Independent Assessment of Specific Administrative Controls at the Savannah River Site Defense Waste Processing Facility

May 2022

Office of Enterprise Assessments
U.S. Department of Energy

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Acronyms

AC	Administrative Control
DOE	U.S. Department of Energy
DOE-SR	DOE Savannah River Operations Office
DSA	Documented Safety Analysis
DWPF	Defense Waste Processing Facility
EA	Office of Enterprise Assessments
OFI	Opportunity for Improvement
SAC	Specific Administrative Control
SRR	Savannah River Remediation, LLC
SRS	Savannah River Site
SS	Safety Significant
SSCs	Structures, Systems, and Components
TSR	Technical Safety Requirement

INDEPENDENT ASSESSMENT OF SPECIFIC ADMINISTRATIVE CONTROLS AT THE SAVANNAH RIVER SITE DEFENSE WASTE PROCESSING FACILITY

Executive Summary

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted an independent assessment of the development and implementation of specific administrative controls (SACs) at the Savannah River Site Defense Waste Processing Facility from December 2021 to February 2022. This assessment was performed within the broader context of ongoing assessments of the development and implementation of SACs across the DOE complex. The assessment focused on the approach to meeting SAC requirements in DOE-STD-3009-94, Change Notice 3, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*.

EA identified the following strength based on evaluated controls:

- SAC-implementing procedures contain detailed instructions for the performance of activities.

EA also identified three deficiencies as summarized below:

- In five instances, the documented safety analysis does not provide necessary functional requirements for support instrumentation to demonstrate that the SAC safety function can be met as required by DOE-STD-3009-94.
- Some administrative controls that perform safety significant functions are not designated as SACs as required by DOE-STD-3009-94.
- In two instances, the technical safety requirements reference the documented safety analysis for specific parameters required for safe operation of the facility and, therefore, could be revised without DOE approval, contrary to 10 CFR 830.205(a)(2).

In summary, identification, development, and implementation of SACs for the Defense Waste Processing Facility generally meet the requirements of DOE-STD-3009-94. Although EA identified deficiencies associated with both SAC development and implementation, the SACs as written and implemented are sufficient for controlling the analyzed hazards. Resolution of the deficiencies identified in this assessment will support a more robust and reliable control set.

INDEPENDENT ASSESSMENT OF SPECIFIC ADMINISTRATIVE CONTROLS AT THE SAVANNAH RIVER SITE DEFENSE WASTE PROCESSING FACILITY

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), assessed the development and implementation of specific administrative controls (SACs) at the Savannah River Site (SRS) Defense Waste Processing Facility (DWPF). This assessment, conducted from December 2021 through February 2022, was performed within the broader context of ongoing assessments of the development and implementation of SACs at selected high risk (i.e., hazard category 1 and 2) facilities across the DOE complex. The purpose of these assessments is to evaluate the effectiveness of both the contractor and field office in developing, implementing, and maintaining SACs.

This assessment was conducted in accordance with the *CY 2022 Plan for the Independent Assessment of Specific Administrative Control Implementation across the DOE Complex*. The assessment focused on the line management approach to meeting SAC requirements in DOE-STD-3009-94, Change Notice 3, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*.

Savannah River Remediation, LLC (SRR)[1] manages DWPF under the direction and oversight of the DOE Savannah River Operations Office (DOE-SR). DWPF, located in S-Area at SRS, vitrifies high-level radioactive liquid waste produced by chemical separation processes. The liquid waste is currently stored in tanks in F- and H-Areas at SRS.

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.

