); DB water-level indicator alignment (SR 4.1.1.2); fuel handling/storage in accordance with an approved nuclear safety data sheet (SR 4.1.4.1); critical lift requirements of a standard cask (SRs 4.1.4.5 and 4.1.4.6); fuel identification shipping paperwork verification (SR 4.1.6.1); and DB area radiation monitor (ARM)

instrument operational/calibration/testing checks (SRs 4.2.2.1 – 4.2.2.5). Operator rounds observed in the field demonstrated adequate implementation and completion of routine (e.g., more frequent) SRs by SRNS staff. During the rounds, the operator demonstrated adequate knowledge of the SRs that were incorporated within the required checks using a wireless electronic tablet. Use of an electronic tablet to complete operator rounds is an efficient way to record data from the field and provide information to the control room. A reviewed sample of control room logs maintained by the shift operations manager demonstrated that applicable TSR limiting conditions for operation related to ARM SRs were appropriately entered and exited.

SRNS has adequately implemented its structural integrity program (SIP), as required by the TSR document, section 5.7.2.14. The reviewed system health report for the DB underwater structure (WSRC-TR-2005-00303, *105-L Structural Integrity Data Sheets*, SIP number SAB.1, *Structure: Disassembly Basin Under Water*) and discussions with the cognizant system structural engineer demonstrated that the structure was appropriately inspected and is being maintained in accordance with the TSR-required 5-year frequency.

Criticality Safety Control Implementation Conclusions

SRNS's suite of SOPs adequately incorporates and identifies criticality safety controls and TSR SRs. Observed field activities were properly implemented and demonstrated that SRNS staff is knowledgeable of the significance of criticality safety controls and TSR SRs throughout the facility.

3.4 Nuclear Criticality Emergency Planning and Response

This portion of the assessment evaluated the effectiveness of SRNS's ability to plan and respond to a criticality accident, including functionality and testing of the CAAS and emergency response planning.

Criticality Accident Alarm System

The SRS CSPDD, approved by DOE-SR, adequately addresses the applicable requirements for installing, evaluating, and maintaining a CAAS as specified in ANSI/ANS-8.3-1997 and DOE-STD-3007-2017. The CSPDD, section 5.1, states, in part, that "[i]n general, NIM systems (gamma detection instruments) are provided wherever a criticality accident is credible mitigated, radiation exposure potentially exceeds 12 rad [radiation absorbed dose] in free air for normally occupied areas, and it is deemed that they will result in a reduction in total risk." SRNS's overall conclusion for LAF activities was that the installation of a nuclear incident monitor (NIM) system (the CSPDD uses the terms CAAS and NIM interchangeably) was unnecessary based upon CSPDD, section 5.1 guidance, though did not provide further justification (see the OFI-SRNS-2 discussion above).

Nuclear Criticality Emergency Response Planning

SCD-3 adequately implements the requirements of ANSI/ANS-8.23-2019, *Nuclear Criticality Accident Emergency Planning and Response*, including requirements related to roles and responsibilities of management and staff, planning, equipment, evacuation, rescue, reentry, stabilization, classroom drills, and exercises. In addition to ANSI/ANS-8.23-2019, SRNS is required to meet DOE Order 151.1D[1], *Comprehensive Emergency Management System*, which is implemented by SCD-7, *SRS Emergency Plan*. While SCD-7 is the primary implementing document for DOE Order 151.1D, SCD-3 includes requirements related to criticality emergency response and planning that potentially overlap with DOE Order 151.1D requirements. A potential weakness was identified in sections 5.7.2 and 11.2.1 of SCD-3,

[1] The current version of this order, DOE Order 151.1E, was not referenced in this report because the SRNS contract currently references DOE Order 151.1D.

which state that emergency planning and response is only required for facilities where a CAAS is installed. This requirement is consistent with ANSI/ANS-8.3-1997 and ANSI/ANS-8.23-2019 but could be inconsistent with DOE Order 151.1D because it implies that only facilities where the worker consequence exceeds the ANSI/ANS-8.3-1997 threshold of 12 rad in free air would require formal criticality emergency planning and response. DOE Order 151.1D, attachment 4, *Emergency Management Hazardous Materials Program*, requires formal emergency planning including declaration of an Alert if radiological hazards exceed the U.S. Environmental Protection Agency radiological protective action guideline of 1 rem at 30 m. (See **OFI-SRNS-3**.)

