



2024

# SAVANNAH RIVER SITE

## Environmental Report

# SUMMARY



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## 2024 Environmental Report Summary

This report highlights the Savannah River Site’s environmental performance and engagement with local communities. Many articles in this Summary are based on the information presented in the *2024 Environmental Report* and touch on the following:

- Significant environmental accomplishments that support Site missions
- Compliance with environmental laws and regulations
- Dose to the public from onsite activities
- Community involvement

When applicable, text at the bottom of the page identifies the related chapters in the *2024 Environmental Report* where readers may find more detailed information, along with supporting data, maps, and figures.

## CONTENTS

1	<b>Overview</b>
2	<b>History</b> NNSA Takes SRS into the Future
4	<b>Environmental Management System</b> Environmental Management System Overview Cost-Effective Environmental Cleanup Forest Recovery after Hurricane Helene
6	<b>Environmental Compliance</b> Environmental Compliance Overview More than 17 Million Gallons of Salt Waste Processed
8	<b>Environmental Monitoring</b> Environmental Monitoring at the Savannah River Site New Surveillance Location Added for Environmental Baseline Sampling Wildlife Hunts Are Open to the Public
12	<b>Radiological Dose</b> What is Radiation? The 2024 Potential Radiation Dose to the Representative Person
14	<b>Groundwater Management</b> Groundwater Management Program Major Milestone in Groundwater Remediation Achieved Per- and Polyfluoroalkyl Substances (PFAS)
16	<b>Quality Assurance</b> Quality Assurance Overview The Use of Drones for Waste Tank Inspections Using Augmented and Virtual Reality New Sample Lab Leads to Savings
18	<b>Outreach to the Community</b> Savannah River Site Helps Promote STEM Education in Local Schools Community Support After Hurricane Helene Stakeholder Involvement Citizens Advisory Board



Phinizy Swamp at sunrise



Aerial view of the Tritium Facilities

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## OVERVIEW

The Savannah River Site (SRS) is a 310-square-mile Department of Energy (DOE) industrial complex located along the Savannah River in the sandhills of three western South Carolina counties. It is 12 miles to the south of Aiken, South Carolina, and located southeast of Augusta, Georgia. Based on the U.S. Census Bureau’s 2020 data, the population within a 50-mile radius of the Site center in South Carolina and Georgia is 838,883. The largest population concentration is in the Augusta, Georgia, metropolitan area.

The Atomic Energy Commission, the precursor to the Department of Energy, selected this area in 1950 for E. I. du Pont de Nemours Company to create materials for nuclear weapons for the nation’s defense.

In 1972, the Atomic Energy Commission designated the Site as the first National Environmental Research Park, providing it with opportunities to study environmental impacts of energy and defense-related technologies that had taken place. SRS supports natural habitats, including pine and hardwood forests, riverine environments, 48,973 acres of wetlands, along with thousands of species of plants and animals.

Today, the Site’s mission is to protect public health and the environment, while also supporting the nation’s defense and nonproliferation programs. The Savannah River Site is committed to environmental cleanup, nuclear weapons stockpile stewardship, and disposing of nuclear materials to support the nation’s nonproliferation policy. Together, these actions are transforming the Site for future use.

The National Nuclear Security Administration (NNSA) took over primary authority to oversee the Savannah River Site and its resources on October 1, 2024.



SRNS-RP-2025-00275

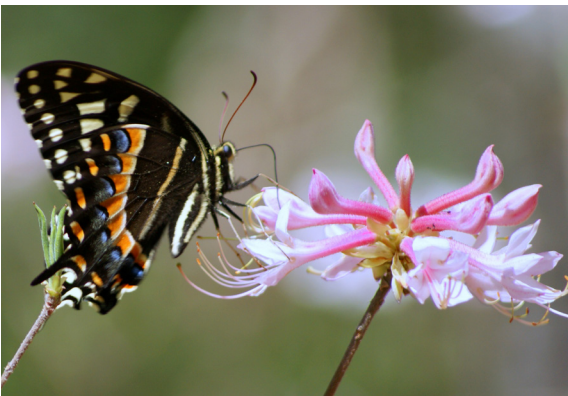
Left, view of the Savannah River. Above shelf fungi growing on a mossy log/Shane Shull, SRNS



Map of the Central Savannah River Area and counties impacted by SRS



Deer fawn/Amanda Hurst, SREL



Palamedes swallowtail butterfly/Ken Cheeks, SRNS retiree





# HISTORY

## NNSA Takes SRS into the Future

### History of the Ownership of Nuclear Responsibilities

Throughout the years, multiple agencies have managed various facets of the federal government’s nuclear energy program. The sections on the next page provide a brief overview of the key agencies that have played a role in our Nation’s nuclear history.

### DOE-EM to NNSA Landlord Transition at SRS

Since its creation, the mission of the Savannah River Site (SRS) has been 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. The SRS core values include performing safe and effective operations, along with maintaining good relations with Site stakeholders. The Site’s main activities continue to be environmental cleanup, nuclear waste management, and disposition of nuclear materials.

On October 1, 2024, nearly six years after it was first announced, DOE transitioned landlord responsibilities at the Savannah River Site from the U.S. Department of Energy Office of Environmental Management (DOE-EM) to the National Nuclear Security Administration (NNSA). This transition aligned with the

*An entrance to the Savannah River Site*

start of federal fiscal year 2025. SRS has joined other sites like the Los Alamos National Laboratory, the Nevada National Security Sites, and the Pantex Plant under the direct responsibility of NNSA.

Landlord responsibilities include the primary authority, accountability, and stewardship responsibilities of SRS. The transition was deemed necessary due to the steadily increasing NNSA mission requirements at SRS and the concurrent progression of the EM cleanup mission toward a defined end state. NNSA’s expanded footprint goes beyond its long history of success in tritium operations to include providing the backbone of plutonium pit production and continuing to expand its plutonium disposition capabilities.

The transition of landlord responsibilities from DOE-EM to NNSA is seen as an administrative change with the overall missions of SRS remaining the same.



*Early operations at the Savannah River Site*

1940s

### Atomic Energy Commission (AEC)

In 1946, Congress passed the Atomic Energy Act of 1946, establishing the Atomic Energy Commission (AEC). The purpose of the AEC was to manage the development, use, and control of nuclear energy for military and civilian purposes. The Energy Reorganization Act of 1974 dissolved the AEC and established the Energy Research and Development Administration and the Nuclear Regulatory Commission (NRC).

