U.S. DEPARTMENT OF ENERGY

SRS

Savannah River Site Overview

Environmental Management Missions

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SRS Citizens Advisory Board
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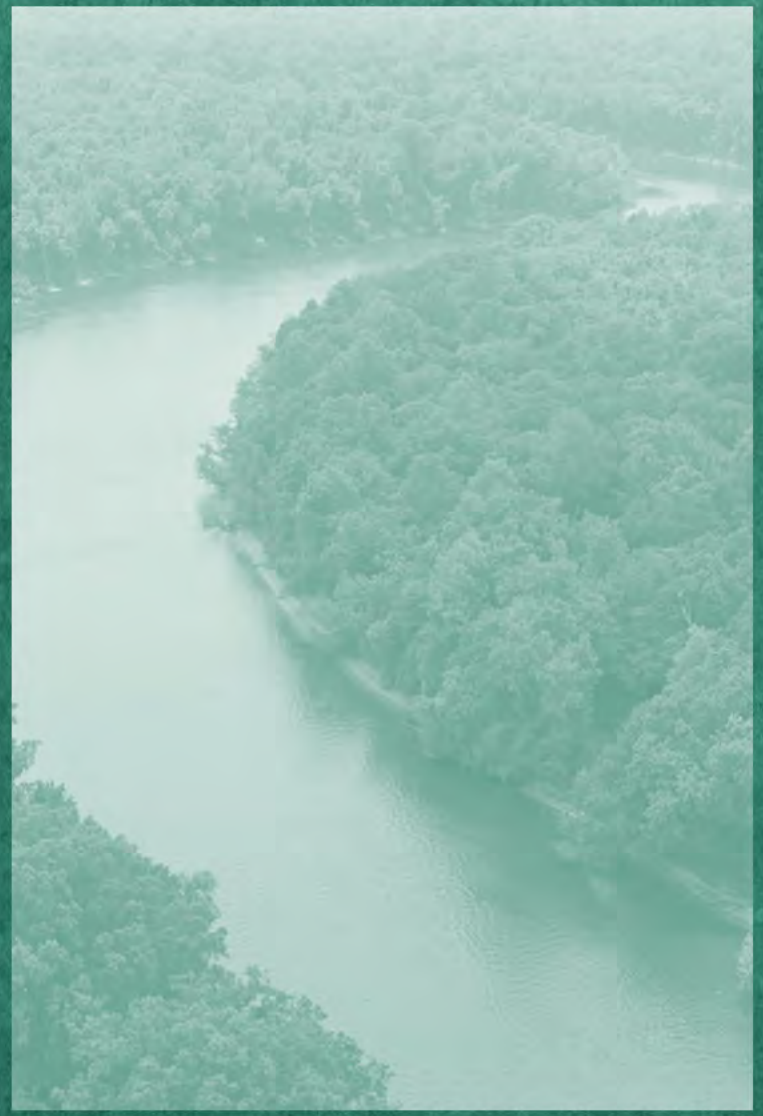
Dedicated to maintaining the highest possible safety and security standards, the Savannah River Site is a key U.S. Department of Energy industrial complex.

