

SOUTH CAROLINA

Savannah River Site

Background

The Savannah River Site (SRS) complex covers 310 square miles in South Carolina's Aiken, Allendale and Barnwell counties. It was constructed during the early 1950s to produce special radioactive isotopes (plutonium-239 and tritium) to produce nuclear weapons. After the Cold War, greater emphasis at SRS was placed on cleanup, but the site remains a major defense installation, with a continuing mission to process and purify tritium, uranium and plutonium. Savannah River is home to H Canyon, the only facility of its kind in the nation for processing nuclear materials. Because of past operations, more than 500 potentially contaminated sites and 14 groundwater contamination plumes exist at SRS.¹ Currently, the site's annual cleanup budget is about \$1.4 billion. A consent order between the U.S. Department of energy (DOE) and the state addresses legacy mixed waste storage and treatment under the Federal Facilities Compliance Act. A Federal Facilities Agreement (FFA) among South Carolina, the U.S. Environmental Protection Agency and DOE addresses investigation and cleanup of contaminated sites at Savannah River.² In addition, relevant state statutes and regulations are applied to DOE EM cleanup activities, including treatment of high-level waste (HLW) and wastewater.

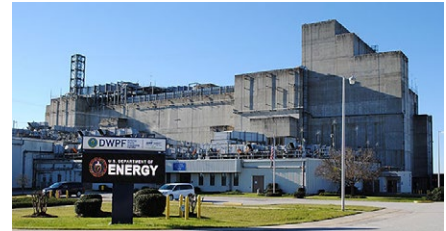


FIGURE 1: The Savannah River Site defense waste processing facility. Photo courtesy of U.S. Department of Energy.

Accomplishments

DOE EM has worked with South Carolina to achieve the following outcomes:³

- DOE EM has made progress in the treatment of approximately 35 million gallons of mixed hazardous and radioactive HLW and closure of the aging storage tanks. As of 2021, eight tanks have been operationally closed, which comprise a third of the total old-style tanks scheduled for closure. Since 1996, the Defense Waste Processing Facility has produced 16.4 million pounds of vitrified HLW incorporating over 62.4 million curies in over 4,250 canisters;⁴
- SRS successfully operated an interim salt disposition treatment facility from 2008 to 2019 to augment treatment of the HLW. By the end of operation of this facility, SRS processed 7.4 million gallons of radioactive salt waste.⁵ Salt waste processing is an essential step in the closure of the HLW tanks because 90 percent of this waste is composed of salt waste. With the interim salt disposition treatment facility proving successful for removing radioactive components from salt waste, Savannah River completed construction of the large-scale salt waste processing facility (SWPF) and began

¹ U.S. Department of Energy, *Savannah River site* [Fact sheet] Document no. 20CC00295. Retrieved from https://www.srs.gov/general/news/factsheets/srs_overview.pdf.

² U.S. Department of Energy, Savannah River Site. (1993, August 16). *Federal facility agreement for the Savannah River Site* (Document No. 89-05-FF). Retrieved from <https://www.srs.gov/general/programs/soil/ffa/ffa.pdf>.

³ U.S. Department of Energy, Savannah River Site. (n.d.). SRS news releases. Retrieved from <https://www.srs.gov/general/news/releases.htm>.

⁴ U.S. Department of Energy, Savannah River Remediation. (2022, January 25). *Citizen's Advisory Board Update The Liquid Waste System: A Status*. Retrieved from https://cab.srs.gov/library/meetings/2022/ms/Liquid_Waste_Update.pdf.