As identified in the approved plan, this assessment considered requirements from EA Criteria and Review Approach Document (CRAD) 34-02, *Specific Administrative Controls*, and CRAD EA-30-07, *Federal Line Management Oversight Processes*. The assessment was conducted in two parts. The first part of the assessment was conducted remotely and focused on SAC identification and development. EA reviewed the DWPF documented safety analysis (DSA), technical safety requirement (TSR) document, and relevant reference documents to determine whether SAC identification and development meet the requirements of DOE-STD-3009-94. DOE-STD-1186-2004, *Specific Administrative Controls*, clarifies those requirements, provides guidance for the development and implementation of SACs, and is cited as a requirement in the DWPF DSA. EA also reviewed SAC-implementing documents (e.g., procedures) to determine whether SAC requirements are adequately captured. The second part of the assessment was conducted at SRS and consisted of field observations of SAC-related activities, observations of simulator

[1] On February 27, 2022, the contractor, SRR, transferred SRS liquid waste operations management responsibilities to Savannah River Mission Completion, LLC.

evolutions, and interviews with SRR and DOE-SR personnel. The interviews included personnel responsible for SAC development and implementation, training and qualification, simulator operations, and implementation of DOE-STD-1186-2004 SAC maintenance expectations (e.g., periodic assessments of SAC effectiveness).

EA used a written comment and response process to address issues identified during the offsite review. Follow-on discussions among EA, SRR, and DOE-SR were conducted to clarify and resolve comments.

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

3.0 RESULTS

3.1 SAC Identification and Development

The objective of the DSA review was to determine whether the DWPF SACs are appropriately identified and developed in accordance with DOE-STD-3009-94.

EA evaluated all ten SACs in the DWPF DSA. The Waste Acceptance Criteria and Material Tracking Program SACs are identified as safety-class initial conditions to protect analysis assumptions. Other SACs are identified as safety-significant (SS) controls. In general, SACs are appropriately identified based on the control selection in the hazard and accident analyses to prevent or mitigate an accident scenario. SAC safety functions are adequately derived in the hazard and accident analyses. The SAC descriptions and evaluations meet the requirements of DOE-STD-3009-94 and the expectations of DOE-STD-1186-2004. The descriptions contain sufficient detail for an understanding of each SAC's safety function and its relationship to the facility safety analysis. Functional requirements and performance criteria are sufficient to ensure that the SACs can be effectively implemented.

DOE-STD-3009-94, section 4.5.X.2, states "Identify SSCs [structures, systems, and components] whose failure would result in losing the ability to complete the action required by the SAC. These SSCs would also be considered safety-class or safety-significant based on the significance of the SAC safety function." EA assessed the functional classification of support SSCs required for SAC implementation. Instrumentation and control systems necessary for implementation of multiple SACs (Waste Tank Contents, Transfer Control Program, Waste Compliance Plan, Retained Hydrogen Program, Material Tracking Program) are not designated as safety SSCs, and functional requirements are not provided in the DSA for these SSCs.

Based on the guidance provided in DOE-STD-1186-2016, *Specific Administrative Controls*, EA determined that non-safety SSCs can be used to support the SACs of concern. However, the technical justification for not classifying instrumentation is incomplete. Contrary to the requirements of DOE-STD-3009-94, section 4.5.X.3, the DSA does not provide functional requirements for support SSCs to demonstrate that the SAC safety function can be met. (See **Deficiency D-SRR-1**.) Failure to provide necessary functional requirements for SSCs results in an inadequate control evaluation. The DOE-SR response to the EA comment commits to evaluating the SACs and providing functional requirements, as necessary, in the 2022 annual update of the DSA.

EA selected a sample (7 of 18) of administrative controls (ACs) based on their contribution to risk reduction to determine whether ACs are properly categorized (i.e., are not required to be SACs). The analysis determined that most of the selected controls are appropriately designated as ACs. However, the two ACs identified below perform SS functions. Contrary to the *Definitions* section of DOE-STD-3009-94, these

ACs are not designated as SACs. (See **Deficiency D-SRR-2**.) Failure to identify and evaluate ACs that perform credited safety functions as SACs can result in an ineffective hazard control.

- The Load Lift Program is credited in the hazard analysis to prevent a load drop that would result in a high-consequence release of hazardous material; however, it is improperly designated as a programmatic AC and not as a SAC.
- The Glass Waste Storage Building (GWSB) #1 Canister Handling Administrative Control is credited in the hazard analysis to ensure that the GWSB steady-state concrete temperature limit is not exceeded. This safety function is SS; however, the control is improperly designated as an AC and not as a SAC.

