Defense Waste Processing Facility (DWPF)

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Discussion Topics

- Liquid Waste Program Snapshot
- DWPF Background
- DWPF Mission Requirements
- Quick Facts
- Glass Waste Storage Buildings (Canister Storage/Double-Stacking) / Shielded Canister Transporter
- Challenges
- Optimization and Ongoing Improvement Initiatives
- Looking ahead

Liquid Waste Program Snapshot

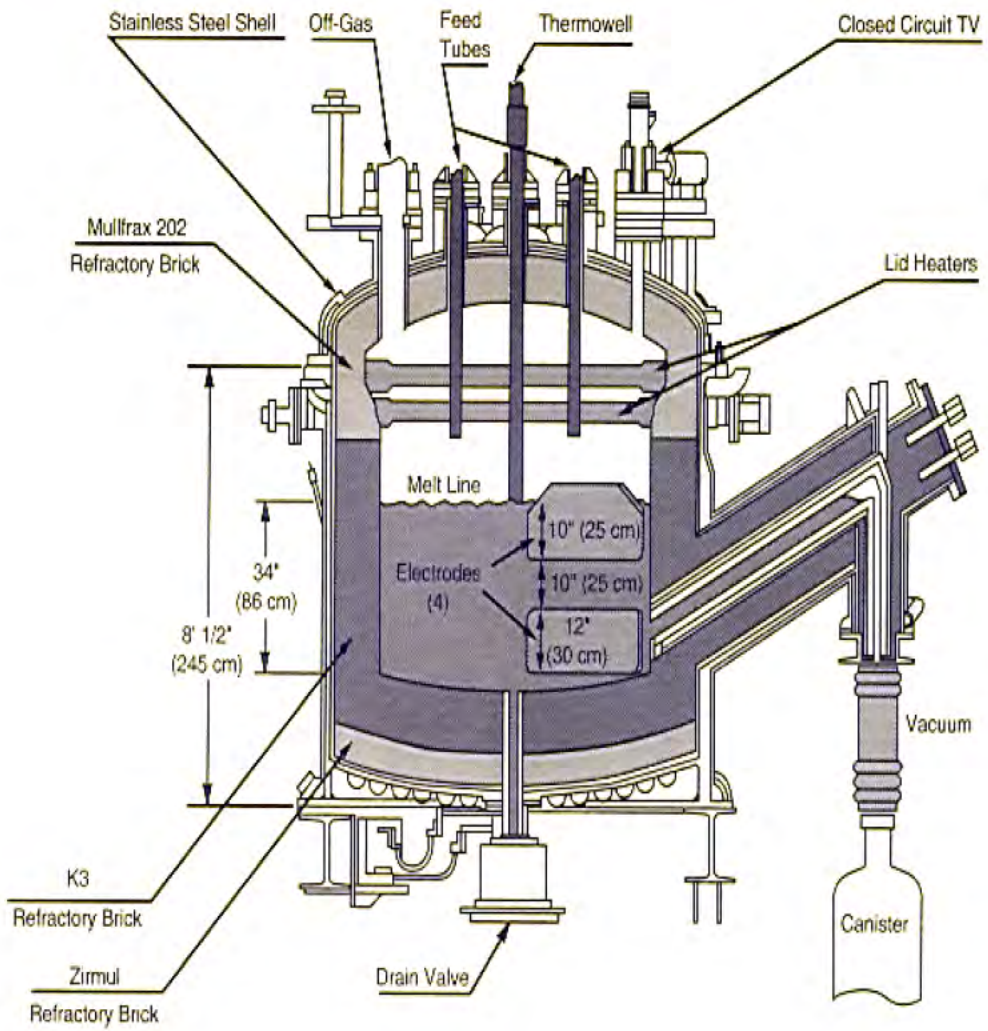
- **Retrieve, process, treat, and dispose of legacy tank waste**
- **43 active waste tanks, 35 Mgals of high-activity radioactive waste**
- **Key processing and treatment facilities**
  - Defense Waste Processing Facility (DWPF)
  - Salt Waste Processing Facility (SWPF)
  - Saltstone Production Facility (SPF)
- **Three End States**
  - Vitrified high-level waste canisters stored in Glass Waste Storage Buildings (GWSBs) 1 & 2
  - Decontaminated salt solution mixed with grout, stored in Saltstone Disposal Units (SDUs)
  - Operational tank closure

