Independent Assessment of Safety System Management at the Savannah River Site Concentration, Storage, and Transfer Facilities

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Office of Enterprise Assessments
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Acronyms

CFR	Code of Federal Regulations
CGD	Commercial Grade Dedication
CM	Corrective Maintenance
CSE	Cognizant System Engineer
CSTF	Concentration, Storage, and Transfer Facilities
DCP	Design Change Package
DOE	U.S. Department of Energy
DOE-SR	DOE Savannah River Operations Office
DSA	Documented Safety Analysis
EA	Office of Enterprise Assessments
FE	Facility Engineer
HDB	H-Area Diversion Box
LFL	Lower Flammability Limit
LW	Liquid Waste
M&TE	Measuring and Test Equipment
NMMP	Nuclear Maintenance Management Program
OFI	Opportunity for Improvement
P&ID	Piping and Instrumentation Diagram
PM	Preventive Maintenance
QA	Quality Assurance
QAP	Quality Assurance Program
SC	Safety Class
scfm	Standard Cubic Feet per Minute
SDD	System Design Description
SHR	System Health Report
SR	Surveillance Requirement
SRMC	Savannah River Mission Completion, LLC
SRNS	Savannah River Nuclear Solutions, LLC
SRS	Savannah River Site
SS	Safety Significant
SSCs	Structures, Systems, and Components
SSO	Safety System Oversight
STAR	Site Tracking, Analysis, and Reporting
TSR	Technical Safety Requirement
TWD	Technical Work Document
VS	Vital Systems
WDED	Waste Disposition Engineering Division
WO	Work Order

INDEPENDENT ASSESSMENT OF SAFETY SYSTEM MANAGEMENT AT THE SAVANNAH RIVER SITE CONCENTRATION, STORAGE, AND TRANSFER FACILITIES

Executive Summary

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted an independent assessment of safety system management implemented by Savannah River Mission Completion, LLC (SRMC) at the Savannah River Site (SRS) from November to December 2022. The assessment focused on safety class (SC)/safety significant (SS) structures, systems, and components (SSCs) at the Concentration, Storage, and Transfer Facilities (CSTF) and included a review of contractor safety management programs and Federal oversight provided by the DOE Savannah River Operations Office (DOE-SR). The facilities within the CSTF complex are, in aggregate, a hazard category 2 facility that stores and processes wastes generated at other facilities across SRS.

EA identified the following strengths:

- SRMC has implemented an effective commercial-grade-dedication process that provides reasonable assurance that SC/SS SSCs not available from qualified suppliers are adequately procured and can perform their intended safety functions. Further, the reviewed commercial-grade-item evaluations were of high quality.
- Operations activities supporting CSTF SC/SS SSCs are adequate to ensure that operators are informed of conditions, operate equipment properly, monitor system function and status, and identify problems when they arise. SRMC operations personnel effectively established and implemented observed shift turnovers, operator rounds, system walkdowns, and system equipment lineups.
- SRMC performs periodic self-assessments of CSTF safety system engineering, configuration management and operations processes, and appropriately identifies deficiencies. Feedback information is used regularly to focus attention on issues and drive performance improvement.
- DOE-SR facility engineers are knowledgeable of safety systems and periodic assessments are effective and appropriately documented.

EA also identified several weaknesses as summarized below:

- SRMC did not provide an adequate basis in the documented safety analysis (DSA) for determining that doubling of the required exhaust ventilation flowrate was sufficient to remain below 25% of the lower flammability limit in each pump tank and account for flow imbalances in the system.
- SRMC did not provide an adequate basis in the DSA for determining that the mid-1950s installed ductwork meets the intent of DOE HDBK-1169-2003-2003, *DOE Handbook-Nuclear Air Cleaning Handbook*, criteria for level 4 ductwork.
- SRMC procedure E7-2.05A, *LW Modification Traveler*, does not properly invoke the graded approach for the specification of post-modification test requirements for SC/SS SSCs.
- SRMC did not properly document a quality assurance hold point when field conditions changed requiring a modification to the alarm setpoint for the tank 32 temperature transmitter.
- SRMC did not obtain a field change when it was discovered that the technical work document referenced the wrong section of the surveillance procedure to place the tank 27 hydrogen analyzer in its normal configuration and operating pressure.
- SRMC did not obtain an engineering review of a work order for a SC/SS piece of equipment.
- Due to staffing issues, DOE-SR is not performing safety system oversight assessments at the frequency specified in DOE guidance.

In summary, SRMC has established the essential programs and capabilities necessary for managing and maintaining SC/SS SSCs. DOE-SR is meeting the requirements of DOE Order 426.1B and has implemented an adequate safety system oversight program.

INDEPENDENT ASSESSMENT OF SAFETY SYSTEM MANAGEMENT AT THE SAVANNAH RIVER SITE CONCENTRATION, STORAGE, AND TRANSFER FACILITIES

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 safety system management for the Concentration, Storage, and Transfer Facilities (CSTF) at the Savannah River Site (SRS) from November to December 2022. This assessment was conducted as part of an ongoing review of the management of safety systems at hazard category 1, 2, and 3 nuclear facilities across the DOE complex. The purpose of this effort was to evaluate processes for monitoring, maintaining, and operating safety systems to ensure their continued capability to reliably perform their intended safety functions.

The facilities within the CSTF complex are, in aggregate, a hazard category 2 facility that stores and processes wastes generated at other DOE facilities across SRS. CSTF has the capability to perform volume reduction, where appropriate, and transfer waste between facilities for treatment and to other facilities, such as the Defense Waste Processing Facility for vitrification, the Salt Waste Processing Facility for cesium and actinide separation, or the Saltstone Production Facility for disposition. The DOE Office of Environmental Management's Savannah River Operations Office (DOE-SR) is responsible for oversight of CSTF. Savannah River Nuclear Solutions, LLC (SRNS) is the overall management and operating contractor for SRS; however, Savannah River Mission Completion, LLC (SRMC) manages CSTF under a separate prime contract covering liquid waste (LW) operations for DOE-SR. In most respects, SRMC operates under the sitewide processes established by SRNS. This assessment also evaluated the effectiveness of DOE-SR's oversight of CSTF safety system management.

This assessment was conducted in accordance with the *Plan for the Independent Assessment of Safety System Management at the Savannah River Site Concentrate Storage & Transfer System,* November-December 2022. The CSTF systems within the scope of this assessment included the safety class (SC) tank 30, 32, and 37 temperature indicators; the safety significant (SS) waste tank hydrogen monitor and interlock; and the transfer facility ventilation system for H-Area Pump Tank (HPT)-2/H-Area Pump Pit (HPP)-2/HPT-3/HPP-3/HPT-4/HPP-4/H-Area Diversion Box (HDB)-2. EA discussed and coordinated the scope of this assessment with the DOE-SR Waste Disposition Engineering Division (WDED) Director and staff.

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 related to engineering design; configuration management; system engineering; operations; maintenance; surveillance and testing; quality assurance (QA); feedback and improvement; and Federal oversight. Further, EA examined the flowdown of safety basis requirements into technical baseline documents and the application of appropriate technical requirements in the procurement process for component spares and replacement items.

