Saltstone Disposal Units

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Purpose

To satisfy Waste Management Committee Work Plan by:

• Providing a description of the Saltstone Disposal Units (SDUs)
• Providing an update on SDU 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
DOE-SR Liquid Waste System

Legend:
- ARP: Actinide Removal Process
- DWPF: Defense Waste Processing Facility
- MCU: Modular Caustic Side Solvent Extraction Unit
- SCIX: Small Column Ion Exchange
- SWPF: Salt Waste Processing Facility

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

Legacy Liquid Waste

47 tanks, 37 Mgal

- 47 tanks, 37 Mgal
- Tanks cleaned and closed
- <1% radionuclides remain in tanks

- >98% radionuclides to glass
- Radionuclides to glass
- Saltstone Disposal Facility

- Inert chemicals
- Chemicals to Saltstone

- Salt waste
- Interim Salt Processing

- <1% radionuclides to saltstone
- SWPF (under construction)
- SCIX (future)
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.
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 SDUs 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 100X100 ft. cells
- Vault 2 is of similar design with roughly twice the capacity but includes a drainage system to return flush water back to SPF
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
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

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

• Vault 1 - Three cells filled with saltstone and capped with a 6 in. clean concrete cap
• Vault 4 - Cells are in various stages of fill and capping based upon operational necessity
• SDU 2 - Almost full
• SDU 3&5 - Ready for operation
• SDU 6 - Disposal cell construction has commenced
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 (SDF) is the final disposal location for decontaminated salt solution fixed in a saltstone grout matrix.

- The SDUs have gone through many design evolutions to provide the safest containment structure with the most cost benefit to the tax payer.

- The SDF has been operating since the early nineties with additional disposal cells under construction to assure uninterrupted disposition saltstone grout.

- Once all salt waste is treated, a final closure cap will cover the SDF with ground water wells used to monitor its performance post active operations.