



# **Independent Assessment of Work Planning and Control at the Savannah River Site F and H Tank Farms**

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## Acronyms

AHA	Assisted Hazards Analysis
CAS	Contractor Assurance System
CFR	Code of Federal Regulations
CHA	Construction Hazard Analysis
COVID-19	Coronavirus Disease 2019
DOE	U.S. Department of Energy
DOE-SR	Savannah River Operations Office
EA	Office of Enterprise Assessments
ESH	Environmental Safety and Health
FR	Facility Representative
GPR	Ground Penetrating Radar
IH	Industrial Hygiene
IHA	Individual Hazard Analysis
ISMS	Integrated Safety Management System
LOTO	Lockout/Tagout
MFO	Management Field Observation
NFPA	National Fire Protection Association
OFI	Opportunity for Improvement
OPEX	DOE Operating Experience Program
OSHA	Occupational Safety and Health Administration
PAD	Performance Assurance Division
POD	Plan of the Day
PPE	Personal Protective Equipment
SME	Subject Matter Expert
SRIP	Savannah River Implementing Procedure
SRR	Savannah River Remediation, LLC
SRS	Savannah River Site
STAR	Site Tracking, Analysis, and Reporting
STARRT	Safety Task Analysis Risk Reduction Talk
STR	Subcontractor Technical Representative
SWRG	Safe Work Rules and Guidelines
TBO	Task-Based Observation
TSP	Task Specific Plan
UPC	Unit Price Contractor
VMT	Visual Management Tool
WP	Work Package
WP&C	Work Planning and Control
WPP	Worker Protection Program
WSHP	Worker Safety and Health Program

# Independent Assessment of Work Planning and Control at the Savannah River Site F and H Tank Farms

## Summary

### Scope

This assessment evaluated the implementation of the U.S. Department of Energy (DOE) integrated safety management system core functions with respect to work planning and control (WP&C) processes involving the liquid waste program contractor, Savannah River Remediation, LLC (SRR), at the Savannah River Site F and H Tank Farms to determine if construction work is safely coordinated with operations. This assessment included contracted or self-performed construction activities of SRR and its sub-tier contractors. Additionally, this assessment focused on elements of the hoisting and rigging, excavation, and electrical safety programs. Due to COVID 19 restrictions in place at the time, this assessment was conducted remotely. The assessment team was able to review written programs, policies and completed work packages. The team could not observe actual work activity so the effectiveness of hazard controls could not be assessed.

### Significant Results for Key Areas of Interest

Overall, SRR has developed and implemented satisfactory systems and procedures for WP&C of construction activities at the F and H Tank Farms as required by 10 CFR 851, *Worker Safety and Health Program*. Construction activities are coordinated with ongoing operational work activity. Management, craft personnel, and workers have adequate experience, training, and qualifications to plan and execute work activities. The assessment team identified specific weaknesses with the level of detail included in work packages.

#### Work Planning and Control – Construction Coordination with Operations

SRR has a mature WP&C program; however, several issues were identified in that some work packages did not contain the applicable hazards and/or controls, could not be performed as written, or were not complete, correct, or revised appropriately. Work is planned, overseen, and performed by a competent, experienced, and trained workforce. SRR demonstrated a strong commitment to safety

#### Subcontracted Construction Work

SRR has established effective procedures for ensuring that DOE safety requirements flow down to first-tier construction subcontractors and for overseeing safety performance. Identified weaknesses include contract documents that did not consistently flow down DOE safety requirements to lower-tier subcontractors performing onsite work and project task-specific plans that did not fully identify activity-level or worksite-specific hazards and controls.

#### Construction Safety Focus Areas

Hoisting and Rigging: The reviewed hoisting plans were detailed and included lift weights, calculations, and the maximum operating radius. Appropriate personnel are involved in developing work plans and in the development of corrective actions to address the issues identified in a previous DOE-SR concern letter. Identified weaknesses include crane demarcation sketches with lack of detail related to expected hazards or missing demarcation sketches in some work plans and the lack of correlation between critical lift plans and work packages.

Excavation: SRR uses ground penetrating radar to identify subsurface hazards. Pre-entry daily inspections of the trench are completed by an excavation competent person, and hydraulic shoring is required when the excavation exceeds a depth of five feet. Work packages did not adequately identify

hazards related to the safe clearance distance from surface encumbrances, such as a cooling tower, and did not prescribe the manufacturer's limitations on the use of hydraulic shoring.

#### Electrical Safety

The SRR electrical safety program is well-developed, with policies and procedures compliant with National Fire Protection Association 70E-2018 and Occupational Safety and Health Administration requirements. SRR has a skilled and qualified cadre of electrical workers, subject matter experts, and Authorities Having Jurisdiction. Identified issues involve work packages not listing specific lockout/tagout order numbers and specific shock hazards.

#### Contractor Assurance System

SRR has implemented a contractor assurance system that contributes to the improvement of WP&C processes. SRR uses a graded approach to ensure that higher risk elements of WP&C are assessed more often. Third-party assessments are conducted semi-annually.

#### Federal Site Office Oversight

The Savannah River Operations Office has established and implemented appropriate processes and procedures for Federal line oversight, including assessment planning and performance, operational awareness activities and performance assurance analysis. A corrective action for a 2017 Office of Enterprise Assessments finding regarding DOE-SR's development, sharing, and implementation of lessons learned through the DOE operating experience program is in progress, but has not been completed.

#### Best Practices and Findings

This assessment identified three best practices that may merit consideration by other DOE and contractor organizations for implementation. Task-based observations and management field observations are effective field oversight tools for identifying areas for improvement and future oversight opportunities, and the practice of assisting construction subcontractors in developing a process in their worker protection program for self-assessing safety during work activities using the focused observation checklist are all identified as Best Practices.

This assessment identified one finding related to work packages prepared by SRR that could not be performed as written because they contained extensive pen-and-ink field changes, work instructions entirely crossed out, and changes in work steps. Work packages did not completely address mercury vapor and fast cure epoxy in the hazard analysis. Critical crane lift documentation was not associated with specific work packages. Sketches included in work packages for crane hazards and excavation work were missing or insufficiently detailed.

#### **Follow-up Actions**

The Office of Enterprise Assessments will follow up to determine the effectiveness of corrective actions taken by SRR to address the finding identified during this assessment.

# **Independent Assessment of Work Planning and Control at the Savannah River Site F and H Tank Farms**

## **1.0 INTRODUCTION**

The U.S. Department of Energy (DOE) Office of Worker Safety and Health Assessments, within the independent Office of Enterprise Assessments (EA), assessed work planning and control (WP&C) at the F and H Tank Farms at the Savannah River Site (SRS). This assessment was requested by the DOE Savannah River Operations Office (DOE-SR) and was conducted remotely due to the Coronavirus Disease 2019 (COVID-19) pandemic.