EA used Criteria and Review Approach Document (CRAD) 31-15, Rev. 1, *Safety Systems Management Review*. In addition, EA used elements of CRAD 30-07, Rev. 0, *Federal Line Management Oversight Processes*, to collect and analyze data on DOE-SR oversight activities. EA also examined various documents, including system design descriptions (SDDs), system health reports (SHRs), work orders, procedures, engineering analyses, design change packages (DCPs), and training and qualification records. Furthermore, EA interviewed key personnel responsible for developing and executing the associated programs; observed daily activities related to operations and maintenance; and performed onsite inspections of accessible portions of the selected systems. EA also conducted interviews and reviewed assessment records to determine whether the Federal oversight program ensures that safety systems reliably perform as intended. 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 at the SRS CSTF in 2021, as documented in EA report *Independent Assessment of Work Planning and Control at the Savannah River Site F and H Tank Farms, October 2021*. The current assessment examined the completion and effectiveness of corrective actions from the finding described in the previous assessment report. Additionally, the scope of the current assessment included a review of work packages for proper identification of worker and nuclear safety hazards. Results of the corrective action assessment are included in section 3.0 of this report.

3.0 RESULTS

3.1 Engineering Design

This portion of the assessment evaluated SRMC's engineering design processes and products for technical adequacy and implementation of WSRC-SA-2002-00007, *Concentration, Storage, and Transfer Facilities Documented Safety Analysis (DSA)*, and S-TSR-G-00001, *Technical Safety Requirement (TSR) Savannah River Site Concentration, Storage, and Transfer Facilities*, such that adequate protection of the public, workers, and the environment from facility hazards is demonstrated.

Design Processes

SRMC uses generally adequate procedures for developing and maintaining engineering design products. These procedures address key engineering design process attributes, including scope, inputs, assumptions, references, identification of applicable standards, and the flowdown of safety basis requirements. The procedural requirements for documenting these attributes are sufficient to allow an independent reviewer to reach the same conclusions. Procedure E7-3.46, *Replacement Item Evaluation/Commercial Grade Dedication*, establishes an appropriate dedication process, providing directions for selecting critical characteristics, attributes, and acceptance criteria as required by 1Q-7-3, *Quality Assurance Requirements for Commercial Grade Items and Services*. Also, 11Q-1.05, *Nuclear Facility Unreviewed Safety Questions*, addresses an adequate unreviewed safety question process as required by 10 CFR 830, *Nuclear Safety Management*.

Design Products

EA reviewed 54 design products (calculations, commercial-grade-dedication [CGD] item evaluations, backfit packages, plant modification travelers, and drawings) associated with modifications (J-DCP-H-21009, J-DCP-H-21010, J-DCP-H-21011, and J-DCP-F-18001) to SC structures, systems, and components (SSCs) and also related to the design of the SS HDB-2 transfer facility ventilation system. Overall, the design products were developed in accordance with SRMC design procedures and are of

appropriate quality; however, several weaknesses were identified. Additional details are provided in the sections below.

Backfit Analysis Process

J-BFA-G-00005, *CSTF Waste Tank Thermowells and Thermocouples Backfit Analysis*, evaluates waste tank thermowells, in-tank thermocouples, extension wires, and tank top terminal strips with respect to the criteria of E7-3.41, *Backfit Analysis Process*, to determine whether the components can be designated SC to protect assumptions and initial conditions related to the waste tank explosion accident analysis in the DSA. The backfit process, as described in E7-3.41, is a qualitative evaluation tool to determine whether an existing SSC can perform its new safety function. The backfit process used by SRMC in E7, Procedure 3.41, is not clearly specified in DOE directives, guidance, or invoked standards; therefore, the required information in a backfit analysis, as well as the applicability of QA design control requirements, could not be determined. (See also Section 8.0).

HDB-2 Transfer Facility Ventilation System

Section 4.4 of the DSA credits the SS HDB-2 ventilation system that provides an exhaust from the SS pump tank vapor plenums and pump pits to mitigate the potential for a pump tank explosion (due to internal hydrogen generation and buildup). Section 4.4 specifies a performance criterion of less than or equal to 25% of the lower flammability limit (LFL) for the concentration of flammable vapors in those areas. The SS HDB-2 ventilation system consists of below-ground ductwork, constructed in the mid-1950s from schedule 10 stainless steel, butt-welded pipe encased in concrete. Extended runs of this ductwork (>100 feet) connect multiple tanks to an above-ground assembly with a HEPA filter housing, instrumentation, and exhaust fan. EA reviewed calculations and DSA-related information to determine whether the HDB-2 transfer facility ventilation system could perform its intended safety function to prevent a hydrogen explosion in a pump tank.

Calculation S-CLC-G-00209, *Explosion in a Transfer Facility*, establishes the airflow rates necessary for each pump tank to meet the DSA performance criteria for flammable vapors. These required flow rates are the basis for the calculation of the acceptance criterion for Limiting Condition for Operation 3.7.5 (exhaust flow indicator ≥ 0.2 inches water column) developed in J-CLC-H-00787, *Instrumentation Uncertainties Evaluation HDB-2 Ventilation Flow (Purge Exhaust) Loop: HL-241035-HV-FE-2011 (U)*. The required flow rate for HDB-2 is based on 20 standard cubic feet per minute (scfm) per pump tank, multiplied by 3 pump tanks, and doubled to 120 scfm to account for flow imbalances. The configuration of the HDB-2 transfer facility ventilation system does not allow for monitoring the flow rates of each flow stream. Consequently, only the total airflow upstream of the exhaust is measured. Contrary to DOE-STD-3009-94 CN3, sec. 4.4.X.4, the DSA did not adequately evaluate the capabilities of the SSC to meet performance criteria for flammable vapors. Thus, the technical basis for determining that doubling of the required exhaust ventilation flowrate was sufficient to remain below 25% of the LFL in each pump tank and account for flow imbalances in the system was not adequately justified in the DSA. Inadequately justified assumptions in the DSA could adversely impact the ability of an SC/SS SSC to perform its intended safety function. (See **Deficiency D-SRMC-1**.)

Section 4.4.9.2 of the CSTF DSA states that pump pit/pump tank ventilation systems shall be maintained as at least a level 4 duct class per DOE-HDBK-1169-2003, *DOE Handbook-Nuclear Air Cleaning Handbook*, for normal permissible leakage rates. Per M-CLC-G-00460, *Permissible Leak Rate for Level 4 Waste Purge Ventilation Systems*, the assumed bounding in-leakage rate associated with the level 4 duct class for all transfer facilities is 1 scfm. The intent of this calculation was to quantify the DSA assumption that level 4 duct in-leakage was a small amount. The calculation assumes that construction standards in the 1950s were similar to current construction standards for nuclear ventilation systems;

however, no comparison was made between the code of record (assumed to be Dupont Standards) and DOE-HDBK-1169-2003. Subsequently, SRMC provided an additional reference, WSRC-TR-2005-00532, *A Structural Integrity Evaluation of the Tank Farm Waste Transfer System*. The purpose of this calculation was to evaluate the estimated life of Schedule 10 stainless steel used for waste transfer core pipes but does not provide a basis to determine whether ventilation system construction (in the case of HDB-2, also schedule 10 stainless steel pipe) is consistent with level 4 duct class requirements. The assumption for potential in-leakage from ventilation system components, such as dampers, filter housings, fan housings, sample ports, flow instruments, valves, fan seals, or any non-welded mechanical connections, was not addressed in the DSA. Contrary to DOE-STD-3009-94 CN3, sec. 4.4.X.4, the DSA did not adequately evaluate the capabilities of the SSC to meet performance criteria for allowable in-leakage. Thus, the basis for determining that the mid-1950s installed ductwork meets the intent of DOE-HDBK-1169-2003 criteria for level 4 ductwork was not adequately justified in the DSA. Inadequately justified assumptions in the DSA could adversely impact the ability of an SC/SS SSC to perform its intended safety function. (See **Deficiency D-SRMC-2**.)

