U.S. DEPARTMENT OF ENERGY | OFFICE OF ENVIRONMENTAL MANAGEMENT

Congressional Nuclear Cleanup Caucus
Savannah River Site

T. Zack Smith
Deputy Manager
Savannah River Operations Office

June 12, 2013

History of National Service

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

June 12, 1950 — Atomic Energy Commission asked E.I. Du Pont de Nemours & Company to undertake a new atomic project. Du Pont built the Savannah River Plant and operated it for nearly 40 years.

April 1, 1989 — Westinghouse Savannah River Company took over as SRS's prime contractor.

Sept. 17, 2002 — DOE selected Parsons to design, build, commission, and operate for one year the Salt Waste Processing Facility.

Aug. 1, 2008 — Savannah River Nuclear Solutions (SRNS) assumed responsibility for SRS management and operations.

June 1, 2009 — Savannah River Remediation (SRR) assumed responsibility for SRS Liquid Waste operations.

The Augusta Chronicle

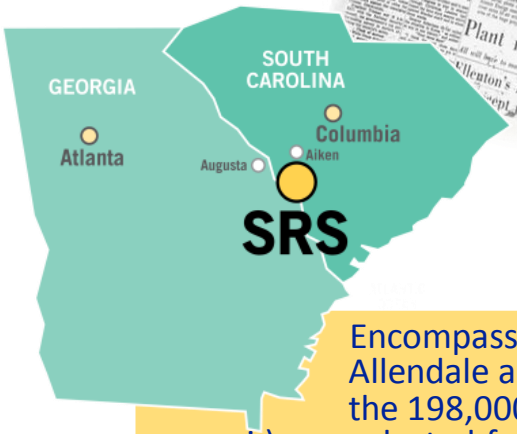
$260,000,000 H-bomb material facilities will be constructed in S. C. near Augusta

Allies facing 'new war'

Grim note is voiced by Gen. MacArthur

Aiken-Barnwell site is selected for plant

Plant means big boom for Augusta



Encompassing portions of Aiken, Allendale and Barnwell counties, the 198,000 acre tract (310 sq. mi.) was selected from over 100 sites:

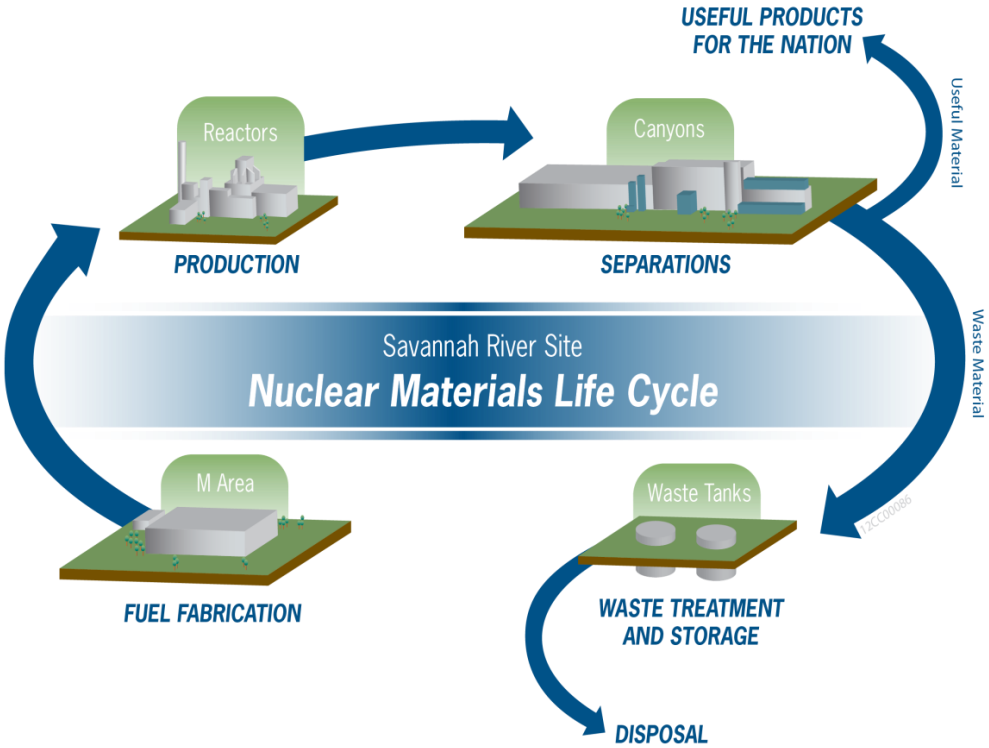
- very large dependable water source
- large land area for rapid construction
- good transportation
- moderate climate

SRS: The Entire Cycle

H Canyon and HB Line

- Production 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 from 1953-1988
- End of Cold War meant a whole different philosophy and approach to the nuclear arsenal

- Produce and recover nuclear materials
  - Tritium production
  - Plutonium 238 production
  - Plutonium 239 production
  - Special isotopes production
  - Uranium Recovery