Savannah River Remediation, LLC (SRR) is the liquid waste contractor. Consistent with the *Plan for the Work Planning and Control Assessment at the Savannah River Site F&H Tank Farms* (April 2021), this assessment evaluated SRR's integrated safety management system (ISMS) core functions with respect to WP&C processes related to the coordination of construction work with operations. This assessment included self-performed or subcontracted construction activities of SRR and its sub-tier contractors. Additionally, this assessment focused on elements of construction safety, including hoisting/rigging and excavation, and the electrical safety program. The assessment team also reviewed DOE-SR WP&C oversight processes.

SRS missions include nuclear materials management, research, environmental management, and cleanup. SRR's team of 2,600 employees is responsible for the portion of the environmental management mission that involves treating, storing, and disposing of radiologically contaminated liquid waste at SRS. This assessment focused on liquid waste activities at the F and H Tank Farms, encompassing 51 liquid waste tanks, 8 of which have been operationally closed. Approximately 35 million gallons of radioactive liquid waste is currently stored in the remaining 43 underground tanks, which are in various stages of waste removal, cleaning, and closure.

Planning calls and document collection began at the end of February 2021, and the remote assessment was conducted on April 12-22, 2021. The document review, meeting participation, and interviews were conducted remotely.

## **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, findings, deficiencies, and opportunities for improvement (OFIs)" as defined in DOE Order 227.1A.

As identified in the assessment plan, this assessment considered objectives and criteria from DOE Guide 226.1-2A, *Federal Line Management Oversight of Department of Energy Nuclear Facilities*, Appendix D: *Activity Level Work Planning and Control Criterion Review and Approach Documents with Lines of Inquiry*. The assessment team used elements of Criteria and Review Approach Document EA-30-07, *Federal Line Management Oversight Processes*, to collect and analyze data on DOE-SR oversight activities related to WP&C. The assessment team also used selected objectives and criteria from EA Criteria and Review Approach Document 32-03, Rev. 1, *Industrial Hygiene Program*.

The assessment team examined key documents, including contracts, work packages (WPs), procedures, manuals, analyses, policies, and training and qualification records. The assessment team also interviewed key personnel responsible for developing and executing the associated programs and attended selected meetings by phone. The members of the assessment team, the Quality Review Board, and management responsible for this assessment are listed in Appendix A.

EA conducted a previous assessment of SRS WP&C in July 2017, which is documented in *Office of Enterprise Assessments Assessment of Work Planning and Control at the Savannah River Site Salt Waste Processing Facility* (November 2017). While the scope of that assessment did not include SRR, the current assessment examined the completion and effectiveness of corrective actions associated with the DOE-SR finding described in the 2017 assessment report. Results of the corrective action assessment are included in Section 3.6 of this report.

Due to travel restrictions resulting from the COVID-19 pandemic, this assessment was conducted remotely. Conclusions are based on a comprehensive documentation review of work previously performed within the past year, remote participation in scheduled planning calls, and interviews of staff at all levels within the DOE-SR and SRR organizations. Because the assessment team was not on site to witness work as it was performed, the effectiveness of WP&C implementation was not directly assessed.

### **3.0 RESULTS**

#### **3.1 Work Planning and Control for Construction and its Coordination with Operations**

The objective of this portion of the assessment was to verify that SRR has established and implemented WP&C processes to enable construction work to be coordinated and performed safely with operations at the F and H Tank Farms

##### **3.1.1 WP&C Institutional Programs**

SRR has mature WP&C processes that are adequately documented. Manual 1E6, 13-01.04, *Conduct of Construction*, states that the Construction organization is covered by SRR-ESH-2018-00093, Rev. 3, *Worker Safety and Health Program*, which complies with 10 CFR 851, *Worker Safety and Health Program* (WSHP) and requires the use of Procedure 1Y, 8.20, *Work Control Procedure*, for planning and executing work. This work control procedure adequately addresses the workflow process, including planner and facility management responsibilities, work screening, and scheduling. Manual 8Q, Procedure 122, *Hazard Analysis Process*, appropriately addresses the ISMS core functions for activity-level work that involves a technical work document and an assisted hazards analysis (AHA). The AHA software application includes a comprehensive listing of hazards, assigns controls to the pre-job brief and/or technical work document, and drives the involvement of subject matter experts (SMEs). It also addresses work in the field and facilities, designated shop areas, and subcontracted work. Controls are identified as part of the AHA process. The AHA includes disposition reports for pre-job brief controls, technical work document controls, and other controls, including safety data sheets for chemicals. The disposition reports correlate the controls with the associated hazards in an easy-to-follow tabular form.

SRR personnel demonstrated the work management Visual Management Tool (VMT), which was developed in-house and integrates data from several systems to provide a visual indication of task readiness. The system graphically depicts the percent of ready work for each week in a seven-week timeline, provides job status and to-do lists, assigns crews, shows facility outages, displays key performance indicators, and flags work for management's attention. Additionally, this system is used to

populate and track key performance indicators, including work readiness and work week performance. This innovative system is a **Best Practice**.

Manual S4, OPS.14, *Liquid Waste Facilities Work Control Procedure*, provides a thorough description of the work management scheduling process, which includes an eight-week rolling window and integrated project schedule. The schedule shows all the planning meetings, including a six-month look ahead and an eight-week countdown to the projected work start date; a lock-in meeting two weeks before the project start date to authorize all work on the schedule; a resource meeting one week out to verify task readiness, including resources; and meetings on the start date, including a concurrence meeting and plan-of-the-day (POD) meeting. This work management scheduling process incorporates appropriate representation from the involved organizations, including operations, construction, maintenance, work planners, facility management, industrial hygiene (IH), safety engineers, radiological protection department, and the fire protection coordinator, resulting in work that was adequately planned, coordinated, and deconflicted. The SRR work management scheduling process provides multiple opportunities to deconflict work and ensure the readiness of personnel and materials.

SRR guidance for unplanned work (i.e., work that does not involve a technical work document or AHA) is provided in various documents. The SRS *Basic Hazard Control Handbook* adequately addresses basic safety requirements and includes the requirement that the individual hazard analysis (IHA) process be used, as a minimum, for all activity-level work, including unplanned work. The IHA involves a self-performed review of potential hazards and safety considerations. SRR Construction has strengthened the IHA process using the safety task analysis risk reduction talk (STARRT) card, a form that is completed daily by workers and includes job description, key work steps, potential hazards, equipment and tools, personal protective equipment (PPE), and permits.

Fabrication shop hazards and controls are discussed in Manual 8Q, Procedure 122, *Hazard Analysis Process*, Section 5.9, *Hazards Analysis for Work in Designated Shop Areas*. Per this procedure, the safe work rules and guidelines (SWRGs) describe the hazards and controls associated with the use of individual machinery, equipment, fabrication processes, and hazardous materials in the shop. The SWRGs reviewed during this assessment do not include specific job task analyses and point to other documents for controls, such as noise protection and ventilation for welding. SRR also uses construction hazard analysis (CHA) documents for fabrication shop equipment. However, CHA documents have not been updated since 2012, and they reference outdated documents from previous contractors. (See OFI-SRR-1)

### **3.1.2 WP&C Implementation**

#### **Define Scope of Work**

EA observed two meetings of the work scope review team, which adequately performed an initial scoping review for requested work. The work scope review team used the VMT, described above, to assist with the screening of work requests, and appropriately included representation from construction, operations, and ES&H. In 27 of the 28 reviewed construction WPs, the scope of work was adequately described in the work order, the task instructions, and the attached engineering documents, including design change packages, drawings, and weld maps. The scope of work described in WP 01731710-04, *Install Windbreak for Stack Welding*, was inconsistent with the actual work (as discussed below under Develop and Implement Hazard Controls).

