SAVANNAH RIVER SITE FACT SHEET

Fifth Five-Year Remedy Review Report for SRS Operable Units with Geosynthetic or Stabilization/Solidification Cover Systems

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Savannah River Site, Aiken, SC
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The United States Department of Energy (USDOE), the United States Environmental Protection Agency (USEPA), and the South Carolina Department of Health and Environmental Control (SCDHEC) has prepared the Fifth Five-Year Remedy Review Report for Savannah River Site (SRS) Operable Units (OUs) with Geosynthetic or Stabilization/Solidification Cover Systems. This report documents the methods, findings, and conclusions for fifteen remedy decision document reviews for the SRS.

What is a Five-Year Remedy Review?

The Comprehensive Environmental Response, Compensation, and Liability Act requires that a remedy review is conducted every five years for sites where any hazardous substances, pollutants, or contaminants remain following a remedial or cleanup action. The remedies are evaluated to determine whether they are functioning as designed and whether they are protective of human health and the environment. The methods, findings, and conclusions of remedy reviews are documented in a five-year remedy review report.

Three Major Questions:

1) Is the remedy functioning as intended by the decision documents?
2) Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection still valid?
3) Has any other information come to light that could call into question the protectiveness of the remedy?

Previous five-year remedy review reports were single reports that included all SRS OUs that had implemented a remedial action. Agreement was reached to conduct future remedy reviews in phases to reduce the volume of the reports and to more effectively identify and resolve issues for similar remedies. For this reason, the SRS Fifth Five-Year Remedy Review Report will be conducted in five phases with OUs grouped by the remedy types.

- Phase 1: Native soil covers and/or land use controls (LUCs)
- Phase 2: Groundwater
- Phase 3: Engineered cover systems
- Phase 4: Geosynthetic or stabilization/ solidification (S/S) cover systems
- Phase 5: Operating equipment

Figure 1. SRS General

This report presents the fourth phase of the fifth year remedy review for OUs that selected geosynthetic or S/S cover systems as part of the final remedy.

SRS History

SRS occupies approximately 310 square miles of land adjacent to the Savannah River, principally in Aiken and Barnwell counties of South Carolina. SRS is located approximately 25 miles southeast of Augusta, Georgia, and 20 miles south of Aiken, South Carolina (Figure 1). Approximately 90 percent of SRS land consists of natural and managed forests.

The primary mission of SRS was to produce tritium, plutonium, and other special nuclear materials for our nation's defense programs as well as for medical, industrial, and research efforts. Production of nuclear materials for the defense program was discontinued in 1988. Chemical and radioactive wastes are by-products of nuclear material production processes. These wastes have been treated, stored, and in some cases, disposed of at SRS. Past disposal practices have resulted in soil and groundwater contamination.

Site Chronology	
1989	*SRS included on the National Priorities List as needing a long-term cleanup plan.*
1993	*Federal Facility Agreement established with the USDOE, USEPA – Region 4, and the SCDHEC to coordinate remedial actions at SRS into one comprehensive regulatory program.*
1997	*First SRS Five-Year Remedy Review is issued.*
2004	*Second SRS Five-Year Remedy Review is issued.*
2009	*Third SRS Five-Year Remedy Review is issued.*
2014	*Fourth SRS Five-Year Remedy Review is issued.*
2015	*Fifth Five-Year Remedy Review for SRS OUs with Native Soil Covers and/or LUCs (Phase 1) is issued.*
2017	*Fifth Five-Year Remedy Review for SRS OUs with Groundwater Remedies (Phase 2) is issued.*

What are the Cleanup Objectives?

Remedial goals are defined for individual OUs, but generally support the following cleanup objectives:

- To prevent unacceptable exposure of human receptors and ecological receptors to contaminants in soils and groundwater.
- To prevent or minimize the migration of contaminants from soils to groundwater at levels that exceed groundwater maximum contaminant levels (MCLs).
- To prevent or minimize the discharge of contaminated groundwater to surface water at levels that exceed MCLs.

