



Independent Assessment of Conduct of Operations at the Savannah River Site Tritium Facilities

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Acronyms

CFR	Code of Federal Regulations
CRAD	Criteria and Review Approach Document
DCS	Distributed Control System
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
EA	Office of Enterprise Assessments
FR	Facility Representative
HANM	H-Area New Manufacturing
HAOM	H-Area Old Manufacturing
IV	Independent Verification
LCO	Limiting Condition for Operation
LO/TO	Lockout/Tagout
MOU	Memorandum of Understanding
NFPA	National Fire Protection Association
NNSA	National Nuclear Security Administration
OFI	Opportunity for Improvement
ORPS	Occurrence Reporting and Processing System
PA	Public Address
SI	Site Infrastructure
SOM	Shift Operations Manager
SPLT	Single Point Lockout/Tagout
SRFO	Savannah River Field Office
SRNS	Savannah River Nuclear Solutions, LLC
SRS	Savannah River Site
SRTE	Savannah River Tritium Enterprise
TEF	Tritium Extraction Facility
TSR	Technical Safety Requirement

INDEPENDENT ASSESSMENT OF CONDUCT OF OPERATIONS AT THE SAVANNAH RIVER SITE TRITIUM FACILITIES

Executive Summary

The U.S. Department of Energy's Office of Enterprise Assessments (EA) conducted an independent assessment of the conduct of operations program at the Savannah River Site Tritium Facilities on June 13-16, 2022. The purpose of this assessment was to evaluate the performance of the Savannah River Nuclear Solutions, LLC (SRNS) conduct of operations program and the National Nuclear Security Administration Savannah River Field Office (SRFO) oversight program for operations of safety hazard controls at the Tritium Facilities.

EA identified the following strengths:

- SRNS operations personnel at the Tritium Facilities are knowledgeable, well trained, and qualified to perform their functions.
- Shift turnovers performed by SRNS operations personnel at the Tritium Facilities are thorough and effective.
- SRNS operations personnel have strong communication practices that support conduct of operations at Tritium Facilities.
- SRNS proactively performs effectiveness reviews for additional issues that were not specifically required.
- SRFO Facility Representatives are well trained and qualified to perform oversight of Tritium Facilities operations.

EA also identified the following weaknesses:

- Documents and postings that provide information to assist operations personnel in performing official tasks are not always controlled as operator aids. Inadequate control of these aids can mislead operations personnel with inaccurate information.
- Equipment condition tags, which denote deficient conditions, were not always removed following resolution of the deficient condition. This misleading information can result in an inaccurate understanding of the status of systems that are important to Tritium Facilities operations.
- A memorandum of understanding requires that only H-Area New Manufacturing Facility operations management be notified of fire water supply system outages or degradation. Notification to Tritium Extraction Facility operations management is not also required; consequently, some Tritium Extraction Facility safety basis assumptions may not be protected.

In summary, the SRNS conduct of operations program at the Tritium Facilities has been adequately implemented such that the performance of operations related to the control of nuclear safety hazards is generally effective. In addition, the oversight provided by SRFO adequately supports effective performance of the SRNS conduct of operations program. Nevertheless, addressing the concerns identified in this report will help mitigate the vulnerabilities and potential increases in risk posed by the minor programmatic deficiencies identified during this assessment.

INDEPENDENT ASSESSMENT OF CONDUCT OF OPERATIONS AT THE SAVANNAH RIVER SITE TRITIUM FACILITIES

1.0 INTRODUCTION

The U.S. Department of Energy (DOE) Office of Nuclear Engineering and Safety Basis Assessments, within the independent Office of Enterprise Assessments (EA), conducted an assessment of the effectiveness of selected elements of the conduct of operations program at the Savannah River Site (SRS) Tritium Facilities. The purpose of this assessment was to evaluate the performance of the Savannah River Nuclear Solutions, LLC (SRNS) conduct of operations program and the National Nuclear Security Administration (NNSA) Savannah River Field Office (SRFO) oversight program, as implemented for operations of safety hazard controls at the SRS Tritium Facilities. EA conducted the onsite portion of this assessment on June 13-16, 2022.

During EA assessment planning and coordination with SRFO in 2020, conduct of operations was identified as a functional area of interest to be assessed and was included in the EA schedule of planned assessment activities. In part, this decision was driven by the planned increase in production at the Tritium Facilities and further reinforced by a negative trend in conduct of operations performance at the Tritium Facilities documented by SRFO in 2021. EA was unable to conduct the assessment until 2022 due to travel and operational restrictions related to the ongoing pandemic.