## Analyze the Hazards

Work planners and work control staff interviewed are experienced and knowledgeable. Work planners and the three interviewed SMEs involved in the AHA process were trained on the AHA process, including completing the recently revised *Introduction to Web-Based AHA* course. Interviews with SMEs, planners, and work team members confirm that SMEs are appropriately involved in the AHA process and are knowledgeable of the hazards at the Tank Farms. Planners, craft workers, and others participate in walking down complex jobs. However, COVID-19 restrictions since March 2020 have limited the number of people permitted to walk down a job at the same time.

An AHA determination guide and/or disposition report was included in 19 of 20 WPs for work that was performed in the field (i.e., not shop work). One AHA had been accidentally purged from the WP, but SRR was able to recreate the AHA. The reviewed disposition reports identified the hazards and associated controls, described how the controls were implemented (i.e., pre-job brief, technical work document, or other), and listed the required SME reviews and documented approvals. The hazards were appropriately identified for most WPs.

Nine of the 28 reviewed construction WPs involved potential exposure to mercury vapor. Planners are expected to select Hazard 172D, “Potential for release of gas/vapor” to address mercury vapor. The AHA in 5 of the 9 WPs did not identify the mercury hazard under 172D. Only one WP identified a control specifically for 172D. The AHA in WP 01751876-03 did not identify mercury vapors as a hazard. The AHAs for these 9 WPs did not consistently identify the mercury vapor hazard and WP controls were inconsistently selected. The AHA system does not specifically identify mercury vapors as a hazard and does not include a related suite of mercury vapor controls. This has contributed to mercury vapors not being identified as a hazard and planners inconsistently selecting controls (See **Finding F-SRR-1**). The SRR WP&C process does not ensure that all WPs contain the applicable hazards and controls as required by 10 CFR 851 Appendix A.1; 10 CFR 851.21(a)(6); and 48 CFR 970.5223-1(b)(5) and (6).

When hazards related to ordinary lifts are identified during a pre-job walkdown within the liquid waste facilities, an ordinary lift plan is created. OSR 46-348, *LW Crane/Hoist and Rigging Compliance Checklist* is filled out and will include a demarcation sketch which shows proper setbacks from any overhead power lines or critical infrastructure. WP 1751636-02 did not include a demarcation sketch even though the task involved conducting a lift and the ordinary lift plan required one (See **Finding F-SRR-1**). The SRR WP&C process does not ensure that all WPs contain the applicable hazards and controls as required by 10 CFR 851 Appendix A.1; 10 CFR 851.21(a)(6); and 48 CFR 970.5223-1(b)(5) and (6).

Nine of the 28 reviewed work tasks involved fabrication shop work, which does not require the AHA process but relies on the IHA process using the STARRT card, and on existing SWRGs and CHAs, to identify hazards. The fabrication shop SWRG lists generic hazards associated with shop tasks, such as chemical hazards and fumes, but neither the SWRG nor the CHA specifies the chemicals of concern. Manual 8Q, Procedure 122, Section 5.9.4 references a chemical application output document that was not included with the SWRG. The SWRG refers users to the CHA for shop mounted equipment. The assessment team reviewed three CHAs and found that although the documents need to be updated, workers use them in the shop, as evidenced by an authorized operators list with signatures and dates (See **OFI-SRR-1**). Interviewees confirmed the use of the STARRT card before work begins.

## Develop and Implement Hazard Controls

As discussed in section 3.1.1, controls are identified as part of the AHA process. The reviewed AHAs included an appropriate listing of required ES&H SME reviews and approvals. The identified controls

are addressed through the pre-job briefings, technical work document controls, and other controls, including safety data sheets for chemicals. The assessment team was not able to observe any pre-job briefings, however the reviewed WPs included a completed pre-job briefing checklist. All 28 reviewed WPs included precautions and limitations, prerequisites, and announcements as needed.

WP 01751876-03, *Install Purge Tower Support Tank 35*, did not include IH action steps for performing mercury vapor surveys (e.g., ensure that the IH/IH-qualified radiological control inspector monitors for mercury vapor). Additionally, a prerequisite in the WP required an evaluation prior to performing elevated work, but after it was determined that elevated work was being performed, a monitoring survey for mercury vapor was conducted. A handwritten field note indicated that the survey monitoring results exceeded action levels, so the work had to be paused while additional controls were applied. On other jobs, the chemicals of concern were identified in the safety data sheet section of the AHA form, but the controls were not consistently specified; for example, WP 01750673- 02, *Modify Cell Cover C*, listed fast cure epoxy, but no controls were provided. Further, SWRGs which describe hazards related to shop equipment do not specify the maximum pressure limit of the equipment used to conduct hydrotesting in the shop (See **Finding F-SRR-1**). The SRR WP&C process does not ensure that all WPs contain the applicable hazards and controls as required by 10 CFR 851, Appendix A.1; 10 CFR 851.21(a)(6); and 48 CFR 970.5223-1(b)(5) and (6).

While most WPs could be performed as written, nine WPs were missing documents, contained errors, or had conflicting steps. Missing documents included critical lift plans, hoisting and rigging checklists, rescue plan, LOTOs, a pre-job brief, and OSR 20-204, *Drilling and Penetration Safety Checklists*. WP 01751636-02, *Core Drill New Inspection Port*, contained conflicting steps regarding silica controls. The SRR WP&C process does not ensure that all WPs are written in a clear, concise, and worker-friendly manner as required by Manual 1Q, Procedure 9-4, *Work Planning and Control*. (See **Finding F-SRR-1**)

The assessment team identified significant field revisions in two WPs. One, WP 01731710-04, *Install Windbreak for Stack Welding*, included documents for constructing a certified containment hut/windbreak. The enclosure for this job was not required to be a certified enclosure, so all work instruction steps including those involving radiological control for installing and maintaining a certified containment hut/windbreak were crossed out. Interviewed crew members said that windbreaks are typically installed as skill of the craft using the STARRT card process, which is how they accomplished this job. The planner said that a WP was prepared for the windbreak, including containment hut steps as a shortcut to the planning process if a containment hut was needed. This work could not be performed as written without these revisions, contrary to Manual 1Q, Procedure 9-4. (See **Finding F-SRR-1**)

The other field-revised WP, 1751876-03, *Install Purge Tower Support*, included four field pen-and-ink revisions, which included nine changes to the work instructions and a handwritten note to document mercury survey results, which were not required by the work instruction; a handwritten change to remove a chain eyebolt; and a handwritten change to one of the AHA controls for silica. Without these pen-and ink revisions this work could not be performed as written, contrary to the requirements of Manual 1Q, Procedure 9-4. (See **Finding F-SRR-1**)

