Chapter 1: **Introduction**

The "Savannah River Site (SRS) Environmental Report" is the primary document that the U.S. Department of Energy (DOE) uses to inform the public of environmental performance and conditions at SRS. This report meets the requirements of DOE Order 231.1B, "Environment, Safety, and Health Reporting." It is also the principal document that demonstrates how the Site complies with the requirements of DOE Order 458.1, "Radiation Protection of the Public and the Environment."

The "SRS Environmental Report" summarizes the Site's environmental information and data to achieve the following:

- Highlight significant Site programs
- Report environmental occurrences and responses
- Describe SRS's compliance with environmental standards and requirements
- Provide the results of monitoring material containing residual radioactivity before its release from SRS

Chapter Highlights

This chapter presents the following:

- A brief history of SRS, along with a summary of its current missions
- Highlights of SRS organizations and their primary responsibilities
- Descriptions of the physical characteristics and attributes of the environment in and around SRS
- Updates of SRS's primary mission and annual programs

1.1 HISTORY

On November 28, 1950, President Harry S. Truman tasked the E. I. DuPont de Nemours Company with designing, building, and operating what was to be the Savannah River Plant. The construction project relocated citizens, homes, and businesses from the six South Carolina towns that had existed on the land. By 1953, the Savannah River Site (SRS) began producing the basic materials used to create nuclear weapons for the nation's defense. The work performed during the Site's early days was key to the United States winning the Cold War. For the seven decades since the Site's beginning, SRS has been a leader in environmental protection within the U.S. Department of Energy (DOE) complex and a steward of water and energy conservation throughout the 310-square-mile site.

An *Overview of the Savannah River Site*, available on the SRS website, details much of the Site's history and accomplishments.

1.2 MISSION AND CURRENT OPERATION

The mission of the Savannah River Site is to safely and efficiently protect public health and the environment, while supporting the nation's nuclear deterrent programs and transforming the Site for future use. The Site is a recognized long-term national asset in the areas of environmental stewardship, innovative technology, national security, and energy independence. It acts with an inspired workforce and mature, efficient management processes, to sustain public confidence in its employees and capabilities. The SRS core values include performing safe and effective operations, along with maintaining good relations with Site stakeholders. The Site's main activities are environmental cleanup, nuclear waste management, and disposition of nuclear materials. Figure 1-1 highlights many of these programs as well as presents historical milestones chronologically.

The DOE Office of Environmental Management (DOE-EM) and the National Nuclear Security Administration (NNSA) oversee the Site mission. DOE-EM's primary mission through DOE-Savannah River (DOE-SR) is to ensure that SRS operations and the cleanup of legacy waste are done in a way that protects public health and the environment. DOE-EM executes this mission with the support of contractors and subcontractors, universities, and federal agencies. Additionally, DOE has various agreements with the U.S. Department of Agriculture (USDA), the U.S. Forest Service-Savannah River (USFS SR), the University of Georgia (UGA), the University of South Carolina (USC), and Ameresco Federal Services (via contract) to manage and conserve the Site's environmental resources. USFS-SR oversees SRS's natural resources through an interagency agreement with DOE-SR. UGA has operated the Savannah River Ecology Laboratory (SREL) since 1951, independently evaluating the environmental risk associated with Site activities. Since 1978, USC has overseen the Savannah River Archaeological Research Program (SRARP), a research unit that provides the technical expertise to manage SRS cultural resources. Ameresco Federal Solutions maintains a cogeneration power plant that uses renewable materials to supply steam, eliminating the need for coal.

NNSA's Savannah River Field Office (SRFO) is responsible for defense programs, like the Savannah River Tritium Enterprise, which began operations in 1955 as the nation's sole provider of tritium used for nuclear deterrence. NNSA's Office of Defense Nuclear Nonproliferation is responsible for the nuclear nonproliferation elements of the national security missions.