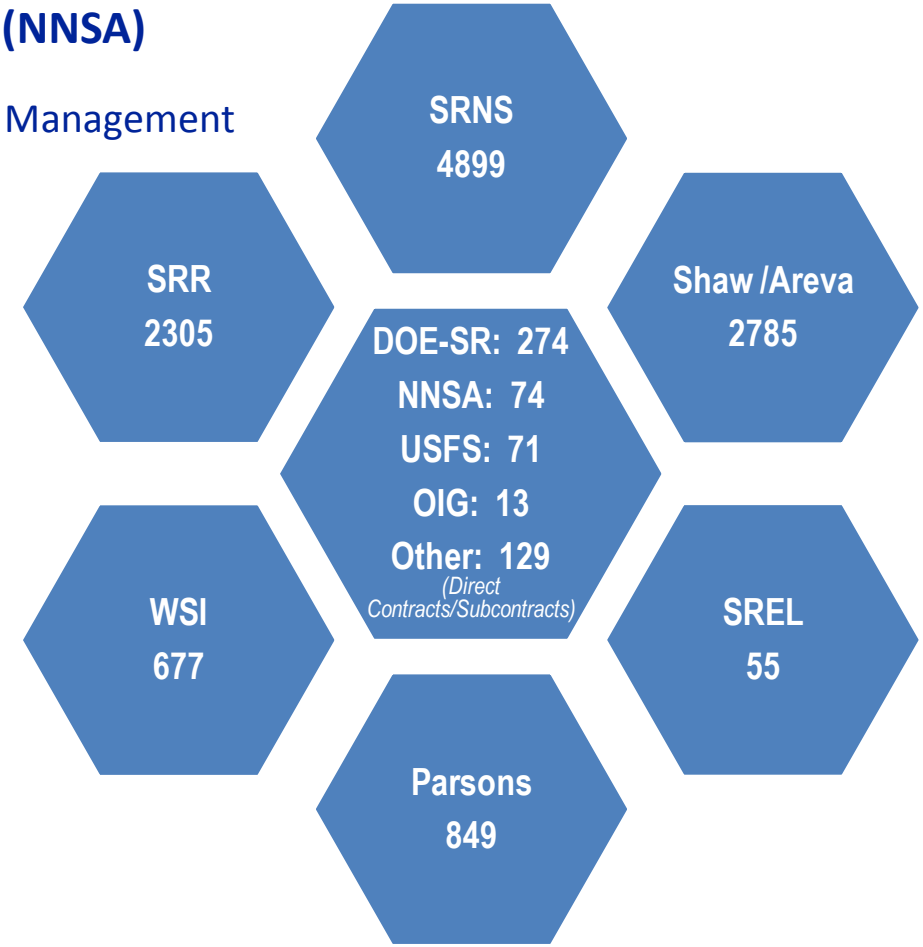


Integrated Workforce

- **U.S. Department of Energy -Savannah River Operations Office (DOE-SR)**
- **National Nuclear Security Administration (NNSA)**
  - Savannah River Field Office
  - Office of Site Engineering and Construction Management
- **U.S. Forest Service (USFS)**
- **Office of Inspector General (OIG)**

Contractors

- **Savannah River Nuclear Solutions (SRNS)**
  - Management & Operations
  - Savannah River National Laboratory
- **Savannah River Remediation (SRR)**
  - Liquid Waste Operations
- **Parsons (**Salt Waste Processing Facility)
- **Ameresco** (Biomass Cogeneration Plant)
- **WSI-SRS** (Security)
- **Shaw AREVA**:
  - Mixed Oxide Fuel Fabrication Facility (MOX)
- **University of Georgia**
  - Savannah River Ecology Laboratory (SREL)



SRS Workforce = 12, 131

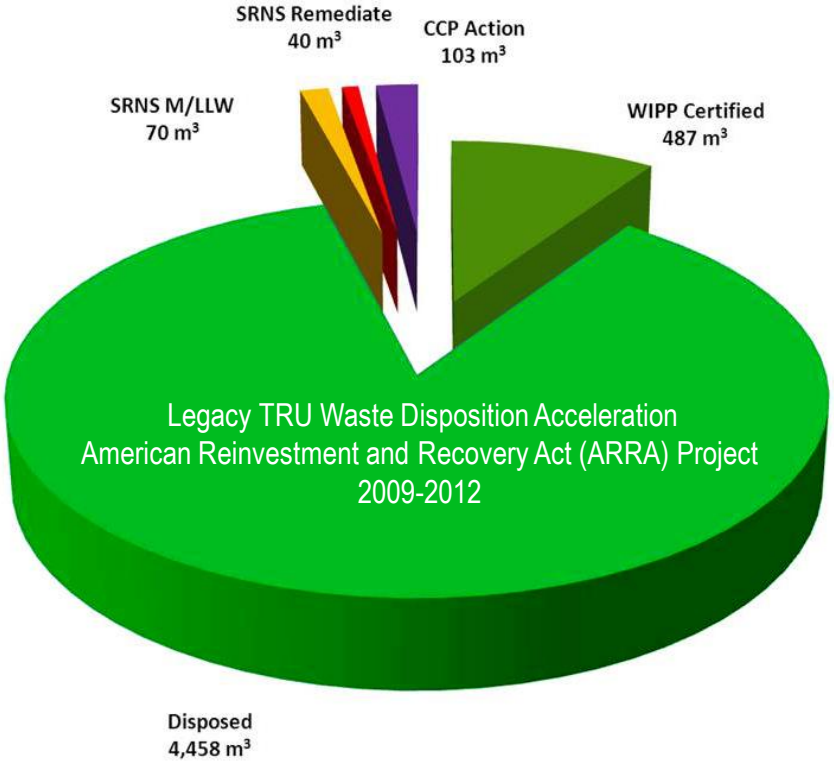
-March 2013

SRS Accomplishments

Risk Reduction Breakthroughs

Transuranic Waste Disposition

- Continue disposition of 12,000 cubic meters legacy transuranic (TRU) waste (1.2 million curies)
- Completed 1,536 TRU waste shipments to Waste Isolation Pilot Plant (WIPP), New Mexico