The Tritium Facilities are part of NNSA's operations and are designed and operated to supply and process tritium, an isotope of hydrogen that is a vital component of nuclear weapons. SRNS operates the Tritium Facilities as part of the Savannah River Tritium Enterprise (SRTE), which is the collective term for the facilities, people, expertise, and activities at SRS related to tritium.

2.0 METHODOLOGY

The DOE independent oversight program is described in and governed by DOE Order 227.1A, *Independent Oversight Program*, which is implemented 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.

For this assessment, EA identified the Tritium Facilities operations necessary for mitigating or preventing high-consequence events with a relatively high likelihood of occurrence that firmly establishes their risk significance. EA evaluated the performance of those operations by assessing selected elements of the SRNS conduct of operations program, in accordance with the requirements of DOE Order 422.1, *Conduct of Operations*, to determine the effectiveness of program implementation. This scope was in accordance with the *Plan for the Independent Assessment of Conduct of Operations at the Savannah River Site Tritium Facilities, May 2022*.

As identified in the assessment plan, this assessment considered the requirements of DOE Order 422.1 and associated criteria and lines of inquiry presented in EA Criteria and Review Approach Document (CRAD) 31-39, Rev. 0, *Review of Conduct of Operations*, for the following topics:

- Organization and Administration – EA CRAD 31-39, Objective CO.1
- Communications – EA CRAD 31-39, Objective CO.4
- Investigation of Abnormal Events, Conditions, and Trends – EA CRAD 31-39, Objective CO.6
- Control of Equipment and System Status – EA CRAD 31-39, Objective CO.8
- Lockout and Tagouts – EA CRAD 31-39, Objective CO.9

- Independent Verification – EA CRAD 31-39, Objective CO.11
- Logkeeping – EA CRAD 31-39, Objective CO.12
- Turnover and Assumption of Responsibilities – EA CRAD 31-39, Objective CO.13
- Control of Interrelated Processes – EA CRAD 31-39, Objective CO.14
- Technical Procedures – EA CRAD 31-39, Objective CO.17
- Component Labeling – EA CRAD 31-39, Objective CO.19.

This assessment also considered the requirements of DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*, and associated criteria and lines of inquiry presented in EA CRAD 30-07, Rev. 0, *Federal Line Management Oversight Processes*, to evaluate the performance of field element oversight activities related to conduct of operations.

EA examined key documents, such as system descriptions, work packages, procedures, manuals, analyses, policies, and training and qualification records. EA also interviewed key personnel responsible for developing and executing the associated programs; observed operations supporting the implementation of safety controls; and walked down each of the high-hazard Tritium Facilities of SRTE (i.e., the H-Area Old Manufacturing (HAOM) Facility, the H-Area New Manufacturing (HANM) Facility, and the Tritium Extraction Facility (TEF)). The members of the assessment team, the Quality Review Board, and management responsible for this assessment are listed in appendix A.

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

3.0 RESULTS

3.1 Organization and Administration

This portion of the assessment evaluated the policies, programs, and procedures that define the SRNS operations organization.

SRNS has adequately established a framework of policies, programs, and procedures that define the SRNS operations organization through corporate-level and facility-level documents. SRS Manual 2S, *Conduct of Operations*, establishes an adequate formal conduct of operations program for all SRNS operations at SRS that includes requirements for incorporating lessons learned to improve operating practices. Manual 2S specifies detailed implementing procedures for specific topics related to conduct of operations. For example, Manual 2S, procedure 5.1, *Facility Operations Organization and Administration*, comprehensively describes SRS-wide roles, responsibilities, authority, and accountability for operating organizations. Operations personnel, from senior managers to operators, demonstrated strong accountability and ownership through the safe and effective discharge of their duties, as observed during shift and job briefings and interviews. Other Manual 2S procedures adequately address all required elements of DOE Order 422.1. Additionally, the Tritium Facilities supplement Manual 2S with ADM TRIT-6324, *Tritium Operational Guidelines and Instructions*, which provides generally adequate facility-specific implementation requirements, including methods for approving, posting, maintaining, and controlling access to electronic operations documents (procedures, drawings, schedules, maintenance actions, etc.). EA observed that operators had ready access to all of the necessary electronic operations documents, including procedures (electronic and printable), the limiting condition for operation (LCO) tracking database, drawings, and work packages. Appropriate controls were in place to ensure that only current procedures were in use.

SRNS has provided adequate personnel resources, supported by the framework of policies, programs, and procedures, to accomplish operations. The reviewed organizational chart and overtime reporting demonstrate that sufficient qualified operators are available to complete the assigned tasks and that technical personnel are assigned to support operations. Manual 4B, procedure 2,

Qualification/Certification Program Requirements, establishes requirements consistent with DOE Orders 422.1 and 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*, for managers and supervisors. One reviewed training/qualification record for a shift manager and interviews with three SRNS operations personnel demonstrated that Manual 4B, procedure 2 is adequately implemented.