Savannah River Nuclear Solutions (SRNS), Savannah River Mission Completion (SRMC), Centerra-SRS, and Battelle Savannah River Alliance (BSRA) contract with DOE to directly contribute to both the DOE-EM and NNSA missions. SRNS, as the management and operations contractor, oversees and ensures safe and efficient operations at SRS, managing landlord services and supporting both DOE-EM cleanup (excluding liquid waste operations) and NNSA activities. SRMC is the liquid waste operations contractor and is responsible for treating and disposing of radioactive liquid waste and tank closures. SRMC worked closely with Parsons Government Services, Inc., a limited-service contractor to DOE-EM, to design, construct, and commission the Salt Waste Processing Facility (SWPF) to accomplish SRMC's goals. Centerra-SRS provides a uniformed force to protect DOE and NNSA security interests at the Site. BSRA is the management and operations contractor for the Savannah River National Laboratory (SRNL), whose mission is applied research and development in environmental remediation and risk reduction, nuclear materials processing and disposition, nuclear detection and national security, and clean energy applications.

Milestones in Savannah River Site Construction and Missions History

1950s

November 28, 1950: President Truman tasks DuPont with designing, building, and operating the Savannah River Plant.

1951:
- Construction is complete on CMX pilot plant, the first working facility.
- Construction begins on the first waste tank.
- Ecological studies and environmental monitoring are initiated.

1953: The Savannah River Plant begins producing basic materials for nuclear weapons.

1953-55: R, P, L, and C Reactors start up.

1955: H Canyon starts recovering uranium and neptunium from reactor fuel tubes. Today, it processes weapons-grade nuclear materials for final disposition.

1959: SRP produces the first Pu-238 heat source, which was used in a space satellite in 1961.

1960s

1961: The Atomic Energy Commission establishes a permanent ecology laboratory onsite, later known as Savannah River Ecology Laboratory.

Savannah River Ecology Laboratory

The Heavy Water Components Test Reactor

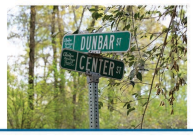
1964: Reactor shutdown begins with R Reactor and the Heavy Water Components Test Reactor.

1970s

1972: SRP named the nation's first National Environmental Research Park in recognition of its unique value and habitat diversity.

SRS Alligator

1978: The Savannah River Archaeological Research Program is established to perform data analysis of prehistoric and historic sites.



Savannah River Archaeological Research Program

1980s

Effluent Treatment Facility

1983: Wackenhut Security International begins providing security.

1988: Effluent Treatment Facility operations start up.

1989:
- The DuPont contract ends, and the Westinghouse contract begins.
- The name of the Site changes from the Savannah River Plant to the Savannah River Site.

1990s

1990: The Saltstone Facility starts up.

March 1996: The Defense Waste Processing Facility begins vitrification to convert radioactive liquid waste into glass suitable for long-term storage and disposal.

Defense Waste Processing Facility

1999: Washington Group International acquires the government services business of Westinghouse, changing the Westinghouse Savannah River Company name to Washington Savannah River Company.

2000s

May 2001: The Savannah River Site begins shipping transuranic waste to the Waste Isolation Pilot Plant.

2004: The Savannah River Technology Center becomes the Savannah River National Laboratory.

Savannah River National Laboratory

2007: The Tritium Extraction Facility opens.

2008:
- The U.S. Department of Energy awards the management and operations contract to Savannah River Nuclear Solutions.
- Actinide Removal Process & Modular Caustic Side Solvent Extraction Unit begins operating.

2009:
- American Recovery and Reinvestment Act accelerates Area Completion Projects and transuranic waste disposition.
- Savannah River Remediation receives the contract for the Liquid Waste Operations.

2010s

D-Area Coal Pile and Runoff Basin

2012: Ameresco starts up the Biomass Cogeneration Facility.

2018: The Savannah River Site completes D Area coal ash clean up.

August 2018: The first mega-sized Saltstone Disposal Unit becomes operational.