1970s

### Department of Energy (DOE)

In 1977, the creation of the U.S. Department of Energy (DOE) brought most federal energy activities under one department. DOE became responsible for long-term, high-risk research and development of energy technology, federal power marketing, energy conservation, the nuclear weapons program, energy regulatory programs, and a central energy data collection and analysis program. The NRC maintained regulatory responsibility over areas such as reactor safety and radiological protection.

1980s

### Department of Energy Office of Environmental Management (DOE-EM)

Created in 1989, the DOE Office of Environmental Restoration and Waste Management, which later was renamed the Office of Environmental Management (EM), consolidated activities that had been spread throughout DOE. DOE-EM’s mission is to address the nation’s environmental legacy from the Manhattan Project through the end of the Cold War. EM is responsible for cleaning up and protecting communities that supported defense production programs and government-sponsored nuclear energy research. EM also plays a key role in cleaning the environment, contributing to national security priorities, investing in the future and aiding community efforts to build strong economies, growing jobs, and preparing for a clean energy future.

1990s

### National Nuclear Security Administration (NNSA)

Established by Congress in 2000, the National Nuclear Security Administration (NNSA) is a semi-autonomous agency within DOE responsible for enhancing national security through the military application of nuclear science. NNSA maintains and enhances the safety, security, and effectiveness of the U.S. nuclear weapons stockpile; works to reduce the global danger from weapons of mass destruction; provides the U.S. Navy with safe and militarily effective nuclear propulsion; and responds to nuclear and radiological emergencies in the United States and abroad.

2000s



*Early construction on the Savannah River Site*





# ENVIRONMENTAL MANAGEMENT SYSTEM

## Environmental Management System Overview

The Savannah River Site (SRS) Environmental Management System (EMS) implements the U.S. Department of Energy (DOE) commitment to sound environmental stewardship policy and practices. These safeguards protect air, water, land, and natural resources as well as archaeological and cultural resources that SRS potentially affects.

The EMS plans and evaluates SRS construction, operations, maintenance, and decommissioning projects to protect public health and the environment, prevent pollution, and comply with applicable environmental and cultural resource protection requirements. The way SRS conducts its actions demonstrates the Site’s commitment to minimize waste, manage water, foster renewable energy, reduce greenhouse gases, acquire sustainable services, remediate, and observe best management practices. All these attributes are vital components of environmental management.

Pine trees growing at the Savannah River Site/Shane Shull, SRNS

### 2024 Highlights

- SRS completed a triennial, external EMS audit which determined that the SRS EMS meets the requirements.
- SRS diverted 58.5% of municipal solid waste from landfills.
- SRS was recognized for significant contributions toward achieving 100% Zero Emission Vehicle Fleet.



U.S. Forest Service employees examine an affected forested area inhabited by Red-cockaded woodpeckers.

## Cost-Effective Environmental Cleanup

### Using Passive Technology for Continued Soil and Groundwater Cleanup

The Site has completed active soil cleanup of the A Area Burning Rubble Pits and Miscellaneous Chemical Basin/Metals Burning Pit Operable Unit. These pits/trenches were utilized from 1951 to 1973 to burn and bury waste accumulated from A Area, leaving behind chlorinated solvents, which contaminated the surrounding soil and groundwater.

To remove the contaminant mass from the soil, the process of soil vapor extraction is utilized in two phases: active cleanup and passive cleanup. The active soil vapor extraction system in A Area was permanently shut down in 2018 and dismantled and removed in spring 2024. Passive soil vapor extraction continues to operate; however, soil sampling is being conducted to evaluate when clean-up goals have been achieved.

Solar-powered soil vapor extraction units, also known as MicroBlowers™, are an example of passive cleanup. MicroBlowers are designed to generate a vacuum that exhausts contaminants from designated wells. Each unit requires only 20 or 40 watts of power, which is easily produced by a small solar panel. BaroBalls™ are another passive soil vapor extraction technology utilized onsite. BaroBalls make it possible to pump contaminants from the subsurface by harnessing natural changes in barometric pressure.

These passive technologies are proving not only to be a cost-efficient means of reducing risk to human health and the environment but also are shortening the time needed for Site cleanup.

## Forest Recovery After Hurricane Helene

When Hurricane Helene made its way across the Savannah River Site, its gusts blew down timber throughout the Site. Helene’s effects on the forest across the Site will be felt long after the roads are cleared.

Forested areas onsite that are specifically set aside to help manage threatened, endangered, or sensitive species, such as the Red-cockaded woodpecker (RCW), were also affected by the storm. Seventy-three cavity trees used by RCWs were damaged. Fortunately, not all these cavity trees were in use at the time. Surveys have found that roughly 25% of the cluster areas where the RCWs are found onsite contained trees that were damaged by the storm. United States Forest Service



Savannah River Nuclear Solutions’ Site Services employees inspect the D Area solar-powered pump system that manages water infiltration in underground valve pits at the Savannah River Site.

### Solar-Powered Pump Solution

The underground valve pits, constructed as durable concrete structures, house large valves that regulate nearly 50 miles of river water piping that is integral to Savannah River Site (SRS) operations. Routine maintenance of these valves is crucial for the seamless functioning of the River Water System. However, the pits are susceptible to water infiltration from rainfall and groundwater, requiring them to be dewatered before maintenance can be performed.

Historically, diesel-driven pumps were used to remove excess water which was time consuming. To combat this, the Site designed a pumping system—powered by repurposed solar panels—that automatically activates to remove water from the valve pits. The project not only made effective use of excess materials, but it also reduced labor costs and extended the lifespan of the distribution system by mitigating water damage and corrosion.

employees and contractors needed to designate new cluster areas and install new inserts for future use by the woodpeckers.

The focus has changed from first response to forest recovery in which the landscape will transform from one heavily damaged by Hurricane Helene back to one that is a healthy dynamic forest.



Installation of new artificial nesting cavity inserts for Red-cockaded woodpeckers





# ENVIRONMENTAL COMPLIANCE

## Environmental Compliance Overview

The Savannah River Site (SRS) implements programs to meet the requirements of applicable federal and state environmental laws and regulations, as well as U.S. Department of Energy Orders, notices, directives, policies, and guidance. The Site’s goal is to comply with regulatory requirements and eliminate or minimize any environmental impacts. SRS has a decades-long commitment to environmental compliance and protecting human health and the environment.

