



U.S. DEPARTMENT OF
ENERGY

OFFICE OF
**ENVIRONMENTAL
MANAGEMENT**

Department of Energy High-Level Waste Integration

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*Nuclear Waste Technical Review Board Meeting
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Waste Processing: Treatment and Disposal of Radioactive Waste: Treat ~90 million gallons/500 million curies

Hanford

- 177 Tanks
- 176M curies
- 55M gallons
- ~ 9,700 canisters (projected)

Idaho

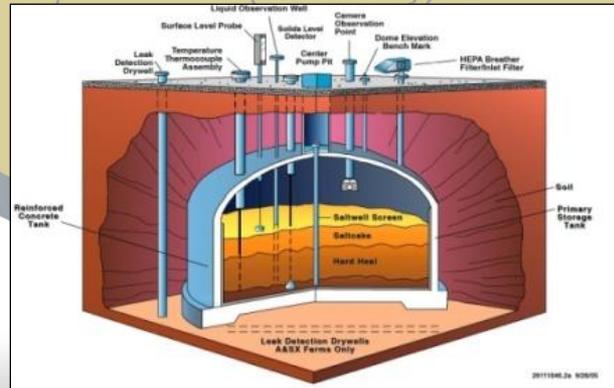
- 15 tanks (11 closed);
- 37M curies
- 900K gallons, 4,400m³ calcine

Savannah River Site

- 51 Tanks (8 closed)
- 37M gallons
- 292M curies;
- ~4,100 canisters (2016); ~8,000 (total projected)

West Valley Demonstration Project

- 4 tanks
- ~ 25M curies
- 275 canisters



- Safely store waste in form of liquids, sludges, saltcake and calcine
- Retrieve waste for purposes of pretreatment, treatment, and disposal
- Pretreat alkaline waste (SRS, Hanford and WVDP), typically through a separations process to separate waste into:
 - Low-activity waste stream treated and disposed as low-level waste (LLW) onsite [except offsite disposal at WVDP] (most of volume);
 - High-activity waste stream treated and disposed as high-level waste (HLW) at a geologic repository (most of activity);
- Treat high-activity alkaline waste (SRS, Hanford and WVDP) using vitrification
- Retrieve, treat and dispose remaining acidic liquid wastes at INL for disposal in a geologic repository.
- Retrieve and dispose calcine (INL) directly in its existing form or following alternative preparations for disposal.
- Stabilize tank waste residues intended for in-place closure.

The Tank Waste Program Strategy

- The Tank Waste Program Strategy consists of:
- Safely storing:
 - over 90 million gallons of radioactive liquid waste at the SRS, Idaho and Hanford
 - 4,400 m³ of radioactive calcine at Idaho
 - 4,100 HLW canisters at SRS and 275 canisters at West Valley
- Constructing and operating major nuclear facilities to treat and disposition the tanks waste; and
- Emptying, cleaning and closing waste tanks.