Saltstone Disposal Unit

2020s

October 2020: The Site transfers the first batch of radioactive waste to the Salt Waste Processing Facility.

June 2021:
- The National Nuclear Security Administration approves producing at least 50 plutonium pits per year at the Savannah River Plutonium Processing Facility.
- Savannah River National Laboratory transitions to management and operations under Battelle Savannah River Alliance.

October 2021: Savannah River Mission Completion becomes the Integrated Mission Completion Contractor.

October 2024: The Department of Energy-Savannah River and the National Nuclear Security Administration's Savannah River Field Office transferred primary authority, accountability, and Site stewardship for the Site to the National Nuclear Security Administration's Savannah River Field Office effective October 1, 2024.

Figure 1-1 Timeline Depicting Key Milestones in SRS History

Given the steadily increasing NNSA mission requirements at SRS and the concurrent progression of the EM clean-up mission toward defined end state(s), EM and NNSA decided to transition SRS from EM to NNSA leadership. The transition was effective October 1, 2024.

1.3 SITE LOCATION, DEMOGRAPHICS, AND ENVIRONMENT

SRS borders the Savannah River and encompasses about 310 square miles of Aiken, Allendale, and Barnwell counties in South Carolina. SRS is about 12 miles south of Aiken, South Carolina, and 15 miles southeast of Augusta, Georgia (Figure 1-2). The Savannah River flows along the Site's southwestern border.

Based on the U.S. Census Bureau's 2020 data, the population within a 50-mile radius of H Area—the Site's center, where most radiological releases occur—is 838,833 people. This equates to about 111 people per square mile outside the SRS boundary in Aiken, Allendale, and Barnwell counties in South Carolina and Richmond, Burke, and Screven counties in Georgia, with the largest concentration in the Augusta metropolitan area.

1.3.1 Geology

SRS is on the southeastern Atlantic Coastal Plain in the Aiken Plateau. The center of SRS is about 25 miles southeast of the geologic fall line that separates the Coastal Plain from the Piedmont. The observed climate, surface drainage, and landforms on SRS are typical of the southern part of the Atlantic Coastal Plain. The Aiken Plateau slopes gently to the southeast and is generally well-drained, although many poorly drained depressions exist. Elliptical-shaped Carolina bays, for example, are common on the Aiken Plateau. Carolina bays are important wetland habitats and refuge for many plants and animals. As many as 300 Carolina bays exist on SRS.

Carolina Bays Are Important Wetland Habitats.

All major streams on SRS originate onsite, except for Upper Three Runs, which begins north of the Site. All onsite streams drain southwesterly into the Savannah River (Denham 1995).