TRU Pad 1 Culvert Excavation

Pad 1 Drum Mining

TRUPACT III Containers Processed

Shipped to WIPP

SRS Accomplishments

Making Cleanup History

Tank Closures

- Closed 2 waste tanks under current regulatory regime in 2012, three months ahead of schedule Federal Facilities Agreement (FFA) commitment
  - Outstanding collaboration and integration with SC Department of Health and Environmental Control, Environmental Protection Agency Region IV, and Nuclear Regulatory Commission
  - Full compliance with FY 2005 NDAA Section 3116 process for Secretarial Waste Determinations
- Another 15 radioactive waste tanks in stages of being emptied and prepared for closure

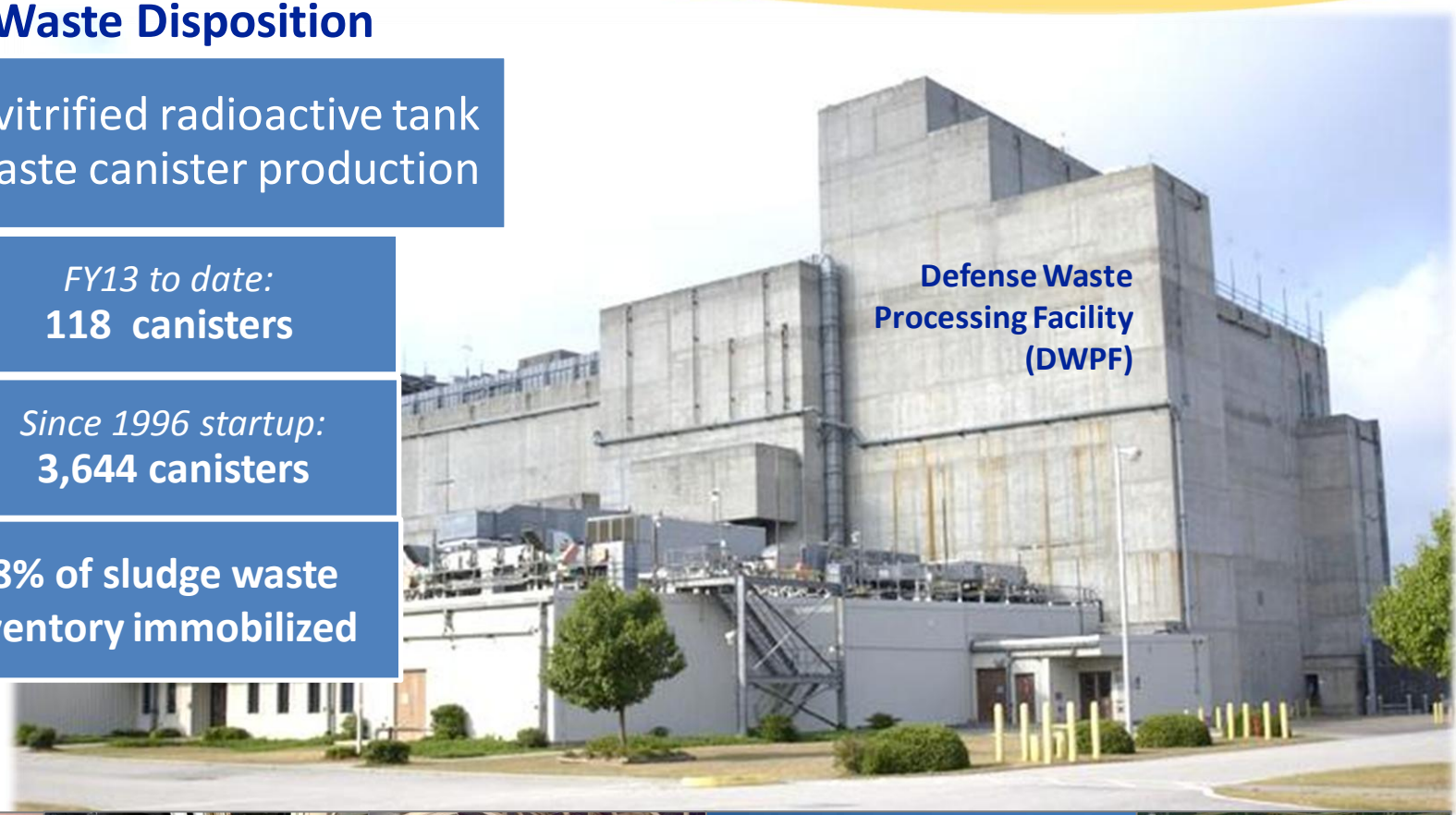
SRS Accomplishments

Consistent Record of Risk Reductions

Liquid Waste Disposition

DWPF vitrified radioactive tank waste canister production

- *FY13 to date:* **118 canisters**
- *Since 1996 startup:* **3,644 canisters**
- **48% of sludge waste inventory immobilized**



SRS Accomplishments

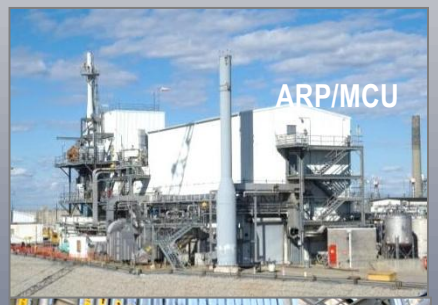
Critical Cleanup Components

Salt Waste Processing Facility

- Achieved 72% construction completion of Salt Waste Processing Facility (SWPF)

SWPF Stats	
Area	~140,000 ft^2
Basemat	8 ft. thick
Concrete	~40,000 yd^3
Pipe	~23 miles
Rebar	~4,600 tons
Actuated Valves	~1,000
Manual Valves	~3,000
Instruments	~1,500
Tanks	85
Pumps	116

Record production milestone 771,500 gallons salt waste solutions processed through **interim salt disposition facilities**: Actinide Removal Process (ARP)/ Modular Caustic Side Solvent Extraction Unit (MCU)