Drilling and penetrations into concrete were part of five of the 28 reviewed WPs. Use of an electronic drill stop/tool interrupter to protect workers from electrical shock hazards was specified in all five WPs as required by Manual 8Q, Procedure 124, *Drilling and Penetrations Including Cutting/Altering Installed Conduit/Piping*. One WP that involved drilling into a manhole lid, stated that the drill stop would not be used because rebar contact was expected, and the core drill would shut off. This revision was appropriate because no energized wires run through a manhole, therefore, no electrical shock hazard was expected; however, Manual 8Q, Procedure 124 does not state an exception to allow core drilling without the drill stop system. (See **OFI-SRR-2**)

## **Perform Work within Controls**

As stated in Section 2, this assessment was conducted remotely, and conclusions are based on a review of documentation, remote participation in scheduled planning calls, and interviews. The assessment team confirmed through remote attendance of meetings that work is systematically scheduled and integrated through SRR's scheduling system and work scheduling processes. The assessment team remotely attended POD and plan-of-week meetings, as well as other scheduling meetings, and found the work to be scheduled sufficiently in advance to allow deconfliction of work and to provide workers with an opportunity to review the WPs. Twenty-seven of 28 reviewed WPs included a completed pre-job brief checklist (OSR 39-31), which had been signed by attendees. The remaining WP involved skill of the worker tasks and did not require a pre-job checklist. The supervisor uses the AHA disposition report or a STARRT card for pre-job hazards and controls. The interviewed superintendents, foremen, and lead work group supervisors had substantial experience, and the craft are experienced journeyman workers.

SRR demonstrates a strong commitment to safety. All interviewed employees stressed the right to stop work and examples of paused work were provided. The SRR construction managers' monthly safety meeting report for March 2021 included seven individual recognition awards, some of which involved pausing work due to safety concerns. Supervisory training includes the SRR Construction Supervisor Workshop Training, which stresses safety. SRR has implemented numerous safety programs, including several related to observing work in the field, such as SAFET (craft behavior-based observation program), task-based observations (TBOs), and management field observations (MFOs), as well as Toolbox Target weekly meetings and the Reinforcement for Achieving our Values and Expectations award (an instant recognition program). All interviewed personnel emphasized the importance of performing work safely. Also, the Environmental Safety and Health (ESH) SMEs are involved in the AHA process, conduct workplace surveys, and support work performed in the field and in the shops.

Nineteen of the 28 reviewed WPs included properly released work with signed work release forms. The work release forms were signed by the shift manager, the lead work group supervisor, and the workers. The other nine documents were shop work packages, which do not require releases. Interviews with construction and operations personnel confirmed the use of the work release process.

## **Provide Feedback and Continuous Improvement**

SRR uses the TBO process to obtain feedback on work performed in the field. The use of a large selection of TBO checklists facilitates oversight of the specific type of construction work being observed. One hundred and twenty checklists are available online and are searchable by ISMS core function, title, and checklist number. SRR construction senior management established a Leadership Engagement Matrix that, among other things, sets goals for the number of TBOs conducted. In March 2021, 724 TBOs were completed. Similarly, SRR uses the MFO process for managers to conduct observations in the field, resulting in significant field oversight with identification of issues and tracking of corrective actions. The TBO and MFO processes are effective tools for identifying areas for improvement and future oversight opportunities. These represent a **Best Practice**.

### **3.1.3 Work Planning and Control for Construction Coordination with Operations Conclusions**

SRR has a mature WP&C program that includes a robust work management VMT and work management scheduling processes. Work was planned, overseen, and performed by a competent, experienced, and trained workforce. WP&C processes identified hazards and controls, and SRR systematically scheduled and integrated work with operations to ensure that facility management was knowledgeable of construction activities, to minimize schedule impacts, and to ensure that appropriate resources were available. SRR demonstrated a strong commitment to safety, including extensive use of TBOs and MFOs

to drive improvement of safe work performance in the field. The field oversight processes, TBO and MFO, are effective tools for identifying areas for improvement and future oversight opportunities.

Despite these strengths, the assessment team identified a finding associated with SRR work control processes resulting in WPs that did not identify the applicable hazards and/or controls, could not be performed as written, or were not complete, correct, or appropriately revised.

### **3.2 Subcontracted Construction Work**

The objective of this portion of the assessment was to verify that SRR has appropriately flowed DOE contract WP&C and safety requirements down to its lower-tier construction subcontractors and ensured that requirements are implemented.

#### **DOE Requirements Flowdown**

The EA team evaluated the SRR process for ensuring that DOE WP&C and safety requirements are flowed down to lower-tier subcontractors that were working at the Tank Farms at the time of this assessment. In addition, the assessment team evaluated how 10 CFR 851 requirements are implemented for SRR subcontracted construction work at the Tank Farms. Two unit-price contractor (UPC) subcontractors were evaluated, one performing general construction work and the other performing roofing construction work.

SRR S18, *SRR Procurement Services Manual*, SRR 11B, *Subcontract Management Program (SMP)*, and Manual 8Q, Procedure 15, *Subcontractor and Visitor Safety and Health*, provide an adequate process to establish a graded approach to flowing requirements down to three categories of subcontractors and describe how to implement WP&C and safety requirements. The categories are based on the level of risk and proximity to the SRR direct-hire workforce: Category A, subcontractors who perform work independently away from SRR workers; Category B, subcontractors who perform work independently, collocated with SRR workers; and Category C, subcontractors whose work is integrated with the SRR workforce.

The two evaluated UPC subcontractors were performing Category B work. Form OSR 1-183, *Subcontractor Safety Checklist*, completed by the subcontractor technical representatives (STRs) for the UPC purchase requisitions, as well as OSR 1-126, *Subcontract Field Conditions*, accurately identified the potential level of risk and the category of the work to be performed. The UPC subcontractors were each pre-screened by SRR to ensure that their recent safety performance met SRR's established thresholds for experience modification rate and total recordable injury incidence rate. SRR subcontract documents with its UPC subcontractors includes the requirements of Manual S18 and Manual 8Q, Procedure 15 to ensure that its subcontractors meet DOE requirements as implemented by SRR subcontracts terms and conditions. The roofing UPC's contract with its primary subcontractor included all the SRR subcontract language related to WP&C and worker safety and health. The general construction UPC contracts (showing safety requirement language) with its subcontractors were not provided for review. However, email records from the general construction contractor indicated that they did not include safety and health requirement language in the contracts with their subcontractors as required by the DOE contract with SRR (DE-AC09-09SR22505, Sections C.2.2, H.1, I.116 and I.140). **(See Deficiency D-SRR-1)**

DOE-SR-approved SRR-ESH-2018-00093, *Worker Safety and Health Program*, and SRR-RP-2014-00926, *SRR Integrated Safety Management System Description*, establish appropriate SRR implementation procedures for ensuring that the UPC subcontractors meet DOE and SRR requirements. This flow down for Category B UPC subcontractors requires the submittal of a worker protection plan (WPP) and task-specific plans (TSPs) to implement 10 CFR 851 and SRR ISMS requirements. SRR's

WPP template to guide subcontractors on the development of acceptable WPPs and SRR's review and approval process result in satisfactory UPC subcontractor WPPs to implement DOE regulatory and contractual requirements. For example, the WPPs included implementation procedures for 10 CFR 851 requirements and Occupational Safety and Health Administration (OSHA) standards applicable to the subcontractor's work scope, provisions for reporting safety concerns, procedures to allow workers to stop work to address noted work hazards, reporting and recording occupational injuries and illnesses, and reporting occurrences required by DOE Order 232.2A, *Occurrence Reporting and Processing of Operations Information*.