⁵ U.S. Department of Energy, Savannah River Site (2019, August 6). SRS news release. Retrieved from <https://www.energy.gov/em/articles/srs-completes-interim-projects-prepares-salt-waste-processing-plant-startup>.

hot operations at this facility on January 17, 2021.⁶ As of January 18, 2022, SWPF has processed 2.3 million gallons of HLW;⁷

- Most of the legacy mixed transuranic (TRU) waste volume and mid-low-level waste (LLW) streams have been disposed of;
- At least 81 percent of 500 potentially contaminated sites at Savannah River have a cleanup decision in place in accordance with the FFA; and
- To save time and money, DOE EM and state regulators adopted an area closure approach rather than individual closures within the area. One example of area closure success is T Area in 2006, which included demolition of 28 buildings, off-site disposal of 91 cubic yards of soil and construction of a ten-acre geosynthetic cap. The project was completed in 36 months, which was 48 months ahead of the original schedule.

Site-Specific Issues

Activities with both cleanup and defense related production are ongoing at Savannah River, and their continuation and expansion are important to South Carolina. A significant focus of the cleanup is on treatment and closure of the HLW tanks. The 35 million gallons of liquid radioactive and toxic HLW stored in aging and degrading tanks represent the single largest environmental threat in South Carolina.⁸ Other concerns for the site include soil and groundwater cleanup because SRS is in a humid area in which groundwater contamination can discharge relatively quickly into surface waters and subsequently the Savannah River.

In 1998, DOE designated SRS as the immobilization or conversion facility for much of the nation's surplus plutonium and began constructing the mixed-oxide fuel fabrication facility at SRS in August 2007. The facility was part of a nuclear nonproliferation agreement with Russia to dispose of 34 metric tons of weapons-grade plutonium by converting it into mixed-oxide fuel for use in commercial nuclear power plants. The mixed-oxide (MOX) facility was not completed due to cost overruns and technical barriers, and DOE terminated funding for construction completion, prompting a lawsuit by South Carolina which was settled in 2020. DOE is now pursuing downblending for plutonium disposition. DOE is required under the 2020 settlement agreement to remove plutonium from the state by January 1, 2037.⁹

In 2020, the National Nuclear Security Administration announced its decision to repurpose the uncompleted MOX facility to produce a minimum of 50 war reserve plutonium pits, per year, at the Savannah River Site for the nuclear weapons stockpile beginning in 2030.¹⁰

Relationship to Other Sites in the Complex

SRS will play a significant role in processing nuclear materials into the future including tritium processing, plutonium pit production and downblending of surplus plutonium. While it moves ahead with those missions, significant volumes of waste will continue to require treatment or disposal at other sites in the complex, including transporting TRU waste to the Waste Isolation Pilot Plant and spent nuclear fuel and vitrified HLW to a HLW repository that has yet to be sited or built. The vast majority of LLW (more than 55,000 cubic meters) at SRS will be disposed of on-site between 2015 and 2050, with the remainder destined for the Nevada National Security Site.¹¹

⁶ U.S. Department of Energy, Savannah River Site. (2021, January 19). *SWPF Completes Hot Commissioning, Begins Full Radioactive Operations*. Retrieved from <https://www.energy.gov/em/articles/swpf-completes-hot-commissioning-begins-full-radioactive-operations>.

⁷ Parsons (2022, February 16). Salt Waste Processing Facility SCDHEC Status Update in Quarterly Liquid Waste Meeting.

⁸ AECOM. (2019). Savannah River remediation. Retrieved from <https://www.aecom.com/ie/projects/savannah-river-site/>.

⁹ U.S. Nuclear Regulatory Commission. (2017, May 23). Backgrounder on mixed oxide fuel. Retrieved from <https://www.nrc.gov/reading-rm/doc-collections/fact-sheets/mox-bg.html>.

¹⁰ U.S. Department of Energy. (2020, November 5). DOE/EIS-0541: Record of Decision (November 2020). Retrieved from <https://www.energy.gov/nepa/downloads/daeis-0541-record-decision-november-2020>.

¹¹ U.S. Department of Energy, Savannah River Site. (2015). *An overview of the Savannah River Site*. Retrieved from https://www.srs.gov/general/outreach/srs_info_pods/documents/srs_overview_2015_web.pdf.