

SAVANNAH RIVER SITE FACT SHEET

Fifth Five-Year Remedy Review Report for SRS Operable Units with Operating Equipment

ERD-EN-2017-0076

Savannah River Site, Aiken, SC
December 2017

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 Operating Equipment. This report documents the methods, findings, and conclusions for eleven 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 following remedy types:

- Phase 1: Native Soil Covers and/or Land Use Controls (LUCs);
- Phase 2: Groundwater Remedies;
- Phase 3: Engineered Cover Systems;
- Phase 4: Geosynthetic or Stabilization/Solidification (S/S) Cover Systems; and
- Phase 5: Operating Equipment.

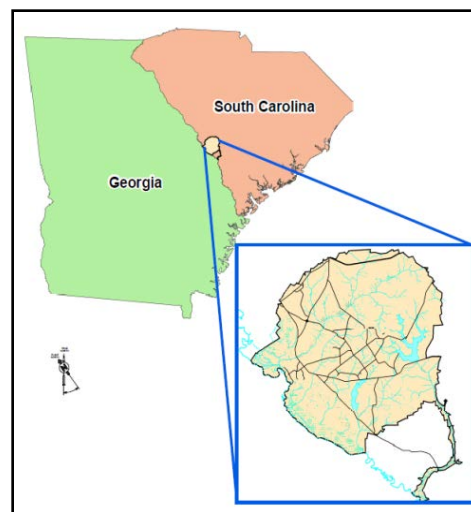


Figure 1. SRS General

This report presents the fifth phase of the fifth five-year remedy review for OUs that selected operating equipment 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.

<i>Site Chronology</i>	
1989	<i>SRS included on the National Priorities List as needing a long-term cleanup plan.</i>
1993	<i>Federal Facility Agreement established with the USDOE, USEPA – Region 4, and the SCDHEC to coordinate remedial actions at SRS into one comprehensive regulatory program.</i>
1997	<i>First SRS Five-Year Remedy Review is issued.</i>
2004	<i>Second SRS Five-Year Remedy Review is issued.</i>
2009	<i>Third SRS Five-Year Remedy Review is issued.</i>
2014	<i>Fourth SRS Five-Year Remedy Review is issued.</i>
2015	<i>Fifth Five-Year Remedy Review for SRS OUs with Native Soil Covers and/or LUCs (Phase 1) is issued.</i>
2017	<i>Fifth Five-Year Remedy Review for SRS OUs with Groundwater Remedies (Phase 2) is issued.</i>
2018	<i>Fifth Five-Year Remedy Review for SRS OUs with Engineered Cover Systems (Phase 3) is scheduled for issuance in 2018.</i>
2018	<i>Fifth Five-Year Remedy Review for SRS OUs with Geosynthetic or S/S Cover Systems (Phase 4) is scheduled for issuance in 2018.</i>

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 (VOCs), 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 operating equipment as part of the final remedy. A range of active remediation systems are used at SRS. Soil vapor extraction (SVE) systems are used to remove VOCs from vadose zone source areas before the contaminants can migrate to the water table. Air strippers are employed to remove VOC contaminants from groundwater in the source zone. Pump and treat systems are used to remove contaminant mass and exert hydraulic control over contaminated groundwater plumes. Thermal technologies have been employed in several areas to mobilize dense non-aqueous phase liquid (DNAPL) VOCs in the vadose zone and groundwater. Dynamic Underground Stripping is a technology employed at SRS that utilizes steam injection to enhance removal from large DNAPL source zones. Electrical Resistance Heating has been used in smaller DNAPL source zones.

Many existing SVE systems have been converted from active vacuum extraction powered by fossil fuel to enhanced-passive systems powered by natural non-fossil-fuel energy sources. BaroBall™ and MicroBlower™ systems are two types of low-energy-consumption, low-carbon-emission SVE systems currently used at SRS to remove VOC contaminants from the subsurface.