During the review of M-CLC-G-00460, EA also identified a separate issue related to waste tank ventilation systems. M-CLC-G-00460 does not account for in-leakage through an opening between the fan housing intake and its shaft for four SC waste tank purge ventilation systems for tanks 3, 7, 8, and 9. In these four systems, the flow instrument is located downstream of the blower. Thus, the basis for determining that the ventilation ductwork of the installed waste tank meets the DOE-HDBK-1169-2003 criteria for level 4 ductwork was not justified or documented in the DSA. (See **Deficiency D-SRMC-2**.)

Tanks 30, 32, and 37 Temperature Monitors

In the area of post-modification testing, EA identified that section VI, *Design Output, Modification Test*, of the modification traveler was blank for the SC SSC modifications J-DCP-H-21009, J-DCP-H-21010, and J-DCP-H-21011. The implementing work orders (WOs) developed per Manual 1Y, Procedure 8.20, specified the appropriate post-modification tests; however, a reference to the WO and requirements was not included in the modification traveler. E7-2.05A, sec. 5.3.4[4], requires test requirements to be established up front during design development for large, complex, or novel designs since the testing provisions themselves might impact the actual design needs. For simple, small-scope designs, such as those in DCPs J-DCP-H-21009, -21010, and -21011, SRMC stated that the testing provisions within the modification traveler or DCPs do not need to be included as part of design development. SRMC considered this a proper application of the graded approach.

Contrary to requirements in 1Q-3-1, *Design Control,* sec. 5.4, item 4, and G-QP-G-00002, *Savannah River Site (SRS) Management and Operations (M&O) Quality Assurance Graded Approach Plan,* sec. 3.0 and table 5.2-4, procedure E7-2.05A, sec. 5.3.4[4], does not properly invoke a graded approach for performing post-modification testing since specification of functional acceptance criteria or development of a formal test plan per S4 TST.09, *Test Specification Plan for Preparation for Liquid* Waste, is on an "as needed" basis for SC/SS items. The lack of rigor in the specification of testing requirements may lead to malfunctions that are only revealed during abnormal conditions, which could adversely impact credited SC/SS SSC functions.

Procedure 1Q-3-1, sec. 5.4, item 4 states, in part, "Specify required inspections and tests and include or reference appropriate acceptance criteria." In addition to considerations for impact on safety described in G-QP-G-00002, sec. 3.0 states that the graded approach is "the process of ensuring that the level of analysis, documentation, and actions used to comply with (or implement) QA requirements are commensurate with": (1) the relative importance to safety, safeguards, and security; (2) the magnitude of the hazards involved; (3) the life cycle stage of a facility; (4) the programmatic mission of a facility; (5) the particular characteristics of a facility; (6) the relative importance of radiological and non-radiological

hazards, and (7) any other relative factor. Various sections of E7-2.05A indicate that formal design processes are not required for simple, small scope designs. The importance to safety, including functional classification, should be the primary factor in determining the required level of rigor because even small or simple changes could impact nuclear safety. Therefore, E7-2.05A does not properly implement the graded approach. Additionally, E7-2.05A does not refer to the use of the maintenance work control process (work orders) for specification of post modification test requirements for SC/SS SSCs. (See Deficiency **D-SRMC-3.**)

Consistency with the Safety Basis

SRMC has established a generally adequate process for verifying the accuracy of DSA inputs and assumptions; however, there are some inconsistencies between some engineering products and DSA analyses as shown by the following examples: (See **OFI-SRMC-1**.)

- Figure 4.4-3 of the DSA and section B3.7.5 of the TSR document identify HDB-2 flow as consisting of three separate streams, stating that the fourth stream is "blanked off," a configuration that is not clearly indicated on the design output drawings. Piping and instrumentation diagram (P&ID) M-M6-H-8904, sheet 0, *H Area Old Hill Heating and Ventilation for Pump Pits and Pump Pit 1 Waste Transfer System*, shows that airflow at the filter/fan assembly is a composite flow fed by four separate streams, but with the presence of a remote connector (colored in solid black) at nozzle 22, which connects HPP-1 to the transfer facility ventilation system. The symbol used to show the position of the closed remote connector is not defined on drawing M-M6-H-8904 or on W201680, *Flow and P&I Diagram Legend*.
- Additionally, drawing W163527, sheet 0, *Savannah River Plant 200 Area – Bldg. 241-H Pumping Pit Equipment Arrg't. – Plan*, describes a connection from the fourth stream as "Dummy." It is unclear whether a closed remote connector meets the DSA requirement to be blanked off.
- P&ID M-M6-H-8904 contains a note that the underground piping configuration was not "field verified." The meaning of this statement is unclear.

Finally, SRMC permits the use of simple calculations in the DSA; however, this practice is not addressed by SRMC procedures. (See **OFI-SRMC-2**.) For example, the flow requirement of 120 scfm for the HDB-2 ventilation system is based on 20 scfm per pump tank multiplied by three pump tanks and doubled for conservatism. The only place this calculation is documented is in the DSA. Typically, DSAs are based on standalone calculations performed using consistent QA design control requirements.

Engineering Design Conclusions

SRMC has established a generally adequate process for developing and maintaining engineering design products. Two weaknesses were identified for not adequately evaluating the capabilities of SSCs to meet performance criteria as required by Section 4.4.X.4 of DOE-STD-3009-94 CN3. EA also identified weaknesses associated with a lack of consistency between the DSA and some engineering design products for the HDB-2 transfer facility ventilation system.

3.2 Configuration Management

This portion of the assessment evaluated SRMC's configuration management of SC/SS SSCs to ensure reliable performance of intended safety functions through maintaining consistency between requirements, documents, and physical configuration; controlling system changes; and performing self-assessments.

Configuration Management Processes

In general, SRMC's configuration management processes comply with DOE Order 420.1C and DOE-STD-1073-2016, *Configuration Management*, ensuring that DSA requirements and performance criteria are effectively integrated into observed SC/SS SSC documents. Specifically, EA observed the following:

- The reviewed design documentation (i.e., drawings, calculations, diagrams, and specifications) for the tank 27 hydrogen monitor actuation logic and tanks 30, 32, and 37 temperature indication adequately addresses DSA chapter 4 system requirements and performance criteria.
- The reviewed SDDs accurately describe SS SSCs and integrate the reviewed design documentation consistent with the DSA.
- During facility walkdowns of the tank 27 hydrogen monitor and tanks 30, 32, and 37 temperature indicators, the observed physical configurations and labeling of system components were consistent with the approved P&IDs specified in the SDDs and "as-built" drawings.
- Reviewed documents confirmed that formal quality control and assurance practices ensured that performance criteria were met during procurement, installation, and operation of SS SSCs.
- Procurement documents for the tank 32 temperature indicator replacement demonstrate the appropriate acquisition of this device through SRMC's CGD program.
- After one of the tank 32 temperature indicators was replaced (WO 1979401-01, *SC Verify Parts/Config Temp Transmitter HL-241932-WTE—TIT-6884E*), post-maintenance testing demonstrated that the acceptance criteria were met, so the system was returned to operation.
- Operational surveillance round sheets demonstrate continued operability of SC/SS SSCs.

