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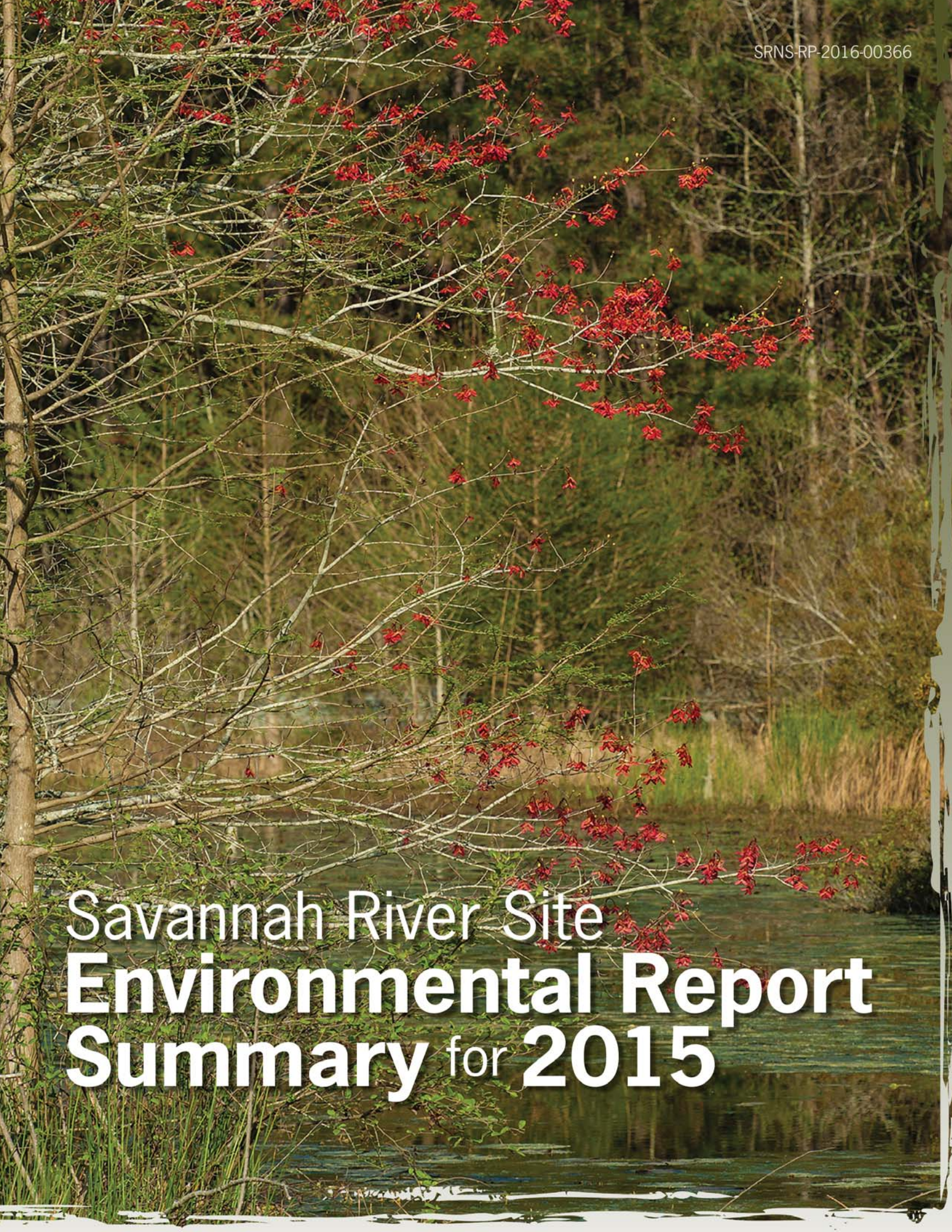

Savannah River Site
Environmental Report Summary for 2015

Front Cover – Steel Creek at L-Lake. Photograph provided by Steve Ashe, SRNS Corporate Communications.

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or go to the SRS Environmental Report webpage at
http://www.srs.gov/general/pubs/ERsum/index.html
and under the SRS Environmental Report for 2015, complete the electronic Customer Satisfaction Survey.

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The Savannah River Site (SRS)

The Savannah River Site's (SRS) mission is to operate safely and efficiently and to protect public health and the environment, while supporting the nation's nuclear deterrent programs.

SRS began publishing the annual environmental report over 60 years ago and the report was first made available to the public in 1959. It is our duty as citizens of these communities to communicate the impact of SRS operations on our communities.

This summary report is meant to:

- Demonstrate our mission accomplishments,
- Demonstrate SRS compliance with environmental laws and regulations,
- Highlight SRS's environmental monitoring and surveillance programs, and
- Highlight our community involvement efforts

SRS is a Department of Energy (DOE) facility located in the western region of South Carolina along the Savannah River. The site is approximately 300 square miles covering parts of Aiken, Allendale, and Barnwell counties. SRS was built in the early 1950's to produce materials used to create nuclear weapons. To produce these materials five nuclear reactors were built and these reactors continued to operate until 1988. A number of support facilities were also built, and several of these facilities continue to operate today. The main activities on Site today are waste processing and treatment, environmental cleanup and remediation, tritium processing, and protection of nuclear material.