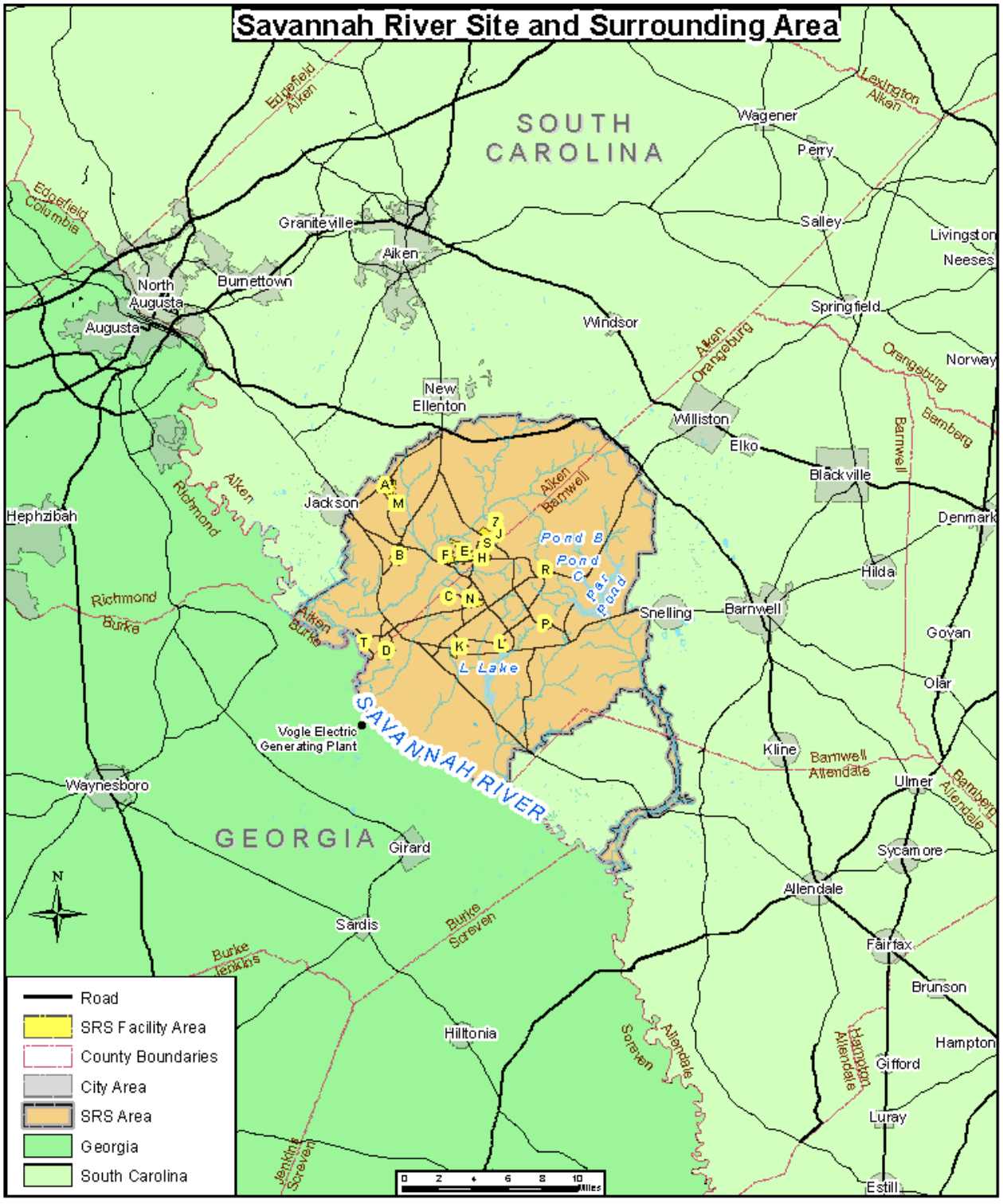


Figure 1-2 The Savannah River Site and Surrounding Areas
(The capital letters reference the operational areas within the SRS borders.)

1.3.2 Water Resources

SRS activities potentially impact water resources, including the Savannah River, Site streams, and the underlying groundwater. The Savannah River bounds SRS on the southwest for 35 river miles. The upriver boundary of SRS is about 160 river miles from the Atlantic Ocean. The nearest downriver municipal facility that uses the river as a drinking water source (Beaufort-Jasper Water and Sewer Authority's Purrysburg Water Treatment Plant) is about 90 river miles from the Site. Commercial fishermen, sport fishermen, swimmers, and boaters also use the river. The Savannah River is not currently used for any large-scale irrigation projects downriver of the Site. The groundwater at SRS, which is used for both industrial processes and drinking water, migrates through the subsurface, primarily discharging into the Savannah River and its tributaries.

1.3.3 Land and Forest Resources

About 10% of SRS's land is industrial; the remaining 90% consists of natural and managed forests that the USFS-SR plants, maintains, and harvests. SRS consists of four major forests: 1) mixed-pine hardwoods, 2) sandhills pine savanna, 3) bottomland hardwoods, and 4) swamp floodplain forests. These forests, as well as Carolina bays, are accessible to the public when visiting the Crackerneck Wildlife Management Area and Ecological Reserve near Jackson, South Carolina.

Par Pond Is Located on the Savannah River Site.