System Changes

Engineering instructions for the proposed design modifications clearly identified the new components and the differences between the old and new system performance and were effectively coordinated with facility operations and integrated into maintenance work orders. Documents affected by the proposed changes (e.g., P&IDs, engineering evaluations, calculations, CGD item evaluations, installation instructions, post-modification acceptance criteria, and SDDs) were appropriately identified and included in the change process. A review of four design changes reflected that they were adequately controlled and documented during design, procurement/CGD, installation, and operation of SC/SS SSCs. The proposed system changes were adequately described in the DCPs to enable a thorough understanding of the design, component specifications, and potential impacts. An independent cognizant system engineer (CSE), other discipline representatives, and the senior design authority engineer appropriately reviewed these DCPs and sampled associated design change notices to ensure that system requirements and performance criteria were not affected in a manner that could adversely impact the ability of the system to perform its intended safety function.

Self-Assessments

Overall, SRMC adequately implemented an effective self-assessment program for configuration management. The SRMC contractor assurance organization uses Manual S13, Procedure 5.2, *Development and Performance of the SRMC Risk-Based Integrated Assessment Plan*, to develop an integrated assessment plan for functional areas in the site tracking, analysis, and reporting (STAR) system. Assessment performance objectives and criteria are used to plan and prioritize assessments. SRMC performs self-assessments of configuration management using Manual 12 Q, Procedure SA-1,

Self-Assessment, which effectively addresses assessment purpose and scope, lines of inquiry, and methods for conducting self-assessments. During the past two calendar years, SRMC conducted 18 self-assessments of configuration management for the CSTF, primarily assessing systems files for compliance with S4-ENG.45, *VSS System Design Descriptions and System Files*.

Configuration Management Conclusions

SRMS generally ensures consistency between requirements, documents, and the physical construction of CSTF SC/SS SSCs. SRMC has also established and implemented an effective independent assessment program for configuration management.

3.3 Cognizant System Engineer Program

This portion of the assessment evaluated SRMC's CSE program implementation, SDDs, and CSE system assessments.

CSE Program Implementation

SRMC implements the CSE program through training and qualification, a documented list of all active SC/SS SSCs, and CSE support of operations and maintenance personnel.

SRMC implements a generally adequate CSE training program that ensures that CSEs are properly trained and qualified. LWOTS000, *LW Engineering Training Program Description*, adequately defines the CSE training and qualification program requirements and process as required by DOE Order 420.1C, att. 2, ch. V, 3.e. SRMC properly assigned designated CSEs to the three reviewed active SC/SS SSCs. Reviewed qualification records for these CSEs demonstrated appropriate completion of all training and qualification program requirements, including the oral board examination. However, SRMC has only one qualified CSE for each of the three reviewed systems, without having backup CSEs or providing procedural instructions to address CSE actions when the qualified CSE for a safety system is unavailable. (See **OFI-SRMC-3**.)

SRMC effectively established and implements a list of all active SC/SS SSCs. Procedure E7-1.31, *Master Equipment List*, adequately provides the requirements, responsibilities, and methodology for identifying the SSCs to be controlled in the master equipment list (MEL). The SRMC MEL, maintained in Smartplant® design software, appropriately identifies all active SC/SS SSCs. The MEL data in Smartplant is then appropriately uploaded into Asset Suite® to create maintenance WOs. Sampled MEL entries for the three assessed SSCs confirmed that identified SSC functional classification was aligned with the safety basis.

CSEs actively support operations and maintenance personnel to ensure that SC/SS SSCs comply with safety basis requirements. The CSEs demonstrated adequate knowledge, understanding, and ownership of their assigned safety systems. Three reviewed maintenance WOs demonstrated that CSEs provided adequate instructions and technical direction to operations and maintenance personnel. System equipment used in operations and maintenance is periodically assessed in the SHR.

System Design Descriptions

Procedure E7-2.19, *Facility Design Descriptions and System Design Descriptions*, provides an adequate process for developing SDDs in accordance with the requirements of DOE Order 420.1C, att. 2, ch. V, 3.c.(2), and the guidance in DOE-STD-3024-2011, *DOE Standard Content of System Design Descriptions*. The SDD system file, J-SD-H-00014, *Vital Safety System – Waste Tank Temperature*

Monitoring System File, comprehensively addresses the current system configuration, satisfying the requirements and performance criteria specified in the DSA. This system file was generated per S4/ENG.45, *Vital Safety Systems – System Design Descriptions and System Files*, and serves a similar function as SDDs prepared under E7/2.19. The SDD addresses system testing and provides a comprehensive reference source for design inputs, performance standards, and surveillance requirements (SRs). The CSEs demonstrated adequate knowledge, understanding, and ownership of their assigned SDD. The reviewed SDDs were adequately developed and maintained to reflect system requirements and performance criteria in accordance with safety basis requirements.

CSE System Assessments

CSEs perform and document system assessments using SHRs that address system operability, reliability, and material condition for the tank 27 hydrogen monitor; tanks 30, 32, and 37 temperature monitors; and HDB-2 ventilation system. Procedure E7-3.04A, *Conduct of Engineering LW SSC Performance Monitoring*, provides an adequate process that fully addresses the requirements of DOE Order 420.1C, att. 2, ch. V, 3.c.(3).

Annual SHRs for each of the three systems appropriately communicated performance information. The reviewed annual SHRs provided important information regarding safety-related systems operability, material condition, configuration management, surveillance test results, maintenance backlog, and overall system reliability and availability. In addition, quarterly SHRs are prepared for all systems within the performance monitoring program and entered into the SHR computer software. The quarterly SHRs include a color-coded status of the SSC, with recommendations for improving the performance of red and yellow statused systems. Spare parts availability is also discussed. The SHRs demonstrated that CSEs are appropriately identifying issues (e.g., system degradation and open WOs) that could impact the functional requirements specified in the DSA. SHRs for the sampled systems were reviewed to determine if CSEs are evaluating the availability of critical spare parts. Walkdowns of storage warehouses were conducted to ensure that sampled critical spare parts were available or on order.

Cognizant System Engineer Program Conclusions

SRMC implements a generally adequate CSE program. The CSEs demonstrated adequate knowledge, understanding, and ownership of their assigned safety systems, although there are no assigned backups for the systems reviewed. The reviewed SDDs were adequately developed and maintained to reflect system requirements and performance criteria in accordance with safety basis requirements. The reviewed annual SHRs adequately addressed system operability, system performance, spare parts, and maintenance activities.

3.4 Operations

This portion of the assessment evaluated SRMC's shift operations; operator training and qualification; and procedure development, use, and adherence to ensure the availability and functionality of the assessed safety systems.

Shift Operations

SRMC operations personnel effectively performed the shift turnovers observed by EA. Manual S4, Procedure OPS-SO-F-HTF.20, *F/H Tank Farms and ETF Shift Briefings Guidance*, effectively implements the requirements of DOE Order 422.1, *Conduct of Operations*, att. 2, sec 2.l. Observed shift turnovers among operations personnel were adequately conducted in a distraction-free environment, and important information was appropriately communicated on the turnover checklist. Operators effectively

and clearly articulated the status of systems under their purview, reviewed system trends and alarms, updated operator narrative logs, discussed activities for the upcoming shift, and summarized relevant system indicators and displays. Narrative logs were appropriately updated with consistent documentation of key shift activities. Upon turnover completion, the incoming operator appropriately logged acceptance of the shift prior to the outgoing operator's departure, and a public address announcement was made to inform all CSTF personnel in the field that the watch had been accepted.