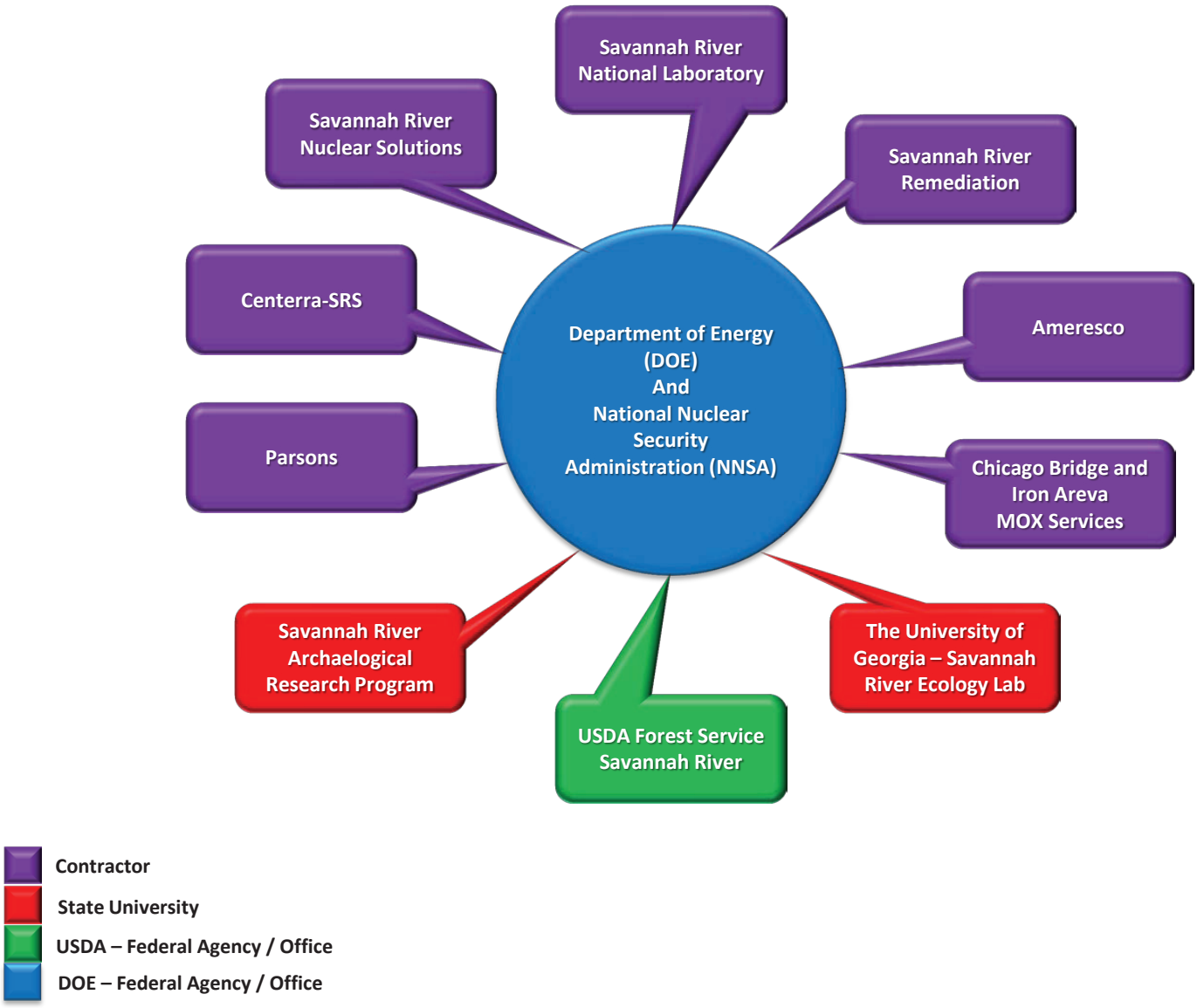
SRS conducts an extensive environmental monitoring program to determine impacts, if any, from SRS operations to the surrounding communities and the environment. In addition to the environmental monitoring activities conducted on the Site, SRS also monitors a 2,000-square-mile area beyond the Site's boundary.

Stream on Site

Savannah River

SRS Organizations

The SRS is home to multiple organizations working side by side to accomplish our mission. The main organizations operating at SRS are presented below. Additional information on these organizations is presented in Chapter 1, "Introduction", of the *SRS Environmental Report for 2015*.



SRS Organizations

SRS is committed to cleaning up legacy contamination, minimizing the effects of our operations, and working with community leaders and neighbors to keep SRS and the surrounding communities a safe place to live and work. In 2015 SRS continues to honor these commitments.

Environmental Stewardship

Under Environmental Stewardship, SRS complied with all regulatory laws and standards in 2015. Under the Waste Disposition program, 93 canisters were produced through the fiscal year at the Defense Waste Processing Facility (DWPF), immobilizing approximately 1.8 million curies of radioactivity. Since the beginning of operations at DWPF in 1996, 57.4 million curies have been immobilized. SRS continued processing high activity waste through the interim salt processing pilot (ARP/MCU) and disposing of radioactive waste through the interim Salt Waste Disposition facilities. We continued construction of disposal units at the Saltstone facilities to accommodate the salt treatment capacity. Through FY2015, over 750,000 gallons of waste was processed and disposed through the Saltstone facilities. Tank 16 H was operationally closed and Tank 12H was undergoing preparation for closure. SRS also continued construction of disposal units at the Saltsone facilities to dispose of low level waste from the processing facilities (DWPF and ARP/MCU). You will find more information on Liquid Waste Facilities and Radioactive Liquid Waste Tank Closure and Salt Waste Disposal on SRS's website.

In 2015, under the Area Completion Projects, SRS continued operation of soil and groundwater cleanup systems. During 2015, SRS continued a five-year project to restore 90 acres located near the former coal-fired power plant in D Area. The restoration activities will include removal of ash, deposited over decades, and construction of an engineered cover system, resulting in two highly engineered grassy hills. You will find more information on the Area Completion Projects page on SRS's website.

SRS Employees Observe D-Area Coal Ash Basin Closure Activities

National Security

H Canyon

In 2015 the H-Canyon facility, the only one of its kind in the United States, marked 60 years of service to the nation. This facility is where nuclear materials are chemically recovered and purified. SRS plays an important role in the national mission to prevent the spread of nuclear weapons and related material, thereby helping the United States to meet its international commitments in this mission area. SRS uses H-Canyon to downblend enriched nuclear materials into undesirable forms that cannot be used for nuclear weapons in order to make fuel for commercial reactors, such as the Tennessee Valley Authority.

For over a half-century, SRS has consistently delivered high-quality tritium products and services to meet the needs of the United States military. Tritium is a radioactive form of the hydrogen element when in a gaseous state. SRS continued to process and deliver tritium in 2015.

