Savannah River Remediation
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Defense Waste Processing Facility Update

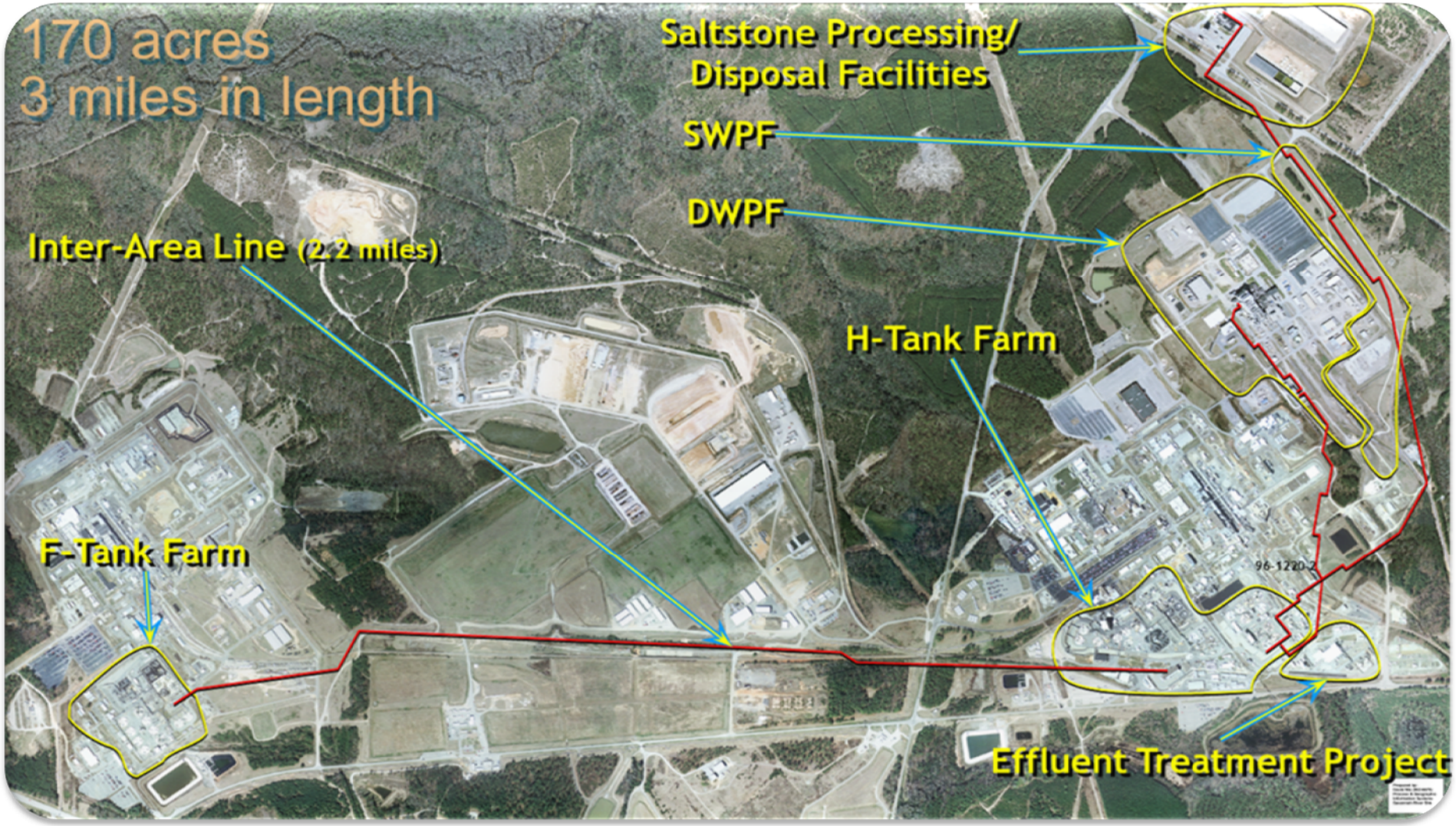
Savannah River Remediation

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

April 2015

Liquid Waste Operations Overview

We do the right thing.



