
Introduction

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The Savannah River Site (SRS), one of the facilities in the U.S. Department of Energy (DOE) complex, was constructed during the early 1950s to produce materials (primarily plutonium-239 and tritium) used in nuclear weapons. The site covers approximately 310 square miles in South Carolina and borders the Savannah River.

Mission

SRS's mission is to fulfill its responsibilities safely and securely in the stewardship of the nation's nuclear weapons stockpile, nuclear materials, and the environment. These stewardship areas reflect current and future missions to

- meet the needs of the U.S. nuclear weapons stockpile
- store, treat, and dispose of excess nuclear materials safely and securely
- treat and dispose of legacy radioactive liquid waste from the Cold War
- clean up radioactive and chemical environmental contamination from previous site operations

SRS will continue to improve environmental quality, clean up its legacy waste sites, and manage any waste produced from current and future operations. This will include continuing to work with the State of South Carolina, the Environmental Protection Agency, and the Nuclear Regulatory Commission to find mutually acceptable solutions for waste disposition. The site also will continue to address the highest risk waste management issues by working to safely dispose of liquid waste and surplus nuclear materials at offsite locations, and by safely stabilizing any waste tank residue.

Site Location, Demographics, and Environment

SRS covers 198,344 acres in Aiken, Allendale, and Barnwell counties of South Carolina. The site is approximately 12 miles south of Aiken, South Carolina, and 15 miles southeast of Augusta, Georgia.

The average population density in the counties surrounding SRS is about 91 people per square mile, with the largest concentration in the Augusta metropolitan area. Based on 2000 U.S. Census Bureau data, the population within a 50-mile radius of the center of SRS is approximately 712,780.

Water Resources

SRS is bounded on its southwestern border by the Savannah River for about 35 river miles and is approximately 160 river miles from the Atlantic Ocean.

The Savannah River is used as a drinking water supply source for some residents upstream of SRS. The nearest downriver municipal drinking water sources are approximately 90 miles from the site. The river also is used for commercial and sport fishing, boating, and other recreational activities. There are no known large-scale uses of the river for irrigation by farming operations downriver of the site. The groundwater

flow system at SRS consists of four major aquifers separated by confining units. Flow in recharge areas generally migrates downward as well as laterally—eventually either discharging into the Savannah River and its tributaries or migrating into the deeper regional flow system. SRS groundwater is used both for processes and for drinking water.

Geology

SRS is located on the southeastern Atlantic Coastal Plain, which is part of the larger Atlantic Plain that extends south from New Jersey to Florida. The center of SRS is approximately 25 miles southeast of the geological Fall Line that separates the Coastal Plain from the Piedmont.

Land and Forest Resources

About 90 percent of SRS land area consists of natural forests and managed pine plantations, which are planted, maintained, and harvested by the U.S. Department of Agriculture Forest Service—Savannah River. The site contains portions of three forest types: Oak-Hickory-Pine, Southern Mixed, and Southern Floodplain. More than 370 Carolina bays exist on SRS. These unique wetlands provide important habitat and refuge for many plants and animals.

Animal and Plant Life

The majority of SRS is undeveloped; only about 10 percent of the total land area is developed or used for industrial facilities. The remainder is maintained in healthy, diverse ecosystems. About 260 species of birds, 60 species of reptiles, 40 species of amphibians, 80 species of freshwater fish, and 50 species of mammals have been identified at SRS.

Primary Site Activities

Separations

Originally, site facilities generated materials for nuclear weapons. Since the end of the Cold War in 1991, however, use of the facilities has shifted to the stabilization of nuclear materials from onsite and offsite sources to ensure safe long-term storage or disposal.

Spent Nuclear Fuel Storage

SRS's spent nuclear fuel facilities house used fuel elements from reactors. These elements were generated during site reactor operations and also come from offsite sources. The mission of the spent nuclear fuel project is to cost effectively eliminate the hazards associated with legacy spent nuclear fuels—from SRS and from research reactors throughout the world—by receiving, stabilizing, and dispositioning the fuels in a safe and environmentally sound manner.

Tritium Processing

SRS tritium facilities extract tritium from absorber rods received from the Tennessee Valley Authority, and recycle tritium from nuclear weapons reservoirs that have been returned from service. This allows the United States to use its tritium supplies effectively and efficiently.

Waste Management

SRS manages

- the large volumes of radiological and nonradiological waste created by previous operations of the nuclear reactors and their support facilities
- newly generated waste created by ongoing site operations

Although the primary focus is on safely managing the radioactive liquid waste, the site also must handle, store, treat, dispose of, and minimize solid waste resulting from past, ongoing, and future operations. Solid waste includes hazardous, low-level, mixed, sanitary, and transuranic wastes. More information about radioactive liquid and solid wastes is included on the CD housed inside the back cover of this report.