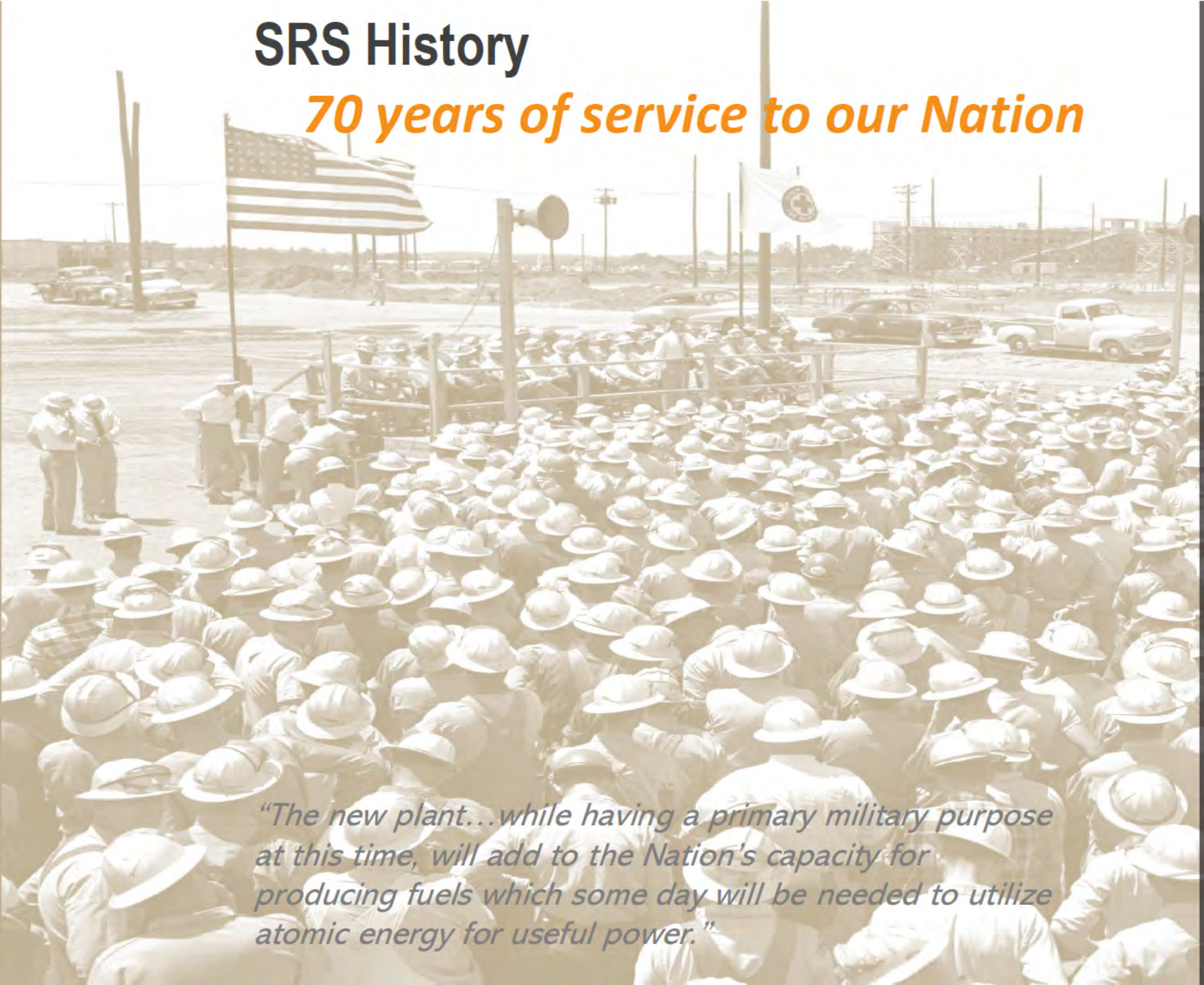
SRS is responsible for environmental stewardship, disposition of nuclear materials and support to U.S. nuclear deterrent.

SRS is also home to the Savannah River National Laboratory.



SRS History

70 years of service to our Nation



"The new plant…while having a primary military purpose at this time, will add to the Nation's capacity for producing fuels which some day will be needed to utilize atomic energy for useful power."

Sept. 23, 1949: President Truman announced Russia tested its first atomic weapon

June 12, 1950: Atomic Energy Commission (AEC) asks Du Pont to build a plant to produce nuclear materials

Site selection considerations

- 100 potential sites
- Narrowed to three (Lake Superior; Red River in Texas and Savannah River near Augusta, GA)

Site requirements

- large dependable source of water
- topography for rapid construction
- available labor pool
- moderate climate
- military defense (beyond range of Soviet bombers)

Nov. 28, 1950: AEC announces selection of location of Savannah River Plant between Aiken, SC, and Augusta, GA, on the Savannah River