Clean Energy

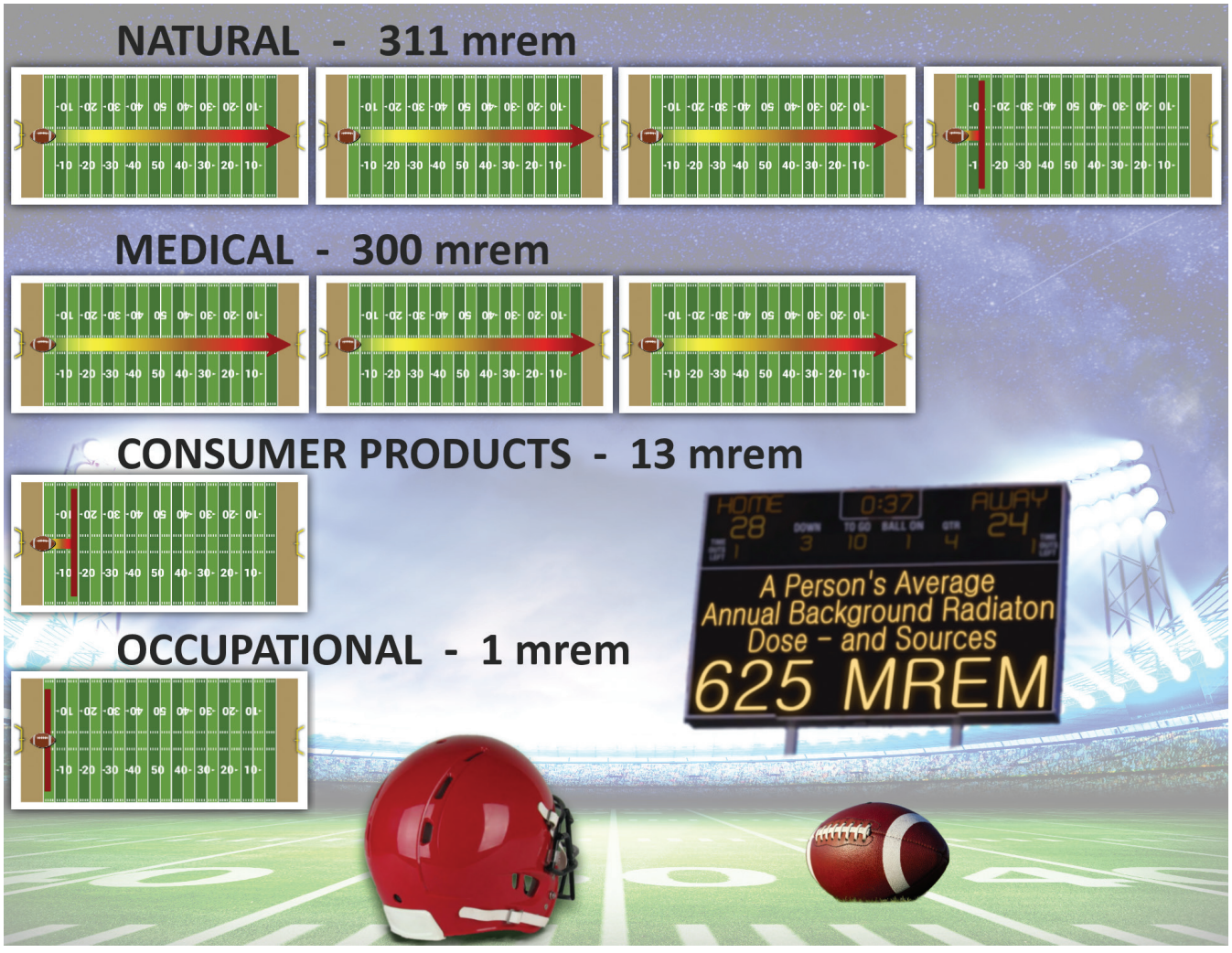
Solar Power is also a Site renewable energy source

SRS is focused on the research and development of sustainable energy through public and private partnerships while continuing to protect environmental health. The Biomass Cogeneration Facility is in its fourth year of full operation and has played a significant role in supporting renewable and alternative energy goals. In May 2015, a new biomass heating plant broke ground that will increase critical steam security and provide additional green power to the Site.

SRS is currently exceeding the 2025 goal of 25% of thermal and electric energy accounted for by renewable and alternative energy with 48% of electric energy used in 2015 coming from the biomass plants, and 100% of the steam used on site generated using renewable biomass fuels.

Radiation is the transfer of energy in the form of rays, waves, or particles through space. 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 that you are standing on. Because it is naturally all around us, we cannot eliminate radiation from our environment. We can, however, reduce our exposure to it.