Table 1 identifies the OUs and associated remedial actions included in the fifth 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

- Groundwater monitoring and reporting for the A/M-Area Groundwater OU, F-Area Groundwater OU, and H-Area Groundwater OU was enhanced consistent with recommendations from the 2012 *SRS Groundwater Monitoring Optimization Report*.
- 1,4-Dioxane was added to the groundwater monitoring for the P-Area Burning/Rubble Pit (131-P) OU and TNX Area OU.
- An Explanation of Significant Difference was approved in 2012 to incorporate bioremediation (i.e., edible oil injection) into the remedy for the TNX Area OU. The pump and treat system was permanently shut down in 2013.

Table 1. SRS OUs with Operating Equipment

#	CERCLIS No. ^a	Operable Unit	Remedial Action ^b
1	28	A-Area Burning/Rubble Pits (731-A and 731-1A) and Rubble Pit (731-2A), Miscellaneous Chemical Basin (731-4A) and Metals Burning Pit (731-5A) OU	SVE (Active and Passive), Air Sparging, Soil Cover, LUCs
2	36	A/M-Area Groundwater OU	SVE (Active and Passive), Pump-and-Treat with Air Stripping, Humate Amendment, Recirculation Wells (Dynamic Underground Stripping previously implemented (Resource Conservation and Recovery Act [RCRA] Permit Renewal)
3	30	A-Area Miscellaneous Rubble Pile (731-6A) OU	Excavation, SVE, Soil Cover, LUCs
4	31	C-Area Burning/Rubble Pit (131-C) and Old C-Area Burning/Rubble Pit (NBN) OU	SVE, Air Sparging, Soil Cover, Monitored Natural Attenuation
5	63	D-Area OU	Removal Action (Excavation, Thermal Treatment, SVE), LUCs
6	8	F-Area Groundwater OU	Barrier Wall Funnel and Gate System with Base Injection (Pump-and-Treat Groundwater previously implemented), LUCs (RCRA Permit Renewal)
7	9	H-Area Groundwater OU	Barrier Wall Funnel and Gate System with Base Injection (Pump-and-Treat Groundwater previously implemented), LUCs (RCRA Permit Renewal)
8	19	M-Area Settling Basin Inactive Process Sewer Lines to Manhole 1 (081-M) OU	SVE, Soil Fracturing, LUCs
9	92	M-Area OU	Removal Actions (Excavation, Backfill), Passive SVE, LUCs
10	59	P-Area Burning/Rubble Pit (131-P) OU	Soil Cover, Passive SVE, Groundwater Monitoring
11	21, 29	TNX Area OU	Excavation, In Situ S/S, SVE (Pump-and-Treat with Air Stripping, Recirculation Wells, Air Sparging previously implemented), Treatability Study (Enhanced Bioremediation with Edible Oil), Cover, Groundwater Monitoring, LUCs

^a USEPA Comprehensive Environmental Response, Compensation, and Liability Information System

^b OUs may include subunits with contaminants in building material or groundwater that are also addressed by the remedy decision document.