SRS History

- Site was established on 198,046 acres, spread over three SC counties (Aiken, Barnwell and Allendale)
- Land cost $19M and covers 310 sq. miles
- Six South Carolina towns were moved and 6,000 people (1,500 families) relocated to build SRS
- Construction began February 1951
  - <10% land used for production
  - 22% wetlands
  - 73% upland forest
- Peak construction in September 1952 = 38,582 workers

Building the SRS Legacy

The construction of the Savannah River Plant was a monumental undertaking, on par with the great engineering achievements in this nation's history, like the building of the Panama Canal. —Dr. J.W. Joseph, III

SRS FIRSTS

- ✓ Produced radioactive fuel (Pu-238) world's first "atomic battery" used in a space satellite launch (1961)
- ✓ Advanced particle physics with the proof of neutrino (1956)
- ✓ Provided first real quantities of californium for research and medical applications
- ✓ Birthplace of modern science of ecology
- ✓ Designed and built the largest radioactive waste vitrification facility in the world
- ✓ Designated first National Environmental Research Park (1972)
- ✓ Discovered natural habitat of bacterium causing Legionnaires' Disease
- ✓ Pioneered use of microbes in environmental cleanup and expanded use in land mine detection
- ✓ Applied horizontal well technology to environmental cleanup/monitoring

SRS Early Production Years

Produce and recover nuclear materials

- Tritium
- Pu-238
- Pu-239
- Special Isotopes
- Uranium Recovery

Early Years

- Five reactors
  - Two chemical separations plants
  - Heavy water extraction plant
  - Nuclear fuel and target fabrication facility
  - Waste management facilities
  - Laboratory/Analytical facilities

- Produced 36 metric tons of Plutonium (Pu) from 1953-1988

End of Cold War meant a completely different philosophy and approach to the nuclear arsenal

SRS Partners and Missions Today

Who's at SRS

Savannah River Nuclear Solutions
Management and Operations; Savannah River National Laboratory