The SRNS conduct of operations framework also addresses requirements and processes to ensure safe work performance. Manual 8Q, procedure 122, *Hazard Analysis Process*, provides adequate methods for the analysis of hazards and implementation of hazard controls in the work planning and execution process. Manual 2S, procedure 5.1 adequately addresses requirements for periodic monitoring and self-assessment of operations to ensure consistent implementation of governing procedures. Recurring self-assessments of conduct of operations (i.e., 20 reports issued in 2021) and one independent assessment by the SRNS Independent Evaluation Board performed per Manual 12Q, procedure FEB-1, *Performance of Company Directed Independent Evaluations*, identified issues for correction and improvement effectively. Also, recent common cause analyses, performed by SRNS at the direction of SRFO, resulted in the development of SRNS-RP-2022-00165, *SRTE Performance Improvement and Sustainability Program*, March 2022, which has been effective in focusing on specific goals for management field observations and conduct of operations focus areas.

EA noted one weakness in the conduct of operations framework for operator aids. Contrary to DOE Order 422.1, attachment 2, paragraph 2.q, procedure ADM TRIT-6324 allows for the implementation of documents that can be used as operator aids without requiring a periodic review for accuracy and correctness. (See **Deficiency D-SRNS-1**.) Inadequate control of documents that assist personnel in performing their official functions can mislead operations personnel with inaccurate information. For example:

- An observed laminated miniature system drawing posted on a wall in the HANM facility was stamped with “Permanent Posting.” To manage long-term operator aids, Manual 2S, procedure 5.10, *Operator Aid Postings*, recommends that “The Operations Manager approves all information that is to be permanently posted and ensures an adequate review of the information is completed.” However, the interviewed operations managers stated that this posting is not periodically reviewed to ensure continued accuracy, contrary to the requirements for operator aids. Also, the SRNS conduct of operations framework does not ensure that permanent postings remain accurate for the life of the facility.
- Operations personnel at TEF were observed using a badge-sized card that identified the conditions to be met for exiting an LCO. The card was later confirmed to have the same content as OSR 49-244, *TSR/LCO - Related Post-Job Review Card*, but was not controlled as an operator aid, contrary to Manual 2S, procedure 5.10, for information used to assist operators in performing tasks. EA observed other approved forms that have been reproduced in badge size for the use of operations personnel, such as OSR-49-239, *Task Preview/Pre-Job Brief Card*. These cards are not listed on the operator aid logbooks maintained in the facility control rooms and are not routinely verified to be accurate.

Organization and Administration Conclusions

SRNS has adequately established a framework of policies, programs, and procedures that define the SRNS operations organization through corporate-level and facility-level documents. This framework adequately addresses most of the required elements of DOE Order 422.1; however, allows for the implementation of documents that can be used as operator aids without requiring a periodic review for accuracy and correctness

3.2 Communications

This portion of the assessment evaluated the communications by SRNS operations personnel during normal operations and emergencies.

The observed communications among operations personnel were adequately conducted in accordance with Manual 2S, procedure 2.2, *Communications*. This procedure sufficiently addresses the requirements of DOE Order 422.1, attachment 2, paragraph 2.d. EA observed face-to-face communications during shift turnovers and field implementation of procedures. Emergency drills were clear and concise, used abbreviations and acronyms effectively, and followed the three-way communication protocol specified in Manual 2S, procedure 2.2 (i.e., sender states information, receiver acknowledges by repeating the information, and sender confirms or corrects the information). During shift turnover, all participants appropriately acknowledged their individual assignments and provided a concise status of equipment and evolutions for their watch station. During the conduct of field activities, operations personnel communicated effectively with the control room through telephones and radios on a dedicated channel using proper radio communication techniques.

Operations personnel demonstrated effective use of the facility-wide public address (PA) communication system for normal and emergency operations. During walkdowns, EA verified that many observed areas received audible PA announcements. Areas where PA announcements were inaudible, because of local noise levels or out-of-service PA equipment, were properly posted with signage identifying the area as a “PA dead zone,” which requires shift operations manager (SOM) permission to enter per Manual 2S, procedure 2.2. The observed operations personnel properly obtained permission from the SOM to use the PA system and repeated the announcement over the radio to cover PA dead zones. During an observed drill, operations personnel adequately used ring-down phones, PA announcements, and radios to communicate emergency information and instructions to all personnel in the facilities involved in the drill (i.e., HANM control room, H-Canyon control room, and the Emergency Operations Center) and emergency responders.

Communications Conclusions

The observed SRNS operations personnel demonstrated effective normal and emergency communications.