Salt Supernate



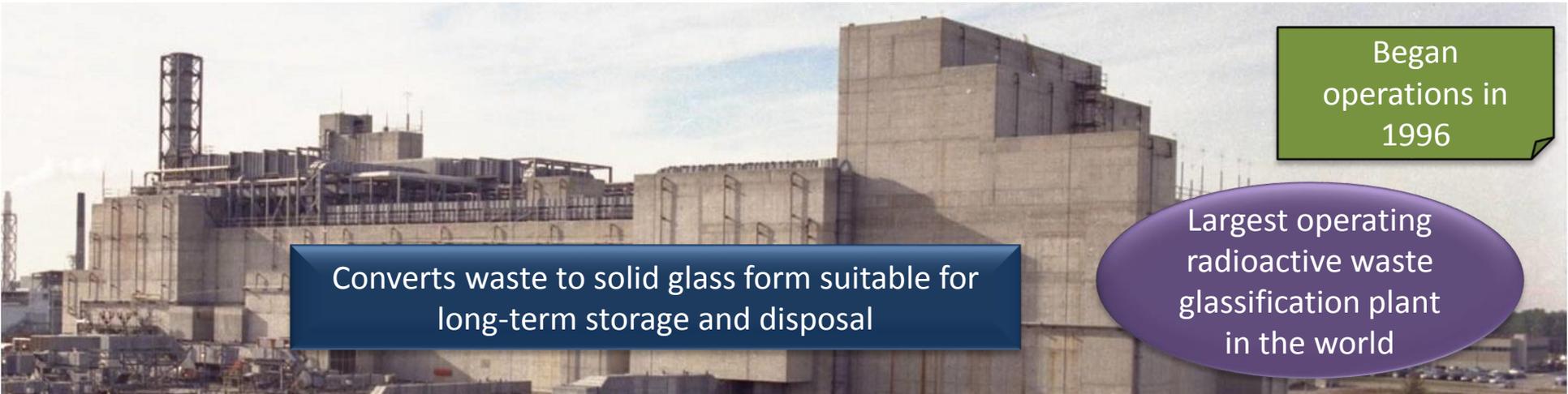
Saltcake



Sludge

Safely Stored Canisters

The Radioactive Liquid Waste Challenge: How EM is Making Progress Today



Began
operations in
1996

Converts waste to solid glass form suitable for
long-term storage and disposal

Largest operating
