Saltstone Disposal Units

Carl Lanigan
Federal Project Director
DOE-Savannah River

Presented to the Waste Management Committee
October 6, 2015
To satisfy 2015 Waste Management Committee Work Plan by:

- Providing a description of the Saltstone Disposal Units (SDUs)
- Providing an update on Saltstone Disposal Unit status
Acronyms

- AE  Acquisition Executive
- AWWA American Water Works Association
- BOP  Balance of Plant
- DOE [U.S.] Department of Energy
- DSS  Decontaminated Salt Solution
- FPD  Federal Project Director
- LLW  Low-level Waste
- LW  Liquid Waste
- PA  Performance Assessment
- SCDHEC  South Carolina Department of Health and Environmental Control
- SDU  Saltstone Disposal Unit
- SRR  Savannah River Remediation
- SRS  Savannah River Site
- SWPF  Salt Waste Processing Facility
- VES  Value Engineering Study
- HDPE  High Density Polyethylene
DOE-SR Liquid Waste System

SRR Liquid Waste Program (with current status)

Legend:
- ARP: Actinide Removal Process
- BWRE: Bulk Waste Removal Efforts
- DWPF: Defense Waste Processing Facility
- MCU: Modular Caustic Side Solvent Extraction Unit
- SWPF: Salt Waste Processing Facility

Operational Goals:
- Radionuclides to glass
- Chemicals to Saltstone
- Tanks cleaned and operationally closed

Legacy Liquid Waste

43 Tanks

Salt waste

Sludge waste

Tanks Cleaned and Closed

<1% radionuclides remain in tanks

6 Tanks closed
2 Tanks heel removal complete

Glass Waste Storage

 ARP

Radionuclides

Salt Processing

Saltstone Disposal Facility

Solid (not hazardous) waste

<<1% radionuclides to saltstone

DWPF

Most radionuclides to glass

SWPF (under construction)
Saltstone Production Facility (SPF)

- SPF takes decontaminated salt solution from either the Actinide Removal Process / Modular Caustic Unit or Salt Waste Processing Facility, combines it with a cement mixture to create a grout that, when set, becomes a stable waste form for permanent disposal of this low level waste.
Project Background and Mission

Background

• Ninety nine percent of treated tank farm waste will be in the form of low level salt waste

• The disposition of this low level waste is fundamental to emptying liquid waste tanks at the Savannah River Site

Mission

• To construct Saltstone Disposal Units on time and with sufficient capacity to continue uninterrupted treatment and disposal of low level salt waste
Evolution of the SDU Design: Rectangular Vaults

- Vault 1 and Vault 4 are a rectangular reinforced cast in place concrete structures constructed between 1986 and 1988
- Vault 1 is 600 ft. long, 100 ft. wide and 27 ft. high with six 100 x 100 ft. cells
- Vault 2 is of similar design with roughly twice the capacity, but includes a drainage system to return flush water back to Saltstone Production Facility
Evolution of the SDU Design: Circular Tanks

• DOE conducted studies in early 2000 to enhance safety and evaluate strategies to reduce the cost and complexity of its waste disposal operations

• These studies concluded that commercial drinking/waste water storage tanks could be adapted for saltstone disposition
  o Successful track record
  o Designed to withstand large hydrostatic pressures
Evolution of the SDU Design: Circular Tanks

SDUs 2, 3, & 5 are pairs of cylindrical disposal cells, 150 ft. in diameter, 22 ft. high with a capacity of 2.9 million gallons

- Water tight
- Geo-synthetic clay liner
- Exterior HDPE liner
- Leak detection system on SDU 3A
- Grout level markers
- Drainwater collection
A 2011 study determined that economies of scale could be achieved if a significantly larger, or ‘Mega’ disposal cell (30 million gallons) were constructed. 'Old' Concept: 72 disposal cells. New Concept: 7 'Mega' Cells. Projected Lifecycle Savings ~ $300M.
Evolution of the SDU Design: SDU 6

- SDU 6 will be 375 ft. in diameter and 43 ft. high with a capacity of 30 million gallons based upon the Syracuse, NY Westcott Reservoir design.
- This is a robust reinforced concrete design using both vertical and horizontal post tensioning for added strength and durability.
Balance of Plant

- Remote Cameras
- Passive Ventilation
- Drainwater Return System
- Thermocouple Trees
- Grout Line
- Power
SDU 6 - Current Status

Disposal cell construction completed September 2015
Saltstone Disposal Unit 6 - Current Status

Balance of Plant
SDU 6 - Current Status

Balance of Plant

- Fabricated 4 thermocouple tree assemblies with Junction Boxes – 100% (4 of 4)
- Well development – Draw down test complete
- Fabricated tank top supports – 100% (202 of 202)
- Fabricated grout pipe – 100% (1260 of 1260 LF)
- Fabricated drain water pipe – 47%
- Fabricated utility bridge – 52%
- Drain well screens – 63% (15 of 24 circumferential welds complete)
Final Closure

• When all liquid waste has been treated and saltstone operations have completed, all disposal cells will be covered with a final closure cap to prevent water intrusion.

• Ground water monitoring wells have been established to detect contamination with additional wells planned as more SDUs are built.
• The Saltstone Disposal Facility is the final disposal location for decontaminated salt solution fixed in a saltstone grout matrix
• The Saltstone Disposal Units have gone through many design evolutions to provide the safest containment structure with the most cost benefit to the taxpayer
• Saltstone Disposal Unit 6 construction is over 70% complete
• Once all salt waste is treated, a final closure cap will cover the Saltstone Disposal Units with ground water wells used to monitor its performance post active operations