SAVANNAH RIVER SITE FACT SHEET

Sixth Five-Year Remedy Review Report for SRS Operable Units with Groundwater Remedies

SRNS-RP-2019-00743

Savannah River Site, Aiken, SC
July 2020

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) have prepared the Sixth Five-Year Remedy Review Report for Savannah River Site (SRS) Operable Units (OUs) with Groundwater Remedies. This report documents the methods, findings, and conclusions for remedy decision document reviews for the SRS OUs that selected groundwater remediation as the interim or final remedy.

What is a Five-Year Remedy Review?

The Comprehensive Environmental Response, Compensation, and Liability Act requires that a remedy review be 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.

The SRS Sixth Five-Year Remedy Review report will be conducted in five phases with OUs grouped by the following remedy types: (1) native soil covers and/or land use controls (LUCs); (2) groundwater; (3) engineered cover systems; (4) geosynthetic or stabilization/solidify-cation cover systems (S/S); and (5) operating equipment.

This report documents the Sixth Five-Year Remedy review for SRS OUs that selected groundwater remedies as the interim or final remedy.

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?

Figure 1. SRS General

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 SRS was constructed during the 1950s to produce the basic materials used in the fabrication of nuclear weapons, primarily tritium and plutonium, in support of our nation's defense programs. Production of nuclear materials for the defense program was discontinued in 1988. SRS has provided nuclear materials for the space program, as well as for medical, industrial, and research efforts. 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 (e.g., seepage basins, pits and piles, landfills, etc.) 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 SRS Five-Year Remedy Review for SRS OUs with Native Soil Covers and/or LUCs (Phase I) is issued.*
2017	*Fifth Five-Year Remedy Review for SRS OUs with Groundwater Remedies (Phase 2) is issued.*
2018	*Fifth Five-Year Remedy Review for SRS OUs with Engineered Cover Systems (Phase 3) is issued.*
2018	*Fifth Five-Year Remedy Review for SRS OUs with Geosynthetic or S/S Cover Systems (Phase 4) is issued.*
2018	*Fifth Five-Year Remedy Review for SRS OUs with Operating Equipment (Phase 5) is issued.*
2019	*Sixth Five-Year Remedy Review for SRS OUs with Native Soil Covers and/or LUCs (Phase 1) 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.
- To prevent or minimize the discharge of contaminated groundwater to surface water.

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.

Groundwater remedies were implemented for SRS OUs that included groundwater monitoring activities as part of the interim or final remedy. These monitoring activities are primarily associated with Monitored Natural Attenuation (MNA) or a Groundwater Mixing Zone (GWMZ) permit. MNA is a passive groundwater remedial action where the fringe and dilute areas of a plume degrade by natural biogeochemical or physical processes such as biodegradation, radioactive decay, dilution, and simple dispersion. MNA remedies must be accompanied by source control and a technical justification that conditions are favorable for natural attenuation. SCDHEC may issue a GWMZ permit to implement an MNA remedy when only the uppermost groundwater aquifer is impacted.

Table 1 identifies the SRS OUs and associated remedial actions included in the Sixth Five-Year Remedy Review Report for SRS OUs with Groundwater Remedies. Figure 2 shows the location of the OUs that correspond to Table 1.

Table 1. SRS OUs with Groundwater Remedies

#	SEMS No.[a]	Operable Unit	Remedial Action[b]
1	82	C-Area Groundwater (CAGW)	Electrical Resistance Heating (ERH) with Soil Vapor Extraction (SVE)[c]
2	24	Chemicals, Metals, and Pesticides Pits (080-170G, 080-171G, 080-180G, 080-181G, 080-182G, 080-183G)	Enhanced Bioremediation, ERH, SVE, Passive SVE, Soil Cover, MNA, and LUCs
3	27	D-Area Oil Seepage Basin (631-G) (DOSB)	Removal Action (Excavation), GWMZ, LUCs
4	77	L-Area Southern Groundwater	MNA, LUCs
5	95	R-Area Operable Unit (RAOU)	Removal Actions (In-situ decommissioning of R-Reactor Building [105-R], Excavation, Cover), MNA, LUCs
6	25	R-Area Reactor Seepage Basins (904-57G, 904-58G, 904-59G, 904-60G, 904-103G, 904-104G) and 108-4R Overflow Basin	Concrete Intruder Barrier, Excavation, On-Site Disposal, GWMZ, LUCs

a Superfund Enterprise Management System

b In addition to groundwater remedies, OUs may also include subunits with contaminants in soils or building material (i.e., concrete) that are addressed by the remedy decision document.

c LUCs are not a component of the interim remedy for CAGW OU and will be addressed (if needed) by the final action.