Savannah River Remediation
Liquid Waste Operations

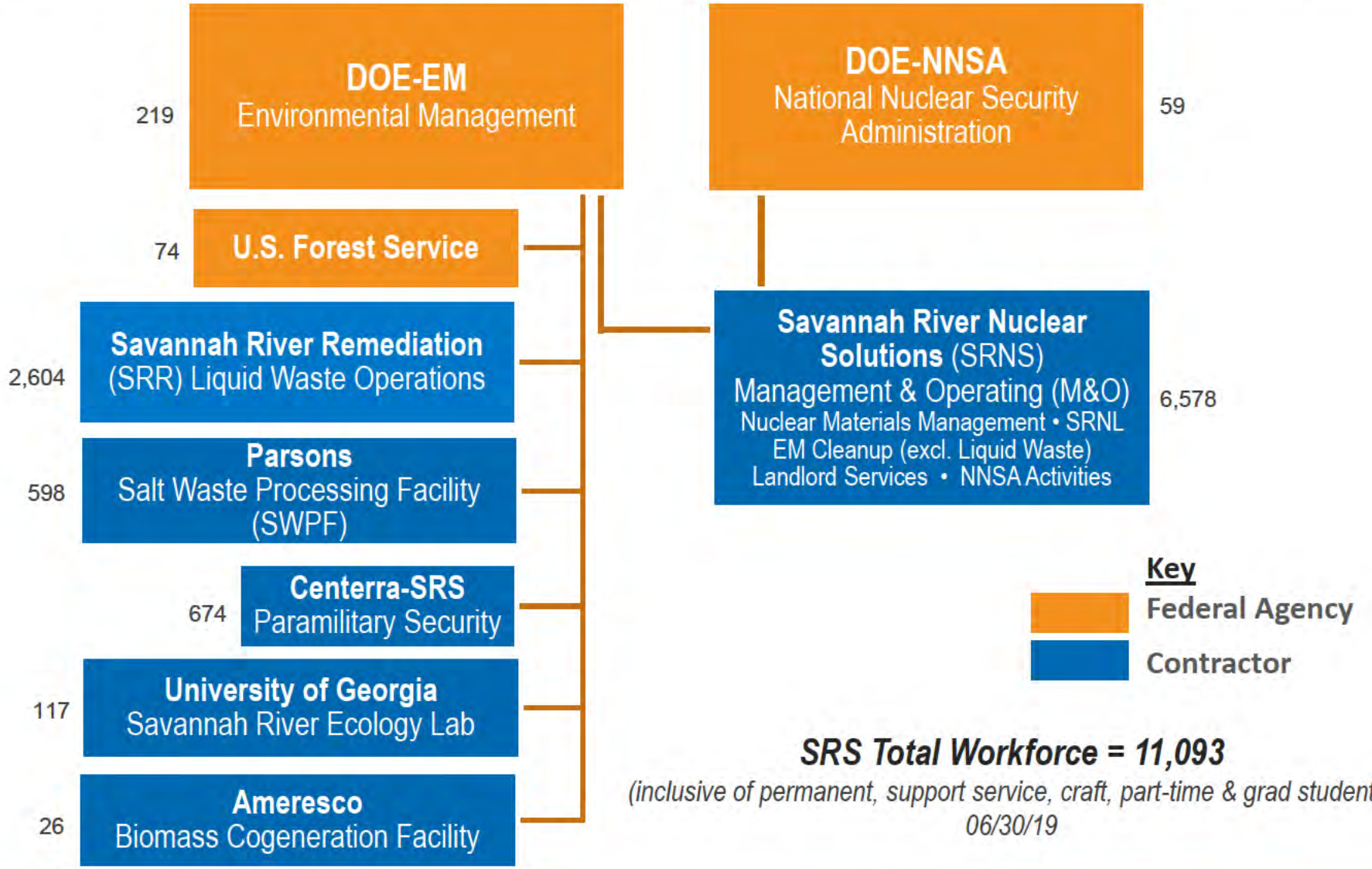
Parsons
Salt Waste Processing Facility

Centerra
SRS security

University of Georgia
Savannah River Ecology Laboratory

U.S. Forest Service–Savannah River
Federal entity

SRS Workforce Structure



SRS Total Workforce = 11,093

(inclusive of permanent, support service, craft, part-time & grad students)

06/30/19

SRS-EM Key Major Prime Contracts

NUCLEAR MATERIALS	SOLID WASTE	SOIL AND WATER REMEDIATION & FACILITY D&D	LIQUID WASTE STABILIZATION AND DISPOSITION	
Savannah River Nuclear Solutions (including Savannah River National Laboratory)			**Savannah River Remediation**	**SWPF** **Parsons**
• Awarded FY08 @ contract value of $5.4B • Latest 14-mos. extension is 8/1/19 through 9/30/20 = $1.8B –Includes two (2) 12-month options (October 1, 2020 through September 30, 2022) • Extension enables SRS to maintain management and operating services while DOE develops an acquisition strategy and subsequent contract competition for these services			• Awarded FY09 @ contract value of $4.9B • Latest 18-mos. extension through 9/30/20 = $750M • New Integrated Mission Completion Contract to include current LW scope, plus H Canyon and L Basin	• Awarded FY02 • Current contract value of $2.2B • Design, build and operate SWPF for one year • Anticipated contract completion in March 2021 • Planned future integration into new SRS Integrated Mission Completion Contract

Centerra	
• Paramilitary Security Services for SRS • Awarded FY09 @ contract value of $989M over 10 years	• Expires 10/7/19 • Final RFP issued 03/06/19; bids under evaluation