Operations personnel adequately performed observed routine operational activities, including operator rounds, system walkdowns, and system equipment lineups. Appropriate control and monitoring of facility access, organized workstations with up-to-date approved operator aids, and the operators' use of relevant and readily accessible procedures were observed by EA during operator rounds on the CSTF SSCs. Field and control room operators used approved checklists and formal three-way communications (sender states information/receiver acknowledges by repeating/sender confirms or corrects) to confirm key system parameters, alarm status, and system configurations. Interviewed operators and managers exhibited a strong questioning attitude. New and experienced operators stated during interviews that they were aware that all personnel have stop-work authority; each had no fear of retaliation for reporting safety concerns and stated that management consistently values safe operations above schedule pressures.

Operator Training and Qualification

SRMC adequately ensures that control room operators and shift operations supervisors are trained and qualified to safely operate CSTF. Manual 4B, *Training and Qualification Program Manual*, adequately addresses the requirements of DOE Order 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*, to ensure that operators are sufficiently knowledgeable and skilled. Manual 4B describes an adequate process for the selection, training, and qualification/certification of personnel involved in managing and operating CSTF (e.g., operators, control room operators, and shift operations supervisors). The initial and continuing training programs of these positions appropriately consist of classroom training and computer-based training, simulator training, required reading, on-the-job training, facility walkdowns, and written and oral examinations.

SRMC's training records and qualification tracking system adequately ensures that operations personnel are qualified. Reviewed required coursework demonstrated a rigorous training process with strong emphasis on operating SSCs in accordance with applicable requirements. Eight reviewed training/qualification records demonstrated that personnel are adequately trained and qualified. These records appropriately documented that the operations personnel had completed reviews of CSTF operating procedures, passed associated knowledge tests, and demonstrated proficiency in executing key operational tasks. All eight training/qualification records adequately documented requalification in accordance with the two-year requirement specified in Manual 4B. The CSTF operations organization uses an effective electronic training and qualification tracking software application that provides operators and management with real-time notifications regarding qualification status and upcoming training requirements. Operators demonstrated that this system will not allow the assignment of workers who lack the required qualifications. During interviews, experienced and newly qualified CSTF operators demonstrated a thorough knowledge of the work and safety systems associated with their responsibilities. Operators and supervisors had strong training and knowledge related to the importance of credited systems and demonstrated good awareness of the status of associated limiting conditions for operations and SRs.

Procedure Development, Use, and Adherence

SRMC uses adequate processes for procedure development, update, and communication. Manual 2S, Procedure 1.1A, *Conduct of Operations Liquid Waste Procedure & Administration*, and Manual S25,

Liquid Waste Operations Procedure Systems Administrative Procedures Manual, provide adequate requirements for the development, validation, issuance, and revision of CSTF operating procedures, in accordance with DOE Order 422.1, att. 2, sec. 2.p. All reviewed procedures conform to Manual 2S, Procedure 1.1A and Manual S25. One reviewed updated procedure demonstrated appropriate revision and subsequent communication to the workforce. Procedural changes associated with SSC upgrades to CSTF SC temperature monitoring instruments demonstrated that operations management, safety basis subject matter experts, training coordinators, and procedure writers closely coordinated to ensure that the proposed updates considered the impacts on safe operations. Current and revised procedures are effectively communicated to the workforce in accordance with Manual 2S, Procedure 3.1, *Required Reading*. Required reading is effectively assigned and tracked to completion using the CSTF training system software. Reviewed tracking reports for required reading demonstrated that operators remain current on updated processes and procedures.

CSTF personnel demonstrated adequate use of and adherence to procedures. EA observed appropriate conduct of routine operational activities, including operator rounds, system monitoring, alarm response, and functional testing in accordance with governing procedures. Observed operators had ready access to hard copies of procedures in the CSTF control rooms and at various workstations throughout the facility. All observed procedures were properly marked and were the correct revision. Reviewed operations records (completed procedures, calibration sheets, configuration checklists, and calculation sheets) demonstrated that operators adhered to work performance instructions, including required verifications performed by qualified persons. Independent verifications were properly performed by qualified operators and appropriately documented during observed evolutions (lockout/tagout installation and removal, performance of operator rounds, and surveillance activities). Interviewed operators were appropriately aware that independent verifiers must be qualified on the systems in order to be verified, as specified in Manual 2S, Procedure 5.7, *Verification Methodologies*. Operators installing a lockout/tagout demonstrated proper actions to ensure that verifiers met requirements.

Operations Conclusions

Overall, operations activities are adequate to ensure that operators are informed of conditions, operate equipment properly, monitor system function and status, and identify problems when they arise. SRMC operations personnel adequately performed and implemented observed shift turnovers, operator rounds, system walkdowns, and system equipment lineups. SRMC adequately ensures that control room operators and shift operations supervisors are trained and qualified to safely operate CSTF. CSTF personnel demonstrated adequate use of and adherence to procedures.

3.5 Maintenance

This portion of the assessment evaluated SRMC's nuclear maintenance management program (NMMP), maintenance resources, work control process, maintenance performance, and personnel training and qualification.

Nuclear Maintenance Management Program

The SRMC NMMP is adequate for conducting maintenance activities. SRS-IM-2021-00080, *Nuclear Maintenance Management Program (NMMP) Description Document*, adequately addresses all 17 elements of DOE Order 433.1B, *Maintenance Management Program for DOE Nuclear Facilities*. SRMC has appropriately submitted its NMMP revisions to DOE-SR at least every three years as required. Additionally, the DSA appropriately addresses the NMMP in accordance with 10 CFR 830.204, *Documented safety analysis*.

Maintenance Resources

SRMC generally provides adequate resources (personnel, maintenance tracking database, facilities, and calibrated equipment) for scheduling and performing nuclear maintenance activities. Maintenance personnel staffing levels are determined annually through a formal staffing plan and updated, as required, during the year. The staffing plan asserts that, out of a total of 110 craft personnel assigned to CSTF, the tank farm maintenance organization is currently understaffed by eight mechanical and five electrical-and-instrumentation technicians. The primary reason for the staffing shortfall is the lack of qualified applicants and the tight labor market. SRMC has plans to post a new job announcement in early 2023 with the intent to hire directly into the SRMC maintenance organization. Previously, job announcements were typically made throughout DOE and across affiliated organizations, including SRNS and SRMC. In the area of planning and scheduling, maintenance resources are adequately coordinated with facility management through plan-of-the-day and plan-of-the-week meetings. EA attended several of these meetings during the assessment. This coordination demonstrates adequate use of the graded approach in prioritizing SC/SS SSCs. SRMC continues to manage the staffing challenge effectively.

Work Control Process

The SRMC work control process is adequately described in Manual 1Y, Procedure 8.20, *Work Control Procedure*. The work control process is mandatory for all organizations and includes implementation of approved modifications, fabrications, projects, preventive maintenance (PM), predictive maintenance, and corrective maintenance (CM). Cognizant quality control functions, including the need for QA hold points, are adequately defined in the work control process. Work order development and approval processes, including interdisciplinary reviews from groups such as health and safety, engineering, and operations, are adequately described. SRMC effectively uses the Asset Suite work management system to automate its management of maintenance work, assets, supply chains, operations coordination, and compliance. A scoring system is appropriately used to prioritize PM and CM work requests and planning of work orders, including placing a high priority on safety-related emergent work. This prioritization system appropriately includes criteria such as functional classification (safety vs. non-safety), impact on TSRs, outage-related, and management priority. SRMC effectively trends key performance indicators to monitor maintenance backlogs. For example, PM completion metrics for the past 12 months demonstrated that PM for SC/SS SSCs was prioritized and completed in a timely manner. However, the key performance indicators showed that the PM backlog for non-SC/SS maintenance was increasing due to staffing shortages and issues with spare parts.