SRR appropriately provides coaching, tools, and resources to assist UPC subcontractors in implementing the DOE contract and 10 CFR 851 requirements. For example, SRR requires new subcontractor senior leadership to come on site for a day-long orientation before starting work and provides subcontractors with blanks and examples of completed safety forms. Interviews with UPC subcontractor project managers and safety representatives indicated that these resources are helpful. In addition, SRR ensures that stop/pause work authority is reinforced throughout subcontractor documents (e.g., WPP, TSP, STARRT card) and discussed frequently (e.g., daily toolbox meeting to discuss STARRT cards).

### **Subcontracted Construction Work Planning and Control Implementation**

The EA team reviewed WP&C documentation for six UPC subcontractor projects, including SRR's review comments and approval documentation for the subcontractors' WPPs and project specific TSPs. The WPPs included the subcontractor's corporate procedures for implementing OSHA standards typical of the scope of work included in their contracts with SRR, as well as implementing procedures for 10 CFR 851 and contract provisions that flowed down from the DOE contract.

Project TSPs (used as activity-level hazard analyses) clearly document project scopes of work and list detailed, specific work activities. Hazards for general construction and roofing work and their controls were mostly generic and repeated from TSP to TSP. For example, the TSP for the 299-H Fence Installation project clearly identified the scope of work and 14 well-defined activities. There were 34 generic hazards and their controls identified for this project. SRR recently initiated the use of STARRT cards for UPC subcontractors to improve identification of activity-level hazards for each day's work. Subcontractor project managers stated that the use of the STARRT cards improved worker involvement and focus on identifying hazards and controls.

IH monitoring data (e.g., for silica, mold, and benzene) was appropriate for the type of work performed by the UPC subcontractors, including monitoring performed by a certified industrial hygienist. The assessment team sampled records of safety training (e.g., fall protection and noise) for UPC subcontractors and found them to be satisfactory.

SRR has several feedback mechanisms specific to subcontracted construction work at the Tank Farms. The requirement for construction subcontractors' WPPs to include a process for self-assessing safety during work activities using the focused observation checklist included in their SRR-approved WPPs is a **Best Practice**. SRR provides online resources to facilitate the development of focused observation checklists matching a subcontractor's scope of work. In addition, SRR provides several ways to oversee subcontracted construction work at the Tank Farms, including:

- Providing day-to-day subcontractor safety oversight by qualified STRs.
- Periodic safety SME oversight of subcontractor safety and contract document deliverables, such as the WPP/TSP.
- As noted in Section 3.1.2, SRR construction senior management established a Leadership Engagement Matrix that, among other things, sets goals for the number of TBOs to be conducted by

STRs, the construction safety specialist, and other management officials. Results of individual TBOs are shared with the subcontractor being observed, and all TBO results are tracked and trended monthly to guide future oversight and improve contractor safety performance.

### **Subcontracted Construction Work Conclusions**

SRR has an appropriate process for flowing down safety requirements to their construction subcontractors, including direction for their subcontractors to flow down safety requirements to lower-tiered subcontractors. The roofing UPC subcontractor properly flowed down requirements in contracts with lower-tiered subcontractors; however, the UPC safety general construction subcontractor did not include safety requirements to its lower-tier construction subcontractors through written contracts. The SRR process ensures that subcontractors are knowledgeable of 10 CFR 851 WSHP and DOE contract integrated safety management/WPC requirements. Safety requirements were included in UPC subcontractor work control documents. SRR oversight mechanisms include TBOs and subcontractor self-assessments of their work activities using focused observations to gather data about the safe performance of work.

SRR has effective processes for establishing safety and WP&C requirements in its construction subcontracts; however, the general construction UPC subcontractor had not included WP&C and safety requirement language in contracts with its subcontractors.

In general, subcontracted UPC work is supported by work planning and safety documentation appropriate to the typical work being performed; however, TSPs generally rely on generic hazard identification rather than a robust identification of hazards and controls specific to the work being performed and the location of the work.

### **3.3 Construction Safety Focus Areas**

The objective of this portion of the assessment was to evaluate completed WPs to determine whether SRR WP&C safety requirements were adequately documented for construction activities involving hoisting/rigging and excavation. DOE-SR conducted an assessment in 2017, and a finding related to hoisting and rigging was documented. Following the 2017 assessment, DOE-SR issued a letter of concern related to the finding which resulted in a reduction of award fee. DOE-SR assessed hoisting and rigging (2019-SA-004093) between July 1, 2019, and August 6, 2020, which resulted in a DOE concern letter pertaining to the implementation of ISMS requirements, lack of engineering rigor, and systematic/programmatic non-compliances like those identified in the previous 2017 DOE-SR concern letter.

#### **Hoisting and Rigging**

Appropriate personnel were involved in the development of corrective actions to address the issues identified in the DOE-SR concern letter from the 2019-SA-004093 assessment. Hoisting and rigging was used in 9 of the 28 WPs reviewed in this assessment. The reviewed hoisting plans were detailed and included lift weights, calculations, and the maximum operating radius. The shift operations manager coordinates and signs all crane lifts daily. Review of the OSR 46-349, *LW Person in Charge Approval Sheet* showed a shift manager signed the daily pre-job brief for each lift. All reviewed WPs appropriately identified and required critical lift plans. WPs 1751876-01, *Tank 35 Install Purge Exhaust Stack Extension*, and 1751876-03, *Tank 35 Install Purge H&V Tower Support*, both stated to follow the approved critical lift plan; however, the AHA for WP 1751876-01 did not identify the critical lift hazard.