DWPF Background

- **Nation's only operating radioactive waste vitrification plant**
- **Groundbreaking for DWPF, November 1983**
- **Facility operations began March 12, 1996**
- **To date, DWPF has poured more than 4,300 canisters**
  - More than half the forecasted ~8,000 canisters for the life of the liquid waste program
- **Since 1996, DWPF produced more than 17 million pounds of glass waste**
  - Incorporating more than 62 million curies

DWPF Mission Requirements

- **Reduce liquid through evaporation**
- **Feed slurry to a joule-heated, 65-ton melter to 2,100 degrees Fahrenheit**
- **Slurry is melted into a borosilicate glass form (frit)**
- **Glass is poured into stainless steel canisters, blasted with frit to remove surface contamination then welded to permanently seal the canister**
- **Vitrification immobilizes the waste**
- **Waste becomes <u>suitable for safe, long-term disposal</u> in stainless-steel canisters**
  - Safely stored in the interim in Glass Waste Storage Buildings 1 & 2



Quick Facts

Melter Facts

- Melter 3 (Current) in service since December 2017
- Melter 2 lasted 14 years
- Melter 4 is fabricated and available
- Melter 5 is in planning stage

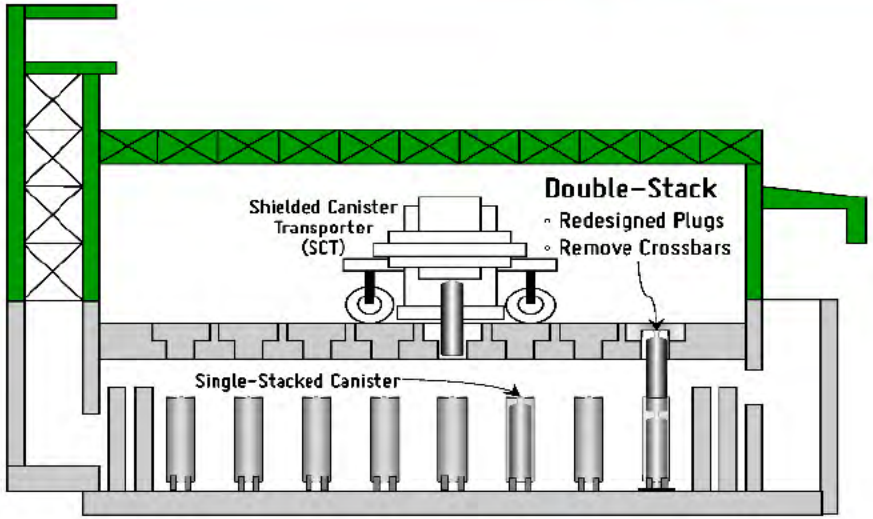
- Anticipated Melter life span is 3-5 years
- Melter remains heated 24/7 @ 2138 degrees F.
- 220 KW power, 1.5” thick stainless-steel shell
- 10’9” high, outside diameter, 8’-4 ½”
- Estimated replacement cost ~ $36 Million
- Replacement down time is ~6 months