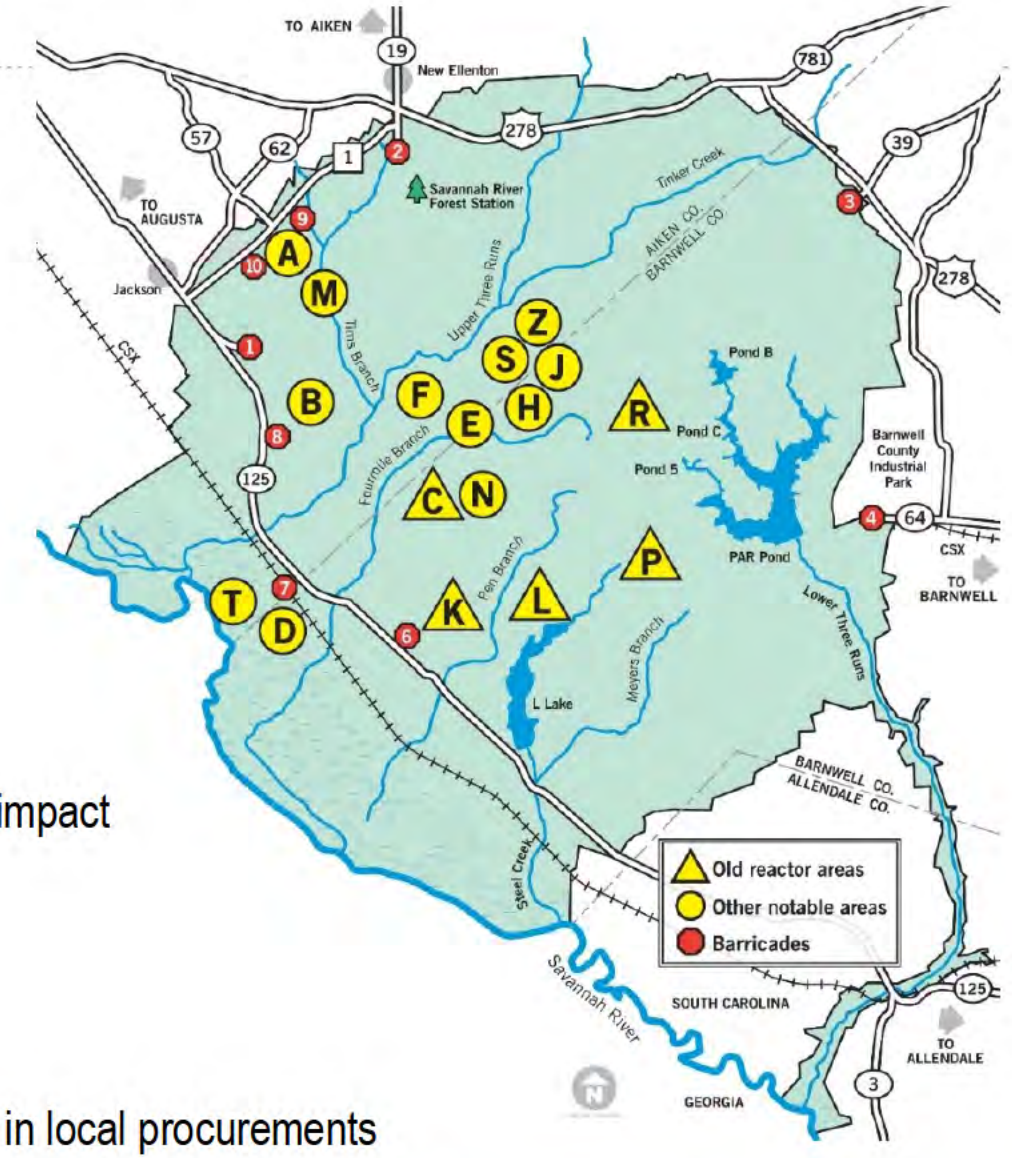
SRS Snapshot Today

11,093
current employee workforce *(6/30/19)*

$2.1B
FY19 enacted budget
(EM = $1.55B; NNSA = $626M)

$2.6B
annual regional economic impact
across SC/GA area

$200M
spent annually in local procurements



The ‘City’ of SRS

To support operations, SRS maintains an infrastructure similar to that of a small city.

fire department and emergency services

medical facilities

230 miles of roads and first S.C. cloverleaf

water and electrical utilities

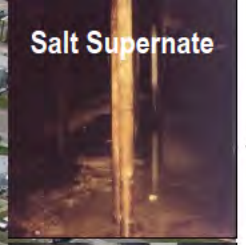
weather center

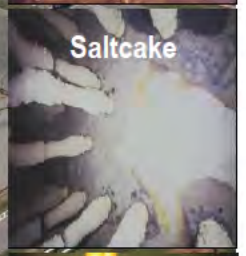
information technology networks

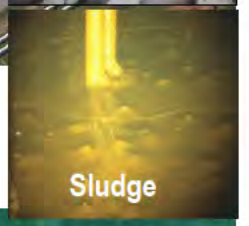
locomotive and train tracks

biofuels plant for power generation

It's our way of life.







