Saltstone Disposal Units

Carl Lanigan
Federal Project Director
DOE-Savannah River

Presented to the Waste Management Committee
October 6, 2015

Purpose

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

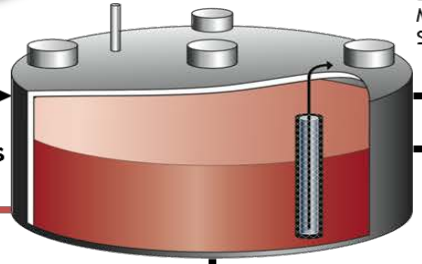
- AE Acquisition Executive
- AWWA American Water Works Association
- BOP Balance of Plant
- DOE [U.S.] Department of Energy
- DSS Decontaminated Salt Solution
- FPD Federal Project Director
- LLW Low-level Waste
- LW Liquid Waste
- PA Performance Assessment
- SCDHEC South Carolina Department of Health 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)

Legacy Liquid Waste

43 Tanks



Sludge waste

Salt waste

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

<1% radionuclides remain in tanks

6 Tanks closed
2 Tanks heel removal complete

Salt Processing

SWPF (under construction)

Radionuclides

Solid (not hazardous) waste

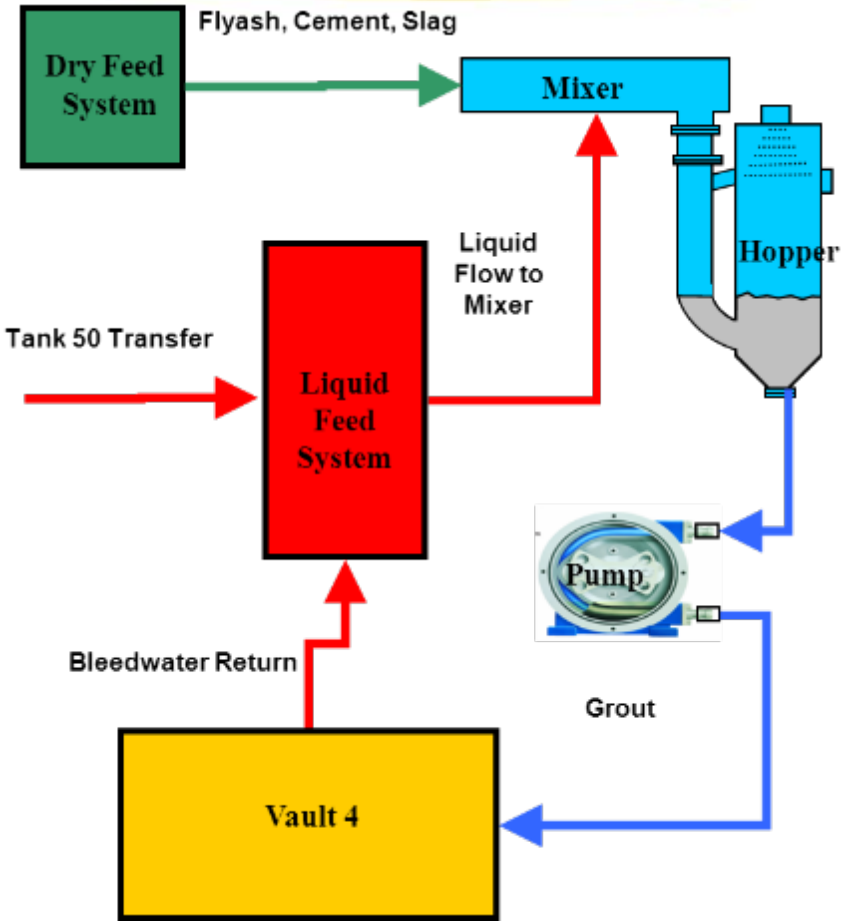
Most radionuclides to glass

<<1% radionuclides to saltstone

Saltstone Production Facility

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
  - Successful track record
  - 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

Evolution of the SDU Design: "Mega" Tank

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

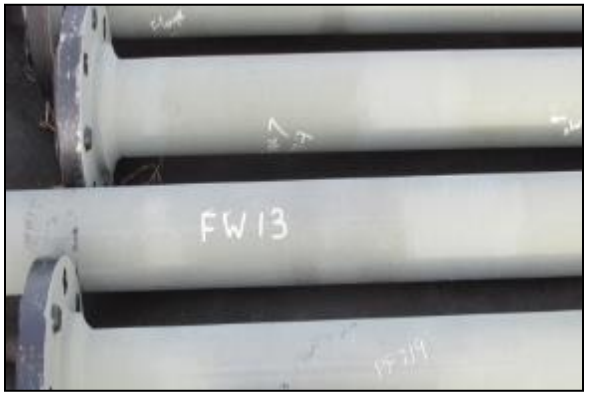
Balance of Plant

- Remote Cameras
- Passive Ventilation
- Drainwater Return System
- Thermocouple Trees
- Grout Line
- Power