***3.5Mgal total since 2008 startup**

SRS Accomplishments

Environmental Cleanup Strategies at Work

Soil, Groundwater and Associated Facilities

- Completed deactivation and decommissioning of 284 Site facilities (industrial and nuclear)
  - This includes in-situ decommissioning of P&R Reactors
- Remediated and closed 399 of 515 waste units in compliance with FFA
- Met over 3,100 FFA & RCRA Permit commitments on or ahead of schedule

American Reinvestment and Recovery Act Footprint Reduction 2009-12

- Decommissioned 14 radioactively contaminated facilities (incl. 3 nuclear reactors) and 16 industrial facilities contaminated with hazardous materials
- Treated over 6.5 million gallons of radioactive and contaminated water
- Disposed of over 52,000 cubic yds. of debris and 90,000 cubic yds. of soils

SRS now 85% "clean"

The majority of SRS now meets industrial cleanup standards

SRS Accomplishments

Assets Applied and Results Delivered

Nuclear Materials Disposition

- Continued processing of vulnerable fuels through H-Canyon
- Completed last shipment of Low Enriched Uranium to Tennessee Valley Authority to meet fuel source contract commitments (enough to power all SC homes for 10 years)
- Shipped down-blended non-Moxable plutonium to WIPP
- Developed Deactivation Plan for 235-F (Pu-238 production facility)
- Contract signed for receipt and processing/uranium recovery of Canadian liquids

Fuel Cask Unloading in L Basin

HB-Line Glovebox

H Canyon / HB-Line

L Area

SRS Accomplishments

Nuclear Knowledge for the Nation

Clean Energy Systems

- Completed 1st year operations of Biomass Cogeneration Facility
  - Reducing greenhouse gas emissions by more than 100,000 tons a year
  - Cutting energy costs with steam from renewable energy sources

Savannah River National Laboratory

- SRNL technical expertise, innovative technologies and applications deployed throughout the world
  - Nuclear Fuels Cycle Research & Development
  - Space Exploration
  - Hydrogen Production & Storage
  - Radiochemical Processing
  - Environmental Risk Reduction
  - Tritium Technology
  - National Security Threat Reduction
  - 10 U.S. patents in 2013

SRNL™

SRS FY 14 Priorities to Planned Accomplishments

Waste Disposition and Risk Reduction

- Continue closure activities for Tanks 5 and 6
  - Grouting scheduled to start August 2013
- Continue construction of the Salt Waste Processing Facility
  - New Salt Waste Processing Facility Federal Project Director reported April 2013
- Continue disposition of Site's contact-handled legacy TRU waste (only 700 cubic meters remaining to be shipped)
- Process 1 million gallons of salt tank waste
- Produce 100 canisters at Defense Waste Processing Facility
- Meet all regulatory commitments and continue operations of remedial systems

FY 14 Priorities to Planned Accomplishments

Nuclear Materials Disposition

Storage Facilities

- Continue safe receipt and storage of Foreign Research Reactor and Domestic Research Reactor used (spent) nuclear fuels (L Area)
- Continue safe receipt and storage of non-pit plutonium materials (K Area)
- Continue 235-F Facility Risk Reduction scope to meet Implementation Plan for DNFSB Recommendation 2012-1

H-Canyon

- Complete processing of vulnerable used nuclear fuel
- Continue preparations for the receipt of Canadian liquid HEU
- Continue shipment of non-Moxable plutonium to WIPP
- Continue partnership with NNSA to use H-Canyon and HB-Line to provide 3.7 metric tons of plutonium oxide through 2017
- Continue receipt of Global Threat Reduction Initiative plutonium from foreign countries

SRS Budget Authority ($K)

Defense Appropriation	FY 2012 Current	FY 2014 Congressional Request
Nuclear Material Stabilization and Disposition	221,104	272,000
Spent Nuclear Fuel Stabilization and Disposition	41,112	44,684
Solid Waste Stabilization and Disposition	45,276	60,369
Radioactive Liquid Tank Waste Stabilization and Disposition	619,675	552,560
Salt Waste Processing Facility	204,377	92,000
Glass Waste Storage Project	3,500	0
Safeguards and Security	129,140	121,196
Soil and Water Remediation	43,154	55,438
Community and Regulatory Support	9,584	11,210
Total, Savannah River Site	1,316,922	1,209,457

A Focused Savannah River Site Team

✓ We Deliver

- Work collaboratively with regulators to meet commitments
- Execute all work safely
  - Safety and Security begin with me.
- Make significant risk reductions
- Cut lifecycle costs
- SRS is investment worthy

Superior Performance * **R**aising the Bar Continually * **S**ecuring the Future

Savannah River NUCLEAR SOLUTIONS℠

Savannah River Nuclear Solutions

Savannah River Site

Dwayne Wilson
President & CEO

Dr. Terry Michalske
SRNS Executive Vice President & Director
Savannah River National Laboratory

June 12, 2013

Savannah River Nuclear Solutions

- SRNS is the Management and Operating contractor for DOE's Savannah River Site in Aiken, SC
- The primary initiatives for SRNS are environmental stewardship, national security and clean energy
  - Provide nuclear materials management to support national defense and U.S. nuclear nonproliferation efforts
  - Support the National Nuclear Security Administration (NNSA) by extracting tritium and delivering products to military and weapons design agencies
  - Develop and deploy environmental cleanup technologies
  - Conduct technology Research and Development on national energy independence initiatives
  - Operate the Savannah River National Laboratory

