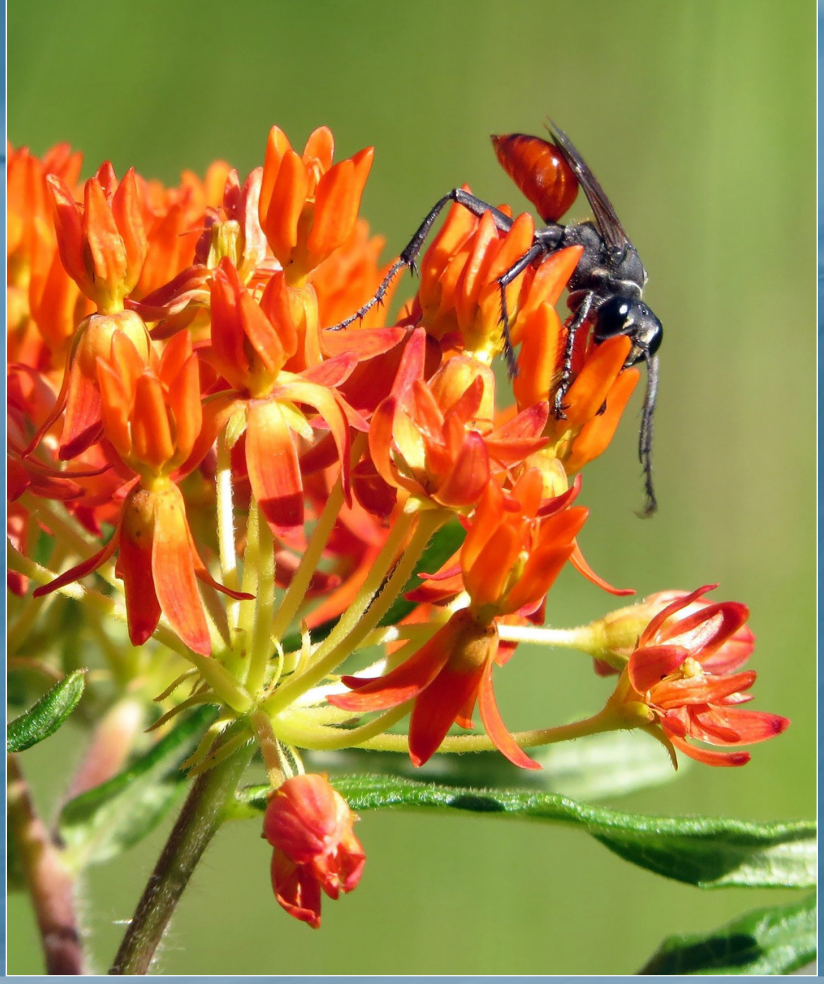

SAVANNAH RIVER SITE

Environmental Report

Summary

2019

SRNS-RP-2020-00065

SAVANNAH RIVER SITE

Environmental Report Summary 2019

This report highlights the Savannah River Site's activities, environmental performance, and engagement with the local communities. Many articles in this Summary are based on the information presented in the *Environmental Report 2019* 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
- Monitoring that supports dose calculations and compliance requirements
- Community involvement

When applicable, a text box at the bottom of the page identifies the related chapters and sections in the *Environmental Report 2019* where readers may find more detailed information, along with supporting data, maps, and figures.

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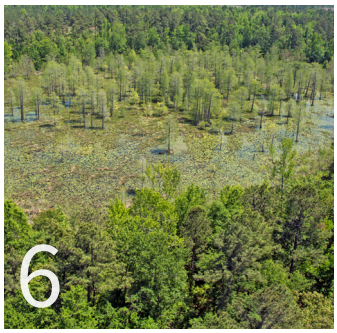
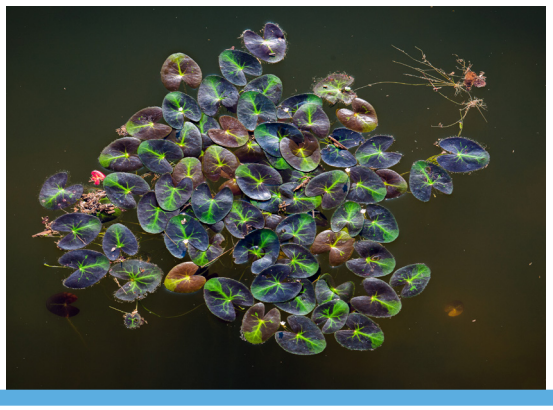


OVERVIEW



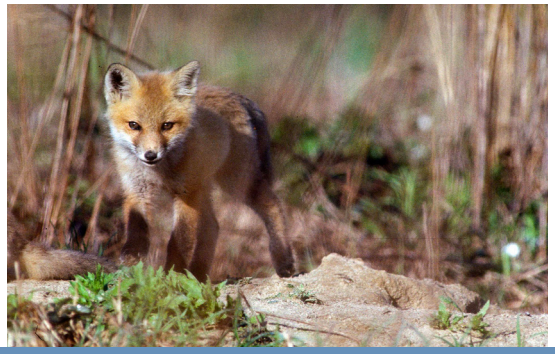
The Savannah River Site is a 310-square-mile U.S. Department of Energy complex along the Savannah River in the sandhills area of three western South Carolina counties. It is 12 miles south of Aiken, South Carolina and 15 miles southeast of Augusta, Georgia. Population within a 50-mile radius of the Site center in Aiken, Allendale, and Barnwell counties in South Carolina and in Richmond, Burke, and Screven counties in Georgia, is 803,370. The largest population concentration is in the Augusta, Georgia metropolitan area.