### 2024 Highlights

#### Environmental Remediation

- At the end of Fiscal Year 2024, SRS had completed the surface and groundwater cleanup of 415 of the 515 operable units (OUs) containing solid or hazardous waste. SRS is currently remediating 8 OUs.

#### Radioactive Waste Management

- 64 transuranic waste shipments were sent to the Waste Isolation Pilot Plant for deep geologic disposal.

Aerial photo of the Salt Waste Processing Facility

### 2024 Highlights (continued)

#### Tank Closure

- The Salt Waste Processing Facility treated more than 3.1 million gallons of salt solution.
- More than 4.7 million gallons of waste was processed into grout and disposed of in the Saltstone Disposal Facility.
- The Defense Waste Processing Facility filled 52 canisters with 214,721 pounds of glass waste mixture, immobilizing approximately 6.4 million curies of high-level radioactive waste.
- The F and H Area Effluent Treatment Facility processed approximately 4.3 million gallons of treated wastewater.

#### Environmental Compliance

- 433 operating and construction permits were managed, and no Notice of Violations were received in 2024.
- Air and water discharges containing radionuclides were well below the DOE public dose limit of 100 millirem per year.

## More than 17 Million Gallons of Salt Waste Processed

The Savannah River Site (SRS) liquid waste program has processed more than 17 million gallons of radioactive salt waste since 2008 through the work of three major facilities.

Radioactive liquid waste is generated at SRS as byproducts from processing nuclear materials for national defense, research, medical programs, and for National Aeronautics and Space Administration (NASA) missions. The waste—totaling 33 million gallons—is stored at SRS’s F and H Tank Farms. To process the radioactive waste, SRS has relied on the Salt Waste Processing Facility (SWPF) for the past three years, along with the Actinide Removal Process/Modular Caustic Side Solvent Extraction Unit (ARP/MCU) and Tank Closure Cesium Removal (TCCR) in the past.

SWPF separates and concentrates the highly radioactive waste—mostly cesium, actinides, such as plutonium and uranium, and waste slurry—from the less radioactive salt solution. After the waste is transferred from H Tank Farm it undergoes a two-step cleanup process. The first step, known as the alpha strike, removes actinides from the waste. The second step, known as caustic side solvent extraction, is designed to remove radioactive cesium. After the separation process is completed, the concentrated high-activity waste is sent to the Defense Waste Processing Facility (DWPF). There, the high-activity waste is combined with sludge waste, immobilized in glass, and stored

in stainless steel canisters in reinforced, underground vaults called Glass Waste Storage Buildings (GWSBs). The canisters will be safely stored in the GWSBs until a federal repository is established. The decontaminated salt solution from SWPF is mixed with dry materials to create a grout at the Saltstone Production Facility (SPF) for disposal onsite. The grout is pumped from SPF into Saltstone Disposal Units (SDUs). There, the grout solidifies into a monolithic, non-hazardous low-level waste form called saltstone. SWPF’s radioactive commissioning began in October 2020. Since beginning operation, SWPF has safely processed over 10 million gallons of tank waste.

The forerunner to SWPF was ARP/MCU, which began operations in 2008. ARP/MCU were designed as a demonstration project to show that salt waste in the high-level waste tanks could be separated from the more radioactive constituents. The two facilities worked as an integrated system to decontaminate the salt waste. During their lifetime, ARP/MCU processed 7.4 million gallons of radioactive salt waste.

The TCCR project operated from Fiscal Year 2019 until the project was suspended in 2022. The project consisted of a self-contained ion exchange process for the removal of cesium from the liquid salt waste to provide a supplemental treatment capability. The high-level waste constituents, such as cesium, must be removed from the tanks before the tanks can be operationally closed and removed from service. TCCR removed cesium from more than 371,000 gallons of tank waste.



Refracted image of the Defense Waste Processing Facility/Rebecca Lynn, SRMC





# ENVIRONMENTAL MONITORING

## Environmental Monitoring at the Savannah River Site

The Savannah River Site (SRS) covers 310 square miles, of which 90% is pine forest and swampland. SRS is home to various threatened or endangered species. SRS has been designated a National Environmental Research Park since 1972.

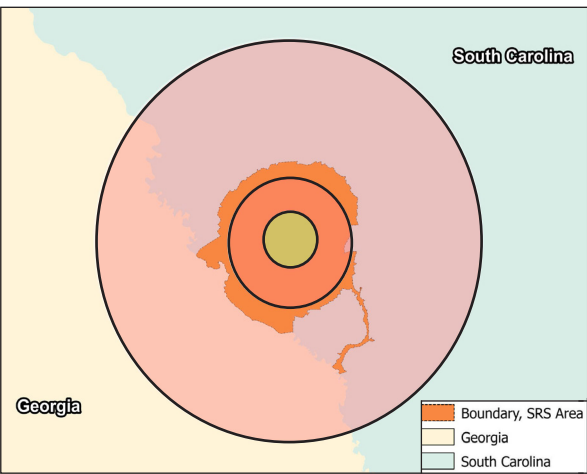
The SRS Environmental Monitoring Program (EMP) was established in 1953 as a tool to monitor the Site and to protect public health and the environment. Over the years the program has been streamlined and optimized due to technological advances and SRS operations. The purpose of the SRS EMP is twofold: it confirms compliance with applicable federal, state, and local regulations, as well as with U.S. Department of Energy (DOE) Orders, and it monitors the effects, if any, of SRS operations on the public and the environment, both on and offsite. The EMP examines both nonradiological and radiological constituents that the Site could release into the environment.



Types and typical locations of radiological sampling

The objective of the effluent monitoring program is to demonstrate that the Site is complying with permits and regulatory requirements, while the focus of the environmental surveillance program is to assess any environmental impacts of Site operations on the surrounding area. The surveillance program samples the types of media that effluent releases may impact. Sampling frequency and analyses are determined based on permit-mandated monitoring requirements, federal regulations, and DOE Orders.