Canister Facts

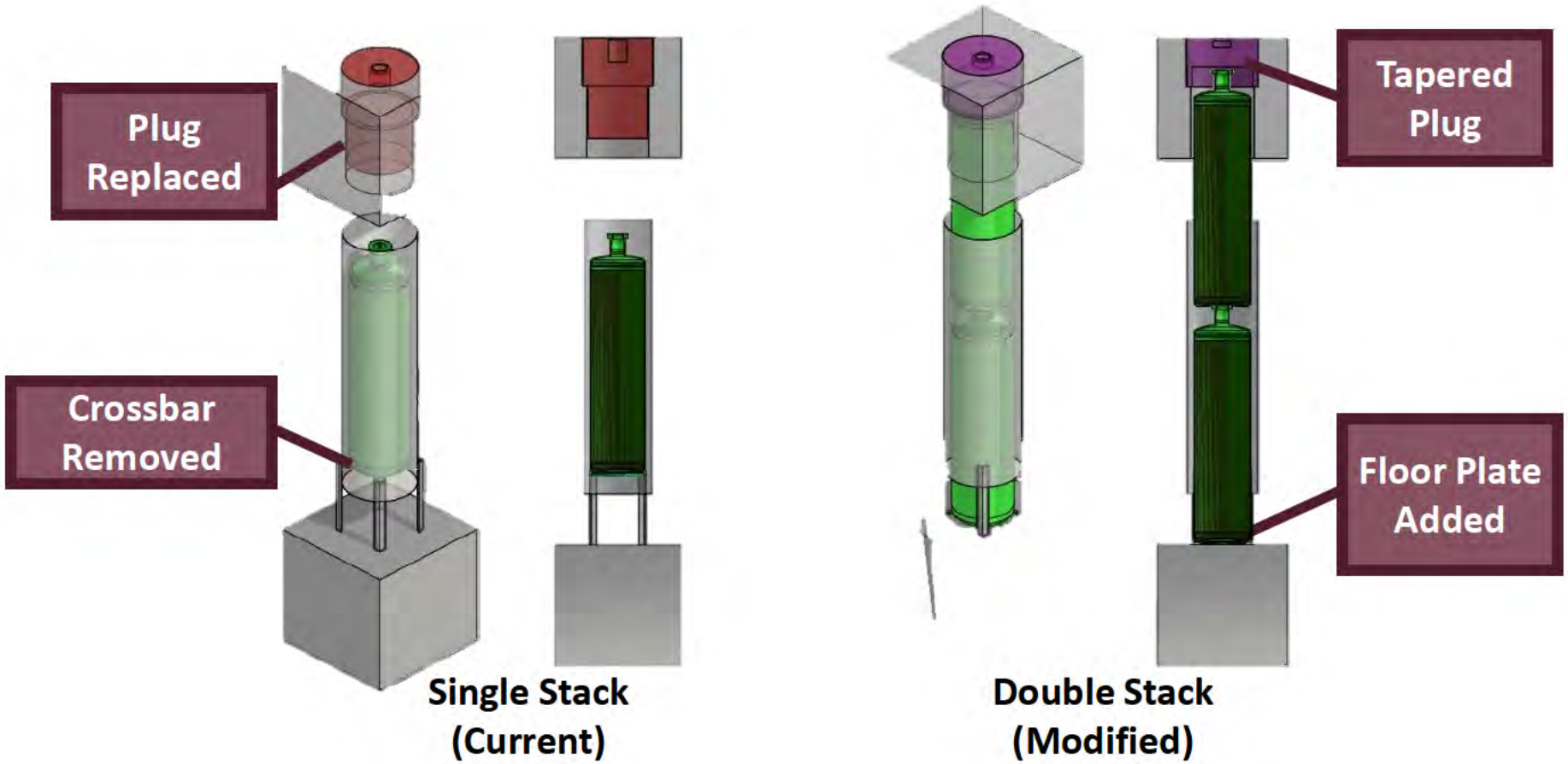
Materials:	304L Stainless Steel
Size:	~ 10’ Height, 2’ Diameter
Empty Weight:	1,150 lbs.
Glass Weight:	4,000 lbs.
Heat Load:	<180 watts

Glass Waste Storage Buildings (GWSB) 1 & 2

- **Additional canister storage is needed onsite**
- **Original combined storage capacity for GWSBs 1 & 2 is 4,602 canister positions**
- **Based on the Liquid Waste current forecast, a total of ~8,000 canister storage positions are needed**
- **Without double-stacking canisters, cost to build two additional GWSBs would be ~$150M, ~$300M**
- **GSWBs originally designed to store canisters one to a slot**
- **Double stacking provides up to 4,602 additional spaces (9,204 total)**
  - Eliminates need to build new GWSBs
  - To date, 1,670 canisters double-stacked
- **Estimate At Completion to modify GSWB1 for double stacking is ~$19M**
  - Avoids capital cost project and allows funds to be redirected to support completion of the liquid waste mission