Safety Performance

- Achieving world class safety is our goal
- SRNS honored by South Carolina Manufacturers Alliance with two 2012 Exemplary Plant Safety awards
- Received two 2013 Occupational Excellence Achievement Awards from the National Safety Council
- Surpassed 16.5 million safe hours without lost workday case
- Branding campaign emphasizes Safety and Security
- “See Something Unsafe, Say Something for Safety and Security”

SRNS Accomplishments

FY 12-13 Accomplishment Highlights

- Excellent safety performance
- Commenced H Canyon/HB Line production campaign for initial MOX feed stock
- Declared operational readiness and began dissolving Sodium Reactor Experiment used nuclear fuel
- Completed Recovery Act Projects
  - Achieved 85% footprint reduction
  - Readied 5,000 cubic meters of legacy transuranic waste for final disposition
- SRNL support for Hanford Tank Waste System Full Scale Vessel Testing
- Key roles in removal of proliferable material from Sweden and the Ukraine as part of the U.S. Global Threat Reduction Initiative

HB-Line at SRS

SRNS FY 14 Goals

- Maintain world class safety performance
- Complete the processing of Sodium Reactor Experiment fuel
- Begin reducing residual plutonium-238 contamination in the F Area Materials Storage Facility (235-F)
- Continue processing of non-pit plutonium to produce plutonium oxide suitable for use in MOX
- Make 12 shipments of non-MOXable plutonium to the Waste Isolation Pilot Plant
- Complete legacy TRUPACT-III and TRUPACT-II shipments of transuranic waste
- Meet all enforceable RCRA/Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) commitments/milestones

H Canyon at SRS

TRUPACT III leaves SRS on its way to WIPP

SRNL's Role in Environmental Stewardship

- Science and technology to:
  - Reduce risk
  - Reduce cost
  - Shorten cleanup schedule
- Over $2B in savings to EM program in five years
- EM national program support
  - Crosscutting technology for multiple site cleanup projects
  - Advanced technical solutions for specific site needs
  - Contractor support for cleanup

High Level Waste Disposition

Outfall Treatment Cell

Savannah River National Laboratory™
OPERATED BY SAVANNAH RIVER NUCLEAR SOLUTIONS

SRNL Highlights – At SRS

- Technical support for waste processing
- Tank closure
  - characterization for regulatory concurrence
  - specialized grout formulation
  - performance assessment modeling
- Next generation solvent for MCU and Salt Waste Processing Facility
  - Allows two year schedule acceleration
- In situ decommissioning of P and R reactors at SRS – saving over $400M

Grout pour during decommissioning

Studying Next Generation Chemistry

SRNL Highlights – DOE Complex

- Refining waste qualification for Hanford High Level Waste process
- Evaluating grout formulation for potential alternative Low-Activity Waste treatment at Hanford
- Full-scale vessel tests for the Hanford Waste Treatment Plant (with PNNL)
- Identified disposal options for transuranic waste and treatment and control of contaminated groundwater at Los Alamos
- Developing strategies for treatment of solvent-contaminated groundwater plumes at Paducah
- Strategy to stabilize Separations Processing Research Unit at D&D Site

Full Scale Test Vessel

Stormwater Management during D&D

Savannah River NUCLEAR SOLUTIONS™

Delivering Results

- World-class safety and security culture to support DOE missions
- Safeguarding our nation's nuclear material interests
- Providing intellectual and program leadership focused on defining and solving complex national problems
- Strength in innovation and results

Savannah River Remediation
A URS COMPANY TEAMED
WITH BECHTEL | CH2M HILL | B&W | AREVA

Savannah River Remediation

Savannah River Site

L. David Olson
President and Project Manager

June 12, 2013

Perspective of our Team

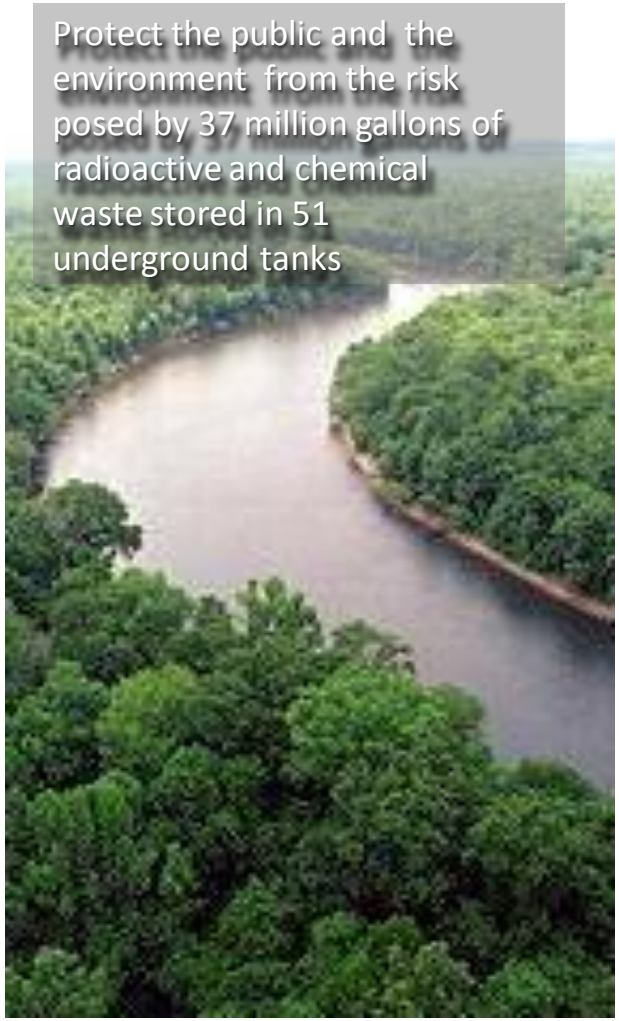
SRR Parent Companies → URS, BECHTEL, CH2MHILL, B&W technical services group