The Atomic Energy Commission, the precursor for 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.

The Savannah River Site supports diverse natural habitats, including pine and hardwood forests, riverine environments, 48,973 acres of wetlands, along with hundreds of species of plants and animals.

Today, the Site mission is to protect public health and the environment, while also supporting the nation's deterrent program. The Savannah River Site dedicates its practices 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 Department of Energy Office of Environmental Management and the National Nuclear Security Administration oversee the Site and its resources.



6,000 Stories

HISTORY

Recollections from 70 years ago–still vivid and emotional today–describe the exodus of 6,000 South Carolinians from their homes, businesses, and lives in three rural counties. The residents' departure gave the Atomic Energy Commission access to the strategically picked land needed to build a nuclear weapons material plant. Their sacrifice made way for Cold-War missions happening literally in their former backyards.

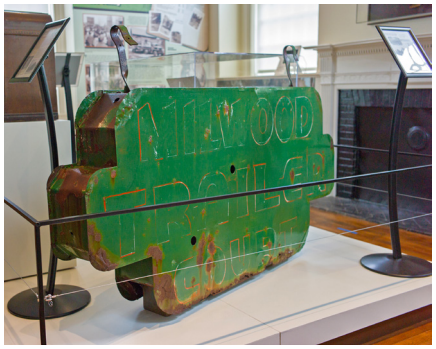
Residents' accounts of this time come to life in an interactive exhibit, *6,000 Stories*, at the Savannah River Site Museum in downtown Aiken. The permanent exhibition, fully funded by the Department of Energy's Office of Legacy Management, debuted in 2019. It shows through first-hand accounts how families disassembled and uprooted their lives from the small communities of Ellenton, Dunbarton, Meyers Mill, and Leigh and relocated to rebuild businesses, homes, and daily routines. Maps, artifacts, photographs, and interpretive panels enhance the oral and written histories.

The museum's front gallery (top) features displays and artifacts, including the Ellenton town sign (hanging on the wall) that become symbolic of the residents' departure. Also part of the exhibit are two interactive screens (bottom) that guide visitors through the stories.

With the Atomic Energy Commission's historical announcement on November 28, 1950 that the E.I. du Pont de Nemours Company would design, build, and operate the new Savannah River Plant, appraisers began evaluating properties throughout a 250,000-acre area in Aiken, Barnwell, and Allendale counties. The landowners who agreed to the appraisals could keep their buildings for a salvage cost and arrange to move them. Those who weren't in agreement with the assigned values had the option of a jury trial. Land that the government needed immediately was subject to eminent domain. Those who did not own property simply left.

> ***...we feel that they picked not just the best spot in the U.S., but in the world. We love these dear hearts and gentle people who live in our home town.***
>
> **– Bonner Lee Smith**
> penned iconic message in December 1950
> and mounted on Ellenton town sign

"This was such a great sacrifice. Such news was quite emotional. The move wasn't easy for anyone because it wasn't a choice," said the late Mary Irene Storm Hiers, formerly of Dunbarton and one of the 6000 voices. "It was many who lived through the move, while others, their lives were shortened, as things for them were never the same."



Dicks Brothers in Dunbarton provided an ample porch for catching up with friends (left). The Milwood Trailer Court sign is one of the features of the exhibit (middle). Houses and lives were relocated to make room for the Savannah River Plant (right).

Through a pair of 6-foot-high touch screens, each flanking the entrance to the museum's front room of photo murals and artifacts–such as a sanctuary chair from Mt. Mariah Baptist Church in Ellenton and the Milwood Trailer Court sign–visitors navigate through a series of video interviews with residents; photographs of stores, theaters, homes and street scenes; and written histories.

A computer on the far end of the room accesses a database, also funded by the Office of Legacy Management, containing approximately 6,000 gravesites relocated from cemeteries and graveyards in the displaced towns. The Savannah River Archaeological Research Program, part of the University of South Carolina system, assembled the database, which is the only one of its kind available to the public. It cross-references the deceased and the cemetery names and grave numbers to the grave locations at the cemeteries they were moved to. The database includes vital information such as birth dates and dates of death.

The Savannah River Site Museum is a part of the SRS Heritage Foundation, a nonprofit organization dedicated to preserving and interpreting the history of the Site.

The Office of Legacy Management has the long-term responsibility for surveillance and maintenance, workforce restructuring and benefits, property management, land-use planning, and community assistance for 100 sites in the United States and the territory of Puerto Rico.