NBN – No Building Number

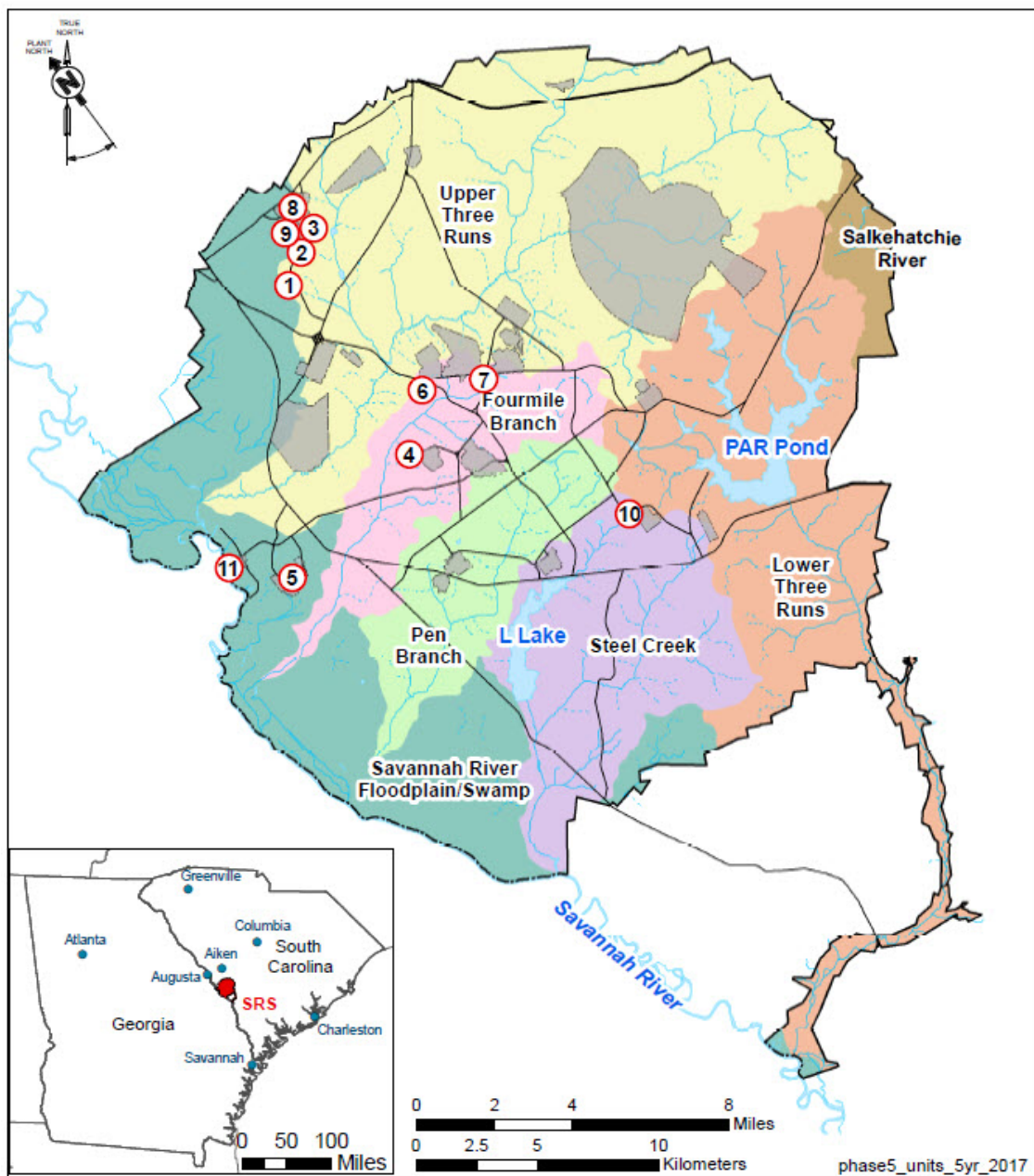


Figure 2. Location Map for SRS OUs with Operating Equipment

Protectiveness Summary

- All eleven remedies were determined to be protective of human health and the environment.
- The remedy for the A/M-Area Groundwater OU has been determined to be protective in the short-term. To establish long-term protectiveness, optimization of the M-1 Air Stripper and recovery system and/or other remediation technologies must be implemented to treat the high concentration portion of the plume located outside of the recovery well zone of capture.

Next Five-Year Remedy Review

The Sixth Five-Year Remedy Review Report for SRS OUs with Operating Equipment is due in January 2024.

Issues and Recommendations

- The passive system at A-Area Miscellaneous Rubble Pile (731-6A) OU has been successful in treating VOC contamination and the remedial goals have likely been achieved. SRS recommends additional characterization of the ash layer and vadose zone soils to determine if the remedial goals have been met to support shutdown of the passive SVE system.
- The D-Area OU MicroBlower™ SVE system at the Bubble Tower subunit has been successful in treating VOC contamination and the remedial goals have likely been achieved. SRS recommends confirmation sampling of the soil to determine if the remedial goals have been met to support shutdown of the MicroBlower™ SVE system.

For More Information

For more information regarding the complete Fifth Five-Year Remedy Report for SRS OUs with Operating Equipment, please contact:

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