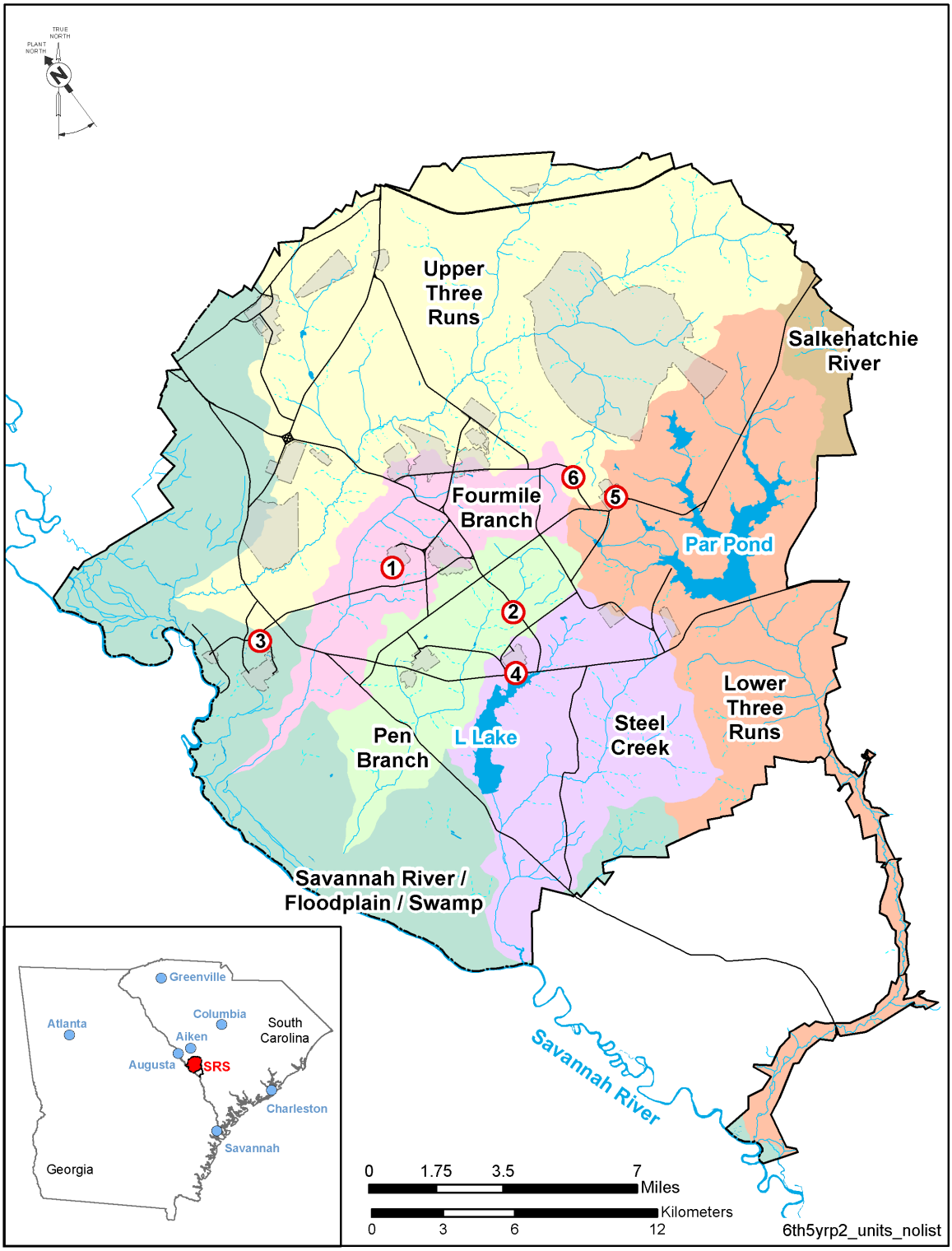

Figure 2. Location Map for SRS OUs with Groundwater Remedies

Major Developments Since Last Five-Year Remedy Review

- The Fifth Five-Year Remedy Review Report included the L-Area Burning/Rubble Pit (131-L), Gas Cylinder Disposal Facility (131-2L) and L-Area Rubble Pile (131-3L) (LBRP) OU. However, the USEPA and SCDHEC approved USDOE's request to 1) discontinue monitoring and reporting at the LBRP OU; and 2) designate LBRP OU as a No Action OU, since groundwater contamination no longer exceeds regulatory limits. Therefore, the LBRP OU is not discussed in the Sixth Five-Year Remedy Review Report for SRS OUs with Groundwater Remedies.
- 1,4-Dioxane was added to the annual groundwater monitoring at three wells (DOB 15, DOL 2, and DOB 16) for the DOSB OU to collect sufficient trend data.
- Groundwater monitoring at the RAOU will focus on the most mobile constituents (carbon-14, chlorine-36, iodine-129, and tritium) every five years at ten in-situ decommissioning wells based on regulatory approved recommendations in the *Addendum to the Effectiveness Monitoring Plan (EMP) for the R-Area Operable Unit*. In addition, carbon-14 and tritium will be monitored annually for five years (2018 to 2022) at five wells because carbon-14 was detected in one sample in 2017. Monitoring for 1,4-dioxane is no longer required at RAOU based on monitoring results and as agreed to by the approved *R-Area Groundwater (NBN) Effectiveness Monitoring Report in Support of R-Area Operable Unit (U) January 2015 through December 2015* and subsequent comment responses. Starting in 2018, the reporting requirements for RAOU were revised from annual to biennially.

Protectiveness Summary

- All remedies were determined to be protective of human health and the environment.
- The ERH with SVE interim remedy for the CAGW OU was determined to be protective of human health and the environment in the short-term. However, in order for the remedy to be protective in the long-term, additional remedial actions, including LUCs (if needed), will need to be implemented. SRS facility security and administrative controls that restrict unauthorized access to the CAGW OU are not part of the interim remedy and therefore not recognized as long-term protective. SRS will include CAGW OU in Appendix A of the Federal Facility Agreement (FFA) Annual Progress Report to demonstrate long-term protectiveness through the SRS facility security and administrative controls. The report is required by the FFA and includes annual certification by the USDOE SRS Manager that the listed OUs are in compliance with land use requirements.

Next Five-Year Remedy Review

The Seventh Five-Year Remedy Review Report for SRS OUs with Groundwater Remedies is due in January 2026.

For More Information

For more information regarding the complete SRS Sixth Five-Year Remedy Report for SRS OUs with Groundwater Remedies, please contact:

Angie Benfield
Savannah River Nuclear Solutions, LLC
Public Involvement
Savannah River Site
Building 730-1B
Aiken, South Carolina 29808
(803) 952-9830
angela.benfield@srs.gov