Animal and Plant Life

SRS is home to many varieties of plants and animals, including:

- More than 100 species of reptiles and amphibians
- Approximately 50 species of mammals
- Nearly 100 species of fish
- Nearly 600 species of aquatic insects
- Approximately 1,500 species of plants, of which at least 40 are of state or regional concern
- More than 250 species of birds, some of which are migratory and do not make SRS their permanent home

The Wood Stork Is One of the Threatened Animal Species at Home on the Savannah River Site.

The Site also provides habitat for state or federally listed as threatened or endangered animal and plant species, including the wood stork, the red-cockaded woodpecker, the gopher tortoise, the pondberry, and the smooth coneflower.

1.4 PRIMARY SITE ACTIVITIES

SRS is a complex Site that in 2024 was managed by both DOE-SR and the NNSA-SRFO. The Site also hosts multiple contractors in technically sophisticated nuclear and non-nuclear facilities. Cleanup activities at SRS include addressing approximately 33 million gallons of radioactive liquid waste stored in 43 underground tanks; down-blending surplus plutonium with eventual disposition as transuranic (TRU) waste to the Waste Isolation Pilot Plant (WIPP), a geologic repository near Carlsbad, New Mexico; dispositioning of highly enriched uranium and receiving, storing, and processing of foreign and domestic research reactor spent nuclear fuel; excessing facility deactivation and decommissioning; and remediating soil and groundwater.

1.4.1 DOE-EM Primary Site Activities

DOE's Environmental Management Program oversaw many Site activities for the majority of 2024. The following sections highlight key programs occurring during the current reporting year. Additional information is available on the SRS website.

1.4.1.1 Nuclear Materials Management

Nuclear materials management operations provide an interim storage location for a portion of the nation's surplus plutonium as well as the capability to disposition the plutonium into a nonproliferable form. Facility infrastructure and security upgrades are being addressed to ensure the safe storage of plutonium and to support the Surplus Plutonium Disposition Project.

1.4.1.2 Nuclear Materials Disposition

H Canyon is the only operating radiologically shielded chemical separations facility in the United States. From 2003 to 2019, H Canyon recovered highly enriched uranium from various sites across the DOE complex and from foreign test reactors to blend down into low-enriched uranium fuel. Known as the Accelerated Basin De-inventory Mission, H Canyon is now being used to dissolve spent nuclear fuel and is discarding this material directly into liquid waste sludge batches for disposition. This approach to operations began in 2020 and will continue until the liquid waste program is no longer available to receive discarded material from H Canyon.

1.4.1.3 Spent Nuclear Fuel Storage

SRS supports DOE's National Security mission by safely receiving and storing spent fuel elements from foreign and domestic research reactors, pending disposition. Currently, SRS stores spent nuclear fuel at the L Area Complex until final disposition.

1.4.1.4 Waste Management

SRS manages radiological and nonradiological waste created by legacy operations as well as newly generated waste from ongoing Site operations.

1.4.1.4.1 Radioactive Liquid Waste Management

SRS generates radioactive liquid waste as the by-product of processing nuclear materials for national defense, research, and medical programs. The Site safely stores approximately 33 million gallons of radioactive liquid waste underground in the F Tank Farm and H Tank Farm in F Area and H Area, respectively. Closing these tanks is a high priority for DOE-EM. To do this, SRS must first remove the waste from the tanks, which is mostly salt waste, and then process and treat the waste before disposing of it.

Construction and Testing of SDU-9 Was Completed Ahead of Schedule.

SRS mixes the salt solution at the Saltstone Production Facility to make saltstone and disposes of this low-activity liquid waste in cylindrical concrete tanks, known as Saltstone Disposal Units (SDUs). In 2024, SRS continued permanently disposing of waste, processing more than 4.7 million gallons into grout and disposing of it in the SDUs. In 2024 construction and testing of SDU-9 was completed ahead of schedule. In addition, SRMC is also in various stages of constructing the final SDUs needed at SRS: SDU-10, SDU-11, and SDU-12.