Dunbarton—It was Home: Farming–cotton, corn, peanuts, watermelon, peas, potatoes, and beans–was this former town's primary business. Agriculture supported the general stores, such as the Western Carolina Trading Company, which was the largest department store in Barnwell County; the Rountree Store; and Dicks Brothers and the Dunbarton Post Office, where the front porches played host to those who wanted to catch up and chat with friends.

Leigh Banana Case Co.—The Town that Worked: Leigh was born when the Leigh Banana Case Co., a 25-year fixture in the region, decided to provide homes for its employees. At its peak, 350 people worked for the Leigh Banana Case Co. A church of every denomination, a hotel, and store also lined themselves on the streets of the company campus-turned-town. Leigh generated its own electricity for the factory and the workers' three-to-eight-room homes. The immense operation had its own locomotives that went down to the swamps of the Savannah River to transport loads of cut pine, gum, and cypress logs.

In 1952, company owner Carl Leigh went out of business. He sold equipment for scrap, let go of buildings, and left, not being able to find a suitable location to move his operation.

Meyers Mill—A One-Church Town: Gone were the train depot, Bob People's and Emma Hankinson's stores, and the cotton gin of town namesake Olan Meyer. With a population of 50, Meyers Mill was the smallest of the unincorporated towns that relocated to make way for the Savannah River Plant.

Ellenton—Turn Right on Main Street, Right Across from the Blue Goose: The largest of the towns to move was Ellenton, founded in 1873 and named after Ellen Dunbar. "Ellen's Town" became home to 739 residents by 1950. There were several restaurants, a Chevrolet dealership, barbers, a theater, a dry cleaner, and Dr. Brinkley's Drugstore. The Blue Goose, though, was perhaps the most colorful. The filling station and café sold beer.

"… my parents admonished me until I left home in 1942 not to go in it," Remembered Claris Ashley Smith, Jr. "During the first five years after WWII, when I visited Ellenton fairly often, I would sometimes stop in to the Blue Goose for a beer. I felt like I had finally arrived."

When it came time to leave, Ellenton residents moved eight miles north and dubbed their new town "New Ellenton."

ENVIRONMENTAL ACCOMPLISHMENTS

Dunbarton Bay Remediation Project

The Savannah River Site completed Phase 1 of the Dunbarton Bay Ash Remediation Project by using a careful and sensitive approach to excavate about 29,000 cubic yards of coal ash from a now-defunct powerhouse ash storage basin.

For more than three decades, the powerhouse generated electricity and steam to support plutonium production for the nation's nuclear defense program. Ash from the powerhouse was disposed in the basin.

A dominant feature of the cleanup area is the Carolina Bay, known locally as Dunbarton Bay. Carolina Bays are elliptical wetland depressions in the land that are typically marshy, rich in biodiversity, and ecologically sensitive. A variety of bay trees grow in and around the depressions.

The Savannah River Site worked with state and federal regulators to preserve the bay. To do this, the Site created a construction approach that protects the sensitive ecosystem from damage that could happen during construction. Ash removal extends from a basin to nearby wetlands and is in a layer up to several feet thick.

The basin has already been remediated as part of a larger project to decommission P and R Reactors.

Completing Phase 1 is a significant step toward completing the Department of Energy's environmental cleanup mission for the Savannah River Site.

The Dunbarton Bay Ash Remediation Project involved removing ash extending from a basin to the nearby wetlands (top and bottom).

TANK CLOSURE

- The Tank Closure Cesium Removal system began operating in January and treated 210,000 gallons of salt solution in 2019.
- Bulk Waste Removal Efforts in Tank 10 were completed one month ahead of the Federal Facility Agreement deadline.
- The Actinide Removal Process and Modular Caustic Side Solvent Extraction Unit facility received the last transfer of salt solution prior to beginning lay-up activities. The facility was put in a safe configuration, which allowed for the final Salt Waste Processing Facility tie-ins to be completed.
- Construction of SDU-7, a mega vault for saltstone disposal, continued in 2019, and site preparation began for the next two mega-vaults, SDU-8 and SDU-9.

ENVIRONMENTAL MANAGEMENT SYSTEM

- Awarded the 2019 Smart Business Recycling Award from South Carolina Department of Health and Environmental Control for several initiatives.
- Awarded the Department of Energy's 2019 Sustainability Award for using drones at postclosure waste sites.
- Continued to reduce greenhouse gas emissions, exceeding federal goals.
- Continued to reduce petroleum use and increase use of alternative fuels, exceeding federal goals.

WASTE SITE REMEDIATION and CLOSURE

- Completed G-Area Oil Seepage Basin Operable Unit remediation.
- Excavated about 29,000 cubic yards of coal ash from the Dunbarton Bay wetland area and disposed of the ash in a permitted landfill.
- Implemented an innovative remediation technology using 760 tons of iron filings to treat groundwater in a section of the P-Area aquifer beneath the Site.
- Injected 36,000 gallons of vegetable oil, mixed with water, a pH buffer, vitamins B-12 and C, and microbes in C-Area groundwater to remove degreasing chemicals from a narrow plume heading toward Castor Creek.