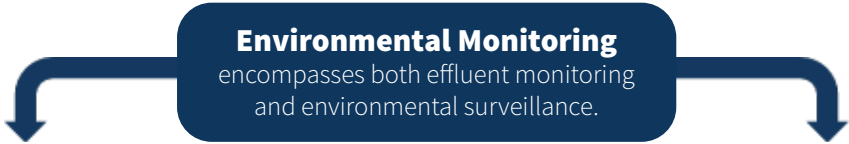
Samples are collected on a 2,000-square-mile area beyond the Site's boundary. The figure on the right shows a general overview of the different areas SRS samples for the Environmental Monitoring Program. At the center of SRS (innermost circle), air and water effluent samples are taken from facility stacks or outfalls. Beyond facility discharges (middle circle), samples from other media, such as stream water and sediment, soil, vegetation, and air, are collected in a circular pattern within the confines and at the border of SRS. These surveillance samples give an understanding of what radiological constituents may be reaching the border of SRS. Sampling of river water, drinking water, air, groundwater, sediment, fish, and shellfish also occurs in the



General overview of the areas the Environmental Monitoring Program covers

areas within the surrounding communities (outermost circle). This sampling provides the communities surrounding SRS with assurance that Site operations have minimal, if any, impact to those living in and around the Site.

Data is reviewed on a regular basis and reported to stakeholders through the Annual Site Environmental Report.



**Effluent Monitoring**

collects samples or data from the point (such as a stack or pipe) that a facility discharges liquids or releases gases.

**Media Sampled**

- Air (stack emissions)
- Surface water (facility effluents)

Stacks are sampled for air emissions

A liquid effluent outfall

**Environmental Surveillance**

collects samples beyond the effluent discharge points and from the surrounding environment.

**Media Sampled**

- Air
- Rainwater
- Drinking water
- Surface water
- Stream, river, and basin sediment
- Terrestrial and aquatic food products
- Vegetation
- Soil
- Wildlife

Fish flesh samples



## 2024 SRS Nonradiological Environmental Monitoring Summary

### Effluent Releases

- SRS reported a greater than **99%** compliance rate for National Pollutant Discharge Elimination System (NPDES) industrial wastewater outfalls.
- **All** SRS industrial stormwater outfalls under the South Carolina general industrial stormwater permit were compliant.



Many alligators call Savannah River Site home.

### Surveillance Program

- SRS **began** collecting soil samples around the construction area of the Savannah River Plutonium Processing Facility (SRPPF) to collect background information prior to operation.
- The surface water quality of the Savannah River and onsite streams is **not significantly affected** by NPDES industrial wastewater and industrial stormwater discharges.
- Sediment results from SRS streams, stormwater basins, and the Savannah River were consistent with the background control locations and were **comparable** with historical levels.
- Samples of fish flesh were collected from the Savannah River and results were **consistent** with historical levels.

### Onsite Drinking Water

- All SRS drinking water systems **complied** with South Carolina Department of Environmental Services and U.S. Environmental Protection Agency water quality standards.

## New Surveillance Location Added for Environmental Baseline Sampling

In 2024 the Savannah River Site Environmental Monitoring Program added a new sampling location behind F Area, which is north of F Area in the Upper Three Runs watershed. This new location will provide baseline data for the Savannah River Plutonium Processing Facility (SRPPF) and will be used to assess impacts, if any, of SRPPF operations on human health or to the environment once SRPPF becomes operational. This baseline environmental monitoring will collect samples to be used for both nonradiological and radiological analysis. Nonradiological sampling consists of soil, stream, and sediment sampling. Radiological sampling consists of ambient air, rainwater, soil, vegetation, stream, and sediment sampling.



Equipment setup for stream sampling at the new sampling location behind F Area/Shane Shull, SRNS

## 2024 SRS Radiological Environmental Monitoring Summary

### Air Pathway

- All air contaminants SRS released **met all** applicable air permit and regulatory limits.
- Radiological results for surveillance media associated with the airborne pathway were **within** historical levels.

### Wildlife Surveillance

- All harvested animals SRS monitored during the annual onsite hunts were **below** the applicable standard. SRS monitored the deer, feral hogs, turkeys, and coyotes harvested during the hunts and **released** all 69 animals.

### Water Pathway

- All water contaminants SRS released **met all** applicable water standards and regulatory limits.
- Radiological results for surveillance media associated with the liquid pathway were **within** historical levels.



Hogs/SREL

## Wildlife Hunts Are Open to the Public

Savannah River Site (SRS) is home to many animal populations, such as deer, coyote, feral hog, and turkey. Since 1965, SRS has provided hunting opportunities to thousands of hunters. Controlled hunts are held onsite and are open to the public. These hunts are used to control populations, reduce animal-vehicle collisions, and reduce the feral hog damage to valuable plant communities, timber stands, and ecological research sites.

In 2024, SRS hosted four wildlife (deer, hog, and coyote)

hunts and one two-day turkey hunt. The wildlife hunts were all stand hunts due to the impacts of Hurricane Helene. All animals are monitored for the amount of cesium-137 before being released to the public to ensure the hunter's dose does not exceed the SRS annual administrative game animal release limit of 22 millirem (mrem) per year. Additionally, an SRS-managed dose-tracking system is in place whereby each hunter is assigned the dose for each animal they harvest, an annual dose based on all animals harvested in a single calendar year, and a lifetime dose assigned for all the years the hunter has harvested animals at SRS. The hunter must stay below both annual and lifetime dose release limits to continue to participate in the hunts.