Maintenance Performance

SRMC appropriately performs PM and CM and maintains maintenance histories using the Asset Suite work management system to ensure safe, efficient, and reliable operation of SC/SS SSCs. Reviewed completed PM WOs and associated work clearance permits demonstrated effective planning and coordination with facility management. The PM coordinator/planner effectively tracked observed PM work progress and performed a final review of completed PM WOs before submittal to the records management organization. The observed performance of a PM work order by EA demonstrated effective pre-job briefings; documentation of measuring and test equipment (M&TE) associated with the work; performance of work steps in sequence; proper use of hold points for quality inspections; completed post-maintenance testing; and effective post-job debriefings.

Furthermore, CM performance was observed to be generally adequate. For example, observed work activities related to the replacement of the SC tank 32 temperature transmitter, performed per WO 01979401-01, *SCTK 32 Replace Riser D1 Temp Transmitter HL-241-932-WTE—TIT-6884E*, demonstrated adequate performance. The pre-job briefing conducted by the first line supervisor was

comprehensive and attended by all team members, including QA personnel. The briefing included a discussion of the safety significance of the components involved, potential work hazards, status of lockout/tagout, use of applicable calibration and test procedures, proper use of M&TE, the need for three-way communication, lessons learned from similar maintenance, specific radiological hazards, and critical work steps, including QA hold points. Workers did not hesitate to contact their first line supervisor when problems were encountered with work steps and unexpected conditions. QA personnel were present for all work activities and signed off on associated hold points related to installation, calibration, and testing. Also, the post-maintenance surveillance test was conducted successfully in accordance the applicable steps of SW11.6-SR-3.8.8, *Surveillance Requirement Tanks 30, 32, and 37 Waste Temperature Monitoring*.

While reviewed documents and observed work performance were generally adequate, the following five performance weaknesses were identified:

- Contrary to Manual 1Y, Procedure 8.21, *Technical Work Document Compliance*, SRMC did not properly document a QA hold point when field conditions changed requiring a modification to the alarm setpoint for the tank 32 temperature transmitter. (See **Deficiency D-SRMC-4.**) Specifically, SRMC maintenance personnel identified a change in conditions that required a modification to the alarm set point. Rather than revising the work control document to add the additional QA hold point, SRMC maintenance personnel made the setpoint change with QA present, but did not document the additional QA hold point in the TWD to verify that the transmitter configuration was consistent with the alarm setpoint database as specified in step 4.2 of task 2 of WO 1979401-02, *SC Verify Parts/Config Temp Transmitter HL-241932-WTE—TIT-6884E.* Not following procedures as written can result in unintended consequences.
- Contrary to Manual 1Y, Procedure 8.21, step 5.3.5, SRMC did not obtain a TWD field change when it was discovered that the TWD referenced the wrong section of the surveillance procedure to place the tank 27 hydrogen analyzer in its normal configuration and operating pressure. (See **Deficiency D-SRMC-5.**) Allowing unapproved work procedure changes without formality can result in unintended consequences.

  During an observed work evolution, SRMC did not perform step 5.2 of WO 01873091, *TK27 T/S Repair H2 Monitor (52)*, as written to adjust the hydrogen analyzer system to normal operating configuration per surveillance SW11.6-SR-3.8.10, *Gas Release Surveillance Requirements*, sec. 4.1. However, section 4.1 was not the correct section of SW11.6-SR-3.8.10 to perform the analyzer system alignment. Instead of pausing the work and correcting the WO, the maintenance personnel enlisted operations personnel to place the analyzer into normal operating configuration and verify that the hydrogen sample flow rate was within round sheet limits. This change was not documented in a field change to the WO.
- Contrary to Manual 1Y, Procedure 8.20, att. 8.6, *Work Order Review and Approval*, SRMC did not obtain engineering review of a work order for an SC/SS piece of equipment. (See **Deficiency D-SRMC-6.**) This concern was noted in one work order. Moreover, engineering was not listed on the review/approval routing list for task one of WO01873091 to troubleshoot/repair the tank 27 hydrogen analyzer. Not involving engineering in WO reviews can result in unintended consequences.
- The wrong version of the calibration data sheet was included in the work order for tanks 30, 32, and 37 temperature monitor replacement. SRMC stated that calibration data sheets are not always included in work orders and that mechanics routinely use the instrument setpoint database to print out calibration data sheets for field use and obtain instrument configuration information. (See **OFI-SRMC-4**.)

- During the replacement of the tank 32 temperature transmitter performed under task one of WO01979401-01, SRMC did not call a timeout as recommended by Manual 1Y, Procedure 8.21, step 5.1.3, when an incorrect alarm setpoint was discovered. Step 5.1.3 states, "When compliance cannot be achieved, unexpected conditions or changes in work scope are encountered, a timeout should be taken until the condition is corrected." (See **OFI-SRMC-5**.)

SRMC adequately documents and uses maintenance history information. Work planners are skilled at accessing WO histories through the Asset Suite work management system. Reviewed historical entries adequately demonstrated proper recording in accordance with work control procedures.

Personnel Training and Qualification

Maintenance personnel are adequately trained and qualified to perform nuclear maintenance work in accordance with PROGSMTMPDES000103, *Site Maintenance Training Program Description*. PROGSMTMPDES000103 meets the requirements of DOE Order 426.2 as a basis for providing a comprehensive approach to training and qualification of nuclear facility maintenance personnel. Specific topics addressed in the training program include responsibilities, training, qualification process, challenge examinations, requalification, training records, and education requirements. All craft and planner candidates are appropriately required to complete the curriculum to receive initial qualifications. The initial curriculum is a six-month course and consists of instructor-led courses, self-study courses, and job performance measures. Additional requirements are specified for requalification, including 80 hours of continuing training and completion of an annual requalification training course. Current qualification status is adequately tracked in the learning management system. Review of one completed qualification card demonstrated that the required continuing training elements were included.

Maintenance Conclusions

The SRMC NMMP adequately covers all 17 elements of DOE Order 433.1B. In general, qualified craft personnel perform maintenance activities properly. An observed maintenance pre-job briefing was comprehensive. Observed PM performance and reviewed PM and CM documents demonstrated an adequate approach to maintenance work performance. Maintenance histories are effectively maintained and used to monitor SSC performance trends. However, weaknesses in work performance were identified in the areas of implementing a QA hold point and performing a work step as written.

3.6 Safety System Surveillance and Testing

This portion of the assessment evaluated SRMC's performance of surveillance and testing and use of M&TE to ensure the operability of the selected safety systems.

Surveillance and Testing

SRMC personnel adequately performed observed safety system surveillances and testing activities to ensure that the selected safety systems can accomplish their safety functions and continue to meet applicable system requirements and performance criteria. SRMC uses an effective scheduling and tracking system to ensure that SRs are performed within TSR-required frequencies; there have been no TSR-related occurrence reports (SC equipment failures or missed SRs) in the last two years. Forty-four previously performed surveillance procedures/rounds for the systems appropriately cited applicable safety requirements; identified precautions and system and test prerequisite conditions; and included clear performance steps, which were properly documented. These surveillance procedures also included provisions for the timely notification of facility management of any test failure so that the system can be declared inoperable and necessary actions can be taken to place the plant in a safe condition; none of the

recorded data indicated a test failure. The shift operations manager's signature appropriately documented the review and acceptance of final test results.