radioactive waste
glassification plant
in the world

Defense Waste Processing Facility – Aiken, SC

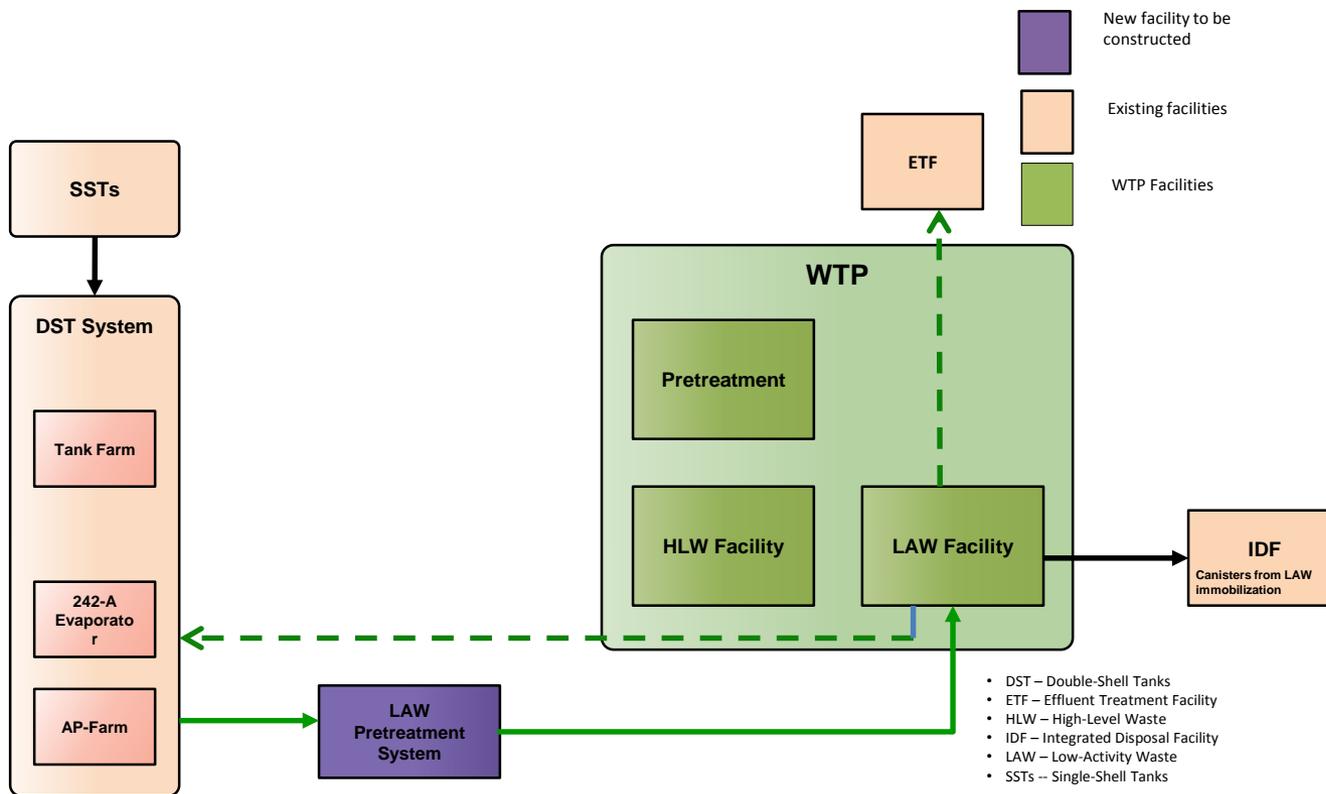


Undergoing
Commissioning for
Start-up

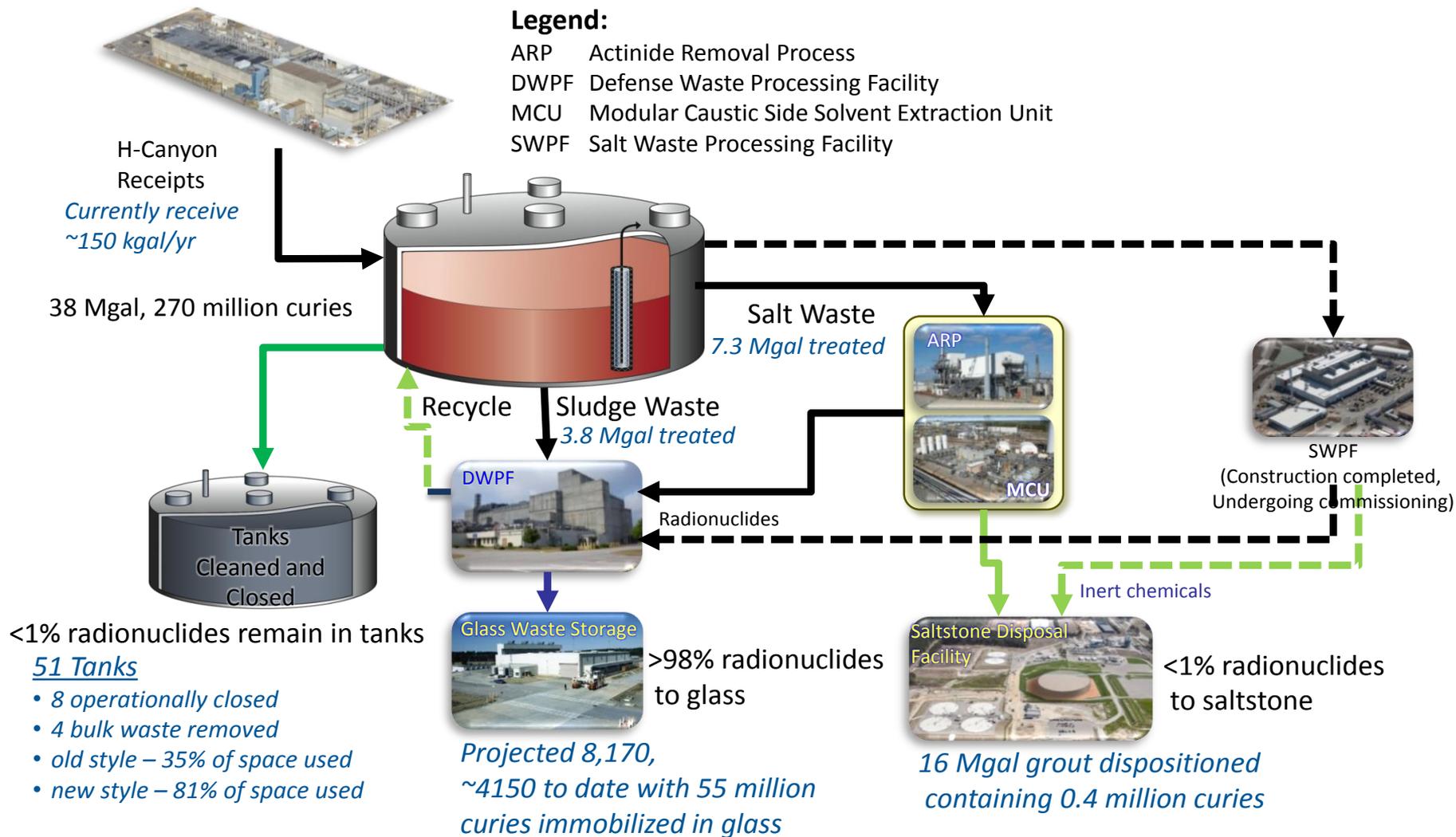
Will treat Idaho's inventory of liquid tank waste –
approximately 900,000 gallons