SRS Liquid Waste Program

We do the right thing.

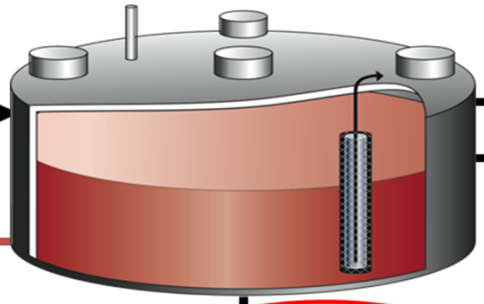
Legend:

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



Salt waste
7.0 Mgal
treated

Salt Processing

SWPF
(under construction)

Sludge waste
3.7 Mgal
treated

<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)

Radionuclides

>99% radionuclides to glass

Poured over 3900 cans of projected 8,582
53 million curies immobilized in glass

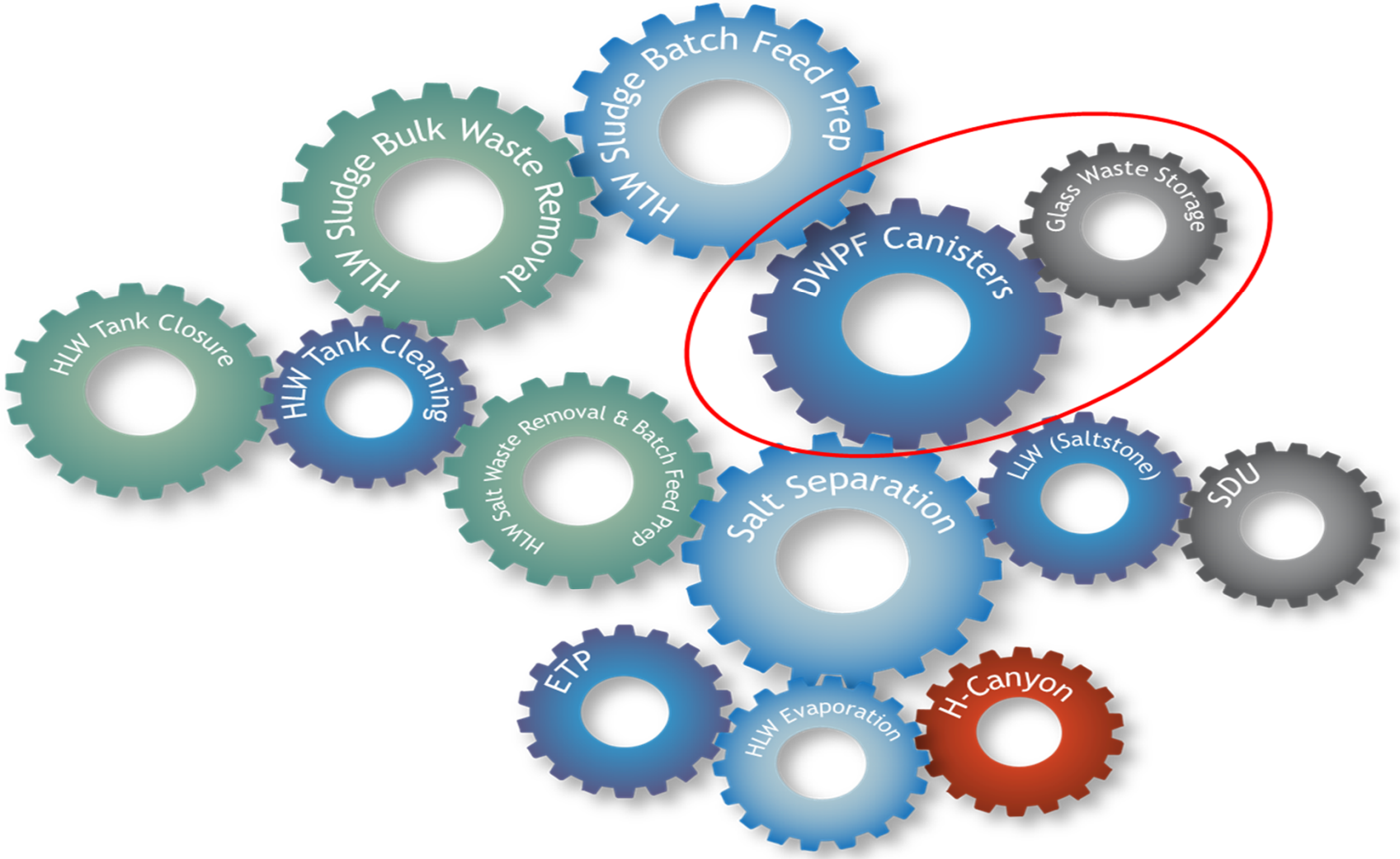
Inert chemicals

<<1% radionuclides to saltstone

16 Mgal grout dispositioned containing 414 kCi

An Integrated System

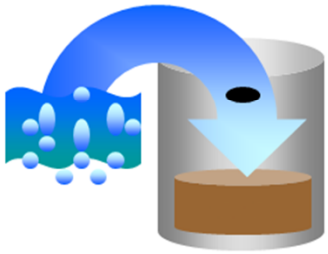
We do the right thing.



Waste Processing

We do the right thing.