SRR Significant Subcontractors → AREVA, ENERGYSOLUTIONS, URS Professional Solutions

- Savannah River Remediation 6-year base contract began on July 1, 2009; plus 2 year option available
- Workforce of ~ 2,000 employees

Successful Liquid Waste disposition is possible by the partnership established between DOE-SR and SRR Leaders

SRS Tank Waste Operations Mission



Our First Focus: Safety

Industrial Safety

Radiological Safety

Environmental Safety

Chemical Safety

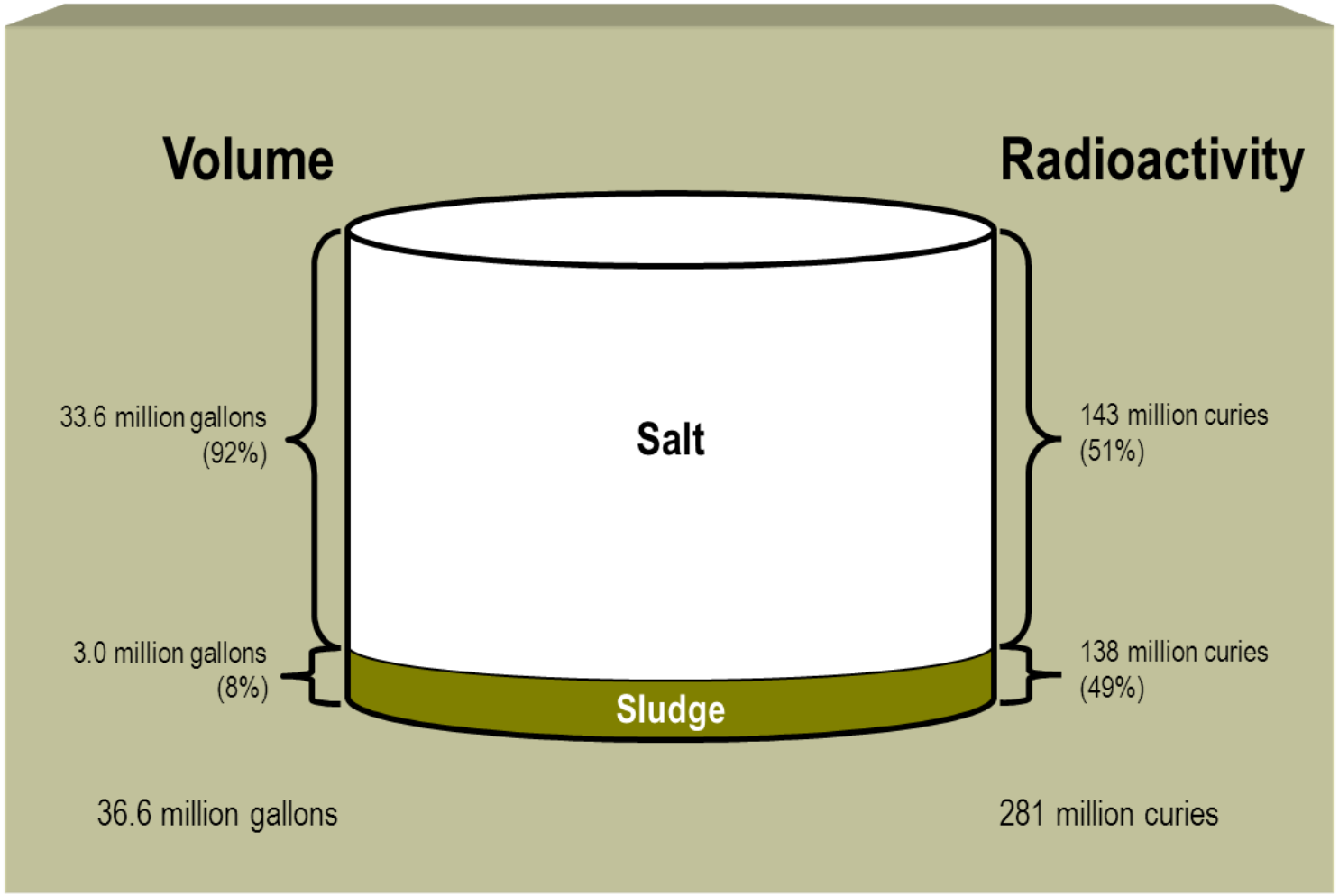
Safety: Perspective/Awards

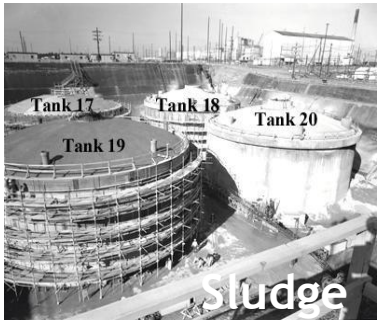
- Construction forces (legacy and current) accumulated over 25 million safe hours
- Recipient of National and State Awards in recognition of safety performance (National Safety Council Occupational Excellence Achievement Awards and Million Hour Awards, South Carolina Chamber of Commerce and South Carolina Department of Labor, Licensing and Regulation Awards)
- Record-setting performance in Calendar Year 2012 for Total Recordable Case rate (47% lower than previous best).