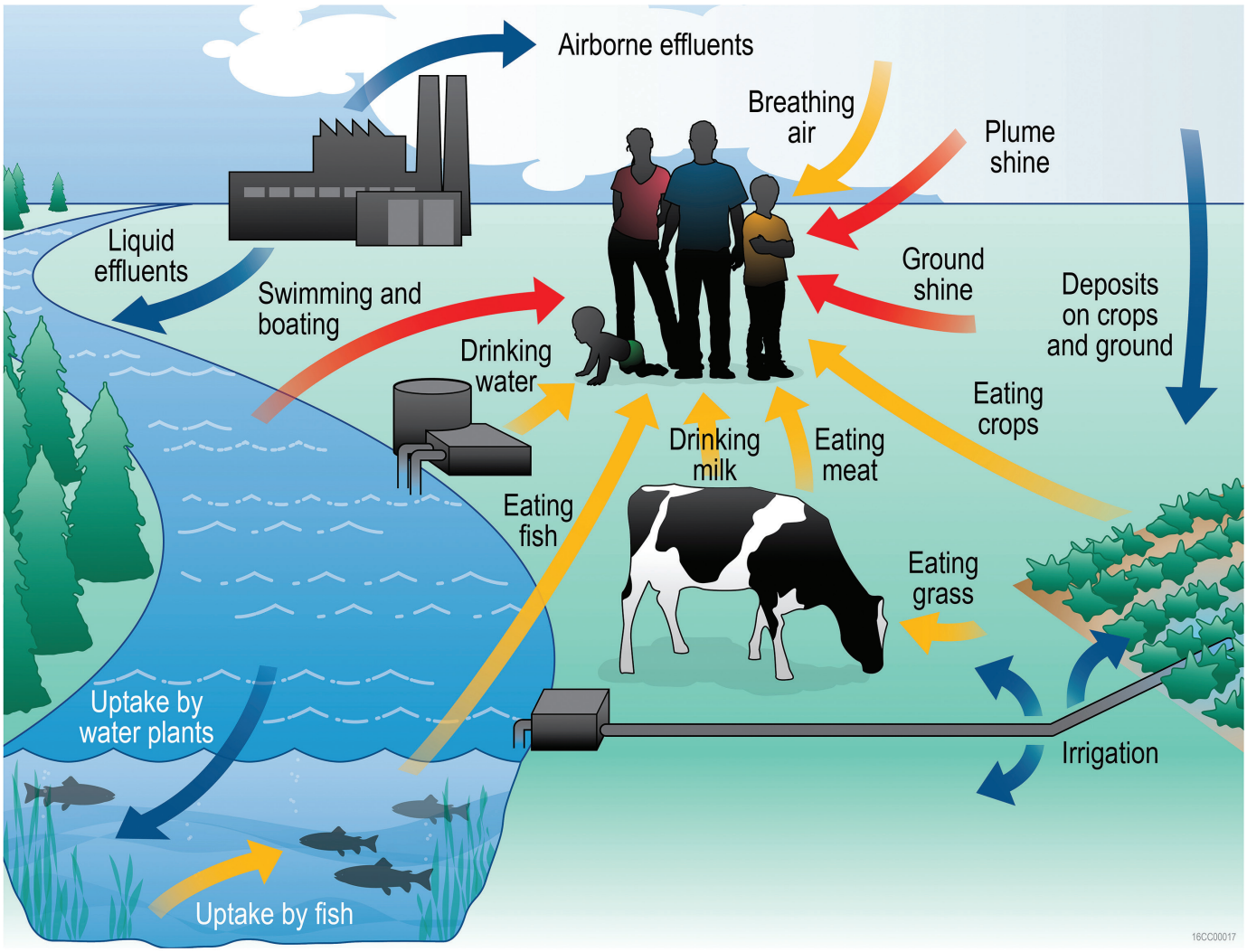
Radiation dose to a person is the amount of energy absorbed by the human body from a radioactive source, located either inside or outside of the body. SRS typically reports dose in millirem (mrem), which is one-thousandth of a rem. Humans, plants, and animals potentially receive radiation doses from natural and man-made 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 and in the earth, and from cosmic radiation. Man-made sources include medical procedures (300 mrem), consumer products (13 mrem), and less than 1 mrem from industrial and occupational exposures.



Sources Contributing to a Person's Average Annual Background Radiation Dose

DOE has established dose limits to the public so that DOE operations will not contribute significantly to this average annual exposure. DOE Order 458.1, *Radiation Protection of the Public and the Environment,* establishes 100 mrem/yr as the annual dose limit to a member of the public. Exposure to radiation potentially occurs through the following pathways, as show in the figure below:

- Inhalation of air
- Ingestion of water and food
- Skin absorption
- Direct (external) exposure to radionuclides in soil, air, and water



Exposure Pathways to Humans

In 2015 SRS operations did not significantly increase the potential radiation dose to the public, as the dose was well below any federal public dose limit.

SRS radioactive discharges to air and water were well below regulatory standards for the public and the environment. Compliance with DOE Order 458.1 is discussed in Chapter 6, "Radiological Dose Assessments", of the *SRS Environmental Report for 2015*. Included in that chapter is the potential radiation dose to the public.

For 2015, the potential representative person all-pathway dose was 0.18 mrem, 0.032 mrem from air pathways plus 0.15 mrem from liquid pathways. The all-pathway dose is 0.18% of the 100 mrem/yr DOE dose standard. The 2015 all-pathway dose is about 13% more than the 2014 total dose of 0.16 mrem. SRS attributes this increase to the 30% decrease in the estimated Savannah River flow rate during 2015. However, the all-pathway dose for 2015 is approximately 200 times less than the 33 mrem of cosmic radiation the average American receives in a year and approximately 15 times less than the dose received on a five hour plane ride.

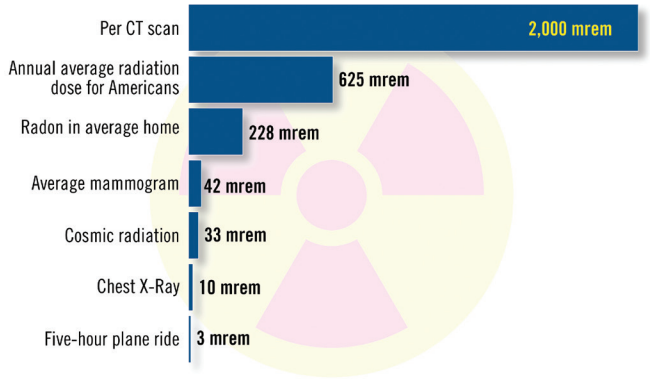
Millirem is a measure of dose

625 mrem
Annual radiation dose to the average person living in the United States

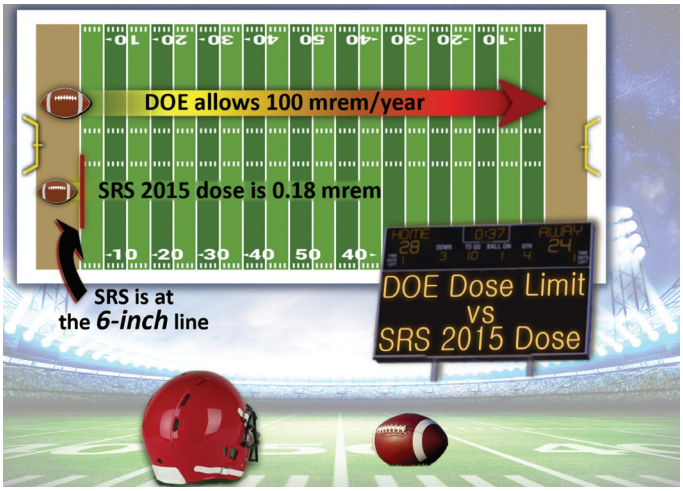
311 mrem
Annual background dose from naturally occurring radionuclides

100 mrem
Annual exposure limit from DOE operations to an individual member of the public

0.18 mrem
Maximum dose to a representative member of the public from SRS operations in 2015