For these two items, DOE-SR committed to updating the Safety Evaluation Report for the DSA revision 40 annual update approval and perform assessments for additional evaluations in the safety basis.

EA provided comments on three controls in the DSA regarding SAC development that are resolved by revision 40 of the DSA, which was formally submitted to DOE-SR in September 2021 and is currently under DOE-SR review. These issues are as follows:

- The Melter Off-Gas Flammability Control Program is improperly identified in the DSA as an AC; the control performs an SS function and should be a SAC. This AC will be deleted and replaced by Safety Class SSCs and a SAC.
- The Excavation Actions SAC does not contain sufficient performance criteria to ensure that the SAC safety function can be met. Performance criteria for excavations will be included in the SAC.
- The Sludge Transfer Line Flushing Interface Control relies on instrumentation that is not designated as SS to ensure a minimum flush flowrate. Additionally, the flushing frequency is not directly supported by the referenced calculation. This SAC will be deleted based on new calculations justifying piping integrity.

These three issues are not identified as deficiencies because anticipated DOE-SR approval and subsequent implementation of DSA revision 40, which resolves these issues, are expected within several months.

SAC Identification and Development Conclusions

Except for the two deficiencies identified above, SACs are adequately identified and developed based on the control selection in the hazard and accident analyses. SAC safety functions are adequately derived in the hazard and accident analyses. SAC descriptions and evaluations are generally sufficient to demonstrate that the SAC safety functions can be met.

3.2 SAC Implementation

The objective of this portion of the assessment was to determine whether the DWPF SACs are implemented and maintained in accordance with the requirements of DOE-STD-3009-94 and the expectations of DOE-STD-1186-2004.

Most DWPF SACs, as developed in chapter 11 of the DSA, are adequately captured in the TSRs. However, the TSRs for the Waste Acceptance Criteria and Material Tracking Program SACs do not include the necessary parameters for implementation. Instead, the TSRs reference external information provided in the DSA SAC evaluations. This practice does not satisfy the 10 CFR 830.3 definition of a TSR, that is (in part) "The limits, controls, and related actions that establish the specific parameters and requisite actions for the safe operation of a nuclear facility." DOE Guide 423.1-1B, *Implementation*

Guide for Use in Developing Technical Safety Requirements, section 4.3.4.3, and WSRC-TR-2003-00573, *TSR Methodology Manual*, also address this issue by prescribing that the TSR should never reference an external document for necessary data. The specific parameters in the DSA may be changed with contractor approval under the unreviewed safety question process. (See **Deficiency D-SRR-3**.) Failure to provide the SAC parameters within the TSRs could violate the requirement in 10 CFR 830.205(a)(2) to obtain DOE approval for all TSR changes.

Detailed operating procedures for activities such as material transfers, jumper installation, and crane operations delineate SAC actions. The procedures are adequate to ensure effective SAC implementation for the protection of workers and the public. EA identified one issue where a procedure might not be able to be performed as written due to the lack of safety equipment. During a field walkdown of procedure SW4-1.0-8.11, *Manual Shutdown of Melter (Feeding and Pouring) and CPC* (one of the procedures that implements SAC 5.8.2.30, *Seismic Event Response*), EA requested the SRR operator show where the required arc flash suit (which is donned for operator safety when manipulating 480-volt switchgear) was located. The storage location was not in a seismically qualified structure. This situation was due to COVID-19 protocols, which eliminated shared personal protective equipment (PPE) from staging areas. This issue was expeditiously remedied when EA brought it to the attention of the DWPF Operations Manager (see Figure 3-1).