3.3 Investigation of Abnormal Events, Conditions, and Trends

This portion of the assessment evaluated the formal program for investigating abnormal events, conditions, and trends, as established and implemented by SRNS.

SRNS has established and implemented adequate operations practices for investigating events to determine their impact and prevent recurrence. SRS Manual 2S, procedure 5.2, *Issue Investigations*, adequately addresses the requirements of DOE Order 422.1, attachment 2, paragraph 2.f. An assigned responsible person for each event uses Manual 9B, procedure 1-0, *Occurrence Reporting*, to appropriately categorize abnormal events for reporting purposes, consistent with DOE Order 232.2A, *Occurrence Reporting and Processing of Operations Information*. Manual 2S, procedure 5.2 comprehensively establishes expectations for investigating abnormal events and appropriately tasks the responsible manager with determining reportability and the level of investigative effort warranted by the event, occurrence, near miss, or condition. Also, Manual 2S, procedure 5.2 appropriately requires fact finding (an investigative technique to acquire and preserve all relevant information for subsequent analysis) for Occurrence Reporting and Processing System (ORPS) reportable events and other high-significance events, as determined by management. A qualified fact-finding director leads these investigations. Six completed fact-finding reports for events occurring over the past 24 months were thorough, appropriate, and completed by qualified personnel (based on the review of associated personnel qualification records).

A less structured investigative technique is specified for non-reportable events (i.e., issue investigations) at the discretion of management. Issue investigations are appropriately led by either a qualified fact-finding director or an issue investigator, who is typically a proficient, qualified cause analyst.

Manual 22Q, procedure CAP-1, *Corrective Action Program and Procedure*, appropriately requires formal causal analysis for high-significance events. SRNS uses an SRTE Review Board to confirm issue categorizations of significance for corrective action, assign responsibility, evaluate trends, and ensure that initial corrective actions are appropriate, in accordance with Manual 22Q, procedure MRB-1, *Management Review Boards*. Twelve reviewed causal analyses over the past 24 months addressing ORPS reports and issue investigations were complete and met the requirements of Manual 22Q, procedure CAP-1. Even though effectiveness reviews are required only for high-significance events, SRNS proactively performs effectiveness reviews for additional issues at management discretion. This conservative approach was demonstrated by 22 reports of effectiveness reviews performed over the past 24 months that were not specifically required by Manual 22Q, procedure CAP-1. SRNS has established processes for identifying adverse trends through metrics, the management review board, and assessments.

Investigation of Abnormal Events, Conditions, and Trends Conclusions

SRNS has established and implemented a formal program for adequately investigating abnormal events, conditions, and trends. Expectations are comprehensively established, responsibilities are identified, and events are appropriately categorized. Further, SRNS proactively performs effectiveness reviews for additional issues that were not specifically required.

3.4 Control of Equipment and System Status

This portion of the assessment evaluated SRNS processes to control equipment and system status through management of deficient equipment and control of temporary modifications of equipment.

During the assessment, SRNS operations personnel at the Tritium Facilities control rooms adequately performed control of equipment and system status in accordance with ADM TRIT-6324. This procedure adequately addresses the relevant requirements of DOE Order 422.1, attachment 2, paragraph 2.h. SRNS effectively uses status boards and the distributed control system (DCS) as the primary methods for status control of some systems and equipment, as is specified in ADM TRIT-6324. Status boards for safety and non-safety process components observed in the control rooms accurately reflected subsequently observed field component alignment. EA observed that the site LCO tracking status board is a useful tool that identifies all approaching expirations of LCO required action times and audibly notifies the SOM when attention is needed. For example, during a severe weather condition alert and a simultaneous investigation of a high-tritium alarm, the SOM was alerted to perform a fire patrol as part of an LCO required action, which was performed on time. Although overall system status is presented on the status boards, some system components (e.g., components associated with the tritium extraction and reservoir loading operations) are not reflected. System components are tracked on the DCS and controlled using normal operating procedures for selective valve alignments. Additionally, control room operators use a system alignment checklist logbook identifying systems subject to periodic verification to ensure proper system configuration. However, the system alignment checklist logbook does not include many facility system components, such as those associated with the tritium extraction and reservoir loading operations; a component missing from the checklist may pose a vulnerability that could result in an adverse configuration of one or more important plant systems. (See **OFI-SRNS-1**.)