ENVIRONMENTAL COMPLIANCE

- 836 National Environmental Policy Act reviews conducted to identify potential environmental impacts from proposed federal activities.
- Air and water discharges containing radionuclides were well below the DOE public dose limit of 100 mrem per year.
- All 19 underground storage tanks were in compliance during the annual South Carolina Department of Health and Environmental Control inspection. Submitted the Closure Certification Report for the Solvent Storage Tanks.

Saltstone Disposal Units 8 and 9, under construction, will be the newest mega-units to permanently store saltstone at the Savannah River SIte.

Saltstone Disposal Units

The Savannah River Site broke ground on two more large-scale units in 2019 to provide safe and permanent storage for decontaminated waste material at the Site. The Saltstone Disposal Units, called SDUs, will accommodate the larger volume of decontaminated salt solution that the Salt Waste Processing Facility will generate.

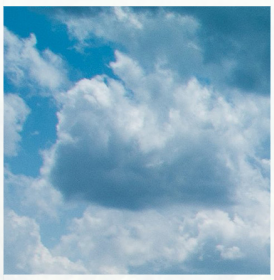
SDUs 8 and 9 will permanently dispose of saltstone, a treated, nonhazardous material. Saltstone is produced by treating decontaminated salt waste with dry materials to create a cement-like grout.

The salt waste is removed from the waste tanks and treated through the Site's interim salt waste processing facilities, where more than 99.9% of the radioactive isotopes are removed.

In unprecedented form for Salt Disposal Unit construction, units 8 and 9 will be built in conjunction, with each phase of construction—excavation, liner installation, slab placement—completed consecutively. This approach will optimize crews and resources used on the two adjacent structures, ultimately cutting costs for the two projects.

Construction of SDU 7 is underway and on schedule to be completed by spring 2022. When complete, it will be 43 feet high and 375 feet in diameter, just like SDU 6, the original mega-volume unit built next to it. SDU 6 was completed 16 months ahead of schedule and $25 million under budget in 2017. It began operating in August 2018.

SDUs 6, 7, 8, and 9 are all considered mega-units; each is able to hold about 32 million gallons of saltstone. Units 8 and 9 are being built with the same design as units 6 and 7, which decreases design costs for the project.



RADIOLOGICAL MONITORING and DOSE

What is Radiation Dose?

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. Radioactive sources typically transfer energy in the form of rays (such as gamma or X-rays) or high-energy particles (such as alpha or beta particles).

Humans, plants, and animals can receive radiation doses from both natural and man-made sources. Radiation can come from as far away as outer space and from as near as the ground on which you are standing. Because it is naturally all around us, we cannot eliminate radiation from our environment.

Radiation dose is typically reported in a unit of measure called a "millirem" (mrem). The average dose from naturally occurring radioactive minerals in the ground and water, and cosmic radiation from outer space is 311 mrem. The average annual dose for U.S. residents from both natural and man-made sources is 625 mrem. Man-made sources of background radiation include the following:

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

The Department of Energy has established dose limits to the public so that Site operations will not contribute significantly to this average annual background exposure.

DOE Order 458.1, *Radiation Protection of the Public and the Environment*, establishes 100 mrem/year as the annual dose limit to a member of the public that can come from Site operations.

Exposure to radiation potentially occurs by:

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

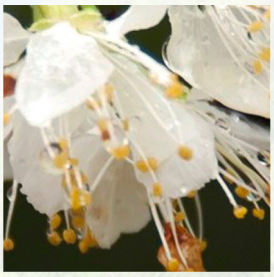
2019 Potential Radiation Dose

In 2019, the Savannah River Site's potential radiation exposure to the public decreased from the previous year.

The potential doses from Site radioactive discharges to air and water were below all regulatory standards for the public and the environment. The *Environmental Report 2019* in Chapter 6, Radiological Dose Assessment, discusses how the Site calculates the potential public doses and shows compliance with DOE Order 458.1.

The combined dose from air and water pathways—called the "all pathway" dose—was 0.18 mrem in 2019, which is well below the DOE public dose limit of 100 mrem/yr. Of this 0.18 mrem/yr dose, 0.16 mrem was from liquid releases, and 0.018 was from releases to the air.

The all-pathway dose for 2019 is lower than the 2018 total dose of 0.27 mrem. The Savannah River Site attributes this decrease to reduced tritium releases from the Site and to the increased Savannah River annual flow volume in 2019.



Assigning 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.

This unnamed, physically indistinguishable person exists only in calculations and dose models as a hypothetical human who is between you and the radiation originating from Savannah River Site projects and missions. The premise is if the dose the representative person receives is at or below the Department of Energy's dose limit prescribed as safe for the public, then you, a resident who does not seek out exposure pathways, would be at an even safer level.

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.

How is the Representative Person's Exposure Significant?

In each scenario below, which describe liquid and air pathway exposures based on location and duration, the representative person is in a position that maximizes the amount of potential radiation that a human could be exposed to.