Critical lift plan HLW-CL-2020-00403 covered lifts at tanks 41 and 43 and referenced six different WPs including WP 01772256. The location sketch of the crane was for reference only and did not specify the crane's exact position on the site. The critical lift plan covered lifting ten types of items. Each of the six WPs did not specifically describe the critical lift items from the lift plan that was associated with it. Additionally, the critical lift performed on October 14, 2020, did not include a pre-job brief for WP 01772256 for the same day. SRR provided information that Lift Plan HLW-CL-2020-00295 was used in lieu of Lift Plan HLW-CL-2020-00403 on this date. The SRR WP&C process did not ensure that all WPs are written in a clear, concise, and worker-friendly manner per Manual 1Q, Procedure 9-4, Work Planning and Control. (See **Finding F-SRR-1**)

Crane proximity controls to prevent contact with electrical power lines or critical piping were used in six WPs in accordance with Manual 8Q, Procedure 10, *Requirements for Working Near Overhead Electrical Lines and Critical Piping*. WP instructions included crane proximity controls tailored to the hazard; however, the actual voltage of the power line was listed in just one of the six WPs. Demarcation sketches showed the location of the demarcation line, with a 20-foot offset, but did not show what the hazard was or its location. Additionally, no crane sketch was provided in the lift plan or WP 1751636-02, *Core Drill New Inspection Port*, even though the WP required demarcation for lift activities near facility equipment, and the ordinary lift plan directed demarcation according to a crane sketch. The SRR WP&C process did not ensure that all WPs contained the applicable hazards and controls as required by 10 CFR 851, Appendix A.1; 10 CFR 851.21(a)(6); 10 CFR 851.23(a)(14) [NFPA 70E] and 48 CFR 970.5223-1(b)(5) and (6). (See **Finding F-SRR-1**)

In reviewing the use of crane travel route information, the EA team noted that four of nine WPs included a crane movement checklist and route sketch or referenced the approval from design for crane travel and setup. Corrective actions from DOE-SR assessment 2019-SA-004093, including documenting planned crane movement, are being implemented to improve crane travel, but were not complete at the time of this assessment.

## **Excavation**

The EA team reviewed two WPs involving excavation work. One WP, for installing a concrete footer, was limited to hand excavation not exceeding 12 inches. Although no survey was required due to partial exemptions in Manual 8Q, Procedure 34, *Excavations and Trenches*, a non-intrusive survey using ground penetrating radar (GPR) was performed at the request of Industrial Safety prior to excavating. The EA team agreed that this was a good work practice that exceeded the requirements of the WP.

WP 01619041-01, *Excavate to Expose HM-241029-CTW-V-17 "T" Handle Broken*, was created to excavate and expose a valve in the waterline of a cooling tower in H Tank Farm. A non-intrusive test using GPR was referenced in the work package. Site mapping and GPR information are clearly indicated on the excavation sketch. The excavation limit on the excavation sketch extended beneath the corner of the cooling tower, potentially creating a structural concern not addressed in the WP. A review of structural integrity and the potential to undermine or destabilize adjacent structures is required as part of the hazard evaluation in Manual 8Q, Procedure 34, Attachment 8.3, *Excavation Planning Checklist*. The lead work planner, planner, and craft supervisor stated that the actual excavation ended up being smaller than the excavation limit allowed on the sketch and was 5 to 6 feet from the cooling tower and approximately 8 feet deep. The manufacturer's tabulated data for the hydraulic shoring that was used as cave-in protection for this job showed that the selected shoring is not approved for use when a trench is deeper than the horizontal distance from a surface encumbrance. Review of the WP and interviews revealed that the structural evaluation and shoring limitations were not addressed. The SRR WP&C process did not ensure that all WPs identified the applicable hazards and controls as required by 10 CFR

851, Appendix A.1; 10 CFR 851.21(a)(6); 10 CFR 851.23(a)(7) [29 CFR 1926.651] and 48 CFR 970.5223-1(b)(5) and (6). (See **Deficiency D-SRR-2**)

### **Construction Safety Focus Areas Conclusions**

The SRR processes appropriately ensure coordination of crane use, since lifts are approved daily by the shift operations manager. WPs identify when critical lifts are needed, as well as controlled hazards, such as work near energized power lines or process piping. However, critical lift plans with multiple lifts are written for use with multiple WPs without specifying which lifts apply to which WPs. Five of six demarcation sketches for crane proximity did not clearly identify the hazardous voltage, and one ordinary lift demarcation sketch was not included in the WP or lift plan.

The excavation process appropriately uses ground penetrating radar to identify hazards, addresses excavation entry with daily inspections of the trench by an excavation competent person, and requires hydraulic shoring when the excavation exceeds 5 feet or as deemed necessary by the excavation competent person. However, the WP did not address the required structural evaluation, or the limitations of the hydraulic shoring stipulated by the manufacturer in the tabulated data sheet.

### **3.4 Electrical Safety**

The objective of this portion of the assessment was to assess the electrical safety program used by SRR and aspects of implementation for maintenance and construction in the F and H Tank Farms. Since the assessment was conducted remotely, facts were established through document reviews and interviews of a cross section of electrical personnel and covered areas related to electrical LOTO, the installation of arc flash warning labels on certain pieces of equipment, PPE, and training. The EA team reviewed six electrical maintenance WPs and eight LOTO orders and interviewed 14 SRR electrical personnel, including maintenance managers, supervisors, engineers, safety officers and qualified electricians.

Manual 18Q, Procedure 1, *Electrical Safety Program and Responsibilities*, and Manual 18Q, Procedure 2, *Safe Practices on or Near Electrical Conductors or Live Parts*, effectively integrate the requirements of National Fire Protection Association (NFPA) 70E-2018, *Standard for Electrical Safety in the Workplace*, Section 110.1, *Electrical Safety Program*. Additionally, the electrical safety program includes Manual 8Q, Procedure 32, *Hazardous Energy Control (Lockout/Tagout)*, and addresses the requirements of 10 CFR 851 for compliance with OSHA 29 CFR 1910.147 and 1910.333(b), along with the requirements to establish an electrically safe work condition, as stipulated in NFPA 70E 2018, Article 120. The electrical safety program is well staffed with SMEs and Authorities Having Jurisdiction.

The electrical personnel interviewed all understood the requirement and benefit of labeling all 208-volt (and greater) three-phase electrical panels, disconnect switches, motor control centers, and switchgear with a current arc flash warning label as required by NFPA 70E-2018, Section 130.5(H). These labels provide warnings and guidance for maintenance, operations, and construction personnel regarding the potential arc flash hazard, the arc flash boundary, and the NFPA 70E-2018, Section 130.7 required PPE for anyone working on or operating equipment within the arc flash boundary. The assessment team interviewed six qualified electrical workers. Topic areas discussed included the selection and use of properly rated PPE for shock and arc flash, including the requirement that street clothing worn under arc-rated coveralls, or an arc flash suit cannot contain “melttable fibers” per NFPA 70E-2018, Section 130.7(C)(9)(c).

The SRR electrical safety program appropriately incorporates the requirements of 10 CFR 851 for the risks associated with electrical hazards. Electrical maintenance work activities are primarily performed on de-energized electrical equipment, but procedures are in place for performing energized electrical

work when permitted and performed in accordance with the requirements of the electrical safety program. Manual 18Q, Procedure 2, *Safe Practices on or Near Electrical Conductors or Live Parts*, adequately describes the safe work procedures for electrical workers who are permitted to work on energized equipment and specifies appropriate labeling, PPE, and other procedures. Electrical workers reported that they use appropriate PPE, such as arc flash and shock rated protection, and they were able to describe the safe work practices that they would use, including zero-energy checks for electrical lockout. They also stated that a second qualified worker is always available to verify that work is performed correctly and safely.