Integrated Waste Treatment Unit – Idaho Falls, ID

Hanford Direct Feed Low Activity Waste Approach



SRS Liquid Waste System



NWTRB Briefing: Tank Waste Overview, Aug. 2016

West Valley Demonstration Project

In September 2002 DOE completed solidification of ~600,000 gallons of HLW that had been generated by the nation's only operating commercial nuclear fuel reprocessing plant located near West Valley, New York

- The HLW sludge was vitrified and resulted in ~600 tons of glass; 24 million curies; 275 canisters
- The canisters of vitrified HLW were placed in storage in a shielded cell within the Main Plant Process Building, to await transport to a federal repository



HLW Canisters

275 stainless steel canisters of vitrified HLW

- 10' tall, 2' diameter
- 2,665 R/hr average dose rate
- 1,100 – 7,460 R/hr range
- 5000 lbs average weight
- 90% average fill height

3 canisters of decontamination wastes

Technical Approach

- Canisters decontaminated in place in the storage racks
- 5 canisters loaded into an overpack within a shielded cask
- Overpack lid remotely welded
- Cask lid secured and cask transported to the High Level Waste (HLW) Cask Storage Pad



Loaded Overpack in Cask



**Eventual transfer of
overpack for shipping**

NWTRB Briefing: Tank Waste Overview,
Aug. 2016

- Canisters:
 - 10' tall, 2' diameter (longer neck than WVDP)
 - 304L stainless steel
- HLW canisters are currently stored in Glass Storage Buildings 1 and 2 in concrete reinforced vaults
 - GSB-1 currently stores 2,254 canisters
 - GSB-2 currently has capacity for 2,340 canisters
 - To increase storage capacity, SRS will “double-stack” canisters in GSB-1 thus increasing GSB-1 storage capacity by 2,254 for a total capacity of 6,848 canisters
 - This mitigates the need for additional storage until FY 2026.



- Treated sodium bearing waste would be loaded into canisters and then the canisters stored in concrete vaults:
 - Canisters are 10' tall, 26 inches in diameter
 - 304L stainless steel
- 16 canisters per vault



- High-Level Waste canisters
 - 15-foot long, 2-foot diameter
 - 304L stainless steel
- Low-Activity Waste canisters
 - 7-foot long, 4-foot in diameter
 - 304L stainless steel



High Level Waste Integration

- Contractor
 - Leadership transfer between Hanford and SRS tank waste contracts (same lead contractor) to promote integration
 - Technology integration – separations processes, tank integrity, tank retrievals
- DOE Federal
 - Temporary assignments:
 - Participation of construction project personnel from one site as reviewers on project peer reviews at other sites
 - Temporary rotations of staff from one site to another to augment startup and commissioning and share lessons learned
 - Tank Waste Corporate Board:
 - Managers with tank waste responsibilities at Headquarters and the field (SRS, Hanford, Idaho, West Valley Demonstration Project)
 - Key issues:
 - Tank waste infrastructure commonalities
 - Tanks waste technology development
 - Commissioning of tank waste projects
 - Disposition of tank waste