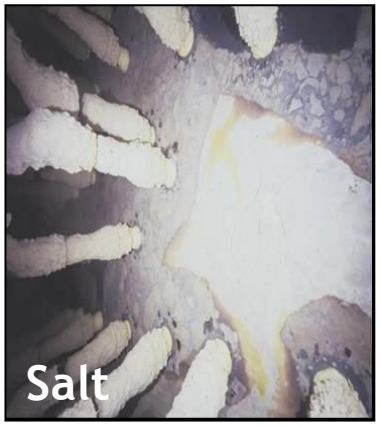
2012 URS Healthy Project Award

Given to SRR for excellence in providing a wide-ranging wellness program for workers

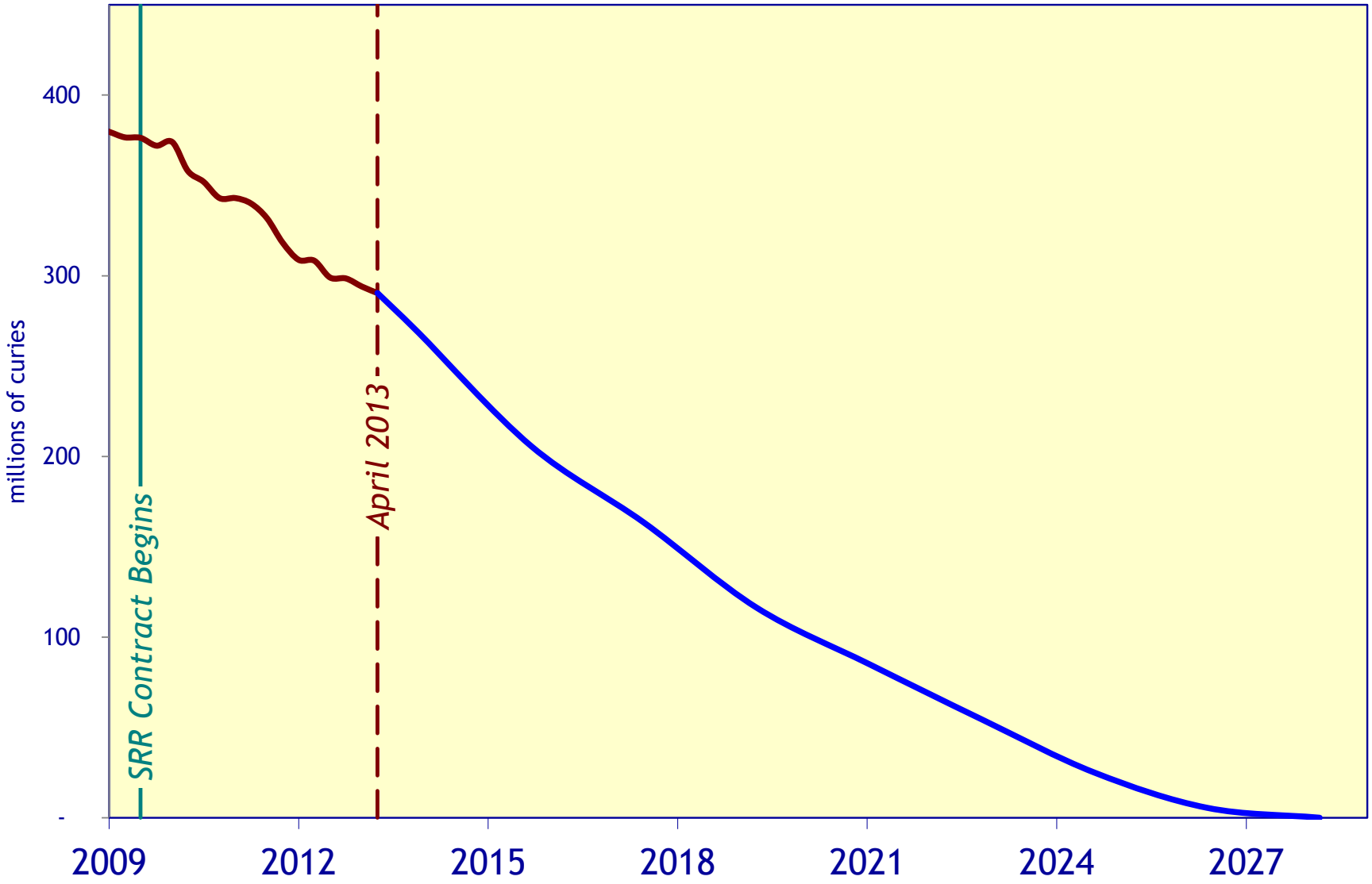
Waste in the SRS Tanks







Removing Radioactivity from the SRS Waste Tanks



SRS Liquid Waste Disposition Progress

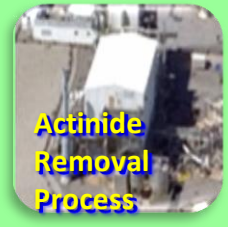
Waste Storage/Retrieval

Sludge Processing

Tank Farms

Salt Processing

Waste Treatment



Salt Waste Processing Facility — *future*

Disposal

High Level Waste Canisters

Final Disposition

Low Level Waste

Saltstone Production Facility

Closure

Grouted Waste Tank

Accomplishments Through May 2013

> 3,600 of 7,580 DWPF Canisters Produced

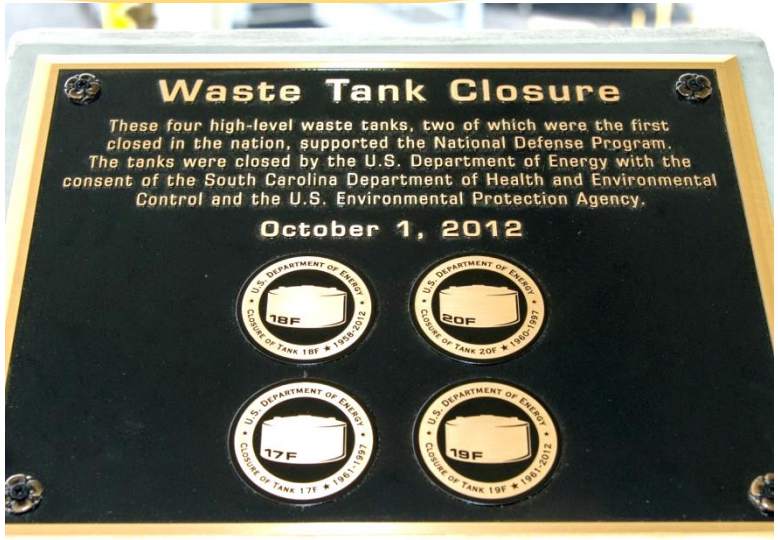
> 6 Million Gallons of 102
Million Gallons of Salt Solution Processed