Remedial Actions

Primary soil contaminants at SRS are cesium-137 and other radionuclides, organic chemicals, metals, polychlorinated biphenyls, and pesticides. The primary contaminants in groundwater are volatile organic compounds, tritium, strontium-90, iodine-129, and metals to a lesser extent. Surface water has been impacted by the discharge of contaminated groundwater to site streams.

Remedial decisions were implemented for SRS OUs that included geosynthetic or S/S cover systems as part of the final remedy. Geosynthetic cover systems are constructed at SRS OUs when there is a concern that contamination left in place may leach to groundwater above acceptable levels. A typical cross section of a geosynthetic cover system consists of a vegetative/soil protective layer, a geosynthetic drainage layer, an impermeable geosynthetic liner, and compacted common fill placed over the contaminated material. A specific hydraulic conductivity to reduce stormwater infiltration is specified in the design.

In some cases, radioactively contaminated soils have been stabilized with in-situ grouting followed by installation of a low permeability cover (i.e., compacted clay, concrete, etc.) to deter migration of contaminants to the groundwater. Not only does a S/S technology stabilize waste left in place, the in-situ containment also provides another layer of protection to prevent intrusion and exposure to contaminated material.

Table 1 identifies the OUs and associated remedial actions included in the fourth phase of the Fifth Five-Year Remedy Review Report. Figure 2 shows the location of the OUs that correspond with Table 1.

Major Developments Since Last Five-Year Remedy Review

- The cover inspection frequency for the F-Area Retention Basin, General Separations Area Consolidation Unit, L-Area Oil and Chemical Basin, and P-Area Reactor Seepage Basin OUs has been reduced to annual. This reduction provides consistency since the majority of OU covers at SRS are inspected annually.

- The recommendation from the last five-year remedy review to reduce sampling frequency from annual to every five years has been implemented for the R-Area Burning/Rubble Pits and R-Area Rubble Pile OU. The five-year sampling frequency coincides with the five-year remedy reviews.

- A meeting and field walk down was held on December 6, 2013 with the USDOE, USEPA, and SCDHEC to discuss installation and maintenance issues for stormwater runoff covers at the E-Area Low Level Waste Facility (LLWF), and a path forward for installation of future stormwater runoff covers. The current geosynthetic covers are not expected to meet the original project life of 25 years and high maintenance and replacement costs are anticipated.

Table 1. SRS OUs with Geosynthetic or S/S Cover Systems

#	CERCLIS No.[a]	Operable Unit	Remedial Action[b]
1	48	B-Area Operable Unit	In Situ S/S, Concrete Cover, Groundwater Monitoring, LUCs
2	60	C-Area Reactor Seepage Basins (904-66G and 904-68G)	In Situ S/S, Soil Cover, LUCs
3	67	D-Area Expanded Operable Unit (comprised of D-Area Ash Basin [488-D] and D-Area Rubble Pit [431-2D])	Excavation, Soil Cover, Groundwater Monitoring, LUCs
4	86	E-Area Low-Level Waste Facility (643-26E)	Interim Stormwater Runoff Covers
5	23	F-Area Retention Basin (281-3F)	In Situ S/S, Soil Cover, Groundwater Monitoring, LUCs
6	23	F-Area Tank Farms Operable Unit (Waste Tanks 5, 6, 17, 18, 19, and 20)	Annual Visible Engineered Barriers Inspection and Maintenance
7	32	General Separations Area Consolidation Unit (including Old Radioactive Waste Burial Ground [643-E] and Old Solvent Tanks [650-1E through 650-22E])	Excavation, Consolidation, Low Permeability Cover, LUCs
8	55	K-Area Reactor Seepage Basin (904-65G)	In Situ S/S, Soil Cover, LUCs
9	17	L-Area Oil and Chemical Basin (904-83G and 904-79G)	In Situ S/S, Soil Cover, LUCs
10	65, 60	L-Area and C-Area Reactor Seepage Basins (904-64G and 904-67G)	Soil Cover, LUCs
11	16	Old F-Area Seepage Basin (904-49G)	In Situ S/S, Groundwater Mixing Zone, LUCs
12	94	P-Area Operable Unit	Removal Actions (In Situ Decommissioning of P-Reactor Building [105-P], Excavation, Cover), Soil Fracturing with Chemical Oxidation, Soil Vapor Extraction, LUCs
13	66	P-Area Reactor Seepage Basins Operable Unit (904-61G, 904-62G, and 904-63G)	In Situ S/S , Consolidation, Soil Cover, LUCs
14	43	R-Area Burning/Rubble Pits (131-R and 131-1R) and R-Area Rubble Pile (631-25G)	Excavation, Soil Cover, LUCs
15	96	T-Area Operable Unit	Cover, Excavation, Soil Amendments, LUCs