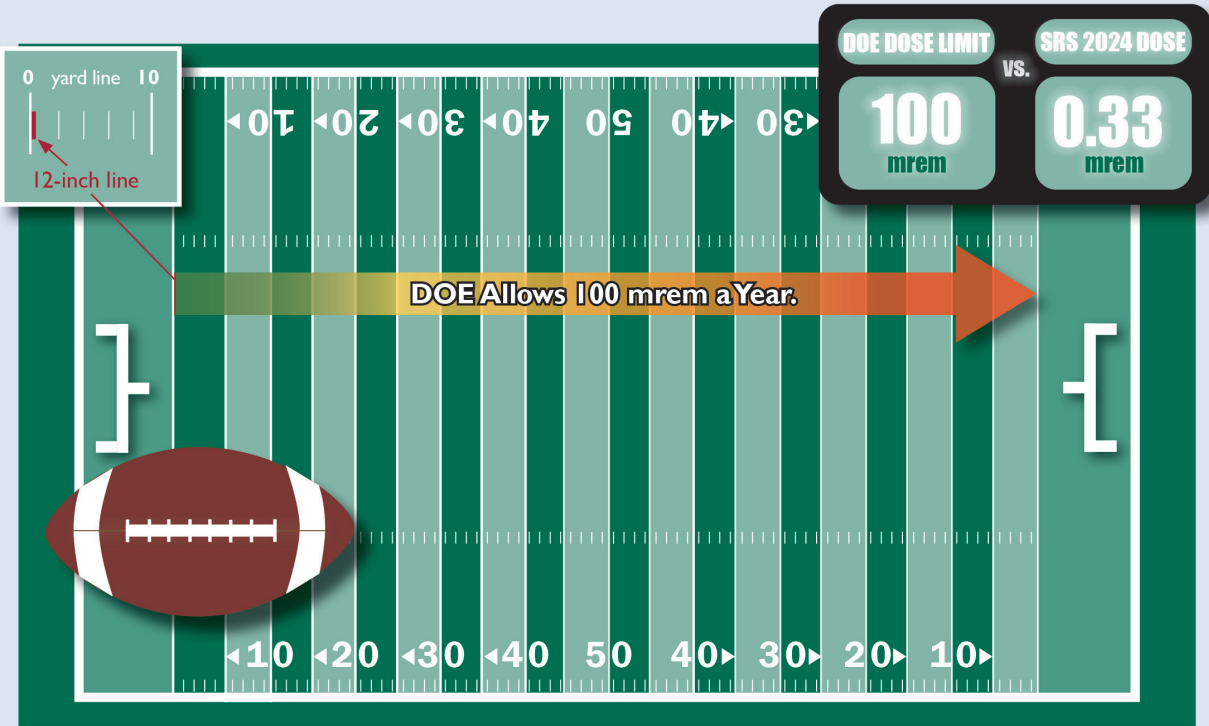
Scientist monitors equipment used to measure cesium-137 concentrations in game animals prior to release.



Participants of the annual Wheelin' Sportsmen/Savannah River Site Ultimate Turkey Hunt



# RADIOLOGICAL DOSE



The length of a football field represents the dose limit the Department of Energy allows. Dose at the Savannah River Site is at the 12-inch line.

Sunset over the Savannah River Plutonium Processing Facility

## What is Radiation?

### Radiation is a Part of Everyday Life

Radiation is the transfer of energy in the form of rays, waves, or particles through space. Humans, plants, and animals receive radiation dose from both natural and manmade sources. It is everywhere and has been here since the earth was formed. Radiation has many uses that are helpful and are important parts of our lives, from regulating the earth's temperature to powering houses.

Radiation can come from as far away as outer space and from as near as the ground beneath you. Because it is naturally all around us, we cannot eliminate radiation from our environment. We can, however, reduce our exposure to it.

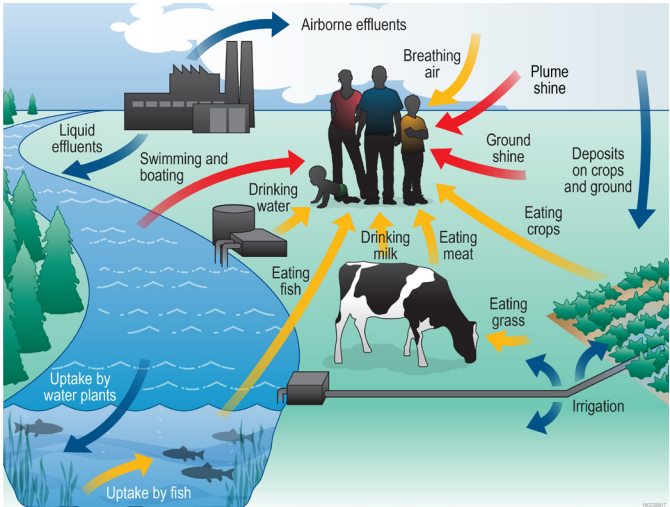
### Radiation Exposure Pathways

We are exposed to radiation in a multitude of ways. Simply breathing particles that are in the air will cause some exposure. Every time we eat food or drink water, we receive radiation. We can be directly exposed to radiation from the sun or the ground. Contaminants in the air can deposit on grass, which can then be eaten by animals and in turn be transferred to humans through consumption and through animal produce. Natural radiation can also be found in foods such as bananas, carrots, white potatoes, and Brazil nuts.

Exposure to radiation potentially occurs by the following:

- Inhaling through the air
- Ingesting through food and water
- Absorbing through the skin
- Experiencing direct (external) exposure to radionuclides in soil, air, and water

These radiation exposure pathways can also be seen in the figure below.



Radiation exposure pathways to humans

Radiation dose to a person is the amount of energy the human body absorbs from a radioactive source located either inside or outside of the body. It is typically reported as a unit of measure called a “millirem” (mrem). Humans, plants, and animals potentially receive radiation doses from natural and manmade sources. The average annual background dose for all people living in the United States is 625 mrem. This includes an average background dose of 311 mrem from naturally occurring radionuclides found in our bodies, in the Earth, and from cosmic radiation, such as from the Sun. Man-made sources of background radiation include the following:

- Medical procedures (300 mrem)
- Consumer products (13 mrem)
- Industrial and occupational exposures (1 mrem)

## The 2024 Potential Radiation Dose to the Representative Person

The representative person is not someone you’ve met or even have much in common with, but this individual has a great influence on protecting your health, your quality of life, and safeguarding the environment you live in. This person represents **YOU**, but in a very unlikely scenario.

The representative person’s exposure is at the 95th

percentile of national and regional data, meaning that this hypothetical person is participating in the exposure scenarios to an extent greater than 95% of the population.

The Department of Energy has established dose limits to the public so that Site operations will not contribute significantly to the average annual background exposure. Department of Energy Order 458.1, *Radiation Protection of the Public and the Environment*, establishes 100 millirem a year as the annual dose limit to a member of the public that can come from Site operations.

In 2024, the potential dose from Site radioactive discharges to air and water were well below regulatory standards for the public and the environment. The combined dose from air and water pathways—called the “all pathway” dose—was **0.33 millirem in 2024**, which is substantially less than the Department of Energy public dose limit. The 2024 all-pathway dose is greater than the 2023 dose of 0.16 millirem, which is attributed to the conservative reporting of radioactive liquid releases. The Department of Energy established the dose limit to protect the public and environment from the potential effects of radiation released during Site operations. The Savannah River Site continues to remain far below the 100 millirem a year public dose limit.