Review of WPs revealed that the work instructions do not reference the lockout order number in the steps that require energy control (See **OFL-SRR-3**). Also, the WPs provide the arc flash hazard and PPE requirements before the step that requires it, but do not provide the required shock hazard and PPE requirements, which may be different from the arc flash hazard requirements. (See **Deficiency D-SRR-3**)

### **Electrical Safety Conclusions**

The electrical safety program, which encompasses SRR electrical work, complies with requirements of NFPA 70E-2018. The arc flash program elements are implemented as required by NFPA 70E-2018, Section 130.5(H). However, WPs lack discussion of shock hazard and related PPE requirements.

### **3.5 Contractor Assurance System**

The objective of this portion of the assessment was to verify that SRR has established a contractor assurance system (CAS) to plan and conduct assessments, identify and manage WP&C issues and associated corrective actions, and analyze CAS results to provide feedback on the adequacy of controls and continue to improve safety management.

SRR has a mature and robust CAS for providing feedback and improvement input for its WP&C program. The SRR integrated assessment plan includes both internal and external assessments to ensure that the CAS meets the requirements outlined in DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*, as detailed in the Contractor Requirements Documents. Results of these assessments were appropriately entered into the Site Tracking, Analysis, and Reporting (STAR) system for corrective actions. External assessments are conducted semi-annually by SMEs from third-party organizations, typically from corporate partners of SRR. Internal self-assessments are conducted for work planning and control using a risk-based methodology to determine the frequency at which certain aspects of the program need to be assessed. As a result, certain aspects of WP&C are assessed annually, such as feedback and improvement, while other aspects are assessed less frequently (to a minimum of once every three years), such as identification of safety standards and requirements. The SRR assessment performance objectives and criteria are used to develop the assessment plan and facilitate the graded approach to ensure that higher risk elements of WP&C are assessed more often.

The effectiveness of the SRR WP&C program is sufficiently documented in quarterly performance analysis reports. These reports provide an overall grade for WP&C performance and a reliability element score based on any identified potential weaknesses that could become issues in the future. Additional metrics are tracked for the WP&C functional area that focus on preventive maintenance actions and work window schedule performance. These metrics are monitored, and although they are not directly associated with ISMS core functions, they keep the focus on current work being performed by SRR.

Lastly, SRR screens external and internal lessons learned for each functional area, including WP&C, and enters this information into STAR to determine its applicability for use by SRR for program improvement. For example, in the first quarter of fiscal year 2021, a total of seven STAR issues were

generated from lessons learned. Interviews with SRR personnel demonstrated a high level of awareness and support for identifying lessons learned.

### **Contractor Assurance System Conclusions**

The SRR CAS is a reliable program for conducting internal and external assessments, tracking metrics to determine the effectiveness of performance, and identifying applicable lessons learned. The SRR assessment programs are risk-informed and formally described and documented.

### **3.6 DOE-SR Field Office Oversight**

The objective of this portion of the assessment was to assess the DOE-SR WP&C oversight process for overseeing and evaluating SRR work, including subcontracted work at the F and H Tank Farms, and the implementation of specific DOE-SR programs, including assessments and operational awareness activities, issues management, and performance assurance analysis.

Savannah River Manual (SRM) 400.1.1G, *Integrated Safety Management System (ISMS) Description Manual*, effectively describes the DOE-SR ISMS, outlining how the principles and core functions of integrated safety management are implemented to ensure that work is performed safely. SRM 300.1.1B, *Human Capital Management Systems Manual, Functions, Responsibilities, and Authorities Procedure (FRAP)*, assigns responsibility for contractor oversight to the Performance Assurance Division (PAD). The PAD consists of a cadre of SMEs who perform contractor oversight, coordinate the development of annual plans for self-assessment and contractor oversight activities, review CAS, and maintain performance indicators.

The Office of Quality Assurance oversees the PAD and develops the annual assessment plan with input from the PAD, Technical Support Division (TSD) and the Facility Representatives (FRs); the EA team noted that the 2019-2021 Integrated Assessment Plans included elements of environment, safety, and health. The PAD, TSD and FRs review the contractor's work schedule and work plan, attend the contractor's POD and plan-of-week meetings, and use a graded approach to plan operational awareness activities and assessments. Planned assessments and operational awareness activities are efficiently managed and tracked through STAR. Beginning in March 2020, DOE-SR required at least one FR to be present on site and rotated the Technical Support Division staff to address the need to limit the number of onsite personnel during the COVID-19 pandemic.

DOE-SR has implemented an effective FR program staffed with well trained and qualified personnel with substantial experience. Savannah River Implementing Procedure (SRIP) 400, Chapter 430.1, *Facility Representative Program*, is consistent with DOE-STD-1063-2017, *Facility Representatives*, and adequately describes FR duties, responsibilities, and authorities. The FRs are well integrated into SRR operations. The FR activity reports document critical results of daily operational awareness activities and are included in the quarterly assessment reports reviewed by management.

DOE-SR completed 61 assessments from January 1, 2018, through March 31, 2021, of which seven included the WP&C functional area. The assessment team reviewed all seven of these DOE-SR assessments of SRR and determined that they were detailed and effectively reported performance deficiencies.

FRs and the TSD staff conduct routine operational awareness activities and planned assessments that are documented in STAR. DOE-SR completed an assessment (2019-SA-004093) and issued several findings, one of which was in the WP&C functional area. In that assessment, DOE-SR determined that SRR did not effectively implement corrective actions related to the hoisting and rigging program finding

issued by DOE-SR in 2017 (Assessment 2017-SA-004776). On November 1, 2017, DOE-SR issued a letter of concern to SRR regarding this 2017 finding, which resulted in an award fee reduction. On August 13, 2020, DOE-SR issued a second letter of concern based on the 2019-SA-004093 assessment. This letter noted SRR's ineffective implementation of corrective actions to the November 1, 2017, DOE Concern Letter, a demonstrated failure to effectively implement ISMS and a lack of engineering rigor in Hoisting and Rigging calculations. Additionally, DOE-SR completed a sitewide quarterly assessment in August 2020 (Assessment 2020-SA-003246), documenting one finding relating to SRR's oversight of hazard analysis, controls, and flow down of safety requirements to subcontractors.

### **Follow-up on EA Findings**

The assessment team followed up on one finding from the 2017 EA assessment (Finding F-SR-01), which stated that the DOE-SR operating experience program (OPEX) did not adequately develop, share, and implement lessons learned through the DOE OPEX as required by DOE Order 210.2A or SRIP 200, Chapter 210.2. DOE-SR registered for the OPEX Lessons Learned DOE complex-wide online database on November 12, 2020 but has neither published nor disseminated any new lessons learned to the database. Further, DOE-SR has not updated SRIP 210.2 to describe how OPEX is to be used. This issue remains open in STAR and is scheduled for closure on December 30, 2021. (See **Deficiency D-DOE-SR-1**)

### **DOE-SR Field Office Oversight Conclusions**

Overall, DOE-SR has a comprehensive, integrated process for Federal line oversight for WP&C and has implemented effective assessment planning and performance, operational awareness activities, issues management, and performance assurance analysis. However, DOE-SR did not complete the corrective actions to address Finding F-SR-01 (DOE-SR OPEX) from the 2017 EA assessment.