SRNS operations personnel generally demonstrated effective management of equipment and system deficiencies. Manual 2S, procedure 5.5, *Control of Equipment and System Status*, and procedure 5.6, *Operations Tags Use and Control*, provide adequate process controls. Facility personnel identify equipment deficiencies using a uniquely numbered and controlled tag (i.e., Operations 39-97, *Site Condition Tag*) or work control system document to ensure appropriate tracking and correction. The

reviewed log entries demonstrated that SOMs completed required quarterly reviews to confirm condition status accuracy. Eleven of the 14 condition tags observed by EA were properly recorded in the condition tag logs documenting the component condition and service request, and the logs are maintained in the control rooms. However, contrary to Manual 2S, procedure 5.6, three condition tags identified by EA (and an additional one subsequently identified by SRNS management as discussed below) had not been removed even though the equipment had been repaired. (See **Deficiency D-SRNS-2**.) The communication of misleading information can result in an inaccurate understanding of the status of systems important to Tritium Facilities operations. This is an administrative weakness that can reflect negatively on the otherwise positive quality culture of the SRTE organization. Nevertheless, when EA informed SRNS management of these observations, management responded swiftly by conducting an audit of all active tags (approximately 60) and identified one additional deficient-equipment tag that had not been removed. All four outdated condition tags were subsequently removed.

SRNS adequately manages temporary modifications in accordance with Manual 2S, procedure 2.5, section 5.11, *Temporary Modification Control*. This process appropriately requires the design authority to design the temporary modification based on the input from the requestor using the design change notice process defined in Manual E7, procedure 2.06, *Design Change Notices*. All temporary modifications were appropriately approved, detailed, correctly installed, appropriately maintained in the temporary modification logbooks in all control rooms, and correctly noted on the associated engineering documents.

Control of Equipment and System Status Conclusions

SRNS has established and implemented appropriate operations practices for the control of equipment and system status. Initial equipment lineups and subsequent changes are documented using status boards, the DCS, and operating procedures; however, the system alignment checklist logbook does not include all facility system components. Deficient equipment and temporary modifications are appropriately marked with condition tags, logged, and verified quarterly by the SOM. However, four deficient-condition tags had not been removed after equipment repairs were completed.

3.5 Lockout and Tagouts

This portion of the assessment evaluated SRNS implementation of lockout/tagout (LO/TO) processes used to control hazardous energy sources.

SRNS operations personnel adequately controlled hazardous energy sources through LO/TO during observed activities. Manual 2S, procedure 5.9, *Hazardous Energy Control*, adequately addresses the requirements of DOE Order 422.1, attachment 2, paragraph 2.i; 29 CFR 1910.147, *Control of Hazardous Energy (Lockout/Tagout)*; and National Fire Protection Association (NFPA) Standard 70E, *Standard for Electrical Safety in the Workplace*. Manual 2S, procedure 5.9 appropriately provides requirements for complex LO/TOs, which require more than one isolation point or involve more than one type of hazardous energy, more than one work group, or other complicating factors. The procedure also appropriately addresses requirements for a simplified LO/TO process with the use of a single point LO/TO (SPLT) for defined situations.

EA observed evolutions involving the installation and removal of complex LO/TOs, including independent verification (IV) and a safe energy state determination, which is a check for hazardous energy following LO/TO installation. Operations personnel performed LO/TO activities in a deliberate manner, with proper attention to detail. The LO/TO installers or removers verified that the labeling on the valve or switch matched the danger tag and the description on the associated LO/TO form (i.e., OSR Form 20-143: a standard LO/TO control form for all LO/TO evolutions). The LO/TO installers and removers appropriately followed the LO/TO form instructions in the specified sequence. The safe energy state determination was appropriately tailored for the installed LO/TO equipment. All interviewed personnel involved with the LO/TO understood the importance of correctly de-energizing the equipment

prior to work. The restoration positions for the components were determined by referencing the standard operating procedure lineup. Before authorizing LO/TO removal, the SOM appropriately verified that the work was complete and that the workers properly signed the LO/TO form. System restoration following LO/TO removal was completed using the standard operating procedure. Also, the interviewed SRTE operations personnel and managers adequately demonstrated their knowledge of LO/TO requirements and the difference between SPLTs and complex LO/TOs.

Lockout and Tagouts Conclusions

SRNS has implemented an adequate LO/TO program that meets the requirements for controlling hazardous energy sources. The observed LO/TO activities were performed in accordance with established procedures, and personnel demonstrated appropriate attention to detail. All interviewed LO/TO personnel understood the importance of correctly de-energizing equipment prior to work and controlling LO/TO processes.

3.6 Independent Verification

This portion of the assessment evaluated the use of IV by SRNS operations personnel for ensuring that important equipment configurations are maintained in accordance with controlling documents.