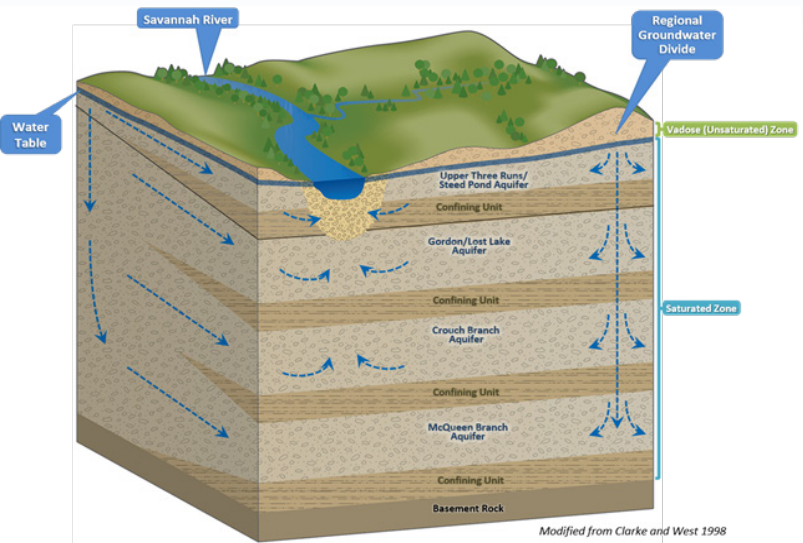


# GROUNDWATER MANAGEMENT

## Groundwater Management Program

The purpose of the Savannah River Site (SRS) groundwater management program is to protect, monitor, remediate, and use groundwater. With this focus, the program accomplishes the following:

- Ensures future groundwater contamination does not occur
- Monitors groundwater to identify areas of contamination
- Remediates groundwater contamination as needed
- Conserves groundwater



Three-dimensional block diagram of groundwater units at SRS and the generalized groundwater flow movements within them

Wetland located on the Savannah River Site

## 2024 Highlights

- There were zero exceedances of drinking water standards in SRS boundary groundwater monitoring wells near A/M Area. These wells are the closest to the Site boundary and would indicate whether contamination was getting offsite.
- SRS removed 11,872 pounds of volatile organic compounds from groundwater. The Site also prevented 15.5 curies of tritium from reaching SRS streams through the Mixed Waste Management Facility Phytoremediation Project.
- Most of the groundwater sampling has resulted in no detections of tritium. This data supports the conclusions of a U.S. Geological Survey that indicate there is no mechanism by which groundwater could flow under the Savannah River and contaminate Georgia wells (Cherry 2006).

## Major Milestone in Groundwater Remediation Achieved

The Savannah River Site (SRS) has injected more than 100 million gallons of artesian well water, which is clean groundwater from deep underground, to clean up shallow groundwater underneath 33 acres of a former coal storage yard and associated runoff basin in SRS’s D Area.

A coal-powered plant, which began operations in 1952, produced electricity for D Area and other parts of SRS until 2012. Even though the coal was removed in 2012-2013, decades of rainwater passing through the coal on the ground left the soils underneath acidic. Metals leached from the coal and natural soil minerals, causing shallow groundwater contamination. It is common in the United States for contamination such as this to exist where coal was used for power production.

A unique system was developed that takes advantage of the existing conditions of the groundwater and the natural flow of the two nearby artesian wells, offering a groundwater remedy that does not involve electricity or pumps. This groundwater remediation system passively ensures a neutral buffering to groundwater to help correct the overly acidic conditions in the groundwater caused by the decades storage of coal in the area. The system is also saving millions of dollars compared to traditional technologies that are not as maintainable, passive, or cost effective.

Working with regulators from the South Carolina Department of Environmental Services and the U.S. Environmental Protection Agency, SRS began injecting the artesian well water to neutralize the groundwater in March 2022. While this passive technology project is adjusting the balance of the groundwater below the coal storage and runoff basin areas, it will take time to see the groundwater restored to pristine conditions. The cleanup is regularly tracked by monitoring the groundwater surrounding the treatment system.

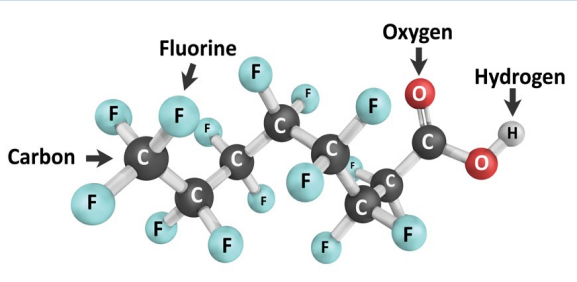


D Area Groundwater Treatability Study project team assesses artesian flow into injection well.

## Per- and Polyfluoroalkyl Substances (PFAS)

Emerging contaminants of concern, such as per- and polyfluoroalkyl substances (PFAS), bring unique challenges to the Savannah River Site (SRS) as changing regulatory requirements compel the reevaluation of historical and current practices to maintain regulatory compliance and continue to protect human health and the environment. SRS responds to this by:

- Ensuring transparency with regulators and the public
- Being proactive and responsive in anticipating regulatory changes
- Collecting data and information to assess and determine further appropriate actions



Perfluorooctanoic acid (PFOA) molecule. PFOA and perfluorooctane sulfonate (PFOS) are two examples of per- and polyfluoroalkyl substances (PFAS)/U.S. Department of Energy

## 2024 Highlights

- The U.S. Department of Energy (DOE), led by the Office of Environment, Health, Safety, and Security, continues to actively assess and understand per- and polyfluoroalkyl substances (PFAS) presence at DOE sites and to take actions to manage risk.
- The SRS PFAS Working Group continued working with DOE by reviewing draft guidance documents and commenting on proposed U.S. Environmental Protection Agency rulemaking and initiatives.
- In 2024, SRS sampled 75 wells and 15 surface water stations in D Area for PFAS constituents as part of an ongoing Comprehensive Environmental Response, Compensation, and Liability Act remedial investigation.





# QUALITY ASSURANCE

## Quality Assurance Overview

The Savannah River Site (SRS) quality assurance (QA) and quality control (QC) program objectives verify that SRS products and services meet or exceed customers' requirements and expectations. Multiple QA requirements are fulfilled for collecting samples, analyzing and reporting data, and managing records. It is important to confirm the accuracy of sample results so SRS can confidently assess the impacts Site activities may have on human health and the environment.