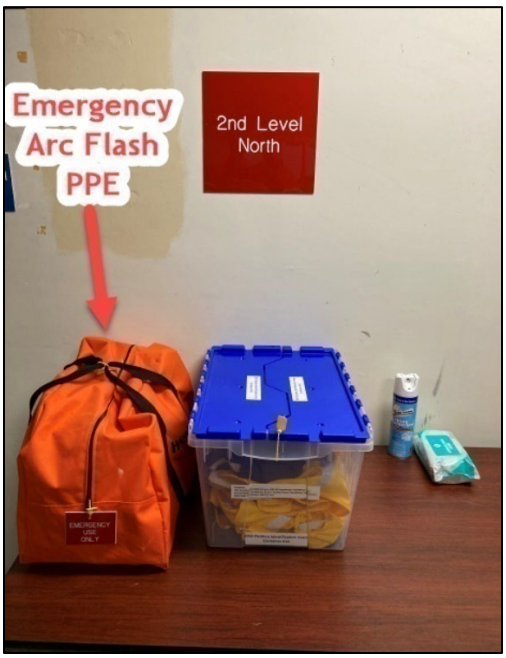

Figure 3-1. Arc flash PPE staged with other emergency use supplies inside the seismically qualified process building

EA also reviewed the training and qualification of SRR personnel responsible for SAC implementation and compliance activities to determine whether the training is sufficient to ensure SAC effectiveness. The evaluation included discussions with the DWPF Operations Manager and training lead, review of training and qualification records, and review of course material. Personnel demonstrated sufficient knowledge of SACs during simulator activities, field walkdowns, and interviews. Training is sufficient to ensure effective SAC implementation.

EA reviewed recent TSR implementation assessments performed by SRR. DOE-STD-1186-2004, section 2.2, expects that SACs are independently assessed on a periodic basis to verify safety function

performance and focuses on performance-based methods for this verification. Although SRR appropriately performs triennial reviews of all ACs, focusing largely on the adequacy of implementing procedures, review of completed SAC implementing documents and observation of activities are not generally performed. (See **OFI-SRR-1**.)

EA reviewed Federal oversight of SAC implementation at DWPF. DOE-SR has a comprehensive suite of procedures governing its oversight process. These procedures address areas including review and approval of safety basis documents, oversight of the safety basis implementation process, and corrective action management. DOE-SR assessments use document reviews, field observations, and interviews to implement the oversight process. The DOE-SR assessments are appropriately focused on TSR changes while considering hazards, associated risks, and past performance. SAC implementation assessment activities by Facility Representatives are not pre-planned or pre-scheduled. Instead, SAC oversight is performed as part of routine oversight activities for scheduled DWPF work. This SAC oversight approach is effective. EA reviewed DOE-SR SAC assessments and interviewed DOE-SR nuclear safety specialists and the Facility Representative program manager and verified that assessments are effectively performed by qualified individuals.

SAC Implementation Conclusions

SACs are adequately implemented in the TSRs except as noted in the deficiency above. SAC implementing documents include appropriate SAC requirements for implementation. Training on SACs is sufficient and appropriately tailored for DWPF personnel. SRR appropriately performs triennial assessments of SAC effectiveness. DOE-SR oversight is appropriately focused on high-risk activities.

4.0 BEST PRACTICES

There were no best practices identified as part of this assessment.

5.0 FINDINGS

There were no findings identified as part of 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.

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Deficiency D-SRR-1: For five SACs, the DSA does not provide necessary functional requirements for supporting instrumentation to demonstrate that the SAC safety function can be met. (DOE-STD-3009-94, section 4.5.X.3)

Deficiency D-SRR-2: Some ACs that perform SS functions are not designated as SACs. (DOE-STD-3009-94, *Definitions* section)

Deficiency D-SRR-3: In two instances, the TSRs reference the DSA for specific parameters required for safe operation of the facility and, therefore, could be revised without DOE approval. (10 CFR 830.3 *Definitions* section, 10 CFR 830.205(a)(2))

7.0 OPPORTUNITIES FOR IMPROVEMENT

EA identified one OFI 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 Remediation, LLC

OFI-SRR-1: Consider enhancing the triennial assessments of SAC effectiveness by including review of completed SAC implementing documents, such as calculations, instrument calibration and test records, and completed procedures. Observation of activities would also provide valuable information.

8.0 ITEMS FOR FOLLOW-UP

EA may review the approved versions of revisions 40 and 41 of the DWPF DSA to verify that the changes resolve the deficiencies identified in this report.

Appendix A
Supplemental Information

Dates of Assessment

December 2021 to February 2022

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