SRNS operations personnel adequately performed IV (i.e., two persons performing verifications sequentially and independently) for observed activities to ensure that important equipment configuration was maintained. Manual 2S, procedure 5.7, *Verification Methodologies*, adequately addresses the requirements of DOE Order 422.1, attachment 2, paragraph 2.j, by specifying verification techniques. Additionally, ADM TRIT-6312, *Procedure Performance*, identifies the specific situations and components that require IV. For situations in which IV is not possible (e.g., areas covered by two-person rule controls), Manual 2S, procedure 5.7 allows concurrent dual verification (i.e., two people performing verifications simultaneously). Operations personnel performing IV of an observed LO/TO installation demonstrated adherence to Manual 2S, procedure 5.7. The operators performing the IV activities were thorough and verified that the component label and position matched the expected label and position indicated on the LO/TO. The operators performing the IV activities understood and demonstrated the prescribed methodologies in Manual 2S, procedure 5.7, ensuring the independence of their sequential verifications to avoid any individual bias.

Independent Verification Conclusions

SRNS adequately uses IV to ensure that important equipment configurations are maintained. SRNS operations personnel adequately performed IV for the observed activities to ensure that important equipment configuration was maintained. The individuals who were observed performing IV activities were thorough and understood the methodologies for ensuring independence.

3.7 Logkeeping

This portion of the assessment evaluated the SRNS operations practices that are meant to ensure thorough, accurate, and timely recording of equipment information for performance analysis and trend detection.

SRNS operations personnel adequately performed logkeeping in accordance with Manual 2S, procedure 2.4, *Logkeeping*, as modified by ADM TRIT-6324. These procedures adequately address the requirements of DOE Order 422.1, attachment 2, paragraph 2.k. An approved alternate implementation method established by ADM TRIT-6324, section 5.1.5, *Operating Logs (2S-2.4)*, appropriately specifies which key positions are required to maintain narrative logs. The reviewed Auxiliary Operator Facility round sheets appropriately provided for recording narrative entries in addition to facility data. Seven

narrative logs and three round sheets reviewed by EA were generally adequate, with some minor legibility issues, and contained appropriate entries with proper techniques for recording late entries and correcting entries; supervisory reviews and annotations were adequately completed. Logbook retention is specified by ADM TRIT-6324, and EA verified the practice as implemented by operations personnel in the control rooms where logs are stored. The electronic logbook used by the Shift Technical Engineer meets all requirements for logkeeping and includes useful features, such as search and export, for providing information to SRNS Tritium Facilities managers and SRFO personnel. Other control room logs that are classified are appropriately not maintained electronically.

Logkeeping Conclusions

SRNS operations uses adequate practices to ensure that thorough, accurate, and timely operations logs are recorded. SRNS personnel adequately performed logkeeping in accordance with governing procedures.

3.8 Turnover and Assumption of Responsibilities

This portion of the assessment evaluated the performance of shift turnovers by SRNS operations personnel.

SRNS operations personnel adequately performed turnovers during the observed shift changes and worker replacements. Manual 2S, procedure 4.1, *Shift Turnover*, adequately defines all key positions and the process for formal turnover of operations from one shift to another and from one person to another, ensuring thorough understanding of equipment status and in-progress or planned activities. Manual 2S, procedure 4.1 also includes the defined content of turnover checklists, ensuring comprehensive communication and documentation of current operations. All interviewed operations personnel were familiar with the expectations for turning over in-progress activities. During EA observations of shift turnovers at TEF and the HAOM facility, operations personnel effectively transferred information on the equipment status from the outgoing shift to the incoming shift in accordance with Manual 2S, procedure 4.1, and properly recorded turnover information. The observed shift turnovers allowed sufficient time for oncoming operations personnel to review logbooks and other document updates and discuss any information contained in the turnover documentation. The reviewed SOM log at the TEF control room properly reflected the signature of the oncoming SOM; however, the SOM log did not include the signature of the outgoing SOM for the previous shift turnover. When EA notified management of this discrepancy, the operations organization performed an audit of all logs and found one additional individual who had not properly signed the SOM log upon turnover. Both discrepancies were corrected.

Turnover and Assumption of Responsibilities Conclusions

SRNS operations personnel adequately performed turnovers during observed shift changes and worker replacements. Manual 2S, procedure 4.1 defines an adequate process to ensure the transfer of information between outgoing and oncoming shift personnel. With a few minor exceptions, observed shift turnovers were consistent with Manual 2S, procedure 4.1, as activities in progress at the time of turnover were correctly transitioned, forms documenting turnover were completed and signed, and appropriate turnover information was communicated.

3.9 Control of Interrelated Processes

This portion of the assessment evaluated the control of interrelated processes through established operating practices that support facility safety and operations, as implemented by SRNS operations personnel.