SRS uses the Defense Waste Processing Facility (DWPF) to process high-activity waste from the F Tank Farm and H Tank Farm. Since DWPF began operating in March 1996, it has produced more than 17 million pounds of glass—immobilizing 78.8 million curies of radioactivity—and pouring more than 4,450 canisters. In 2024, DWPF produced 52 canisters of glass, weighing 214,721 pounds and immobilizing 6.4 million curies of radioactivity.

The Salt Waste Processing Facility (SWPF) is a major piece of the liquid waste system and will process most of the Site's salt waste inventory by separating the highly radioactive waste from the less radioactive salt solution. SWPF processed more than 3.1 million gallons of salt solution in 2024.

1.4.1.4.2 Solid Waste Management

SRS manages the following types of solid waste:

- Low-level waste: ordinary items—such as coveralls, gloves, and hand tools—contaminated with small amounts of radioactive material
- Transuranic waste (TRU) waste: protective clothing, equipment, and job waste containing alpha-emitting isotopes with an atomic number greater than that of uranium (92)
- Hazardous waste (nonradiological): toxic, corrosive, reactive, or ignitable material that could affect human health or the environment

- Mixed waste: construction debris, laboratory samples, and soils containing both hazardous and radioactive components
- Sanitary waste: office waste, other wastes similar to household waste, and industrial or construction waste that is neither radioactive nor hazardous

To meet environmental and regulatory requirements, SRS treats, stores, and disposes of all low-level radioactive and hazardous waste that it generates in Resource Conservation and Recovery Act-permitted facilities. The Site also emphasizes recycling and minimizing waste to reduce the waste volume that SRS must manage.

SRS packages TRU waste and transports it in U.S. Department of Transportation-approved containers for underground disposal at WIPP. SRS began shipping TRU waste to WIPP in May 2001 and has made more than 1,800 shipments (from E Area and K Area combined). SRS made 64 TRU shipments in CY 2024 (24 from E Area and 40 from K Area).

DOE conducts annual reviews to ensure Site operations are within DOE's performance standards. The annual reviews for the E Area Low-Level Waste Facility Performance Assessment (PA) showed that SRS continued to operate these facilities in a safe and protective manner.

TRU Drum Storage in the Solid Waste Management Facility in 1998 Before WIPP Opened (left) and in 2024 (right).

1.4.1.5 Environmental Remediation

SRS is responsible for investigating and remediating waste units, surface water, and groundwater at SRS. The U.S. Environmental Protection Agency and the South Carolina Department of Environmental Services (SCDES) have oversight of the remedial programs that reduce the footprint of legacy wastes and contamination, treat and immobilize contamination in soil and groundwater, and slow contaminate transport. Cleanup can include capping inactive waste sites; installing and operating efficient groundwater treatment units; deactivating and decommissioning excessed facilities; and using natural remedies, such as bioremediation (employing naturally occurring microbes) and phytoremediation (using plants to clean up a contaminated environment).

1.4.1.6 Environmental Monitoring

SRS has an extensive environmental monitoring program, with records and documents dating to 1951, before the start of Site operations. Beginning in 1959, SRS made offsite environmental surveillance data available to the public. SRS reported onsite and offsite environmental monitoring separately until 1985, when it merged data from both programs into one publicly available document, the *U.S. Department of Energy Savannah River Plant Environmental Report for 1985.* The SRS Environmental Monitoring Program (EMP) serves the following two main purposes:

- Confirms compliance with applicable federal, state, and local regulations, as well as with DOE

Orders

- Monitors any effects of SRS operations on the environment, both on and offsite

The SRS EMP is a dynamic program due to requirement changes, program evaluations, continuous improvement initiatives, and deployment of new technology. SRS continues to maintain an extensive environmental monitoring program to determine impacts, if any, from SRS to the surrounding communities and the environment, both on and off the Site. In addition to the onsite environmental monitoring the Site conducts, SRS also monitors a 2,000-square-mile area beyond the Site boundary. This area includes neighboring cities, towns, and counties in South Carolina and Georgia. SRS collects samples of air, rainwater, surface water, drinking water, groundwater, food products, wildlife, soil, sediment, and vegetation. The Site evaluates these samples for radionuclides, metals, and other chemicals that could be in the environment because of SRS activities.

