



***Presentation to Savannah River Site
Citizens Advisory Board
Waste Management Committee
DWPF Process Improvements & Tank 13 Modifications***

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PURPOSE and AGENDA

Purpose: to respond to the WMC request and to meet the FY 11 Workplan

Agenda:

- Defense Waste Processing Facility (DWPF) Process Improvements
 - Bubblers
 - Dry Frit
 - Alternate Reductant
 - Strip Effluent Feed Tank to Slurry Mix Evaporator Tank
 - Water Separation from Decontamination Frit
- Canister Storage
- Plutonium (Pu) Disposition
- Tank 13 Modifications



ACRONYMS

- Decon – Decontamination
- DWPF – Defense Waste Processing Facility
- MFT – Melter Feed Tank
- Pu - Plutonium
- SEFT – Strip Effluent Feed Tank
- SME – Slurry Mix Evaporator Tank
- SRAT – Sludge Receipt and Adjustment Tank
- SWPF – Salt Waste Processing Facility



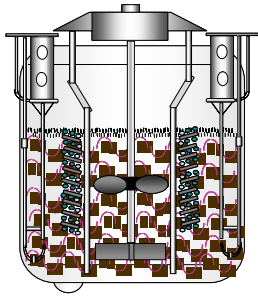
DEFINITIONS

- Frit – a silica based product (glass) used to vitrify high level waste
- Reductant – a chemical reducing agent
- Strip Effluent – the waste stream produced from the removal of cesium from sludge or salt waste
- Sludge – the by-product waste of chemical separations activities at the Savannah River Site
- Slurry – mixture of a liquid with a solid to allow the solution to be transferred between tanks

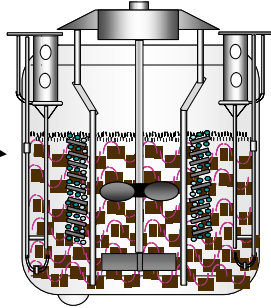


DWPF Process Improvements

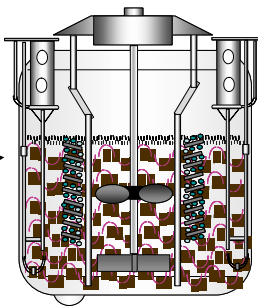
DWPF Chemical Process Cell



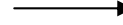
SRAT –
Slurry Receipt
And Adjustment
Tank



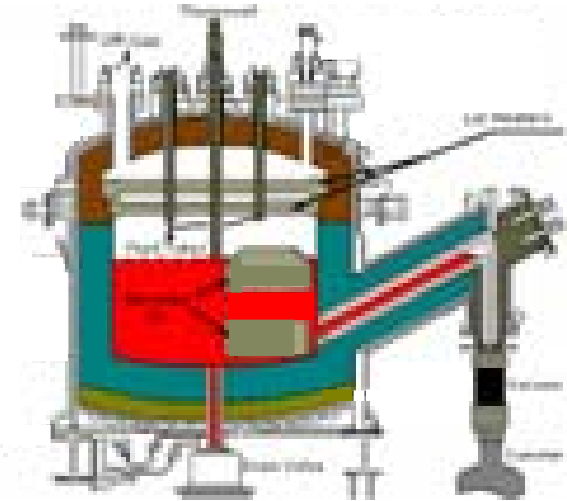
SME –
Slurry Mix
Evaporator



MFT-
Melter Feed
Tank



DWPF Melter Cell



Joule Heated Melter

Melter Feed Prep

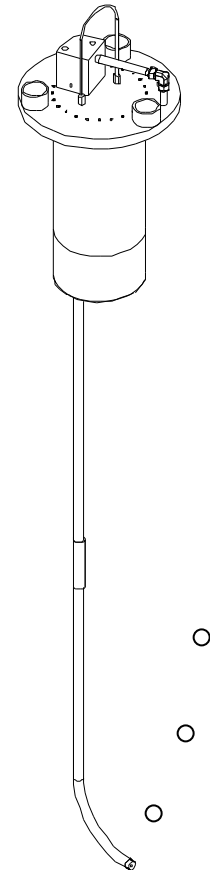
- Alternate reductant
- Dry process frit addition
- Water separation from decon frit
- Strip Effluent addition