### 2024 Highlights

#### Quality Control Activities

- Onsite and subcontracted laboratories reported acceptable proficiency and maintained South Carolina Department of Environmental Services (SCDES) certification for analyses. QC samples showed nothing that would affect the results of the surveillance and monitoring programs.

*Augmented Reality (AR) and Virtual Reality (VR) technologies are used to simulate proper procedure execution in a safe and secure environment.*

### 2024 Highlights (continued)

#### Analytical Laboratory Quality Assurance

- SRS continued to use SCDES-certified laboratories to analyze the environmental monitoring samples it reports to SCDES and the U.S. Environmental Protection Agency (EPA).
- The U.S. Department of Energy Consolidated Audit Program (DOECAP) requires the analytical laboratories providing service to DOE have accreditation through the program. In 2024, the three SRS subcontract laboratories that analyzed the environmental samples reported continued to maintain their accreditation.
- In 2024, SRS participated in two DOECAP audits of treatment, storage, and disposal facilities (TSDFs) and reviewed DOECAP audit reports of other TSDFs. The audits indicated that there were no significant findings that would cause SRS waste generators to discontinue using the commercial TSDFs.

## The Use of Drones for Waste Tank Inspections

The Savannah River Site (SRS) uses drones to inspect the cleaning status of waste tanks.

Until now, wall-crawling robots that cling to the tank walls using magnets have been used in tank inspections. Drones provide more flexibility and capability, as they can cover more area and do so more quickly. Additionally, the drones are equipped with 3D-scanning light detection and ranging equipment which can generate precise 3D scans of the tank and its waste. Initially, the inspections were of the annulus space in the tanks, which provides secondary containment and protection for these tanks in the event of a leak.

The remote-controlled aircraft, the Flyability Elios 3, is a 19-inch diameter drone with four helicopter-like propellers, a high-definition camera, and a thermal camera. The drones also have advanced stability features, making them easier to maneuver in flight. Four drones have been purchased for the project, and all have a protective cage that shields the propellers and cameras from potential collisions with a tank wall. The Elios 3 model drone has undergone extensive radiation exposure testing at the Idaho National Laboratory, where the level of radiation the drone could withstand was determined. This radiation exposure testing concluded that the drone is adequate for the needs of the Liquid Waste Program.



*Drones equipped with cameras are used to inspect the cleaning status of waste tanks onsite.*



## Using Augmented and Virtual Reality

Ongoing collaboration between Savannah River Plutonium Processing Facility (SRPPF) and Savannah River National Laboratory have led to developing cutting-edge Augmented Reality (AR) and Virtual Reality (VR) technologies.

The team has taken a strategic leap into the future of design, initiating a model-based design project, which allows stakeholders to take a virtual tour of the SRPPF Main Process Building (MPB). The team is also crafting 3D models for many of the glovebox models which will eventually be used in the MPB. They are leveraging AR/VR technology to populate the future facility with virtual gloveboxes, critical equipment, and avatars programmed to exhibit realistic behaviors. This effort enables subject matter experts to assess gloveboxes for ergonomics and design enhancements and allows personnel to become familiar with the gloveboxes before the fabrication and delivery stages begin.

The integration of AR/VR technology has led to improvements within the design review process, reducing the risk of delays, increasing cost savings, and benchmarking future projects within SRPPF.

## New Sample Lab Leads to Savings

Savannah River Nuclear Solutions recently worked closely with Savannah River National Laboratory (SRNL) to create a new sample analysis laboratory in the H Canyon Outside Facilities that will decrease processing downtime and save taxpayer dollars.

The technical safety requirements for operating a piece of equipment known as the General Purpose Evaporator (GPE) require that all solution fed to the GPE be basic rather than acidic. The GPE concentrates low-level radioactive solutions from various sources, including sump material, leaks, lab waste, and rainwater.

Until the recent addition of the H Area laboratory, samples from the GPE feed tanks were sent miles across the Site to SRNL for analysis. Establishing a new laboratory involved the procurement of a new piece of analytical equipment and ensuring all safety and laboratory standards were met.

Since implementation of the lab, the downtime due to sample analysis has reduced from 2-6 days to less than four hours. Decreased downtime will help lead to a significant reduction in cost.

*The new H Canyon laboratory utilizes an existing and unused fume hood in H Canyon.*





# OUTREACH to the COMMUNITY

## Savannah River Site Helps Promote STEM Education in Local Schools

The Savannah River Site’s (SRS) Education Outreach Programs (EOPs) provide a variety of science and literacy outreach programs that focus on enhancing interest in Science, Technology, Engineering, and Mathematics (STEM) and to support improvements in education in the Central Savannah River Area (CSRA) by using the unique resources available at the Site.

Additionally, EOPs provide employees the opportunity to support the education community through volunteering. These initiatives help build programs and partnerships with regional educational institutions that encourage students to pursue careers in STEM disciplines. Through these efforts, the intent is to create a local pool of job candidates with the necessary core competencies to support future missions at SRS and other regional industries.

Students complete a toy block activity at the SRS Museum to understand the precision needed to work effectively in a glovebox environment.

This outreach involves students and teachers in an eight-county area within the CSRA which includes Aiken, Allendale, Bamberg, Barnwell, Edgefield, and Orangeburg counties in South Carolina and Columbia and Richmond counties in Georgia.

### “Discover Engineering”

“Discover Engineering” is a program developed in celebration of National Engineers Week and National Job Shadow Day. This week long celebration brings SRNS engineers into middle school classrooms to speak about exciting career opportunities within engineering and highlights how engineering impacts the world from the perspective of engineers. Hand-on activities and demonstrations focus on the design, construction, testing, and redesign that often occurs in engineering occupations. Volunteers also discuss engineering degrees, average salaries, recommended courses, extra-curricular activities, and other ways students can plan for each success.



Middle school students participate in “Leaning Tower of Pasta,” an activity focused on design engineering techniques.

### “STEM That Travels”

“STEM That Travels” is a program where expert scientists and engineers from SRS lead STEM lessons in local K-12 classrooms. In partnership with the University of South Carolina Aiken Ruth Patrick Science Education Center (RPSEC), SRS volunteers conduct demonstrations and experiments for teachers and students using science kits provided by RPSEC. Popular science kits include “Newton’s Toy Box” and “Zoom Into Engineering”. SRS employees also mentor, judge science fair projects, and offer career information for teachers and students.