Further, the SRS Emergency Plan annex for the LAF was deleted from SCD-7, Annex J, *K-Area Annex*, in 2008. The basis for removal is contained in S-EHA-K-00001, *Emergency Planning Hazards Assessment for K- and L-Areas*, Revision 8, which concluded that no LAF release (including from a criticality) would exceed the threshold for an Alert (1 rem at 30 meters). SRNS personnel stated during interviews that criticality emergency planning and response is not applicable at the LAF because a criticality is either not credible or will not result in significant consequences (consequences are < 12 rad in free air). As a result, based on the requirements of DOE Order 151.1D, attachment 4, SRNS concluded that formal criticality emergency planning and response was not required for the LAF. In addition to attachment 4 of the order, SRNS is also required to meet DOE Order 151.1D, attachment 3, *Emergency Management Core Program*, which includes a requirement to declare an operational emergency for a criticality event. SCD-7, section 4.2, *Criteria for Operational Emergencies (OEs) Not Requiring Classification*, currently references Manual 6Q15.1, Procedure 114, *Emergency Categorization and Classification*, to implement this requirement; however, this procedure is no longer part of Manual 6Q. No additional procedures that implement this specific requirement at the LAF were provided by SRNS. (See **OFI-SRNS-4**.)

Finally, as stated above, S-EHA-K-00001 concluded that no LAF release (including from a criticality) would exceed the threshold for an Alert (1 rem at 30 meters). A review of the emergency preparedness hazards assessment shows that the Hotspot computer code was used to calculate the radiological consequences for receptors of concern, including a receptor at 30 meters (worker). The Hotspot-calculated radiological consequences include the inhaled dose from the airborne plume release of fission products (noble gases and halogens) but do not include the direct dose from the criticality (gammas and neutrons). (See **OFI-SRNS-5**.)

Nuclear Criticality Emergency Planning and Response Conclusions

SRNS's justification for not needing a CAAS at the LAF is adequate. SCD-3 adequately implements the requirements of ANSI/ANS-8.23-2019 with respect to criticality emergency planning and response.

3.5 Federal Oversight

This portion of the assessment evaluated the effectiveness of DOE-SR's oversight of SRNS's CSP and management of SRNS-identified issues.

Oversight and Assessments

DOE-SR has effectively performed oversight of NCS activities at the LAF through routine field observations, close engagement with SRNS's NCS organization, and formal assessments. DOE-SR NCS staff maintains a strong presence at SRS facilities; the staff performs NCS program assessments, self-assessments, readiness assessments, and safety evaluation reports for CSPDD revisions. The DOE-SR NCS staff members meet regularly with their SRNS NCS counterparts, participate in SRNS CSP meetings, and conduct periodic status calls to review ongoing NCS-related activities. During interviews, DOE-SR

NCS staff members demonstrated comprehensive knowledge of facility operations and emphasized their close coordination with SRNS NCS engineers when evaluating the adequacy of NCS control implementation in the field. The reviewed DOE-SR NCS oversight activities for fiscal year 2024 (listed in the *DOE-SR Fiscal Year 2024 CSP Assessment Plan*) include a formal NCS program assessment, self-assessment, participation in the Fast Critical Assembly readiness assessment, quarterly NCS walkdowns, and a revision to SCD-3. SRIP 400, chapter 421.1, *Nuclear Safety Oversight*, provides limited guidance to conduct oversight and assessment of NCS activities, as required by DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*. The guidance contained in SRIP 421.1 is limited to the roles and responsibilities of DOE-SR managers with respect to CSP activities and does not provide specific details for Federal oversight of a contractor CSP. (See **OFI-DOE-SR-1**.) Reviewed assessments from fiscal years 2023 and 2024 demonstrate that DOE-SR is providing adequate oversight of SRNS NCS activities. Specifically, DOE-SR oversight products identified issues, provided feedback to SRNS, and tracked DOE-identified issues to closure.