Liquid Waste Management

35Mgal radioactive liquid waste from past nuclear material production stored in 43 underground tanks between H & F Area Tank Farms

8 other tanks closed/grouted since 2012

Operational closure achieved through safe dispositioning of liquid waste using:

- Salt Waste Processing Facility *(future)*
- Defense Waste Processing Facility
- Saltstone Facility

Tank closure:

- Remove radioactive waste to the extent practical
- Fill the tank with cement-like grout
- Tank top penetrations are sealed
- Area is capped and monitored by Environmental Stewardship program

This process reduces risks to human health and the environment by impeding waste migration and minimizing potential for groundwater contamination

Liquid Waste Management

- **SWPF** will separate 90% inventory of tank salt waste into high-radioactive waste and decontaminated salt solution
  - *SWPF startup is scheduled for 2020 and will be a major step toward emptying and closing the Site's remaining 43 high-level waste tanks*
- **Defense Waste Processing Facility** (DWPF):
  - *Vitrifies radioactive sludge waste within 10-ft tall stainless steel canisters*
  - *Nation's only operating vitrification plant*
  - *Has produced 16M pounds of radioactive glass in over 4,200 canisters in 23 years of operations*
- **Glass Waste Storage Buildings** provide safe storage of vitrified waste canisters until a future federal repository designation
- **Saltstone Facility**
  - *Decontaminated salt solution is mixed with cement, ash and furnace slag and poured into above-ground concrete vaults for long-term storage*
  - *New 32Mgal Saltstone Disposal Units (SDUs) are under construction*
  - *SRS is first site in DOE Complex to disposition salt waste*

Solid & Hazardous Waste Management

Disposition of SRS solid waste includes hazardous, sanitary, construction and demolition waste, plus low-level waste (LLW) and transuranic (TRU) radioactive waste

- Hazardous waste is collected and disposed of offsite at a permitted facility
- Sanitary waste is disposed of at nearby Three Rivers Landfill
- Construction and demolition waste is disposed of in a regulatory- permitted landfill
- LLW, contaminated with short-lived isotopes, is disposed of at SRS in engineered vaults
- TRU waste is collected, characterized and packaged for offsite disposal at the Waste Isolation Pilot Plant (WIPP)
  - SRS has made over 1,660 shipments of packaged SRS TRU waste to WIPP *(over 90% of the Site's legacy TRU waste inventory)*

TRUPACT III shipping container at SRS

Environmental Compliance and Area Completion

Manages environmental and groundwater monitoring programs per environmental regulations

Over 9,000 environmental and groundwater samples are collected annually and analyzed for radionuclides, metals or chemicals

Innovative groundwater remediation technologies have been shared across the DOE Complex

Achieved 85% SRS industrial footprint reduction using an area completion approach that addresses diverse cleanup needs across large areas and provides long-term monitoring

- *Over 25% of 1,127 excess facilities safely dispositioned*
- *2 production reactors decommissioned in place*
- *Remediation continues with >79% of 515 waste units completed*


Surveillance in K Area


3013 Container

K Area Materials Storage and Pu Downblending

Category 1 storage facility for handling and interim storage of excess plutonium and other special nuclear materials (SNM)

Ongoing plutonium downblending supports accelerated disposition path for plutonium

SRS saves millions in taxpayer dollars by receipt and storage of SNM from Rocky Flats Environmental Technology Site, Hanford Site, Lawrence Livermore National Laboratory and Los Alamos National Laboratory

Security is ensured through extensive verification measurements and surveillance examinations

L Area Spent Fuel Operations

Spent nuclear fuel, or SNF, is nuclear fuel that has been irradiated in a reactor

L Area is home to the L Disassembly Basin, which stores SNF safely under water

SRS stores SNF from former SRS reactors as well as foreign and domestic research reactors

L Basin holds approximately 3.4Mgal of water in pool depths from 17–50 feet

Since 1964, SRS has received more than 2,300 casks containing over 46,000 SNF assemblies

Spent nuclear fuel cask in L Basin

H Canyon Nuclear Materials Disposition

Only production-scale, shielded chemical separations facility in operation in the U.S.