> 12 of 24 Old-Style HLW Tanks Bulk
Waste Removal Effort Complete

4 of 24 Old-Style HLW Tanks Operationally Closed

FY13 Accomplishments

- Tanks 18 and 19 stabilized with grout; the first at SRS under new regulatory guidelines
- Bulk Waste retrieval continued in 2 tanks and 2 additional tanks were prepared for closure
- Set record production rates in:
  - Defense Waste Processing Facility (DWPF), turning high-level waste into glass
  - Modular Caustic Side Solvent Extraction Unit (MCU), treating salt waste
  - Saltstone (SPF), disposing of decontaminated salt solution in Saltstone Disposal Unit (SDU) #2; SDUs 3 and 5 construction almost complete



Preliminary FY14 Goals

- Continue bulk waste retrieval from 2 additional tanks
- Complete closure of Tanks 5 and 6
- Operate production plants to treat waste:
  - Convert sludge into 100 canisters of glass at DWPF
  - Decontaminate 1 million gallons of salt waste at MCU
  - Dispose of 2 million gallons of decontaminated salt solution at SPF

Work outside a waste tank

Robots help remove waste from tanks

Workers monitor processes

Work inside DWPF

Summary

- The SRS primary focus remains on working safely
  - Protect workers, the public, and the environment
- SRS embraces common goals and values, for the tank waste program, with our external community that emphasize environmental risk reduction
- SRS is committed to deploying transformational technologies that will accelerate liquid waste mission completion
  - Continue to reduce risk with tank waste removal and meeting Federal Facility Agreement commitments
- SRS will continue to be a good steward of taxpayers' money
  - Accelerating the cleanup saves money long-term
  - Technology is transferred to other sites, bringing more cost-savings

PARSONS

Parsons
Savannah River Site

Lou Jackson
Senior Vice President

June 12, 2013

PARSONS

Salt Waste Processing Facility

- Parsons is the contractor for the Salt Waste Processing Facility (SWPF) project *[design, construct, commission and operate for one year]*
- Parsons top priority is to design, construction, commission and operate SWPF in a manner that protects the worker, the public, and the environment
- SWPF will:
  - Process ~ 100 million gallons of radioactive salt waste solutions, reducing a significant hazard to the public and environment
  - Support DOE's highest SRS priority to close aging tank farms, reduce risk and complete the DOE-EM cleanup mission
  - Reduce lifecycle costs, saving taxpayers' dollars, while cleaning up the environment

SWPF Construction Site – May 2013

PARSONS

SWPF Safety Accomplishments

- Earned the South Carolina Department of Labor, Licensing and Regulations Safety and Health Achievement Recognition Program (SHARP) award for both the Parsons Technology Center and Aiken Project Office in 2012 (State version of OSHA VPP for non-manufacturing facilities)
- 2012 field activities had the lowest injury rate and lowest cost per injury since construction of SWPF began
- Site is heavy construction with standard construction safety issues. Transitioned from building erection (steel and concrete) activities as the predominant hazards to equipment installation (piping and instrumentation). Electrical hazards anticipated to increase later this year as permanent power systems begin to become energized. No radiological or bulk chemicals hazards onsite at this time.
- Continue to stress supervisor and safety professional presence in the field - 1850 field inspection reports covering over 250K safety observation points with greater than 99.2% safe conditions or behaviors noted in 2012
- Construction site accepted into the DOE Voluntary Protection Program and awarded MERIT status in (May 2013)

PARSONS

Significant 2012 Milestone

Installation of Large ASME Vessels

PARSONS

Significant 2013 Milestone

Installation of Central Processing Area Roof Membrane

PARSONS

72% Construction Complete

PARSONS

Accomplishments and Goals

Fiscal Year 2013 Accomplishments

- Construction of all facilities' siding, decking and roofing completed
- Commence hydrostatic testing of installed piping systems
- Diluted solvent solution (DSS) line completed
- Diesel generator structure and equipment installed
- North-south electrical substations and safety disconnect switch completed
- All current DNFSB issues successfully closed or pending closure

Fiscal Year 2014 Goals

- Finalize plant process control system programming
- Introduce permanent power to the plant site
- Complete waste transfer line
- Complete installation of motor control centers
- Complete installation of instrument control panels
- Complete installation of CPA 100' North Labyrinths piping
- Complete Chiller Facility

SWPF Technology Innovation

- Testing Program provides high degree of confidence in new technologies' ability to meet and exceed performance requirements
- Next Generation Solvent (NGS) improves Cesium extraction and facilitates higher waste throughput (~200% increase) to shorten lifecycle time for tank waste removal and system closure.
- Testing in progress

PARSONS

SWPF Summary

- Parsons' primary focus is on safety, and we are committed to continual improvement of safety performance
- Mature and well-implemented QA Program with no significant quality issues or concerns
- Working to finalize remaining contract elements through Testing and Commissioning and the first year of Operations
- Start-up of SWPF will dramatically reduce the overall environmental risk at SRS
- Implementation of new technologies can significantly reduce overall life-cycle costs for the liquid waste system