Measuring and Test Equipment

SRMC adequately controls M&TE used to perform surveillance procedures. Three performed surveillance procedures demonstrated that M&TE was appropriately calibrated and maintained at prescribed intervals (or before use) against reference calibration standards with traceability to nationally recognized standards or a documented basis. The calibration documentation appropriately included all required information (i.e., identification, traceability to the calibration standard, calibration data, recalibration due date or interval, and identification of the individual performing the calibration). M&TE identified in the completed work orders was properly labeled, tagged, or suitably marked or documented to indicate a due date or interval of the next calibration and uniquely identified to provide traceability to its calibration data. Further, interviews with the M&TE coordinator, reviews of completed M&TE documentation, and observations of M&TE use in the field confirmed that calibrated M&TE is properly handled and stored to maintain instrument accuracy. Observed out-of-calibration M&TE and instruments suspected to be in error were properly tagged and segregated, as required by S4-MNT.08, *Control of Measuring and Test Equipment in Liquid Waste*. Reviewed records demonstrated SRMC's effective management of lost or damaged M&TE at CSTF. The out-of-calibration notice and evaluation system ensures that M&TE users and associated system engineers are properly notified when instruments are out of calibration. Review of three out-of-calibration notices showed that previously collected measurement data was properly evaluated for acceptability.

A walkdown of the M&TE tool cribs in each craft shop demonstrated that suitable controls are in place for M&TE, in accordance with S4-MNT.08. Observations of M&TE being used in the field demonstrated that M&TE is adequately tracked, returned for recalibration, and then reissued to maintenance personnel and operators. Equipment records demonstrated that M&TE personnel adequately controlled and scheduled M&TE.

Safety System Surveillance and Testing Conclusions

SRMC personnel use calibrated, controlled M&TE and effectively perform surveillance and testing activities.

3.7 Quality Assurance

This portion of the assessment evaluated SRMC's quality assurance program (QAP), procurement verification, and the training and qualification of QA personnel.

Quality Assurance Program

SRMC has established a DOE-SR-approved QAP meeting the criteria specified in 10 CFR 830, subpart A, *Quality Assurance Requirements*. SRMC has adequately established a QA organization with an assigned QA manager responsible for the implementation, assessment, maintenance, and improvement of the QAP as documented in 1Q-2-1A, *LWO Quality Assurance Program*. The QAP effectively implements an appropriate consensus standard, American Society of Mechanical Engineers Nuclear Quality Assurance (NQA)-1-2008, *Quality Assurance Requirements for Nuclear Facility Applications*, along with the NQA-1a-2009 addenda.

Procurement Verification

SRMC has implemented an effective CGD process through 1Q-7-3. 1Q-7-3 provides reasonable assurance that SC/SS SSCs not available from qualified suppliers are adequately procured using the CGD process and can perform their intended safety function. Implementation of the CGD process is controlled by Procedure E7-3.46 based on the process identified in 1Q-7-3. Six reviewed CGD qualification records of recently completed modifications for tanks 30, 32, and 37 temperature indication correctly implemented Procedure E7-3.46 in the selection of critical characteristics, attributes, and acceptance criteria for the SC function of these components. Reviewed commercial-grade-item evaluations were of high quality.

Training and Qualification of QA Personnel

EA reviewed training and qualification records for one QA inspector involved in the replacement of the tank 32 temperature transmitter. All training and requalification requirements for the individual were up to date in accordance with site training requirements identified in Manual 1B.

Quality Assurance Conclusions

SRMC has a QAP effectively implementing NQA-1 and approved by DOE-SR. SRMC has implemented effective processes for procuring SC/SS SSCs by performing a CGD process that yields high quality item evaluations.

3.8 Feedback and Improvement

This portion of the assessment evaluated the effectiveness of SRMC's feedback and improvement processes in addressing and preventing the recurrence of safety system issues.

The SRMC issues management program is implemented through a series of procedures, including Manual 22Q, Procedure CAP-1, *Corrective Action Program*; 22Q, Procedure CA-1A, *LWO Causal Analysis*; 22Q, Procedure PA-1A, *LWO Performance Analysis*; 22Q, MFO-1, *Management Field Observation Program*; and 22Q, OE-1, *Operating Experience Program*. CAP-1 establishes and implements a corrective action program to identify, evaluate, minimize, and prevent recurrence of issues to improve performance. In most respects, SRMC operates under the sitewide processes established by SRNS, although implementation is managed at the company/facility level. Therefore, issues management performance by one company or facility onsite may not be indicative of another. SRMC effectively uses feedback from a variety of sources, including workers, managers, and external assessors and auditors, to improve work performance. The issues management program includes appropriate processes for managing and tracking issues identified during assessments, self-evaluations, or other reviews of project or functional activities. The program also includes processes for managing and tracking any corresponding corrective actions. STAR effectively tracks SRMC issues and resultant actions to closure. A sample of five STAR reports that were generated in the previous two years demonstrated that SRMC adequately documents issues and has an adequate process for tracking and resolving issues associated with SS SSCs in a timely manner.

The SRMC Management Review Team (MRT) provides oversight of the contractor assurance performance improvement processes. EA observed two MRT meetings and determined that the MRT's review of STAR reports including issue characterization and evaluation, and the corresponding corrective actions were adequate.

SRMC's risk-based integrated assessment plan is consistent with Manual S13, Procedure 5.2, and incorporates 23 functional areas, including configuration management, conduct of operations, QA, and design. Five reviewed self-assessments performed by SRMC during the previous two years were adequate, and identified deficiencies were entered into the STAR system.

Feedback and Improvement Conclusions

SRMC adequately demonstrates involvement in issues management and corrective action resolutions. Feedback information is used regularly to focus attention on issues and drive performance improvement. SRMC performs adequate periodic self-assessments of engineering, configuration management, and operations processes, and appropriately identifies deficiencies. STAR effectively tracks SRMC issues and resultant actions to closure.

3.9 Federal Oversight

This portion of the assessment evaluated the effectiveness of DOE-SR's oversight program for ensuring that safety systems can reliably perform as intended.

The DOE-SR safety system oversight (SSO) program is implemented by Savannah River Implementing Procedure (SRIP) 421.2, *Safety System Oversight*, which adequately incorporates the requirements of DOE Order 426.1B, *Department of Energy Federal Technical Capabilities*. Under the DOE-SR Assistant Manager for Waste Disposition, WDED is responsible for implementing the SSO role, and the Waste Disposition Operations Division is responsible for implementing the Facility Representative role. WDED and the Waste Disposition Operations Division coordinate and communicate to adequately perform CSTF oversight activities.

The facility engineer (FE) model, which is used by WDED, combines the SSO and Nuclear Safety Specialist functions. This model enables staff to have a broad overview of safety system performance; however, the combined functions can inhibit the completion of SSO oversight due to competing safety basis document review workload, particularly now that there is only one individual assigned to the FE role for CSTF. The staffing shortages and subsequent challenges of knowledge management are complicating factors in completing SSO oversight that WDED is aware of and working to address through direct hire authority.