## **4.0 BEST PRACTICES**

Best practices are safety-related practices, techniques, processes, or program attributes observed during an assessment that may merit consideration by other DOE and contractor organizations for implementation. The following best practices were identified as part of this assessment:

- The work management VMT facilitates efficient work planning through an innovative computer-based system that was developed in house.
- The field oversight processes, TBO and MFO, are effective tools for identifying areas for improvement and future oversight opportunities.
- SRR requires construction subcontractors to develop a process in their WPPs to self-assess safety during work activities using focused observation checklists.

## **5.0 FINDINGS**

Findings are deficiencies that warrant a high level of attention from management. If left uncorrected, findings could adversely affect the DOE mission, the environment, the safety or health of workers and the public, or national security. DOE line management and/or contractor organizations must develop and implement corrective action plans for findings. Cognizant DOE managers must use site and program-specific issues management processes and systems developed in accordance with DOE Order 226.1,

*Implementation of Department of Energy Oversight Policy*, to manage the corrective actions and track them to completion.

### **Savannah River Remediation, LLC**

**Finding F-SRR-1:** SRR WP&C processes do not ensure that construction WPs contain the applicable hazards and/or controls, can be performed as written, or are complete, correct, and revised appropriately. The assessment team identified the following weaknesses related to WPs, as detailed in Section 3.0 of this report, that support this finding. These weaknesses are associated with approximately one third of the WPs reviewed. (10 CFR 851, Appendix A.1.(a)(1)(i); 10 CFR 851.21(a)(6)); 48 CFR 970.5223-1(b)(5) and (6); Manual 1Q, Procedure 9-4 *Work Planning and Control*).

- Issues where SRR did not ensure that all WPs contained the applicable hazards and controls as required by 10 CFR 851, Appendix A.1; 10 CFR 851.21(a)(6); and 48 CFR 970.5223-1(b)(5) and (6).
  - The AHA system did not specifically identify mercury vapor as a hazard and did not identify specific controls for mercury vapor.
  - WP 01751876-03 AHA did not identify mercury vapors as a hazard.
  - WP 01750673-02 did not identify controls for fast cure epoxy.
  - WP 01751636-02 did not include a demarcation sketch specifying hazards, even though the ordinary lift plan required one.
  - SWRG-001, *Fabrication Shop*, does not specify hydrotesting pressure limits of the testing equipment in the shop.
  - Demarcation sketches for anticipated crane hazards did not always show what the hazard was or its location, and the demarcation sketches provided in WPs differed from those in the lift plans. See WPs 01731710-05, WP 01751636, WP 01751876- 01, WP 01755317-01, and associated lift plans for details.
- Issues where SRR didn't ensure that all WPs are written in a clear, concise, and worker-friendly manner as required by Manual 1Q, Procedure 9-4 *Work Planning and Control*, Section 5.2, Table 2, item 3.3.
  - Nine of the 28 WPs were incomplete and contained errors, significant field revisions, incomplete or contradictory work instructions, and inconsistent use and/or inclusion of checklists. Significant field revisions included crossing out the entire work instructions, crossing out or revising controls, and changing work steps.
  - Critical lift plan HLW-CL-20019-00403 was used for six different WPs at two different tanks, and it is not clear which lifts were related to which WPs.
- Issues where SRR didn't ensure that all WPs could be performed as written, contrary to Manual 1Q, Procedure 9-4, *Work Planning and Control*.
  - WP 01731710-04, *Install Windbreak for Stack Welding*, included documents for constructing a containment hut, which differs from a windbreak. All work instruction steps for installing and maintaining a containment hut were crossed out.
  - WP 1751876-03, *Install Purge Tower Support*, included four field pen-and-ink revisions, including nine changes to the work instructions; a handwritten note to document mercury survey results which were not required by the work instruction; a handwritten change to the grouting process; a handwritten change to remove a chain eyebolt; and a handwritten change to one of the AHA controls for silica.

## 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 Remediation, LLC

**Deficiency D-SRR-1:** SRR did not ensure that DOE safety requirements flow down to all lower-tier UPC subcontractors. (DE-AC09-09SR22505, C.2.2, H.1, I.116 and I.140)

**Deficiency D-SRR-2:** SRR did not identify structures adjacent to the excavation (closer than 8 feet to an 8-foot-deep trench) as a structural concern, and WP 01619041-01 did not address the structural evaluation or the limitations of hydraulic shoring. (29 CFR 1926.651(i); Manual 8Q, Procedure 34, Attachment 8.3.5)

**Deficiency D-SRR-3:** SRR did not ensure that work instructions provide the shock hazard and PPE requirements, which may be different from the arc flash hazard requirements which are provided in the WP. (NFPA 70E-2018, Section 130.4(A))

### Savannah River Operations Office

**Deficiency D-DOE-SR-1:** DOE-SR did not complete timely corrective actions to address the Finding F-SR-01 (DOE-SR OPEX) from the 2017 EA assessment. DOE-SR operating experience program (OPEX) did not adequately develop, share, and implement lessons learned through the DOE OPEX as required by DOE Order 210.2A or SRIP 200, Chapter 210.2.

## 7.0 OPPORTUNITIES FOR IMPROVEMENT

The assessment team identified three OFIs to assist cognizant managers in improving programs and operations. While OFIs may identify potential solutions to findings and deficiencies identified in assessment reports, they may also address other conditions observed during the assessment process. These OFIs are offered only as recommendations for line management consideration; they do not require formal resolution by management through a corrective action process and are not intended to be prescriptive or mandatory. Rather, they are suggestions that may assist site management in implementing best practices or provide potential solutions to issues identified during the assessment.

**OFI-SRR-1:** Consider updating and integrating the guidance for unplanned work to clarify which work can be done without a work package and/or AHA – for example, by requiring task-specific controls and analysis in SWRGs, and periodically reviewing CHAs. Consider strengthening the CHA process for shop equipment, similar to the Certified Hazard Assessment and Job Hazard Analysis process used by Fermilab.

**OFI-SRR-2:** Consider revising Manual 8Q, Procedure-124, *Drilling and Penetrations Including Cutting/Altering Installed Conduit/Piping*, Section 5.1 5, to allow planners to omit the use of a drill stop when drilling into concrete with rebar where there is no expectation of striking an energized circuit. There is currently no exception to allow core drilling without the drill stop system.

**OFI-SRR-3:** Consider referencing the specific lockout order number in the work instruction steps that require energy control.

## **Appendix A Supplemental Information**

### **Dates of Assessment**

Remote Assessment: April 12-22, 2021

### **Office of Enterprise Assessments 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  
Kevin M. Witt, Director, Office of Nuclear Safety and Environmental Assessments  
Charles C. Kreager, Director, Office of Worker Safety and Health Assessments  
Jack E. Winston, Director, Office of Emergency Management Assessments  
Joseph J. Waring, Director, Office of Nuclear Engineering and Safety Basis Assessments

### **Quality Review Board**

John E. Dupuy  
William F. West  
Lawrence J. Denicola  
Michael A. Kilpatrick – Advisor to the Board

### **Office of Enterprise Assessments Assessors**

David Olah – Team Lead  
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Harrichand Rhambarose  
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Terry E. Krietz  
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