Interrelated processes were controlled in accordance with Manual 2S, procedure 5.14, *Control of Interrelated Processes*, which adequately defines responsibilities, requires training and qualification, and

establishes lines of communication relative to agreements in accordance with DOE Order 422.1, attachment 2, paragraph 2.m. Interviewed SRNS SOMs were familiar with the interrelated processes provided by Site Infrastructure (SI), including fire water, electrical power, and steam. Satisfactory lines of communication were demonstrated in the HANM control room during the observed restoration of an electrical feed. The fire water service is credited as safety significant in the safety basis and is governed by F-MOU-H-00001, *Memorandum of Understanding [MOU] Between Site Infrastructure and Savannah River Tritium Enterprise for Fire Water Supply*. This MOU adequately addresses the responsibilities of each party to the agreement with respect to the operation and inspection, testing, and maintenance of the systems. The MOU also establishes lines of communication between operations personnel and SI operators.

Although the MOU addresses the responsibility of SI personnel to notify the HANM SOM of any impairment that degrades the fire water supply system or any unplanned system outage, the MOU does not include the requirement to notify the TEF SOM, as credited in the TEF documented safety analysis (DSA). The TEF DSA, WSRC SA-1-2-VOL-4, *Tritium Extraction Facility Safety Analysis Report*, chapter 4, section 4.4.2, states, “Additionally, site infrastructure personnel are required to notify the Tritium Facilities operations shift management of any emergency/unplanned service outages.” Section 5.7 of the TEF DSA further explains, “Site infrastructure maintains the firefighting water supply in accordance with NFPA codes but does not have technical safety requirements (TSRs) that require the firefighting water supply to be operable. This vulnerability has been assessed and adequate compensatory measures are implemented for loss or impairment of the firefighting water supply for TEF.” Contrary to section 4.4.2 of the TEF DSA, the current MOU between SRTE and SI personnel does not require notification of the TEF SOM in the event of a system impairment that degrades the fire water supply system or any unplanned system outage. (See **Deficiency D-SRNS-3**.) Without a requirement to notify TEF operations management, the TEF safety basis assumptions may be unprotected, and the risk associated with analyzed fire hazards may increase because of delayed implementation of compensatory measures.

Control of Interrelated Processes Conclusions

Control of interrelated processes by SRNS operations is adequately established and generally effective. However, the MOU for the fire water supply does not require SI personnel to notify the TEF SOM of system impairments or unplanned outages.

3.10 Technical Procedures

This portion of the assessment evaluated the processes and procedures SRNS uses to establish and implement accurate, understandable written technical procedures.

SRNS has adequately implemented processes for establishing, maintaining, and using written technical operating procedures at the Tritium Facilities in accordance with Manual 2S, procedure 1.1, *Procedure Administration*; Manual 2S, procedure 1.3, *Procedure Compliance*; and ADM TRIT-6312. These procedures adequately address the requirements of DOE Order 422.1, attachment 2, paragraph 2.p. ADM TRIT-6312 fully incorporates requirements for procedure content, including consistent format and use of terms, as observed during the review of procedures. It also provides sufficient direction to ensure formality in the use of procedures. SRNS includes procedure writers on shift to allow a quick and efficient response when initiating immediate procedure changes and coordinating other changes. Training on revised procedures is appropriately graded based on the scope and significance of the change. During turnover and pre-job briefings, managers demonstrated that they support the freedom of workers to pause work for clarification or to stop work for safety reasons. SRNS operations personnel were observed appropriately using aspects of self-checking, including reader-worker and place-keeping techniques, when implementing use-every-time procedures both in the field and in the control rooms, as described by Manual 2S, procedure 1.3. During the observation, the operations personnel properly checked to ensure

that all of the procedures in use were the currently approved versions. Electronic procedures were used proficiently at TEF during the observed auxiliary operator rounds and TSR surveillances. EA observed that procedure validation processes were also adequate.

Technical Procedures Conclusions

SRNS has adequately implemented processes for establishing, maintaining, and using written technical operating procedures in accordance with Manual 2S and ADM TRIT-6312.

3.11 Component Labeling

This portion of the assessment evaluated SRNS operations personnel's use of component labeling to accurately identify equipment.

SRNS operations personnel used component labeling effectively to accurately identify the observed process equipment. Manual 2S, procedure 5.11, *Equipment and Piping Labeling*, adequately addresses the requirements of DOE Order 422.1, attachment 2, paragraph 2.r. The interviewed facility managers were aware of their responsibility for component labeling. The observation of facility equipment demonstrated that labels are properly applied, enabling facility personnel to accurately identify equipment. For example, walkdowns of each facility demonstrated that safety significant equipment, valves, instruments, and piping (e.g., equipment identified in the Fire Suppression Sprinkler System and Tritium Activity Monitoring System piping and instrumentation diagrams) exhibited the appropriate labels. Walkdowns also confirmed adequate maintenance of component labels, including the prompt identification and replacement of lost or damaged labels, as all observed component labels were in good condition.