- Lives near the Site boundary all day, every day
- Consumes milk, meat, vegetables grown or raised at the Site boundary
- Drinks water and eats fish from the Savannah River
- Participates in recreational activities on the river or spends time near the river every day

SUSTAINABILITY

Recognition for Recycling

Pictured from left are recycled fluorescent bulbs, A-Area biomass facility, recycled aerosol cans, and an employee replacing fluorescent bulbs with LED bulbs. Below, is an engine from a hybrid car in the Site fleet.

Each year, the South Carolina Department of Health and Environmental Control awards outstanding progress in waste reduction and recycling throughout the state. Savannah River Nuclear Solutions, LLC, the management and operations contractor at the Savannah River Site, won the Smart Business Recycling Award in 2019 for practices and accomplishments carried out in 2018.

To earn this recognition, Savannah River Nuclear Solutions took on a "more-with-less approach" to address waste challenges, concentrating on sustainability to get the job done in the most economical manner possible, while also using less energy and generating less waste. This "smart-in-business" mindset took on an added value through outreach to the community and stakeholders. Many programs onsite engage and educate employees, encouraging them to recycle and adopt sustainable practices at work and at home.

During the competition period, the Savannah River Site recycled 504 metric tons of glass, metal, paper, cardboard, and plastics out of 872 metric tons of generated waste. This is a 58% recycling rate, which far surpasses the 40% rate the state requires.

Also, in a large-scale project that diverted 21,360 metric tons of asphalt and concrete from disposal in a landfill, the Site reused or redirected the road repair material to nearby counties for them to use to improve their secondary roads.

Together, the Savannah River Site and nonprofit Savannah River Site Community Reuse Organization, acting as the go-between for the Site and the end-user, sold or donated excess government equipment and material, generating $278,243 in revenue and dispersing these proceeds to surrounding South Carolina and Georgia counties.

Savannah River Site's sustainability projects also include using the A-Area biomass facility to produce electricity and steam from wood waste; pursuing increased energy efficiency by purchasing EnergyStar-qualified energy-efficient electronics; and replacing vehicles with alternative fuel, hybrid, and electric vehicles.

For a long-term benefit, the Site installed cool roofs on buildings to reflect sunlight and emit heat more efficiently. These installations significantly reduced cooling costs initially and will continue to do so throughout the life of the roofs.

Because the Savannah River Site covers 310 square miles, saving fuel to conduct work in remote regions is important. When possible, the Site uses solar panels to power monitoring equipment and has employed drones to replace helicopter surveillance flights.

Through realistic sustainability goals and a committed workforce and community, the Savannah River Site has been able to deploy creative solutions that address today's waste reduction challenges, while receiving regulator recognition for the innovative and effective programs.

Stainless Steel for Welding Students

What is scrap metal to a project the size of the canceled Mixed Oxide Fuel Fabrication (MOX) Facility, is gold in the hands of welding students learning their trade at high schools and technical colleges in the area surrounding the Savannah River Site.

The high cost of stainless steel prevents most welding training programs from being able to offer students a chance to have hands-on experience with it as part of their training. Instead, they train on carbon steel or other materials with properties that can be very different. As a result, welders usually learn to work with stainless steel once they are on the job.

It became an ideal opportunity, however, when Savannah River Nuclear Solutions and the National Nuclear Security Administration identified excess stainless steel from MOX and worked together to provide 15 local welding programs in South Carolina and Georgia with 2,000 pounds each.

The Site rigorously screens all excess material that is being redistributed for reuse to determine if the federal government could use it elsewhere. The National Nuclear Security Administration determined its other projects and the Savannah River Site did not need the scrap stainless steel that was specifically fabricated and that its greatest benefit would be as an investment in the area's workforce, expanding employment opportunities and earning potential for the trainees.

Evans High School (Columbia County, Georgia) welding students examine the stainless steel they will be training with (top). The scrap stainless steel (below) is from the former MOX Facility.

SUSTAINABILITY

This page, a microblower used in M-Area Seepage Basin is solar-powered. Facing page, the Site injects recycled iron filings in P Area (left) and gathers groundwater samples from C Area prior to injection (right).

Passive Cleanup

The Savannah River Site was an important contributor to the nation's Cold War nuclear deterrent with its production of tritium and plutonium to fuel nuclear weapons. As part of these past operations, radionuclides and solvents from the reactors and other production areas seeped into the area's subsurface over time, contaminating soils and groundwater.

In the decades that followed the defense production, the Savannah River Site has strived to protect the environment using innovative, safe, and environmentally sensitive technologies to clean up the contamination associated with supporting the nation's defense.

Using high-energy, high-maintenance active cleanup methods, such as pumping contaminated groundwater to the surface for treatment or using large extraction units to draw solvent gases from subsurface soils, the Savannah River Site has removed many thousands of pounds of solvent. As contamination levels decreased, the Site has transitioned from these methods to more passive and sustainable cleanup practices. Passive technologies are strategies that take advantage of environmental conditions to maximize energy and cost savings, using less energy and requiring less maintenance during the systems' operation. The treatments work in the background, often unmarked by elaborate equipment and operator engagement. In comparison, active systems commonly use power and more expensive materials and equipment.