Vitrification

- Melter Bubblers

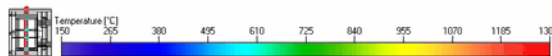
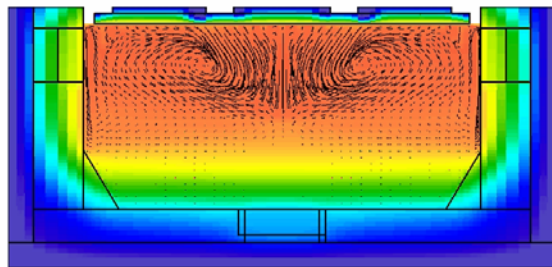
DWPF Process Improvements

- Melter Bubblers
 - Four Bubblers installed in September 2010
 - Melt rate has increased from approximately 130 lb/hr to 200 lb/hr
 - Increased canister production from ~200 cans/year to 300+ cans/year
 - First set of bubblers replaced upon reaching design life of 6 months
 - Second set remains in service
 - Optimization of bubbler operation continues

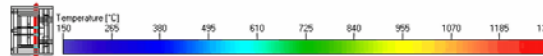
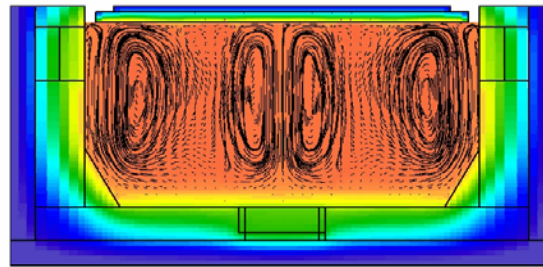


Bubbler

Duratek HLW model, Case 2A: Feed, 2el
Front View (1/2)



Duratek HLW model, Case 5A: Feed, 2el, bubl
Front View (1/2)



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DWPF Process Improvements

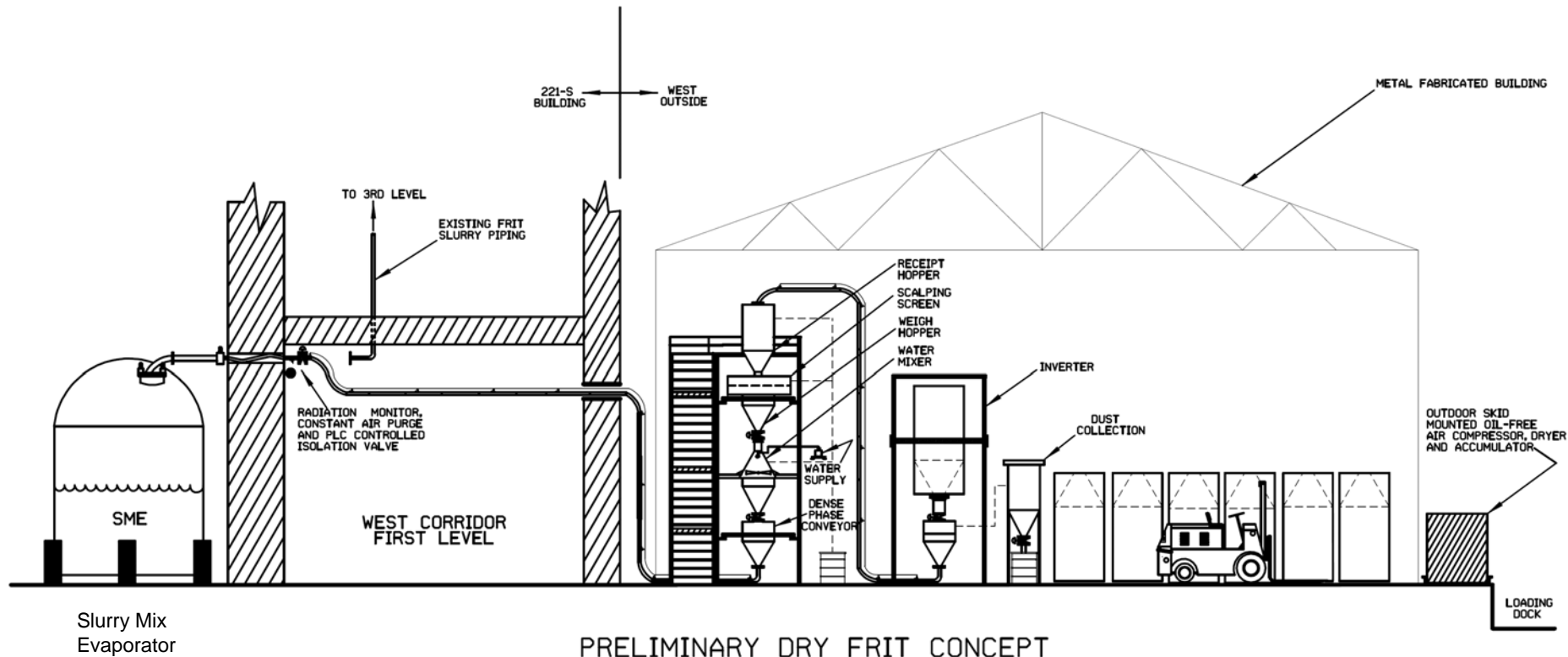
- Dry Frit Addition to the Slurry Mix Evaporator Tank
 - Replace the current slurry-fed transfer design with a dry conveying system
 - Cycle time reduction of up to 7% due to less evaporation time
 - Contract in place with the selected dry frit conveying system vendor
 - Project under evaluation due to forecasted limited funding in FY12.