Dose Associated with Common Activities

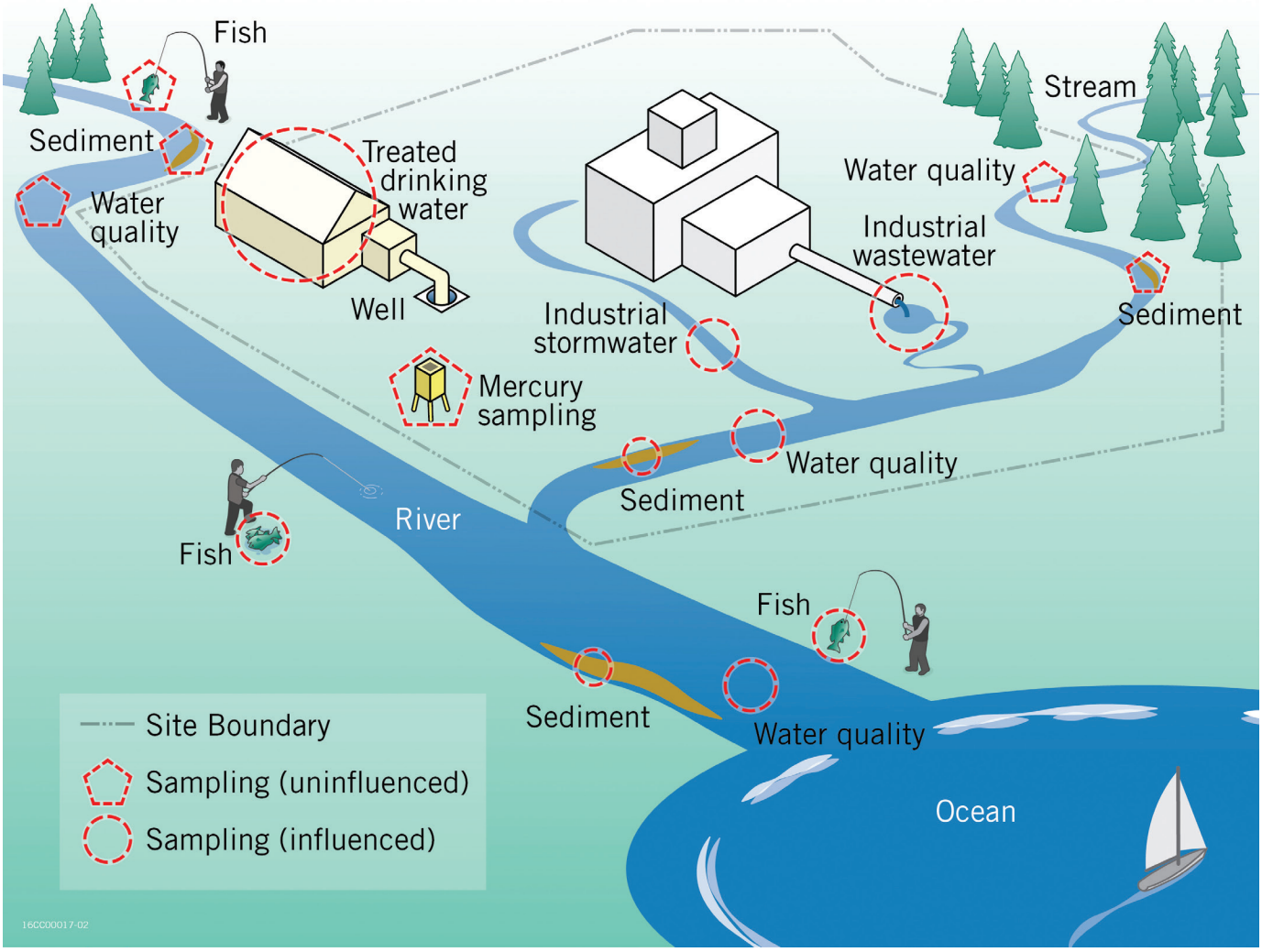


Comparison of SRS 2015 Dose to the DOE Dose Limit

Monitoring Program

Monitoring results indicate SRS activities continue to have minimal impact on the public and the environment. The Site's radioactive and chemical discharges to air and water were well below federal, state, and DOE regulations and standards. Environmental monitoring programs at SRS examine both radiological and nonradiological constituents that could be released to the environment as a result of SRS activities. The figure below shows the different types of environmental samples collected from areas both influenced (downstream of Site operations) and not influenced (upstream of Site operations). The mercury sampling is independent of SRS and part of a national sampling program.

In addition to SRS monitoring, the South Carolina Department of Health and Environmental Control (SCDHEC) conducts environmental sampling on and adjacent to SRS in South Carolina as part of a grant from DOE-SR. You will find more information at the SCDHEC ESOP Webpage.



Air and Liquid Pathway Sample Types

Surface water

SRS monitors surface water at outfalls and streams onsite and in the Savannah River at points upstream and downstream from the Site. SRS monitors surface waters for both nonradiological and radiological parameters. The monitoring results provide data necessary to understand SRS' contributions to these surface water bodies. In addition, industrial stormwater and industrial wastewater outfalls permitted under National Pollutant Discharge Elimination System (NPDES) permit program are monitored for nonradiological parameters to ensure compliance with the permits.

In 2015, tritium accounted for 99.96% of the total radioactivity discharged in SRS liquid effluents. Tritium is the predominant radionuclide detected above background levels in the Savannah River. Tritium averages for 2015 are consistent with the averages for the last five years. All tritium results for Savannah River water samples were less than the 20 pCi/mL EPA drinking water standard for tritium.

Overall the river results are within the trends of the previous five to 10 years. NPDES results indicated 100% compliance with NPDES permits.

SRS performed 5,400 analyses on samples collected from Site streams and the Savannah River for nonradiological water quality. The results indicate that SRS discharges do not significantly affect the quality of these water bodies.