Injections

In 2019, the Site implemented several groundwater cleanup projects using passive clean-up technologies. These projects involved injecting iron in P Area, edible oils in C Area, and silver chloride in the path of contaminated groundwater in F Area. Although they use different materials, all these technologies rely on injecting treatment materials into the contaminated groundwater, allowing the natural flow of groundwater to mix with the treatment materials and destroy or immobilize contaminants over time.

These methods generate no waste and eliminate the need for power, mechanical methods, and equipment.

P-Area Permeable Wall: In P Area, the Site installed a water-permeable reactive wall or barrier made of recycled iron filings from automobile engines to neutralize solvents in the groundwater. This passive technology project entailed injecting 1.5 million pounds of the filings into the subsurface at depths of 45 to 135 feet below ground surface, creating a wall 264 feet long and at least 4 inches thick. With the injection complete, the iron is breaking down the solvents into harmless components without using electricity or equipment. The system design allows it to work for decades with only routine groundwater monitoring to verify its effectiveness.

C-Area Vegetable Oil: In C Area, the Savannah River Site used simple household vegetable oil to address contamination from C Reactor that was heading toward Castor Creek. A previous clean-up project used high-voltage electricity to heat the subsurface soils and vaporize the solvent. While that project was effective at removing 99% of the solvent, the Site still needed to address the remaining solvent in a narrow plume about a mile long.

The low-energy solution involved 36,000 gallons of vegetable oil mixed with water, a pH buffer, vitamins B-12 and C, and microbes, which was injected into the groundwater to intercept solvent-contaminated groundwater prior to it discharging to Castor Creek. Once injected, the oil mixture continues to work for years, absorbing the solvent and the microbes breaking it down into harmless compounds. Conservative estimates are that one injection will be effective for 3 to 5 years and treat more than 1 million gallons of groundwater annually. An additional benefit is that the one-time injection does not require operation or maintenance costs beyond groundwater monitoring.

F-Area Silver Chloride: In F Area, the Site is using silver chloride, a conventional industrial product, to passively treat radioactive iodine-129 in groundwater. The Site based this treatment on comprehensive studies conducted by Savannah River National Laboratory scientists to find the best substance to treat iodine-129. Technicians injected a mixture of 240,000 gallons of water and 165 gallons of silver chloride into groundwater to a depth of 30 to 60 feet. The silver chloride is mixing with the iodine-129 in the groundwater and then binding with it to become silver iodide. This removes the iodine-129 from the groundwater and locks the iodine-129 into place. This innovative *in situ* treatment technology can significantly reduce iodine-129 concentrations in groundwater without operating equipment or generating waste.

Microblowers: Initially, Site personnel used a highly mechanized system to remove nonradioactive degreasing solvents from the groundwater beneath a now-covered waste pond, the M-Area Settling Basin. In that process, they injected steam into the soil and groundwater to mobilize subsurface contaminants. A network of underground piping and equipment then removed those contaminants by traditional soil vapor extraction and air stripping. This system removed about 500,000 pounds of the solvents.

The Site fully transitioned to a low-cost technology using solar-powered soil vapor extraction units, known as microblowers, to remove remaining solvents from groundwater beneath the earthen-capped basin. Installed at multiple wells, microblowers generate a vacuum to exhaust the chemical vapors from the solvents. Each unit requires only 20 to 40 watts of solar power to run its primary component, a compact, high-speed fan. The Site has removed nearly 2,000 pounds of solvents from beneath the basin in M Area over the last 4 years.

By replacing the larger, more complicated, higher-energy-consuming soil vapor extraction units previously used, the Site expects microblowers to save about $200,000 a year, mostly due to the need for less electricity, equipment maintenance, support facilities, and personnel interaction.

TECHNOLOGY

Portable Air Samplers

The portability of the new air samplers allows sampling at the exact location a plume is traveling (top). Portable air samplers are about the size of an ice chest (bottom).

Portable air samplers, with a simplicity and likeness in both stature and appearance to ice chest on wheels, are providing the Savannah River Site with a sophisticated means to quickly and easily determine the extent of airborne contamination around the Site after a release to the air. This is vital information that ensures the safety of the neighboring communities and the environment.

In the spring of 2019, the Site purchased two portable air samplers to use in confirming sampling and monitoring results from stationary air samplers in service around the Site's perimeter.

If a facility has a release to the atmosphere, the Environmental Monitoring Program at the Savannah River Site can access Site meteorological data, determine the direction the wind is transporting the release, and place a portable sampler in that path to measure the radiological content of the plume.

The portable samplers have vacuum pumps that continuously pull air from the direction of the release through a collection system consisting of glass fiber filters, charcoal filters, and silica gel columns. Each system component is better suited for analyzing certain contaminants. A flow meter regulates how much air moves through the network. Based on flow rate, the Environmental Monitoring Program can calculate the volume of air going through the system and then analyze the samples to determine the concentration of various radionuclides. As with the permanent air stations, the calculated volume and radionuclide concentration from the portable air stations allow the Environmental Monitoring Program to accurately determine the amount of contaminant released and help verify the air pathway portion of the dose calculation.