Separates uranium from SNF and downblends it to low-enriched uranium (LEU) for use in Tennessee Valley Authority (TVA) commercial power reactors

- *Over 330 trailers shipped to TVA since 2003*
- *Providing enough LEU to power all homes in SC for over 8.5 years*

H Canyon is actively processing 3 uranium streams for the first time :

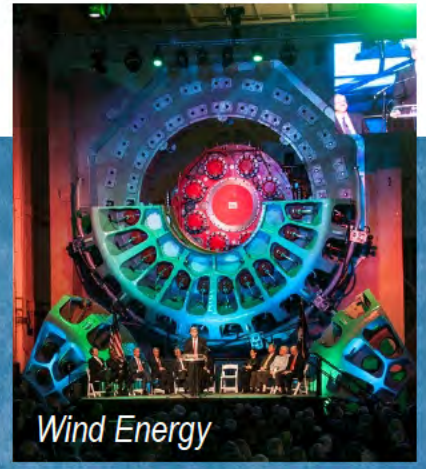
- Oak Ridge National Laboratory High Flux Isotope Reactor (HIFR) cores
- Target Residue Materials from Canada
- Material Test Reactor Fuel

SRNL: A multi-program laboratory


Glass technology


Radiation detection


Spent Fuel Management


Wind Energy

Environmental Stewardship

Waste Treatment

Waste Form Development

Remediation and Cleanup

Nuclear Facility Decommissioning Technologies

Assessments and Verification

National Security

Nuclear Defense

Tritium Technology

Homeland Security

Nonproliferation

Nuclear Forensics

Nuclear Materials Management

Materials Stabilization and Disposition

Spent Fuel Management

Plutonium Technology

Energy Security

Hydrogen Production and Storage

Nuclear Fuel Cycle R&D

Renewable Energy Research

Savannah River National Laboratory

SRNL provides practical, cost-effective solutions to environmental, national security, nuclear materials and energy security challenges, both nationally and internationally

SRNL expertise includes environmental cleanup, nonproliferation, radioactive waste treatment, hydrogen storage technology, glass technology and sensors

SRNL is the national laboratory for DOE's Environmental Management and Legacy Management programs