5,400
Approximate number of sample analyses performed as part of the SRS NPDES monitoring

0
Samples exceeded NPDES (National Discharge Elimination System) limits

100%
Compliance with NPDES permit limits

0
Notices of Violation from the state of South Carolina

Collecting Water Samples

SEDIMENT MONITORING

Collecting sediment samples

Savannah River and Site stream sediments are sampled annually for both radiological and nonradiological analytes. These sample results indicate the accumulation of the parameters of interest in the sediments of these water bodies and provide insight into the movement and deposition along the length of these water bodies. The levels of radionuclides in SRS stream sediments show a decreasing trend, which is due to a combination of decreases in Site releases and the natural decay of radionuclides. Sediment sample results from all locations indicate no buildup of radionuclides from SRS effluent release points. All mercury results in sediment were below the EPA Regional Screening Level for soils.

ONSITE AND MUNICIPAL DRINKING WATER FACILITIES

SRS collects samples from one large and four smaller water treatment facilities that supply most of the drinking water on Site. SRS also collects treated water samples from two offsite Water Treatment Plants (WTPs) located in South Carolina that use water from the Savannah River. The North Augusta WTP is used to measure concentrations of radionuclides in drinking water upstream of SRS. The Beaufort-Jasper Water and Sewer Authority's Purrysburg WTP is the furthest downriver sampling location.

All samples collected from SRS drinking water systems during 2015 complied with South Carolina Department of Health and Environmental Control (SCDHEC) and Environmental Protection Agency (EPA) water quality standards. No monitored drinking water results were over the maximum contaminant levels set by SCDHEC and EPA. The Drinking Water Monitoring section of Chapter 5, "Radiological Environmental Monitoring Program", in the *SRS Environmental Report for 2015* provides additional information.

Onsite and Offsite Groundwater Monitoring

SRS operates an extensive groundwater monitoring program. This program consists of wells for sampling and monitoring groundwater contaminants. The purpose of the groundwater monitoring is to observe and evaluate the changes in the groundwater quality over time, and to establish, as accurately as possible, the baseline quality of the groundwater occurring naturally in the aquifers. While the monitoring data show that the majority of contaminated groundwater is located in the central areas of the SRS, there is a contaminant plume beneath A/M Area located adjacent to the SRS boundary near Jackson, SC.

40
Samples collected from Georgia wells

0
Number of samples with detectable tritium concentrations

The 2015 groundwater data show no exceedances of drinking water standards in the SRS boundary wells near A/M Area. Currently, groundwater contaminant levels beneath a small area (less than 3%) of the entire SRS are greater than the contamination standards set by the EPA and SCDHEC. Trichloroethylene (TCE), tetrachloroethylene (PCE), 1,4-dioxane, vinyl chloride, tritium, gross alpha and nonvolatile beta are common contaminants found above the contaminant standards. SRS continues cleanup activities to restore groundwater to beneficial use and reduce risks to human health and the environment.

In response to public concern, SRS continues to collect groundwater samples from 44 monitoring wells located in Burke and Screven Counties in Georgia. The samples are analyzed for tritium. Three wells could not be sampled in 2015 because they were dry and one well could not be sampled due to damage to the well casing. The 2015 sample results showed no detectable concentrations of tritium. More details on groundwater monitoring are found in Chapter 7, “Groundwater Management Program”, in the *SRS Environmental Report for 2015*.

Groundwater treatment technologies (from left to right): barometric pumping (TCE/PCE) and air stripper (TCE/PCE)

Food

In 2015, SRS collected samples of a variety of food types that are commonly grown by local farmers and gardeners and consumed by the public. Samples are collected annually from communities surrounding the Site. In 2015, SRS collected samples of greens, watermelons, beef, pecans, corn and milk. The analytical results of the food samples are consistent with results for the same foodstuff of the past five years. A majority of results for the radionuclides associated with foodstuffs were non-detectable.

Fish/ Shellfish

SRS collects samples of aquatic species to assess impacts of Site operations on species that are locally caught and consumed. Freshwater fish are collected at six locations on the Savannah River near the mouth of the streams that flow through the Site. Saltwater fish are collected at the Savannah River mouth near Savannah, Georgia. Additionally, shellfish were purchased from vendors in the Savannah area. The shellfish were harvested from local saltwater that is influenced by waters of the Savannah River. All fish are analyzed for radionuclides. Nonradionuclides are measured in freshwater and saltwater fish.

The analytical results of all the freshwater and saltwater fish and shellfish collected in 2015 are consistent with results of the last five years. A majority of radionuclides associated with SRS operations were non-detectable, as were the majority of measured metals.

Technician netting fish

Game Animals

SRS conducts annual hunts and deer removal activities to reduce animal-vehicle collisions and control site deer, coyote and feral hog populations. The annual game animal hunts for deer, coyotes and feral hogs are open to members of the public. You will find information on the SRS hunts at the SRS Deer Control Activities Webpage.

SRS provides monitoring of wildlife harvested from the Site and subsequently released to the public. The purpose of the monitoring is to assess any impact of Site operations on the wildlife populations and ensure that the SRS Annual Administrative Game Animal Release Limit of 22 mrem/year is not exceeded for any individual.

A turkey hunt for Wounded Warriors and those with mobility impairments was held in the spring as well as ten fall game animal hunts in 2015. SRS also conducted a roadside deer removal program in 2015.

During 2015 a total of 473 deer, 80 hogs, 23 coyotes and 27 turkeys were monitored. All harvested turkeys and hogs were released. Four hundred sixty-seven (467) of the harvested deer were released. Six deer were not released because monitoring results indicated cesium-137 concentrations were above the background value of 3.25 pCi/g. All coyotes were released.

Nonradiological Air Monitoring

SRS has five air permits regulating programs on Site. In 2015, SRS remained 100% compliant with the requirements of those five air permits.

On January 16, 2015, SRNS received a Notice of Violation from SCDHEC under the National Emission Standards for Hazardous Air Pollutants (NESHAP) Asbestos Abatement Program. On December 2, 2014, an electrician removed electrical wiring from a rooftop HVAC system. The removal process generated less than 20 linear feet of asbestos-containing wiring insulation. The electrician was not an asbestos-trained individual, nor was an abatement license obtained prior to the removal activity. No fines or penalties were assessed by SCDHEC as a result of this violation. The amount of asbestos released was below the one pound CERCLA Reportable Quantity and therefore did not require reporting to the National Response Center.

