Defense Waste Processing Facility Update

Savannah River Remediation

Savannah River Site Citizens Advisory Board
SRR-DWP-2015-00005

April 2015
Liquid Waste Operations Overview
SRS Liquid Waste Program

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 closed

Legacy Liquid Waste
- 45 tanks, 37 Mgal
- 280 MCi

Tanks Cleaned and Closed
- <1% radionuclides remain in tanks
- 51 Tanks
  - 6 grouted & closed
  - 2 heel removal complete
  - 6 BWRE complete
  - 70% empty (old style)
  - 14% empty (new style)

Salt waste 7.0 Mgal treated
Salt Processing

Saltstone Disposal Facility
- 16 Mgal grout dispositioned containing 414 kCi

<<1% radionuclides to saltstone

Glass Waste Storage
- Poured over 3900 cans of projected 8,582,53 million curies immobilized in glass
- >99% radionuclides to glass

Operational Goals:

We do the right thing.
An Integrated System
Waste Processing

Removing Sludge Waste from Tanks

Water and Liquid Waste

We do the right thing.

→ Immobilize Waste for Disposal

Defense Waste Processing Facility

- Very little of waste volume goes here, but almost all curies dispositioned at DWPF
- World’s largest vitrification plant
- Over 3,900 canisters filled. DWPF has poured since 1996 more than 13.5 million pounds of glassified waste
- Entire 37 million gallons of waste in the tanks awaiting disposition has about 295 million curies of radioactivity

Interim Storage of Canisters

- DWPF Glass Waste Storage Buildings
  - GWSB 1 contains 2,244 canisters
  - GWSB 2 currently contains over 1,250 canisters (capacity for 2,340)
- Underground reinforced concrete vaults
- Seismically qualified
- Designed for safe interim storage
Vitrification Process

Tank Farm

Glass Waste Storage

DWPF Chemical Processing

MFT
SME
SRAT
LPPP Sludge Tank

Chemical Addition

Hg

Canister Cleaning

Glass Melting & Canister Closure

Welding

Transporter
Facility currently in planned outage to upgrade infrastructure
On schedule to produce desired number of canisters this year
Canister Production Rate Based on System Plan 19
- FY15 156
- FY16 136 with 4 month melter outage
- FY17 168
- FY18 160 with 4 month outage for transition to SWPF operation
- FY19 276
- Beyond 276

Canisters Produced To Date (March 12, 2015) 3954
Estimated Total Canister Production 8582
Canisters Produced (% of Total) 46%
Canister Production Exceeds Canister Storage in FY19
GWSB #1 Interim Canister Storage – Double Stack
Supplemental Canister Storage Options

- **No 3rd Glass Waste Storage Building (GWSB) (~ $130 million)**
  - Large upfront cost & future D&D cost
- **Glass Waste Storage Project (GWSP) Being Developed to Provide**
  - Supplemental Canister Storage in above ground storage containers similar to commercial SNF storage
  - Loading Station for SCT transfer of canister to storage containers
  - Storage pad for storage containers
  - Storage containers procured to support canister production
  - Allow future construction of canister transportation capabilities
- **Interim Canister Storage Required Until GWSP Complete**
  - With Double Stack of Canisters in GWSB #1
    - GWSB#1 Capacity Increased from 2,254 to 4,508
    - GWSBs Capacity Increased to 6,848 providing space through FY 26
    - Still need space for 1,734 more canisters
Interim Canister Storage - Double Stack Concept for GWSB1

- Two canisters per location (vs. one can per location)
- Lower canister on support on vault floor (vs. cross bar support 3’ off floor)
- Upper canister placed directly on top of lower canister
- Upper canister extends into operating deck floor, but remains below grade
- Shield plug redesigned for equivalent radiological protection
• Inside vault looking across rows of canister supports

• Inside canister storage location
  • Minimum Opening in floor is 27 inch ID
  • Cross Bar Assembly is 1 ½ inch x 3 inch galvanized carbon steel bars
  • Cross Bar Assembly~ 18 ft down with 30 inch OD
  • 2 sets of guides (3 tabs each) to guide canisters
  • Bottom guides sit 5 inches above cross bar assembly
Proposed Modifications

- Single Stack (Current)
  - Plug Replaced
  - Crossbar Removed

- Double Stack (Modified)
  - Tapered Plug
  - Floor Plate Added
Technical Evaluation Summary

• Heat Model supports canisters produced to date and future sludge batch forecast
• Seismic/Structural calculations support adequate margin for static and seismic performance category and canister integrity
• Cutting tool technology exists: prototype and mockup in progress
• Radiological model/calculations supports canisters produced to date and future sludge batches
  – Design basis < 5 mrem/hr
  – Implemented with new plug design and canister tracking
• Radiological calculations confirm dose rates during modification w/o completely emptying vault
• **Major Modification Evaluation Approved – Not a major modification**
  – No new SSCs required and modifications are not complex
  – Does not introduce new hazards or change existing Hazard Category (HC 2)
  – DSA change to update configuration change

• **Safety Basis Strategy Approved**
  – Canister Double Stack activities will not alter the Hazard Category
  – Increase in MAR evaluated and preliminary consequences do not exceed consequences reported in DWPF FSAR for NPH events
  – Modifications to SS vault and canister support designed to PC-2 and meet safety function
  – Anticipate negative USQE for new plug
• **PCHA Approved**
  – Identified no new events that could exceed the EGs for Offsite, CW, or FW
    • No new SC or SS controls
  – No new DID/ITS controls or SAC identified
  – Events credit Hazard Abatement controls

• **Modified Fire Hazard Analysis Approved**
  – Identified additional controls
    • Building controls to mitigate fire risk
    • Cutting Tool Controls to mitigate fire risk
    • Fire Department Considerations
  – Requires Equivalency for GWSBs to be revised
Canister Storage Summary

- Technical Evaluation Supports Double Stacking GWSB1
- Use Interim Canister Storage – Double Stack to Bridge Canister Storage Gap
- Increases GWSB1 capacity to 4508 canisters
- Provides adequate storage through FY26
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<td>REM</td>
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