Removing Sludge Waste from Tanks



Water and Liquid Waste

Immobilize Waste for Disposal

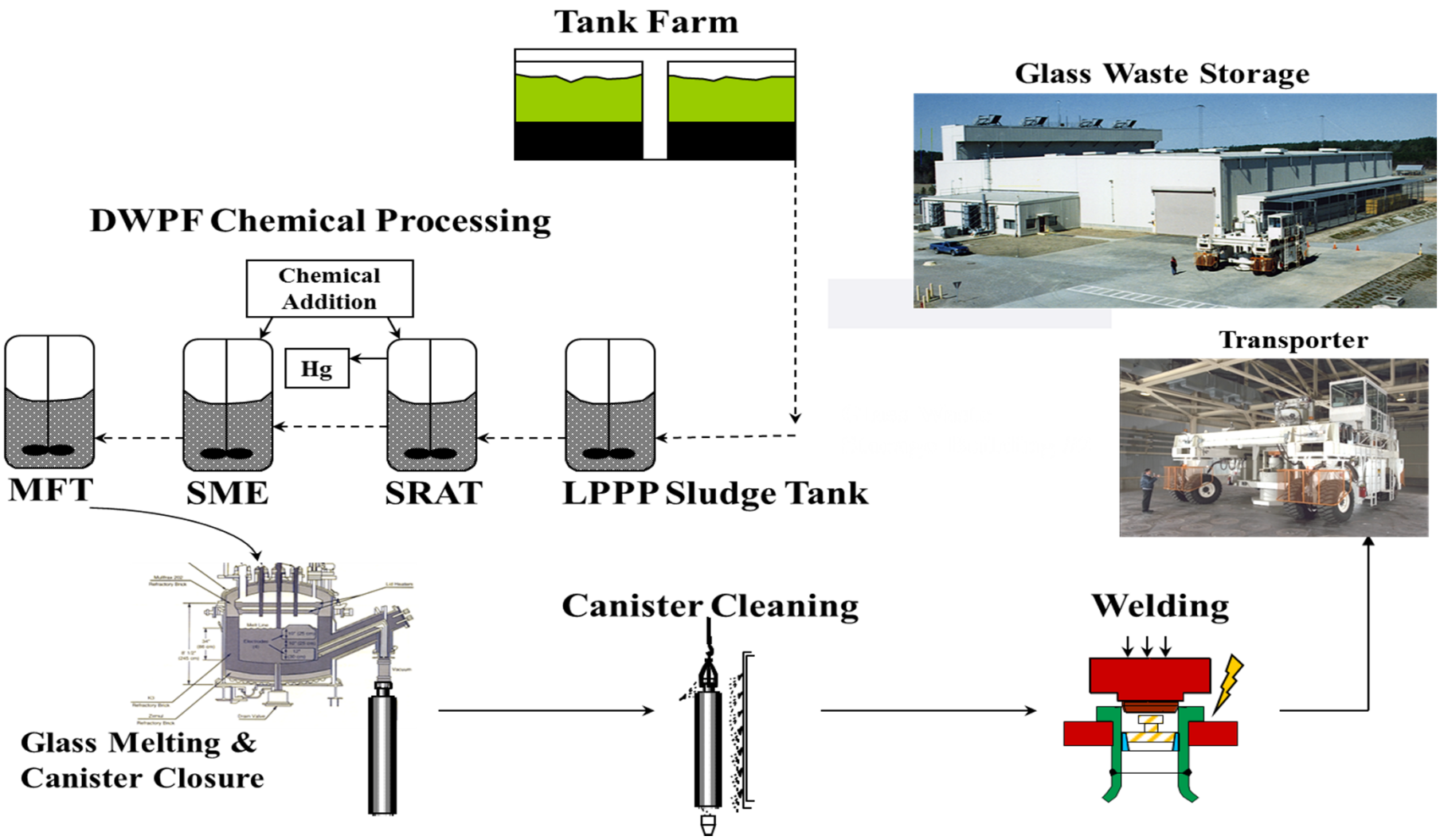
Defense Waste Processing Facility

- 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



DWPF Production

- 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

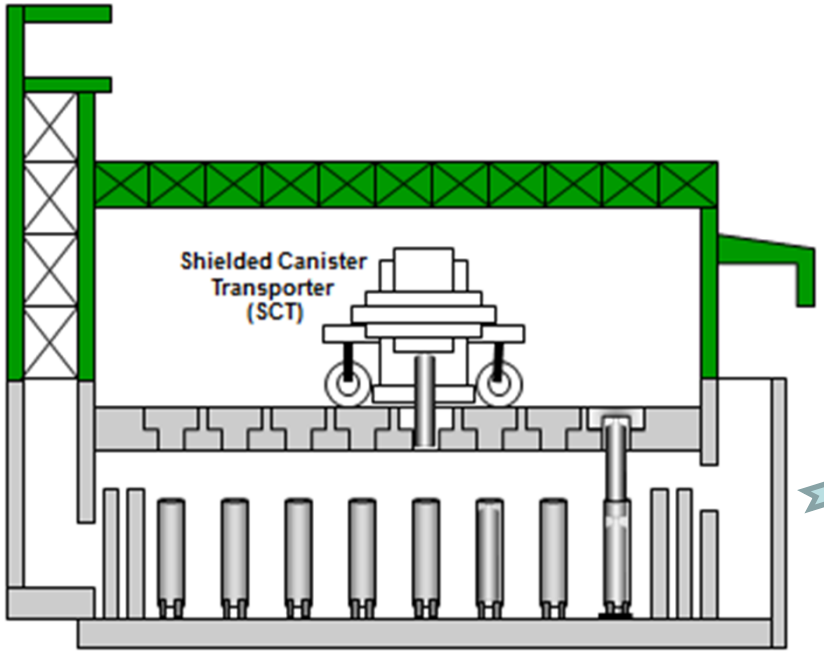
GWSB #1 Interim Canister Storage – Double Stack