Dry Process Frit Addition

Inside the Defense Waste
Processing Facility

← → Outside of the Defense Waste Processing Facility



PRELIMINARY DRY FRIT CONCEPT

Rev. 1
8/16/2018



DWPF Process Improvements

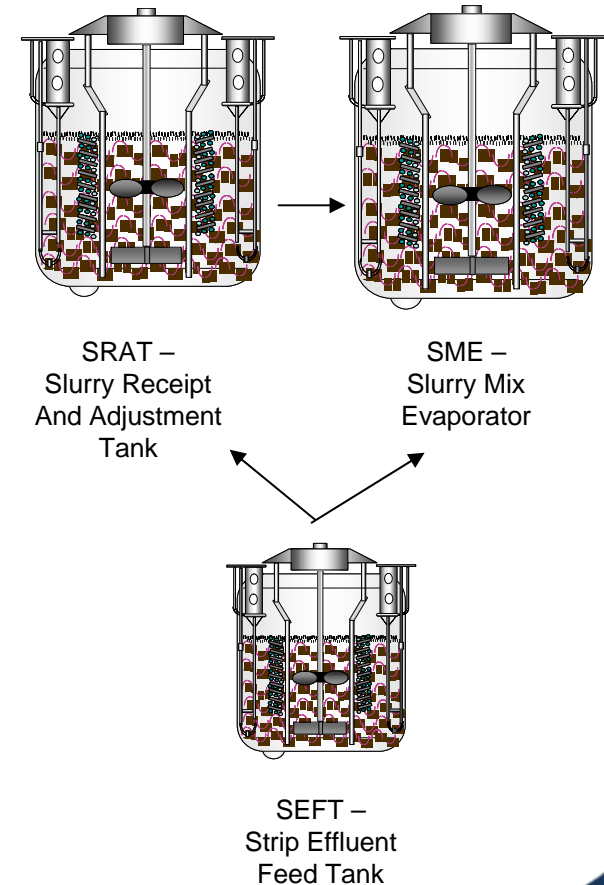
- Alternate Reductant in the Slurry Receipt and Adjustment Tank (SRAT)
 - Formic acid (reductant) currently used in the SRAT - chemically change mercury (Hg) and manganese (Mn) – Hg is removed from system
 - Using an alternate reductant instead of formic acid
 - expected to increase the evaporation rate
 - reduce processing time up to 20%
 - Multiple combinations of reductant evaluated
 - A glycolic acid selected for further process development
 - 18 – 24 months from deployment