[a] USEPA Comprehensive Environmental Response, Compensation, and Liability Information System
[b] OUs may also include subunits with contaminants in building material or groundwater that are also addressed by the remedy decision document.

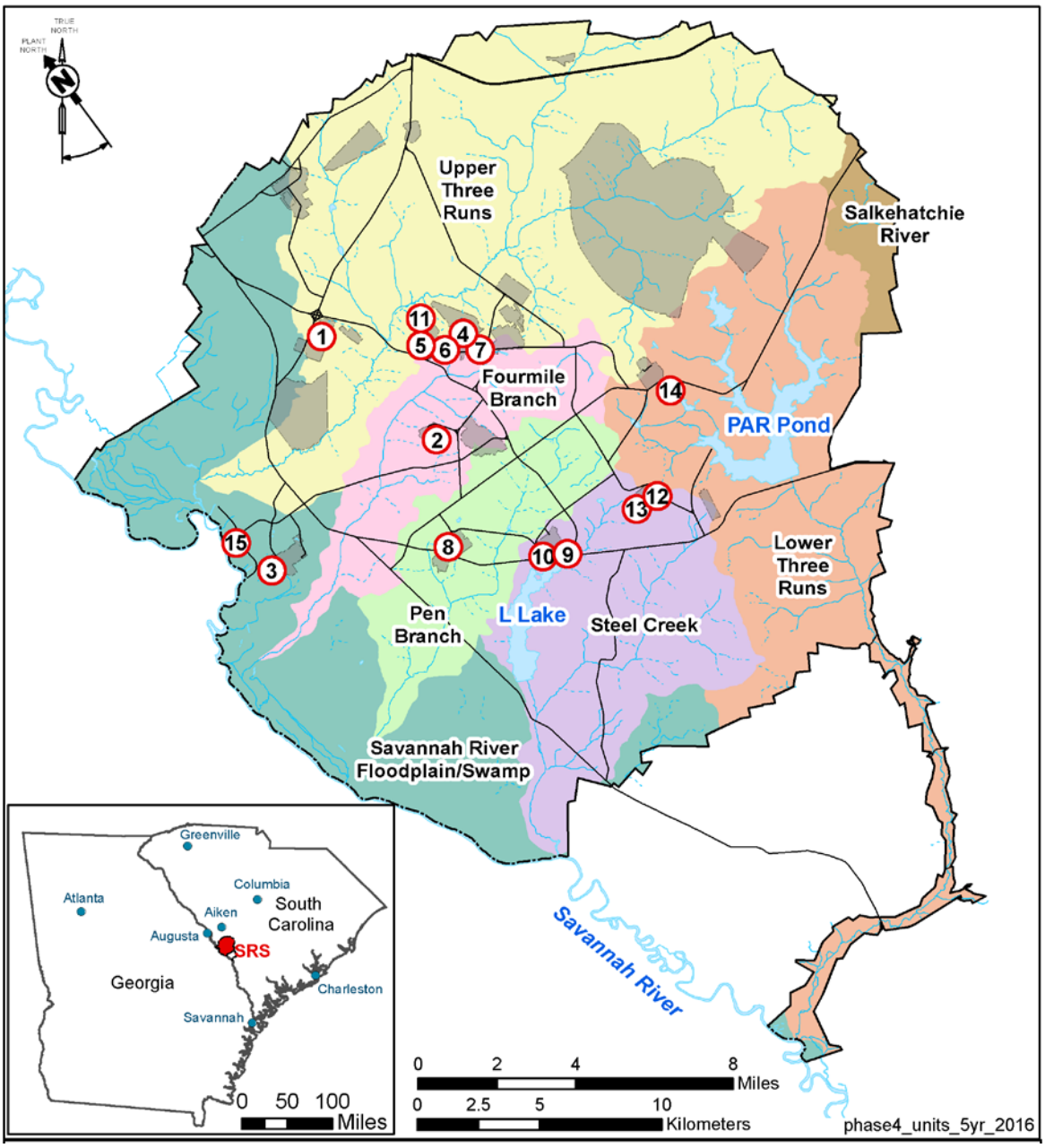

Figure 2. Location Map for SRS OUs with Geosynthetic or S/S Cover Systems

Protectiveness Summary

All fifteen remedies were determined to be protective of human health and the environment. The E-Area LLWF and F-Area Tank Farm OU are currently in the operational phase and unit specific LUCs have been deferred until final closure of these OUs. The interim remedies are currently protective because access is controlled by SRS facility security and administrative controls. SRS geosynthetic and S/S cover systems and related activities are functioning as intended.

Next Five-Year Remedy Review

The Sixth Five-Year Remedy Review Report for SRS OUs with Geosynthetic or S/S Cover Systems is due in January 2023.

Issues and Recommendations

- Maintenance of the stormwater runoff covers at the E-Area LLWF continues to be problematic due to subsidence, water pooling on the covers, and lifting during wind events. The current geosynthetic covers are not expected to meet the original project life of 25 years and high maintenance and replacement costs are anticipated. The USDOE recommends that discussions continue with the USEPA and SCDHEC on the type of cover system needed for future slit trench disposal units.