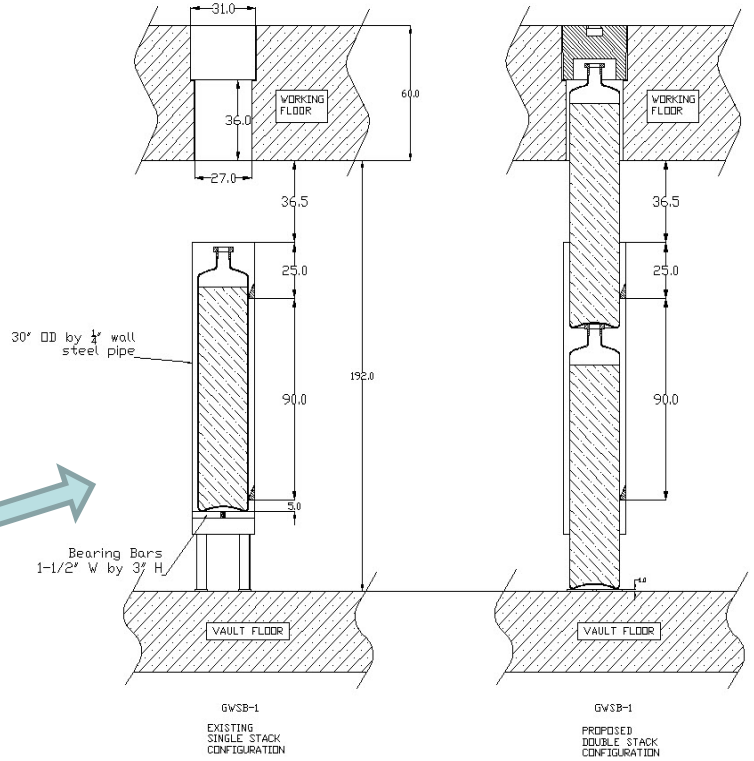
Supplemental Canister Storage Options

- **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

We do the right thing.