The DOE-SR SSO qualification program is guided by Procedure SRIP 426.1, *Technical Qualification Program*, which adequately reflects DOE-STD-8000-2021, *Safety System Oversight Functional Area Qualification Standard*, and DOE-STD-1183-2019, *Nuclear Safety Specialist Functional Area Qualification Standard*. WDED has begun the gap analysis process to determine potential equivalencies between the previous site-specific FE qualification requirements and the more recent SSO qualification standard, DOE-STD-8000-2021. Within the next calendar year, DOE-SR expects that individuals who are currently qualified in the FE role will be required to complete requalification to the newer SSO standard.

DOE-SR has established an assessment schedule for CSTF, in accordance with Savannah River Operations Office Manual, Procedure 226.1.1H, *Integrated Performance Assurance Manual*, which includes independent assessments of safety system performance, equipment configuration, material condition of assigned systems, and safety management programs. When these activities are conducted, DOE-SR conducts assessments of CSTF safety systems, the results of which are appropriately documented. Section 4.1.1 of DOE Guide 226.1-2A, *Federal Line Management Oversight of Department of Energy Nuclear Facilities*, provides guidance with respect to a minimum periodicity for conducting SSO assessments (every three years for SC SSCs and every five years for SS SSCs.) WDED has established a schedule for vital systems (VS)-01 assessments, but the schedule is not consistent with this

guidance. For CSTF, out of 28 VS-01 assessments, 11 (for SS systems) were completed in the past five years. Although there is no specific guidance on the periodicity of self-assessments, the most recent self-assessment of the WDED program was completed in calendar year 2018. The OFIs identified during that self-assessment were adequately resolved.

Overall, the CSTF FE is knowledgeable of the safety systems and the current system status. The FE routinely participates in system health review meetings, conducts system walkdowns (when performing assessments), and performs program and document reviews, such as corrective action reports, maintenance work orders, surveillance test documentation, and DCPs. Additionally, DOE-SR has established a Nuclear Safety Council, chartered under Procedure SRIP 421.1, *Nuclear Safety Oversight*, which provides a forum for discussing and communicating issues related to nuclear safety and SSO among the DOE-SR line organizations.

Federal Oversight Conclusions

Overall, DOE-SR is meeting the requirements of DOE Order 426.1B and has implemented an SSO program that is adequate but inhibited by the dual role of the FE model and current staffing shortages. Periodic assessments of CSTF safety systems are effective and appropriately documented; however, VS-01 assessments are not always conducted at the frequency specified in DOE guidance. The DOE-SR SSO qualification program ensures that SSO personnel can carry out their assigned duties and are working to requalify to the newer DOE SSO standard in a timely manner.

3.10 Follow-up on Previous EA Findings

This portion of the assessment examined the completion and effectiveness of corrective actions for a previous EA finding associated with weaknesses in work planning and control processes.

EA conducted a previous assessment at the SRS CSTF in 2021, as documented in EA report *Independent Assessment of Work Planning and Control at the Savannah River Site F and H Tank Farms, October 2021*. EA followed up on Finding F-SRR-1 from that report, which stated that work planning and control processes do not ensure that construction work orders contain the applicable hazards and/or controls, can be performed as written, or are complete, correct, and revised appropriately. The finding lists the following three weaknesses: (1) the contractor did not ensure that all work orders contained the applicable hazards and controls; (2) the contractor did not ensure that all work orders are written in a clear, concise, and worker-friendly manner; and (3) the contractor did not ensure that all work orders could be performed as written.

STAR No. 2022-CTS-002359 documented the finding significance categorization, corrective actions, and the causal analysis that was performed per Manual 22Q, CAP-1. The corrective actions identified included (1) reviewing changes to SCD-15, *Work Planning Guide*, to ensure that they adequately address the issue of identifying mercury hazards that exist in the field; (2) providing a refresher briefing for the construction design engineers to ensure that the assisted hazard analysis is revised when changes are made to work orders that affect hazards or controls; and (3) adding this briefing as required reading for new personnel.

Additionally, EA reviewed maintenance work packages as part of the current assessment to determine if SRMC was adequately identifying worker hazards and implementing controls to mitigate the hazards.

EA reviewed the completed corrective actions and concluded that the actions are adequate to correct the condition. However, SRMC's effectiveness review has not been completed and is not due until March 2023.

Follow-up on Previous EA Finding Conclusions

The corrective actions implemented for the previous EA finding are adequate to correct the condition.

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 Mission Completion, LLC

Deficiency D-SRMC-1: SRMC did not provide an adequate basis in the DSA for determining that doubling of the required exhaust ventilation flowrate was sufficient to maintain the 25% LFL in each pump tank and account for flow imbalances in the system. (DOE-STD-3009-94 CN3, sec. 4.4.X.4)

Deficiency D-SRMC-2: SRMC did not provide an adequate basis in the DSA for determining that the mid-1950s installed ductwork meets the intent of DOE HDBK-1169-2003 criteria for level 4 ductwork. (DOE-STD-3009-94 CN3, sec. 4.4.X.4)

Deficiency D-SRMC-3: SRMC procedure E7-2.05A does not properly invoke the graded approach for the specification of post-modification test requirements for SC/SS SSCs. (1Q-3-1, sec. 5.4, item 4, and G-QP-G-00002, sec. 3.0 and table 5.2-4)

Deficiency D-SRMC-4: Contrary to Manual 1Y, Procedure 8.21, *Technical Work Document Compliance*, SRMC did not properly document a QA hold point when field conditions changed. (Manual 1Y, Procedure 8.21)

Deficiency D-SRMC-5: SRMC did not obtain a TWD field change when it was discovered that the TWD referenced the wrong section of the surveillance procedure to place the tank 27 hydrogen analyzer in its normal configuration and operating pressure. (Manual 1Y, Procedure 8.21, step 5.3.5)

Deficiency D-SRMC-6: SRMC did not obtain engineering review of a work order for an SC/SS piece of equipment. (Manual 1Y, Procedure 8.20)

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 revising HDB-2 transfer facility ventilation drawings and design information to improve clarity of design assumptions and equipment configuration in the DSA.

OFI-SRMC-2: Consider including procedural guidance on the use of simple calculations in the DSA.

OFI-SRMC-3: Consider qualifying backup CSEs or providing procedural instructions to address CSE actions when the qualified CSE for a safety system is unavailable.

OFI-SRMC-4: Consider opening a STAR item to determine the potential cause for having the wrong version of the calibration data sheet in the work order.

OFI-SRMC-5: Consider providing refresher training on the use of timeouts when compliance cannot be achieved or when unexpected conditions or changes in work scope are encountered.

8.0 ITEMS FOR FOLLOW-UP

EA plans to perform an analysis related to the backfitting of existing SSCs to SC/SS. The purpose will be to determine the regulatory basis for conducting backfit analyses and identify whether DOE sites are consistently implementing safety basis changes that require upgrade of existing, non-SC/SS components to SC/SS.

Appendix A
Supplemental Information

Dates of Assessment

Onsite Assessment: November 28–December 1 and December 12-15, 2022

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
Kevin M. Witt, 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
Vacant, Office of Nuclear Engineering and Safety Basis Assessments

Quality Review Board

William F. West, Advisor
Kevin G. Kilp, Chair
Jacob M. Miller
Timothy B. Schwab
Michael A. Kilpatrick

EA Site Lead for Savannah River Site

Brannen J. Adkins

EA Assessment Team

Brannen J. Adkins, Lead
Tamara D. Powell
Kenneth L. Johnson
Michael Shlyamberg