The portable samplers match the capabilities of the permanent air samplers stationed at the Site. The advantage of the portable samplers over their stationary model is their small size and portability, which makes moving them from point A to point B effortless. Additionally, the Environmental Monitoring Program can sample air and moisture in the exact direction the plume is traveling, rather than relying on the permanently fixed locations that may or may not be in a plume's direction of travel. The portable samplers also have been invaluable in comparing and testing the program's methods with those of its permanent stations, allowing field quality control improvements.

The SIte is able to monitor vegetation growth by using drones to capture aerial views such as this photograph of R Reactor (top, left) and by flight video feed from the ground (middle, right). Drones (top, right) also are equipped to monitor for vegetation growth and dispense herbicide when needed (bottom).

Drones

The U.S. Department of Energy awarded the Savannah River Site the Sustainability Award in 2019 for its innovative approach to finding and treating vegetation growing on the rooftops of two closed reactor buildings.

Drones are providing a bird's eye view of P and R Reactors, allowing the Savannah River Site to capture the high-resolution photographs and video needed to find emerging vegetation. With this documentation in place, and the location of the growth known, the Site uses a second, more robust drone that it developed with Virginia Tech to spray herbicide on the vegetation.

The Site had previously relied on helicopters and a photographer to find and treat the vegetation on the top of P and R Reactors, which were decommissioned in 2011. If the helicopter team found growth, it sprayed it with herbicide, as necessary. Although it is an effective means to monitor and treat vegetation, it was expensive.

The drone technology has proven to provide a more thorough inspection than the helicopter missions, while also saving the Site $170,000 annually and keeping employees safe on the ground.

The concern and the reason for deploying this maintenance is that vegetative root growth may allow root intrusion, which could degrade the structure.

The Site entombed the reactor buildings to last for thousands of years with proper maintenance. Implementing a long-term, safe, sustainable, and efficient maintenance plan ensures the integrity of the structures over time.

ENGAGING THE PUBLIC

General and Historic Tours

General and historic tours begin stop at the Savannah River Ecology Laboratory (top). Participants look at Site information (bottom left). An historic tour stops at a former town site (bottom right).

Each year, the Savannah River Site opens its gates to the public with half-day bus tours through the 310-square-mile nuclear facility that encompasses parts of Aiken, Barnwell, and Allendale counties in South Carolina.

In 2019, the Site offered 22 tours to 750 people so they could see firsthand the historic and operational facilities at the Site that were responsible for producing plutonium and tritium during the Cold War. Tour participants also learn about current activities and facilities supporting future missions at the Savannah River Site.

For the second year, the Savannah River Site partnered with the Cold War Historic Preservation Group to offer a historic focus to six of the tours. These tour-goers are treated to stops at the former town of Ellenton, C Reactor, and the Site's Curation Facility, which houses early artifacts and historical displays.

Tour participants arrive and depart from the Badge Office on SRS Road 1, near New Ellenton. The last stop of the public tours is the Savannah River Ecology Laboratory, where participants learn about the lab and see some of the animals indigenous to the Site.

All tours are free of charge and each will accommodate 34 participants on a first-come, first-served basis. Tour participants must be 18 years of age or older and must be U.S. citizens. Two forms of identification are required at check-in the day of the tour. Registration for each tour will close two weeks before the date of the tour.

Reservations can be made on the Savannah River Site Tours webpage. The schedule distinguishes the historic tour dates from the general tours.

Sign up for a Tour: www.srs.gov/general/tour/public.htm 803-952-8994

Stakeholder Engagement

Savannah River Site management has built long-term support at all tiers of community and government and 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 has ensured that it has a framework from which communication and information exchange purposely between itself and those with a vested interest in Site missions.

The foundation of the stakeholder program is the belief that the public has the right to know what the U.S. Department of Energy is doing in the community and 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 it ensures that the Department of Energy has greater clarity and a shared vision with the public.

The Site involves stakeholders through a variety of activities that solicit input from the public. Some of these follow:

- Assisting stakeholder groups with analyzing environmental management plans
- Increasing public awareness of the impact of contaminant releases or potential releases during cleanup
- Allowing community groups to propose alternative plans that may achieve better results
- Explaining how the Site establishes priorities to promote cleanup and safety

The Savannah River Site works closely with the U.S. Environmental Protection Agency Region 4 and the South Carolina Department of Health and Environmental Control to reduce risk and accelerate environmental cleanup at the Site. Through the federal Resource Conservation and Recovery Act, which tracks and manages hazardous wastes from generation to disposal, and the Comprehensive Environmental Response, Compensation, and Liability Act, which addresses the protection and cleanup of the environment from known releases of hazardous substances, the Savannah River Site relies heavily on communication to streamline essential documentation.

Ellen Lord, Under Secretary of Defense and Acquisition and Sustainment, and Gen. John E. Hyten, Commander of U.S. Strategic Command, tour Tritium Facilities and former MOX Facilities.

A specialist demonstrates stream flow monitoring to a TREAT Workshop attendee.