Canister Double-Stack Modifications



Shielded Canister Transporter

One-of-a-kind vehicle

- 235,000 pounds
- 18’ tall, 25’ long
- Speed: 3 mph
- Diesel engines
- Shielding cast/canister
- lifting equipment
- 164 hydraulic hoses

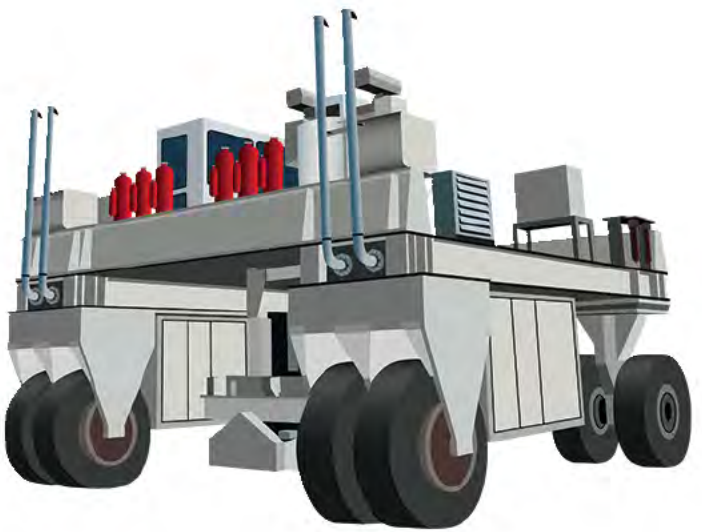
Challenges

- **Highly integrated system: An extended outage in one facility can affect all liquid waste facilities**
- **Procuring spare parts/equipment to address aging infrastructure and unique and long-lead item spare parts items**
- **Reviewing and adjusting preventive maintenance on equipment used for mixing waste and making waste transfers**
- **The Shielded Canister Transporter (SCT) was designed and constructed in the 1980s and has been in continuous radiological service since 1996**
- **Double-stacking project requires additional SCT operating time**

Scheduled Optimizations (next 6 months) Defense Waste Processing Facility

Throughput & Attainment

- Glycolic Acid Flowsheet (Throughput)
- Main Process Crane Reliability (Attainment)
- Increase Critical Spares (Attainment)



Ongoing Improvement Initiatives

- **Formic Acid Flowsheet**
  - Formic acid to chemically adjust sludge slurry prior to vitrification in the melter
  - Very hazardous chemical produces hydrogen and ammonia

Solution

- **Glycolic Acid Flowsheet Implementation (Current Outage)**
  - Reduction in hydrogen and ammonia generation
  - Provides chemical stability during vitrification process
  - Reduction of the process vessel purge air to prevent flammability concerns
  - Favorable flow in the resultant melter feed stream
  - Safer operations

Ongoing Improvement Initiatives

- **DWPF Main Process Cell (MPC) Crane Camera Controls & Reliability Improvement Project**
  - MPC crane is critical to DWPF Operations
  - Subcontract awarded (new PLC controls, cameras and operator consoles)
  - Fiber Optic cabling infrastructure to support this new equipment
  - MPC crane critical spare parts availability
  - Wholistic evaluation and root cause analyses to improve the reliability and availability of the crane
- **Training and Procedures Proficiency**
- **Building additional Failed Equipment Storage Vaults (FESVs) 3 and 4 to house equipment, such as Melters**
- **Performing activities to reduce cycle time in DWPF to eliminate system bottlenecks**
- **Developed process for double-stacking in GWSB 2**
- **Evaluating current critical equipment System Health, availability, and reliability**

Looking Ahead

- Safe and disciplined operations
- DWPF continues to support liquid waste mission
- Meeting liquid waste mission requirements through waste vitrification
- Continuous process improvements/optimizations
- Aggressive critical spare parts procurements
- Infrastructure sustainment
- Safe and successful acceleration and completion of the liquid waste mission in 15 years

Questions?

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