Component Labeling Conclusions

SRNS operations personnel used component labeling effectively to accurately identify the observed process equipment.

3.12 Field Element Oversight

This portion of the assessment evaluated how SRFO has established and implemented processes for conducting oversight of operational activities performed at the Tritium Facilities.

SRFO assessment and oversight planning and execution are adequately described by SV-PRO-011, *Assessment and Oversight Program*, and SV-PRO-028, *Assessment Planning Process*. SV-PRO-028 adequately establishes the process for developing the annual assessment plan using principles of risk management. The integrated assessment plan, SV-PLN-002, *Site Integrated Assessment Plan*, has an adequate scope and frequency based on the resources available and includes four conduct of operations functional area assessments for fiscal year 2022. However, EA observed that conduct of operations assessments past fiscal year 2022 are not included in the current three-year plan out to fiscal year 2025. Mentoring of assessors described in SV-PRO-011 is an effective means of gaining experience; however, the guidance provided in section 5.1, *Assessor Qualification*, does not include the use of National Training Center assessment training courses. (See **OFI-SRFO-1**.)

SRFO has implemented an effective Facility Representative (FR) program to provide Federal line managers with accurate and objective information on the effectiveness of contractor work performance and practices. SRFO implementing procedure SV-PRO-010, *Facility Representative Program*, adequately describes the expectations and requirements for FR duties, authorities, and responsibilities. SRFO has assigned four full-time, fully qualified individuals as FRs at the Tritium Facilities. The most recent SRFO staffing analysis indicates that two additional FRs/subject matter experts are warranted. The

FR staff is currently meeting operational needs. The qualification process for FRs follows the applicable requirements of DOE Order 426.1B, *Department of Energy Federal Technical Capabilities*, and DOE-STD-1063-2021, *Facility Representatives*, resulting in technically competent FRs who can effectively carry out their oversight responsibilities.

SRFO assessments of conduct of operations consist of daily observations and periodic focused surveillances, providing an effective evaluation of the SRNS program and its implementation. A 2022 assessment of conduct of operations focused on independent verification; the assessment was comprehensive and guided by formally documented criteria. FRs maintain daily records of their activities and effectively use the Site Tracking, Analysis, and Reporting System report module for recording results that are searchable for trends. EA observed FRs providing prompt feedback from their field observations and safety concerns to the facility management. Three reviewed FR oversight records demonstrated an appropriate level of detail. The 2021 SRFO triennial self-assessment of the FR program demonstrated generally acceptable program implementation, although the self-assessment identified a finding that the three-year periodicity for FR program evaluation required by DOE-STD-1063-2021 had not been maintained. This EA assessment identified that SRFO oversight personnel do not perform irregular, unannounced backshift assessments as recommended by DOE-STD-1063-2021, which states: “FRs should vary their day-to-day presence in assigned site/facilities to show a degree of unpredictability and spontaneity.” (See **OFI-SRFO-2**.)

Field Element Oversight Conclusions

SRFO meets the oversight requirements of DOE Order 422.1 and has implemented an effective FR program for conducting oversight of operational activities at the Tritium Facilities. SRFO actively and effectively conducts oversight of SRNS operational activities and provides the results to SRNS management.

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

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.

Savannah River Nuclear Solutions, LLC

Deficiency D-SRNS-1: The SRNS conduct of operations framework allows information to be posted and used to assist personnel in performing tasks but does not require that information to be periodically reviewed for accuracy and correctness. (DOE Order 422.1, attachment 2, paragraph 2.q)

Deficiency D-SRNS-2: The SRNS operations organization has not implemented a process to ensure the removal of deficient equipment condition tags following the repair of the associated equipment. (Manual 2S, procedure 5.6)

Deficiency D-SRNS-3: SRNS has not implemented agreements with SI personnel that require notification of the TEF SOM in the event of system impairments that degrade the fire water supply system or unplanned system outages. (TEF DSA, section 4.4.2)

7.0 OPPORTUNITIES FOR IMPROVEMENT

EA identified three OFIs 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 expanding the list of important plant systems and associated components identified in ADM TRIT-6324 that require initial and periodic system alignment checks.

Savannah River Field Office

OFI-SRFO-1: Consider requiring the National Training Center assessment fundamentals course as training for implementing the assessment and oversight program described in SV-PRO-011.

OFI-SRFO-2: Consider establishing goals for conducting spontaneous and/or unannounced backshift assessments by FRs.

Appendix A Supplemental Information

Dates of Assessment

Onsite Assessment: June 13-16, 2022

Office of Enterprise Assessments (EA) Management

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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
Kevin M. Witt, Director, Office of Nuclear Safety and Environmental Assessments
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