Staffing

The reviewed staffing analysis from 2013 (most recent) shows that DOE-SR is currently understaffed by two qualified criticality safety specialists (full staffing is four based on 2013 data). DOE-SR recently hired two new engineers under the DOE Pathways Program, but these individuals will not be able to formally start the criticality safety specialist qualification process until they reach a more senior grade per the current staffing plan, which could take several years. (See **OFI-DOE-SR-2**.)

Issues Management

DOE-SR has performed effective oversight of recent NCS issues and associated corrective actions. The reviewed DOE-SR assessment 2023-CTS-01180, *DOE-MAR September 2023 Assessment 2023-SA-002537, LOI #2, Finding 1 CAP Required*, demonstrated appropriate DOE-SR oversight of issues management follow-up. Specifically, the assessment verified that issues management system actions were being addressed in a timely manner and that the schedule for required actions provided reasonable assurance of preventing or reducing the likelihood of issue recurrence.

Federal Oversight Conclusions

DOE-SR has effectively performed Federal oversight of the SRNS CSP in accordance with DOE Order 226.1B. DOE-SR has appropriately communicated its NCS-related oversight findings and monitored associated corrective action development, execution, and closure through close coordination with SRNS.

4.0 BEST PRACTICES

No best practices were identified during this assessment.

5.0 FINDINGS

No findings were identified during this assessment.

6.0 DEFICIENCIES

No deficiencies were identified during this assessment.

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 Nuclear Solutions, LLC

OFI-SRNS-1: Consider including the CSE type in the front section of CSEs to clearly define which type were used to meet DOE-STD-3007-2017 requirements.

OFI-SRNS-2: Consider discussing the CAAS needs analysis and process analysis requirement compliance separately to avoid confusion as to the objective of a particular contingency evaluation. Also, consider defining objective criteria beyond that required to satisfy the process analysis requirement to reduce the residual risk of an inadvertent criticality to trivial to justify the lack of CAAS coverage.

OFI-SRNS-3: Consider reviewing SCD-3 to ensure that the current guidance for determining the need for formal criticality emergency planning and response is consistent with DOE Order 151.1D.

OFI-SRNS-4: Consider reviewing SCD-7 to ensure that the procedures referenced in Manual 6Q for emergency categorization and classification of operational emergencies are current. Consider installing additional indicators and enhancing the guidance in high area radiation monitor alarm response procedures to ensure that an operational emergency is declared for a criticality incident.

OFI-SRNS-5: Consider using a more advanced computer code such as RASCAL for performing emergency preparedness-related criticality calculations. RASCAL includes both direct dose and inhaled dose from the release of noble gases, halogens, and other nuclides to calculate radiological consequences. Calculations of radiological consequences that do not include direct dose could underpredict the total dose that a worker receives because of the criticality.

DOE Savannah River Operations Office

OFI-DOE-SR-1: Consider revising SRIP 421.1 to include additional guidance for conducting oversight of contractor CSPs. Potential topic areas include criticality safety specialist roles and responsibilities, technical training and qualification, assessments, operational awareness, metrics, CSPDD revisions, safety basis reviews, and ANSI/ANS standards and meeting participation.

OFI-DOE-SR-2: Consider revising the 2013 DOE-SR CSP staffing analysis to reflect current needs and priorities; also consider allowing new hires to formally and more timely start the criticality safety specialist qualification process.

8.0 ITEMS FOR FOLLOW-UP

Some areas of potential concern related to emergency planning were recognized and may be considered in future EA oversight activities.

Appendix A
Supplemental Information

Dates of Assessment

November 25 to December 19, 2024

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
David A. Young, Deputy Director, Office of Environment, Safety and Health Assessments
Thomas E. Sowinski, Director, Office of Nuclear Safety and Environmental Assessments
Kimberly G. Nelson, Director, Office of Worker Safety and Health Assessments
Jack E. Winston, Director, Office of Emergency Management Assessments
Brent L. Jones, Director, Office of Nuclear Engineering and Safety Basis Assessments

Quality Review Board

William F. West, Advisor
Kevin G. Kilp, Chair
Aleem E. Boatright
Christopher E. McFearin
William A. Eckroade

EA Site Lead for Savannah River Site

Brannen J. Adkins

EA Assessment Team

Brannen J. Adkins, Lead
Stephen P. Janson
Thomas J. Marenchin
Tamara D. Powell
Matthew M. Toth