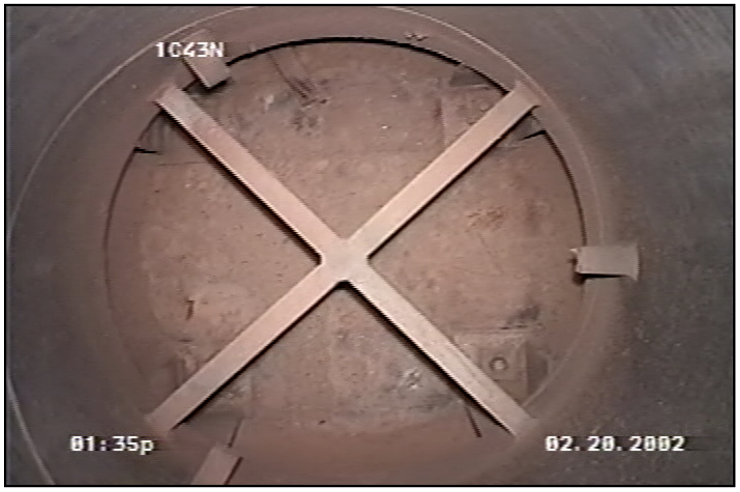




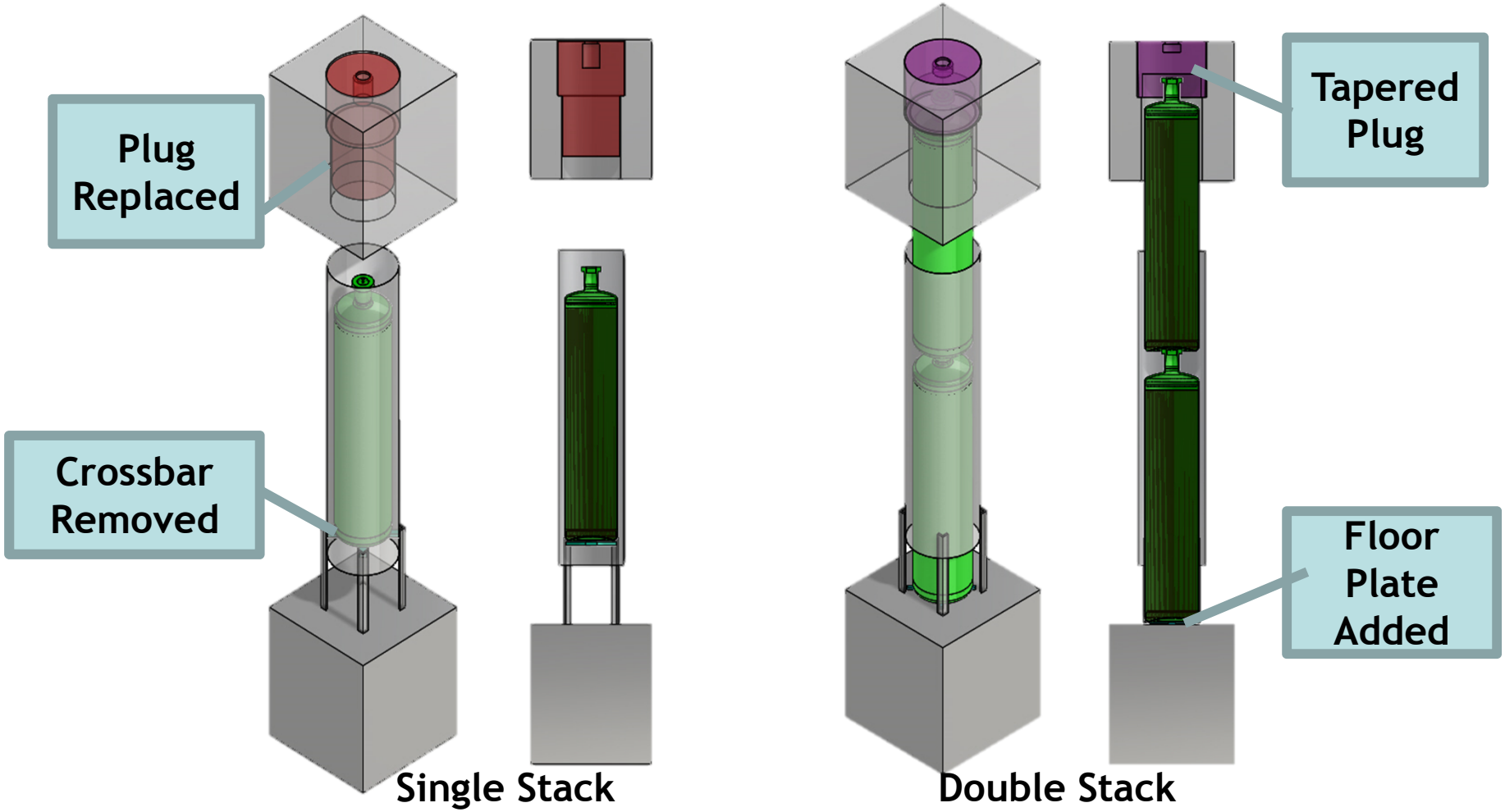
- **Two canisters per location (vs. one can per location)**
- **Lower canister on support on vault floor (vs. cross bar support 3’ off floor)**
- **Upper canister placed directly on top of lower canister**
- **Upper canister extends into operating deck floor, but remains below grade**
- **Shield plug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

Glass Waste Storage Building 1 Vault

- **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



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**

Technical Evaluation Summary Cont'd

- **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

Technical Evaluation Summary Cont'd

- **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**

Acronym List

- DWPF: Defense Waste Processing Facility
- SWPF: Salt Waste Processing Facility
- ARP: Actinide Removal Process
- MCU: Modular Caustic Side Solvent Extraction Unit
- BWRE: Bulk Waste Removal Efforts
- GWSB: Glass Waste Storage Building
- LPPP: Low Point Pump Pit
- SRAT: Sludge Receipt and Adjustment Tank
- SME: Slurry Mix Evaporator
- MFT: Melter Feed Tank
- SCT: Shielded Canister Transporter
- GWSP: Glass Waste Storage Project
- MAR: Material at Risk
- SNF: Spent Nuclear Fuels
- SSCs: Structures, Systems and Components
- USQE: Unreviewed Safety Question
- FSAR: Final Safety Analysis Report
- NPH: Natural Phenomenon HazardsDID: Defense in Depth
- ITS: Equipment Important to Safety
- EG: Evaluation Guidelines
- CW: Collocated Worker
- FW: Facility Worker
- SS: Safety Significant
- SC: Safety Class
- FY: Fiscal Year
- SAC: Specific Administrative Controls
- MREM: One thousands of a REM
- REM: Roentgen Equivalent Man
- HLW: High Level Wastes
- D&D: Decommissioning and Demolition