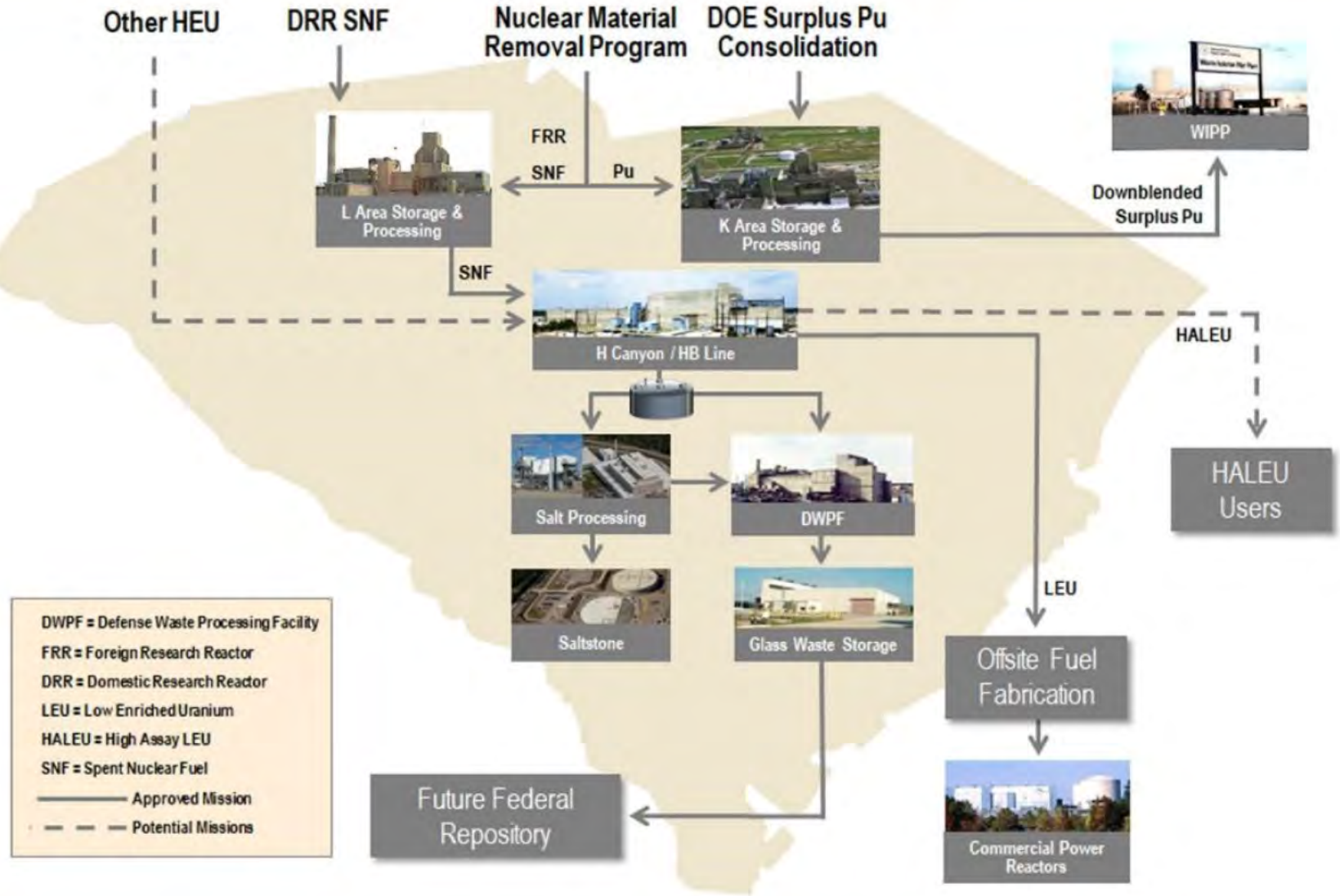
The Lab works for SRS plus non-SRS federal agencies, including the FBI and Department of Homeland Security, and in partnerships with industry and academia

SRNL-created technologies are licensed to private companies for manufacturing, providing taxpayers a second return on their investment

Research and development activities in SRNL

Program Specific Flow Paths

SRS Nuclear Materials Management



SRS Liquid Waste Program

Liquid Waste

43 tanks
35 Mgal
248 MCi

Salt waste

10.3 Mgal treated

← Salt Processing →

ARP

MCU

SWPF

(in Testing & Commissioning)

TCCR

Sludge waste
4.3 Mgal treated

DWPF

Radionuclides

Recycle

8 Tanks Cleaned and Closed

<1% radionuclides remain in tanks

Solid (not hazardous) waste

Spent Columns

ISS

Glass Waste Storage

Most radionuclides to glass

Saltstone Disposal Facility

<<1% radionuclides to saltstone

Legend:

ARP	Actinide Removal Process
BWRE	Bulk Waste Removal Efforts
DWPF	Defense Waste Processing Facility
ISS	Interim Safe Storage
MCU	Modular Caustic Side Solvent Extraction Unit
TCCR	Tank Closure Cesium Removal
SWPF	Salt Waste Processing Facility

Operational Goals

- ✓ Radionuclides to glass
- ✓ Chemicals to Saltstone
- ✓ Tanks cleaned and operationally closed

51 Tanks

- 8 grouted & operationally closed
- 1.2 million curies immobilized in grout
- 5 BWRE complete
- 65% empty or grouted (old style)
- 24% empty (new style)

Poured 4,188 cans of projected 8,121
61.4 million curies immobilized in glass

17.7 Mgal LLW dispositioned containing 736 kCi
(>35 Mgal grout)

2019-03-31