SDU 6 - Current Status

Saltstone Disposal Unit 6 - Current Status

Balance of Plant



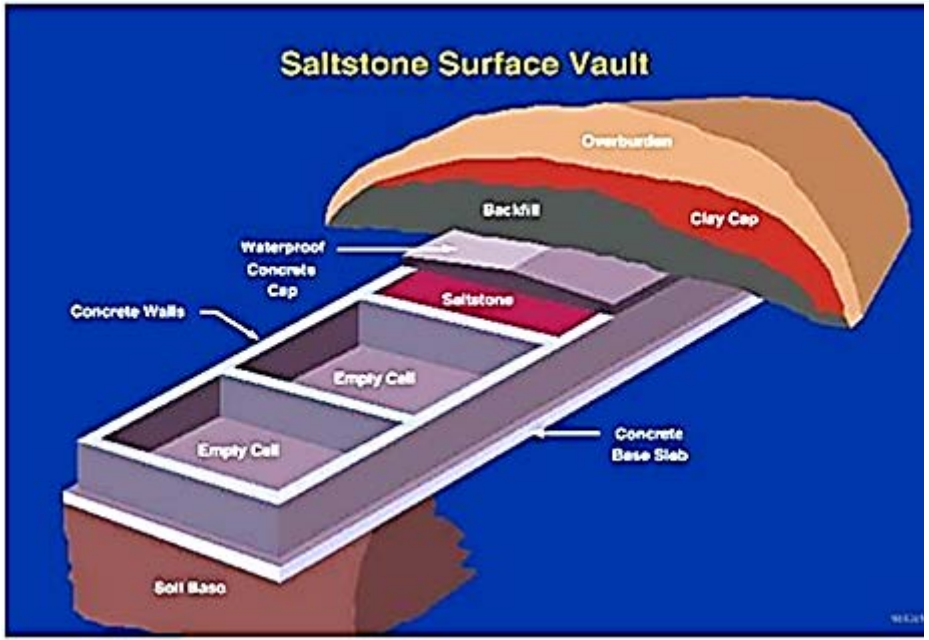
SDU 6 - Current Status

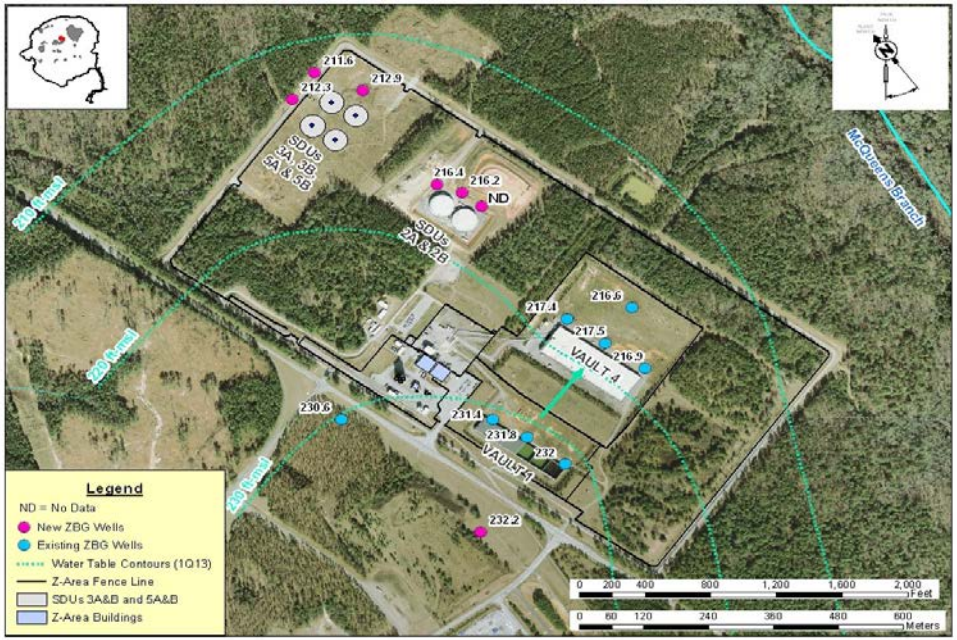
Balance of Plant

- 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





Summary

- 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