Environmental Justice

Mandated by the Department of Energy's Office of Legacy Management, the Environmental Justice program at the Savannah River Site ensures no group of people bears a disproportionate share of negative environmental consequences from Site operations by developing, implementing, and enforcing environmental laws, regulations, and policies.

Funded by the Department of Energy and the Environmental Protection Agency, the Environmental Justice program encourages groups to express concerns that influence the decision-making process associated with setting standards, permitting facilities, awarding grants, and issuing licenses and regulations.

The Savannah River Site uses various methods to enhance engagement from the target communities. One such program is the annual Teaching Radiation, Energy, and Technology (TREAT) workshop, which gives local teachers and community leaders the opportunity to learn more about radiation, energy, and technology from Department of Energy experts. This extra level of training allows educators to more thoroughly pass on the information to their students in the classroom.

Other Environmental Justice programs at the Site include community outreach meetings that focus on job training, grants, environmental monitoring, and emergency response. The Site also offers hands-on training in the form of student internships focusing on environmental contaminant analysis research projects.

The Savannah River Site is committed to the principles of Environmental Justice and ensuring that all programs, policies, and activities support these principles, thereby facilitating meaningful involvement by affected communities and stakeholders.

2019 Members of the Citizens Advisory Board assemble at a meeting venue.

Citizens Advisory Board

For the past quarter of a century, the Savannah River Site Citizens Advisory Board, called the CAB, has been the eyes and ears of the local community, providing insight into Department of Energy programs, policies, and projects. The board also provides a voice for the community to the Site and its regulators, sharing public thought and opinion.

The board's 24 members, from 10 Georgia and South Carolina counties, reflect diverse viewpoints in the affected community and region surrounding the Savannah River Site. They are people whom Site clean-up activities directly affect. A chair and vice chair, who represent the CAB at Environmental Management Site-Specific Advisory Board meetings and to the public, head the organization. The remaining board members belong to the following four issues-based committees:

- Facilities Disposition & Site Remediation Committee
- Nuclear Materials Committee
- Strategic & Legacy Management Committee
- Waste Management Committee

The various committees within the CAB meet bimonthly to discuss topics such as environmental clean-up on the Site, budget management, materials handling, historic preservation, and plans for future uses of the Site.

The Department of Energy started the CAB in 1994 to serve as a local recommendation-giving entity. Over the past 25 years, the members have issued 368 recommendations. In 2019, the CAB made eight suggestions addressing Site programs ranging from a pollinator management plan to nuclear materials processing and operations. Generally, the CAB issues advice on environmental restoration, waste management, and other related topics of interest.

The CAB schedules six public meetings a year, at rotating locations throughout the region extending from east central Georgia to the South Carolina Lowcountry to enable a wide range of attendees and viewpoints. Agency liaisons from the Department of Energy, the U.S. Environmental Protection Agency Region 4, and the South Carolina Department of Health and Environmental Control participate in CAB meetings. The board streams meetings live over the internet for those who can't attend, and a video archive of past meetings and newsletters exist on the CAB website for reference.

The CAB is also dedicated to outreach to the community through Site tours; an online CAB university, which offers background on general Site missions and quizzes to test knowledge takeaway; and a line-up of speakers that civic groups can engage for events and meetings.

Citizens interested in applying for CAB membership are not required to have any special skills or extensive Site knowledge. The general requirement is to have a willingness to attend meetings and learn about the plans and activities at the Savannah River Site and provide advice and recommendations from a public individual's perspective.

25 Years at the Savannah River Site
368 Recommendations
10 Counties Represented

SAVANNAH RIVER SITE

Department of Energy-Environmental Management

To Learn More About the Focus on Environmental Safety:
Visit the SRS website: www.srs.gov/general/srs-home.html

View or download the *Savannah River Site Environmental Report 2019*: www.srs.gov/general/pubs/ERsum/

For More Information about
the Department of Energy-Savannah River Operations Office,
Please Contact:

Office of External Affairs
Savannah River Operations Office
U.S. Department of Energy
P.O. Box A Aiken, SC 29802

www.energy.gov/srs/savannah-river-site
803-952-7697

Follow Us On Social Media:

For More Information about This Report, Please Contact:

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Or, go to the *SRS Environmental Report* webpage at www.srs.gov/general/pubs/ERsum/er19/index.html and under the *Environmental Report 2019*, complete the electronic customer satisfaction survey.

Savannah River Site employees took the photographs featured on the cover of the *2019 SRS Environmental Report* as part of the Site's pilot run of Snap SRS. The employee-driven competition cost-effectively promotes Site pride of ownership, improves facility appearances, and boosts workplace morale through art. The 2019 contest drew 246 photographs. Three Snap photographs taken onsite and in the community have been incorporated into the cover design.

Front Cover—*Pollinator Fireburst,* taken by Karyn Bland, Savannah River Nuclear Solutions, LLC
Back Cover—*Sunset Over the River*, Local Scenery winning selection, taken by Mark Amidon, Savannah River National Laboratory
Front and Back Cover Background—*Rushing Water,* taken by Laura Russo, Savannah River Nuclear Solutions, LLC

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