Site Deactivation and Decommissioning

With the declining need for a large nuclear weapons stockpile, some SRS facilities no longer produce or process nuclear materials. The facilities have become surplus and must be decommissioned safely and

economically. Many are large and complex and contain materials that, if improperly handled or stored, could be harmful. In 2002, SRS began extensive decommissioning activities in D-Area, M- Area, T-Area (also known as TNX), and F-Area. Site Deactivation and Decommissioning (D&D) continued operations through 2007. A total of 263 facilities were removed through the end of 2007, representing a footprint reduction of more than 2.5 million square feet. T-Area is closed, D&D work required for area completion is finished in D-Area and M-Area, and D&D work continues in P-Area, R-Area, and F-Area under the area completion plan endorsed by state and federal regulators. Site D&D activities resulted in the disposition of more than 5.5 million cubic feet of waste from 2002 through 2007. More information about Site D&D activities is included on the CD housed inside the back cover of this report.

Soil and Groundwater Closure

Soil and Groundwater Closure Projects (SGCP) is responsible for remediating SRS inactive waste sites and contaminated groundwater to reduce risk and to protect human health and the environment. At the end of 2007, 352 of the 515 known waste units were complete, 144 were in the assessment phase, and 19 were in the remediation phase.

The remediation is regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA). This is accomplished through the SRS Federal Facility Agreement (FFA) [FFA, 1993], a tri-party agreement between the U.S. Environmental Protection Agency (EPA), the South Carolina Department of Health and Environmental Control (SCDHEC), and DOE. The FFA provides guidelines that

- direct the comprehensive remediation of the site
- ensure that SRS satisfies RCRA and CERCLA requirements
- include cleanup schedules for SRS waste units

During 2007, SGCP contributed to a number of initiatives that support SRS cleanup, as follows: (1) completion of the post-construction report for the highest-risk waste unit in the environmental remediation program—the General Separations Area Consolidation Unit—which consisted of seven waste subunits, including the 76-acre Old Radioactive Waste

Burial Ground; (2) the successful removal of more than 85,000 pounds of Dense Nonaqueous Phase Liquid through Dynamic Underground Stripping (bringing the total removed by this process to approximately 385,000 pounds), which began operations at M-Area in August 2005; and (3) completion of early characterization (for tritium, solvents, and cesium) at the P-Area and R-Area Operable Units—the first area completions involving reactor buildings and ancillary structures.

Environmental Monitoring

SRS has always been concerned about the safety of the public and on-site workers. The site is committed to protecting human health and reducing the risks associated with past, current, and future operations. Sampling locations, sample media, sampling frequency, and types of analysis are selected based on environmental regulations, exposure pathways, public concerns, and measurement capabilities.

More information about SGCP's 2007 operations is included on the CD accompanying this report.

Releases

Releases to the environment of radioactive and nonradioactive materials come from legacy contamination as well as from ongoing site operations. For instance, shallow contaminated groundwater—a legacy—flows slowly toward onsite streams and swamps and into the Savannah River. In ongoing site operations, releases occur during the processing of nuclear materials.

Meeting certain regulations, such as the Safe Drinking Water Act and the Clean Air Act, requires that releases of radioactive materials from site facilities be limited to very small fractions of the amount handled. The site follows a philosophy that emissions will be kept far below the regulatory standards.

Pathways

The routes that contaminants can follow to get to the environment and then to people are known as exposure pathways. A person potentially can be exposed when he or she breathes the air, consumes locally produced foods and milk, drinks water from the Savannah River, eats fish caught from the river, or uses the river for recreational activities such as boating, swimming, etc. One way to learn if contaminants from the site have

reached the environment is through environmental monitoring. The site gathers thousands of air, water, soil, sediment, food, vegetation, and animal samples each year. The samples are analyzed for potential contaminants released from site operations, and the potential radiation exposure to the public is assessed. Samples are taken at the points where materials are released from the facilities (effluent monitoring) and out in the environment itself (environmental surveillance).

Research and Development

The Savannah River National Laboratory (SRNL)—the site’s applied research and development laboratory—creates, tests, and implements solutions to SRS’s technological challenges. Other environmental research is conducted at SRS by the following organizations:

- *Savannah River Ecology Laboratory (SREL)* - More information can be obtained by contacting

SREL at 803–725–2472 or by viewing the laboratory’s website at <http://www.uga.edu/srel>. Also, SREL’s technical progress report for 2007 is included on the CD accompanying this document.

- *U.S. Department of Agriculture Forest Service–Savannah River (USFS - SR)* - More information can be obtained by contacting USFS–SR at 803–725–0006 or 803–725–0237 or by viewing the USFS–SR website at <http://www.srs.gov/general/srfs/srfs.htm>. Also, USFS–SR’s 2007 report is included on the CD accompanying this document.
- *Savannah River Archaeological Research Program (SRARP)* - More information can be obtained by contacting SRARP at 803–725–3623, or by viewing the SRARP website at <http://www.srap.org>