- Elevated gross alpha concentrations were detected in the BMW groundwater wells at the B-Area OU likely due to turbidity issues. The USDOE recommends redevelopment of the BMW wells prior to the next sampling event to reduce turbidity, followed by filtering of samples and speciation, as needed, for radionuclides. The sampling results from the redeveloped wells will be reported in the Sixth Five-Year Remedy Review Report.
- Ten radionuclides identified as contaminant migration constituents of concern for the P Area OU (PAOU) are not predicted to impact groundwater before the year 2230. Many of these radionuclides require specialized analytical methods. The USDOE recommends a reduction of the PAOU analyte list to focus on radionuclides with the fastest travel times as predicted by the groundwater model. The change to the monitoring strategy will be documented in an addendum to the PAOU Effectiveness Monitoring Plan.
- The E-Area LLWF and FTF OU are currently in the operational phase and OU-specific LUCs have been deferred until final closure of the entire facilities. SRS facility security and administrative controls that restrict unauthorized access to the E-Area LLWF and FTF OU are not part of the interim remedies and therefore not recognized as long-term protective. SRS recommends that Appendix A of the FFA Annual Progress Report be revised to include the E-Area LLWF and FTF OU to demonstrate long term protectiveness through the SRS facility security and administrative controls. The report is required by the FFA and includes an annual certification by the USDOE SRS Manager that the listed OUs are in compliance with land use requirements.

For More Information

For more information regarding the complete Fifth Five-Year Remedy Report for SRS OUs with Geosynthetic or S/S Cover Systems, please contact:

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