Radiological Air Monitoring

SRS monitors radionuclides in air releases to demonstrate compliance with EPA's NESHAP and DOE standards. SRS monitors the air at several locations, on and offsite, to make sure Site activities are not affecting the air negatively in surrounding communities. SRS maintains a network of 14 atmospheric sampling stations in and around SRS to monitor the concentration of tritium and radioactive particulate matter in the air and rainwater.

Tritium-in-air results for 2015 were comparable or slightly lower than those observed in 2014 and the previous five years. Tritium-in-rainwater results showed detectable levels in 18 of the 182 rainwater samples for 2015 with levels similar to the previous five to ten years. In 2015, tritium accounted for more than 87% of the total radioactivity released to the atmosphere from SRS operations. Tritium processing facilities are responsible for 84% of the SRS tritium releases, while the dissolution of spent nuclear fuel in H Canyon resulted in the release of less than 1% of the SRS tritium releases.

Technician taking a reading at an air monitor station

Lending a Helping Hand

SRS supports the surrounding communities through a number of social programs. We help the community in numerous ways by donating to the United Way campaign, Toys for Tots, and donating blood to the Shepeard Community Blood Center. SRS holds educational programs for schools, participates in and sponsors food and clothing drives for neighbors in need, and supports our troops through a variety of programs. SRS also participated in Earth Day in downtown Aiken, South Carolina in April 2015. On the job, at home, and in the community SRS is there to lend a helping hand.

Top left: SRS volunteers at Project Serve/Project Care
Top Right: SRS volunteers at Project Vision
Center Right: The Heart Walk
Bottom: Toys for Tots Donations
Center Left: A SRS donation that was made to the American Red Cross

Supporting Education in Our Communities

SRS considers improving science, technology, engineering, and math (STEM) education very important to its community. We know the importance of teaching our children these subjects. For the United States to compete with other countries on building new technology, we need to have new trained workers always ready to take the place of retiring workers. In order to achieve this, SRS supports STEM education outreach activities for students from elementary school through college. We are dedicated to supporting programs, events, and campaigns that will help students learn and will help teachers grow. Some of these programs include:

- The Traveling Science Demonstration Program is designed to help spark interest in STEM subjects by having students participate in fun experiments.
- DOE Savannah River Regional Science Bowl which is organized for students to compete in the areas of math and science. SRS invites local high schools to participate in the regional competition that is held in the first three months of every year. Regional winners compete in the National Science Bowl held in Washington D.C. every year.
- SRS education outreach also supports students to further their education in STEM subjects by offering STEM Scholarships. SRS has the Innovative Teaching Mini-Grants program, which allows teachers of elementary and middle schools to compete for a grant. The teachers win for their creative new ideas for teaching and encouraging STEM programs.

2015 Regional Champions

Elementary Mini-grants Program Recipients and students

SRS supports the development of future candidates for employment and works closely with local Universities and Historically Black Colleges and Universities to help develop and attract talent. Through a variety of educational programs, students in all areas of study from business to engineering to radiation protection to maintenance mechanics and technicians, SRS is helping to develop an excellent pool of candidates for years to come.

Additionally, helping to employ those who have served our Country is of special importance to the Site. Veterans pursuing higher education degrees are able to apply for cooperative employment positions that allow them to get industry-specific job training while attending college in the Central Savannah River Area.

Technical Colleges on Tour at SRS

Aiken Veterans Fair

Environmental Justice Program

The DOE-SR Environmental Justice (EJ) Program stems from a grant with Savannah State University (SSU) that has been funded by DOE-Headquarters since 1995. The EJ grant is a collaboration among DOE-Savannah River (DOE-SR), the Environmental Protection Agency (EPA), and the surrounding communities in the Central Savannah River Area. The EPA jointly funded the grant with DOE-Headquarters (DOE-HQ) from 2003 until 2012, and currently continues to share EJ activities.

The EJ Program includes the following activities:

- Organizing the Teaching Radiation, Energy and Technology Workshop (TREAT) to provide opportunities for local math and science middle school teachers and members of the public to learn about environmental radiation and the Savannah River Site.
- Continuing to acquire cutting-edge environmental analytical laboratory equipment for the SSU Environmental Sciences students, and students from the HQ EJ Environmental Scholars Program.
- Providing students internships on environmental contamination research projects, which gives them the opportunity to work with local communities on EJ specific projects.
- Addressing EJ concerns through coordinating community outreach meetings on topics such as job training programs, the availability of resources through grants, capacity building, environmental monitoring, and emergency response. The EJ community meetings have spanned outreach in numerous cities in both South Carolina and Georgia to include Millen, Waynesboro, Sylvania, Augusta, and Shell Bluff, Georgia; and Aiken, Denmark, North Augusta, Columbia, Edgefield, Hampton, Barnwell, and Allendale, South Carolina.

For more information about the SRS Environmental Justice Program, contact de-Lisa Carrico, DOE-SR Environmental Coordinator, at (803)-952-8607 or D.carrico@srs.gov.

Public Involvement in SRS Cleanup Decisions

SRS believes keeping the public informed about Site activities is of great importance. SRS has held a range of community activities to get the communities' input throughout the cleanup process. Outreach events have included public notices and information meetings on cleanup progress and activities. The Savannah River Site Federal Facility Agreement Community Involvement Plan serves as the overall guidance document for public participation and outreach activities at SRS and is available at **http://www.srs.gov/general/programs/soil/ffa/CIP_2011.pdf.** This explains the process SRS uses for public participation as well as ways the public can be involved in the SRS clean-up decision-making process.