### Innovative Teaching Mini Grants Program

Since 2009, over \$975,000 has been contributed to support 4K through 12th grade educators from public, private, and charter schools in Aiken, Allendale, Bamberg, Barnwell, Edgefield, Orangeburg, Columbia, and Richmond counties through the Savannah River Nuclear Solutions Innovative Teaching Mini Grants Program. The Grants fund the purchase of various project materials, hands-on kits, and computer programs. Educators seeking classroom supplies are eligible for \$500 grants, while those enhancing STEM curriculums receive grants ranging from \$750 to \$1,000.



Teachers in the Central Savannah River Area receiving their K-12 Catalyst Grants



Elementary school students program Edison robots that were funded by the Savannah River Nuclear Solutions Innovative Teaching Mini Grants Program.

### K-12 Catalyst Grants

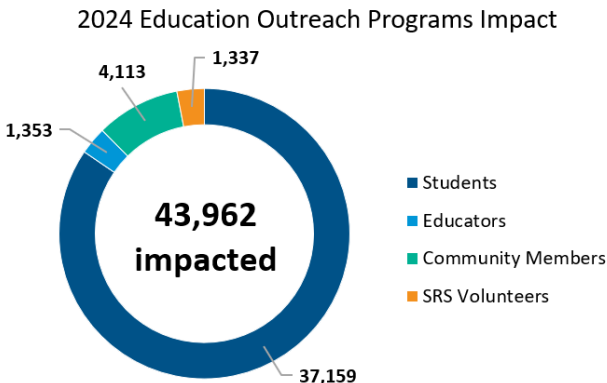
\$125,000 was awarded in Savannah River National Laboratory (SRNL) K-12 Catalyst Grants for STEM Education to CSRA schools to advance activities and programs relating to science, technology, engineering, and mathematics. Grants of \$2,500, or \$5,000 were awarded to 30 teachers from 25 different schools within the Georgia counties of Burke, Columbia, McDuffie, and Richmond, and in the South Carolina counties of Aiken, Barnwell, Edgefield, and Orangeburg. Scientists, engineers, and company leaders judged each grant submission based on a K-12 Catalyst Grant Rubric. The grants fund a myriad of STEM-educated projects, including those relating to robotics, the environment, artificial intelligence, virtual reality, 3-D printing, radio electronic and satellite technology, astronomy, agriculture, biotechnology, and civil engineering.

## Community Support After Hurricane Helene

As part of its Continuity of Operations Plan, the Savannah River Site (SRS) maintains a stock of Meals, Ready-to-Eat (MREs) to ensure essential operations during emergencies. In an effort to support local relief agencies recovering from Hurricane Helene, nearly 40,000 MREs were distributed by SRS. Multiple organizations worked together to expedite the transport to various locations, delivering the MREs within 24 hours.



Meals, Ready-to-Eat prepared for transport





## Stakeholder Involvement

The Savannah River Site is committed to keeping the public informed about Site projects. From individuals, schools, and municipalities to a broader reach encompassing state and national officials, the Site ensures that communication and information flow purposefully to those with a vested interest in Site missions.

The Savannah River Site works closely with the Citizens Advisory Board, the U.S. Environmental Protection Agency Region 4, and the South Carolina Department of Environmental Services to reduce risk and accelerate environmental cleanup at the Site.

The foundation of the stakeholder program is the belief that the public has both the right to know what the Department of Energy is doing in the community and the right to have input in

the decision-making process. Stakeholder engagement offers those who will be affected by the outcome of Site work a chance to voice their opinions and involves stakeholders through a variety of activities that solicit input from the public, including the following:

- Assisting stakeholder groups with analyzing environmental management plans
- Increasing awareness of the impact of contaminant releases or potential releases during cleanup
- Allowing community groups to propose alternative plans that may achieve better results
- Establishing priorities to promote cleanup and safety
- Involving elected officials in Site tours and discussions about technologies, project milestones, and new and ongoing missions

## Citizens Advisory Board

Since it was established in 1994, the Savannah River Site (SRS) Citizens Advisory Board (CAB) provides advice, information, and recommendations from a community perspective on issues affecting the Environmental Management program at SRS. The advisory board is one of eight that the Department of Energy (DOE) has in place across the complex. Since its inception, the SRS CAB has issued 384 site-specific recommendations to DOE; four of those were made in 2024. Generally, the CAB issues advice on environmental restoration, waste management, risk assessment, future land use, excess facilities, technology development, and other topics of interest to stakeholders.

Members are residents of communities that Savannah River Site operations and cleanup activities directly affect.

The CAB schedules public meetings at locations throughout the region to enable a wide range of attendees and viewpoints. Agency liaisons from DOE, the U.S. Environmental Protection Agency Region 4, and the South Carolina Department of Environmental Services also participate in the meetings. The board streams meetings for those who can't attend, and an archive of past meetings and newsletters exists on its website. The advisory board provides outreach to the community through Site tours; an online CAB University, which offers background information on general Site missions; and a line-up of speakers that civic groups can engage for events and meetings.

Citizens interested in applying for membership do not need to have any special skills or extensive knowledge about SRS. The general requirement is to have a willingness to attend meetings and learn about the plans and activities at the Site and provide advice and recommendations from a public perspective.



Members of the Savannah River Site Citizens Advisory Board in 2024

# SAVANNAH RIVER SITE

## National Nuclear Security Administration

For More Information About the Savannah River Site or This Report, Please Contact:

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[www.energy.gov/srs/savannah-river-site](http://www.energy.gov/srs/savannah-river-site)

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Visit the SRS website:  
[www.srs.gov/general/srs-home.html](http://www.srs.gov/general/srs-home.html)

View or download the 2024 Savannah River Site Environmental Report:  
[www.srs.gov/general/pubs/ERsum/index.html](http://www.srs.gov/general/pubs/ERsum/index.html)

Above, Main Street in the historic town of Ellenton, South Carolina

Note: Unless a photograph in this document is identified with the name of an outside organization or photographer, it was taken by photographers from Savannah River Site Communications and Media Services or a Savannah River Site representative.





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Savannah River Site - Aiken, South Carolina