1.4.2 NNSA Primary Site Activities

The NNSA operates tritium facilities at SRS to supply and process tritium, a radioactive form of hydrogen gas that is a vital component of nuclear weapons. SRS tritium facilities are part of NNSA's Defense Program. SRS also plays a critical role in NNSA's nonproliferation missions, helping the United States meet its commitments to security and disposing of plutonium and uranium. A number of the site activities listed above under DOE-EM Primary Site Activities transitioned to NNSA effective October 1, 2024, and will be reported in this section for the 2025 *Environmental Report*.

1.4.2.1 Tritium Processing

SRS has the nation's only facility for extracting, recycling, purifying, and reloading tritium. SRS replenishes tritium by recycling it from existing warheads and by extracting it from target rods irradiated in nuclear reactors that the Tennessee Valley Authority operates. SRS purifies recycled and extracted gases to produce tritium used by the Department of Defense for nuclear weapons. Additionally, helium-3 gas, a by-product of the tritium production process, is used for neutron-detection equipment. SRS is the sole producer of helium-3 gas in the United States.

In 2024, site preparation was completed with the construction of a new warehouse for the new Tritium Finishing Facility (TFF) within the Savannah River Tritium Enterprise (SRTE). TFF is critical to the mission of the SRTE, which is the only facility in the nation capable of preparing tritium for the nuclear weapons stockpile. The Defense Programs page of SRS's website includes more information.

1.4.2.2 Nuclear Nonproliferation

In continued support of nonproliferation goals, SRS continued carrying out the Surplus Plutonium Disposition mission to permanently dispose of weapons-grade plutonium declared excess to national security, with a priority on disposition and removing plutonium previously consolidated onsite.

1.4.2.3 Pit Production

The plutonium pit production mission is an essential part of the NNSA's long-term strategy for nuclear stockpile sustainment. The Savannah River Plutonium Processing Facility (SRPPF) is one of two NNSA pit production sites in the nation, with the other at Los Alamos National Laboratory. Once constructed and operational, SRPPF will produce the bulk of the nation's supply of plutonium pits in support of sustainable

nuclear deterrence. In June 2021, NNSA approved the recommended approach to produce at least 50 plutonium pits per year at SRPPF.

In 2024, NNSA continued to prepare SRS for plutonium pit production with the opening of the Machining Training Facility. This facility is designed to teach machining skills and proficiencies to future operators at the SRPPF and is an important investment in the science and technology required to maintain a safe, reliable, effective nuclear stockpile.

1.5 SPECIAL ENVIRONMENTAL STUDIES

SRS provides a unique setting for environmental studies. Several organizations at the Site—SREL, USFS-SR, SRARP, and BSRA—conduct research to support a better understanding of human impact on both plants and animals.

Since 1951, SREL and other researchers have been conducting ecological research at SRS. It's large size (310 square miles), habitat diversity, and mix of natural and industrial areas provide many opportunities to study both natural ecological processes and human impacts. In 1972, DOE recognized SRS as the nation's first National Environmental Research Park.

SREL and USFS-SR provide annual reports on the environmental studies and research they conduct on SRS. These reports, available on the *SRS Environmental Report 2024* webpage, present and discuss environmental studies and research that occurred during the reporting year. Special environmental studies and research directly impacting the SRS EMP and dose calculations are presented and discussed in their respective chapters: Chapter 4, *Nonradiological Environmental Monitoring Program*; Chapter 5, *Radiological Environmental Monitoring Program*; and Chapter 6, *Radiological Dose Assessment*.

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