In cooperation with the state of South Carolina and the EPA, and in consultation with the Nuclear Regulatory Commission (NRC), SRS seeks public involvement by taking part in workshops, public meetings and public comment periods on radioactive liquid waste tank closure documents so that the concerns of all the affected people can be answered. More information can be found at the NRC Public Meetings and Involvement webpage at **http://www.nrc.gov/public-involve.html** or SCDHEC Public Notices webpage at **http://www.scdhec.gov/publicnotices/.**

The National Environmental Policy Act (NEPA) is a federal law that requires DOE-SR, like all other federal agencies, to consider the potential environmental impacts of our proposed actions and make environmental information available to the public and agency officials before we decide whether and how to undertake a major Site action. Through the NEPA process, you have an opportunity to learn about the Site's proposed actions and provide timely information and comments to us. Information on the Site's NEPA program is available on **http://www.srs.gov/general/pubs/envbul/nepa1.htm.**

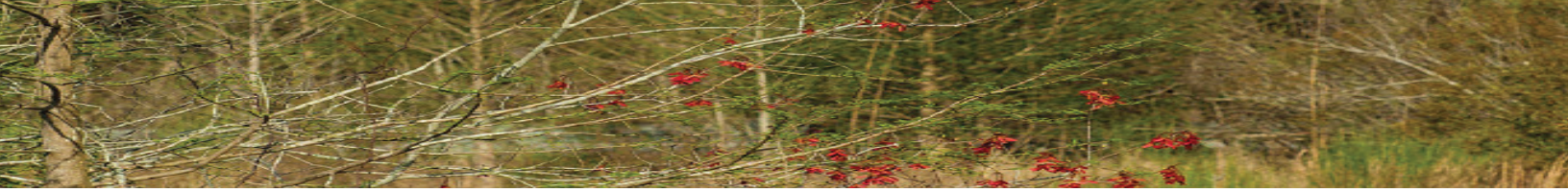
Citizens Advisory Board (CAB)

The SRS CAB is one of eight chapters of the DOE Environmental Management Advisory Boards that is specific to the Site. These boards give advice and recommendations to DOE on environmental remediation, waste management, and related issues. The SRS CAB is nationally recognized as one of the most productive site-specific advisory boards in the DOE Complex.

Part of the SRS CAB mission is to improve communication with communities that could be impacted by the Site and to make sure the stakeholders have the chance to become involved in decisions made at the Site.
A speaker's bureau is available to provide information about the SRS CAB and its activities at civic organizations and club meetings.

For more information about CAB and its recommendations, call the CAB administrator at (800)-249-8155, email the board at srscitizensadvisoryboard@srs.gov, or visit the CAB website at http://cab.srs.gov. A schedule of the SRS CAB meetings, including on-line meetings, is available on the website. Membership applications are also available on the website and are accepted year-round and are selected yearly from stakeholders in Georgia and South Carolina.

CAB Members at SRS field visit



How To Learn More

Visit the SRS website: http://www.srs.gov/general/srs-home.html

The Savannah River Site Environmental Report for 2015 is available on the web at the following address:

http://www.srs.gov/general/pubs/ERsum/er15/index.html.

Contact Us

For information about the Department of Energy-Savannah River Operations Office contact:

Office of External Affairs

Savannah River Operations Office

U.S. Dept. of Energy, P.O. Box A Aiken, SC 29802

Website: http://sro.srs.gov

Phone: 803-952-7697

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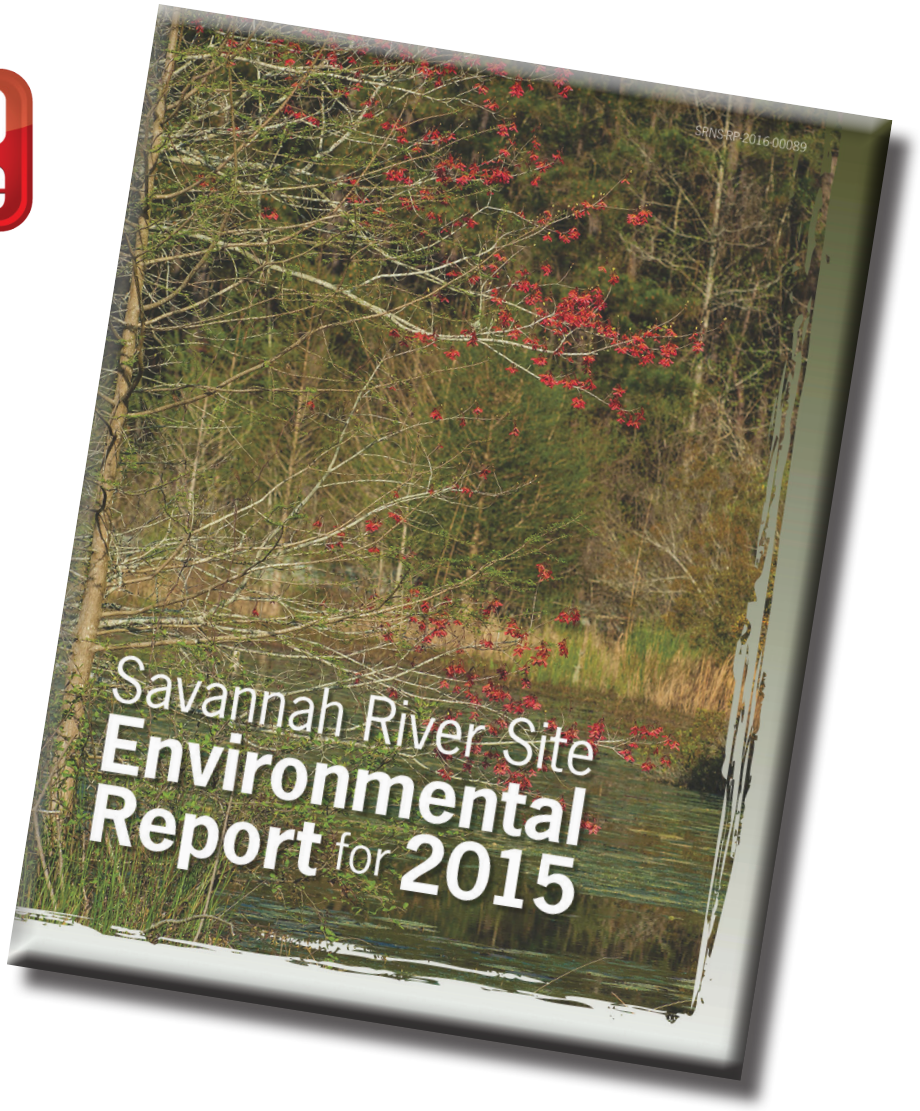

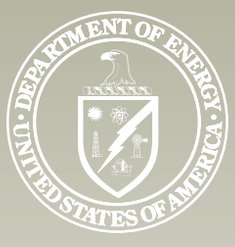

SAVANNAH RIVER SITE

Savannah River Nuclear Solutions, LLC
Aiken, South Carolina