DWPF Process Improvements

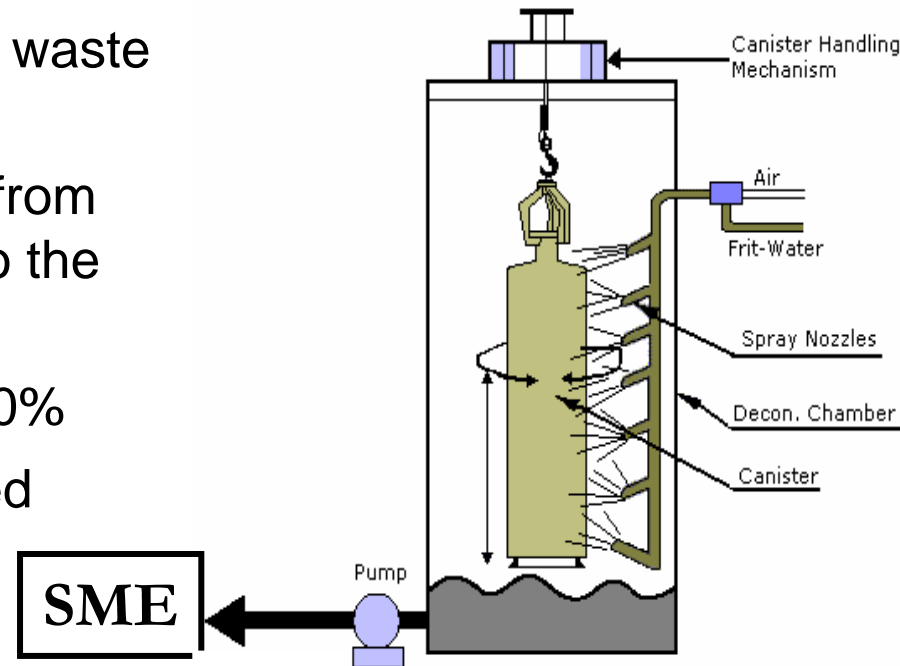
- Strip Effluent Feed Tank to Slurry Mix Evaporator Tank
 - Install the capability to transfer strip effluent to either the Sludge Receipt and Adjustment Tank and/or Slurry Mix Evaporator Tank
 - Strip Effluent comes from the cesium removal from sludge or salt waste – stored in the Strip Effluent Feed Tank
- Provide flexibility to balance evaporation loads
- Piping (jumpers) inside the process cell have been fabricated
- Work outside the process cell in the connecting corridor continues
- Ready by March 2012

DWPF Chemical Process Cell



DWPF Process Improvements

- Water Separation from Decontaminated Frit
 - Currently a frit slurry is used to decontaminate the outside of a waste canister
 - Improvement to remove water from the slurry before it goes back to the slurry mix evaporator tank
 - Cycle time reduction of up to 20%
 - Performed testing and assessed water separations technology
 - Hydro-cyclone design selected
 - Future development dependent on funding



Canister Storage- Glass Waste Storage Buildings

- GWSB #1 - 2,244 storage positions in use – 2251 available
- GWSB #2 - 2,340 storage positions
 - Approx. 40% filled
 - Over 4 years storage remaining at 300 canisters/yr
- GWSB #3 - in planning stages
 - Same design as GWSB #2
 - Operational in FY16.



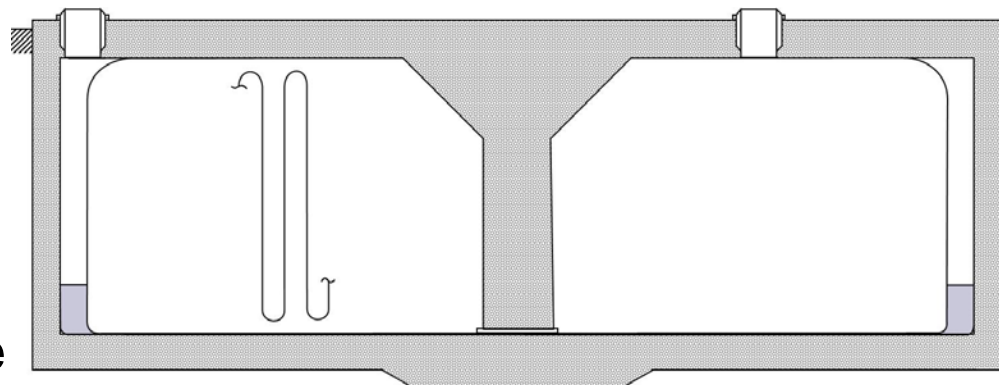
Plutonium (Pu) Disposition

- Supplemental Environmental Impact Statement under development
 - Alternative to disposition 6 metric tons of Pu through the liquid waste system - Defense Waste Processing Facility – into glass
- Record of Decision will determine final disposition path - expected late summer 2012
- To support the alternative if chosen, the following activities have been performed:
 - Studies to determine feasibility:
 - Scoping calculations completed for increased Pu loading in glass
 - Criticality studies completed for one neutron moderator
 - Additional studies required if alternative chosen
 - Pu Disposition impacts will be evaluated in next revision of Liquid Waste System Plan



Tank 13 Upgrades – Background

- Tank 13 is a Type II waste tank located in H Tank Farm
- Currently, Tank 13 contains 277K gallons of sludge
- Upgrades are required to:
 - perform bulk waste removal for sludge transfers to support sludge batch 8
 - provide transfer capability for tanks 14 and 15 to tank 51



Type II (1.03 Mgal cap.)

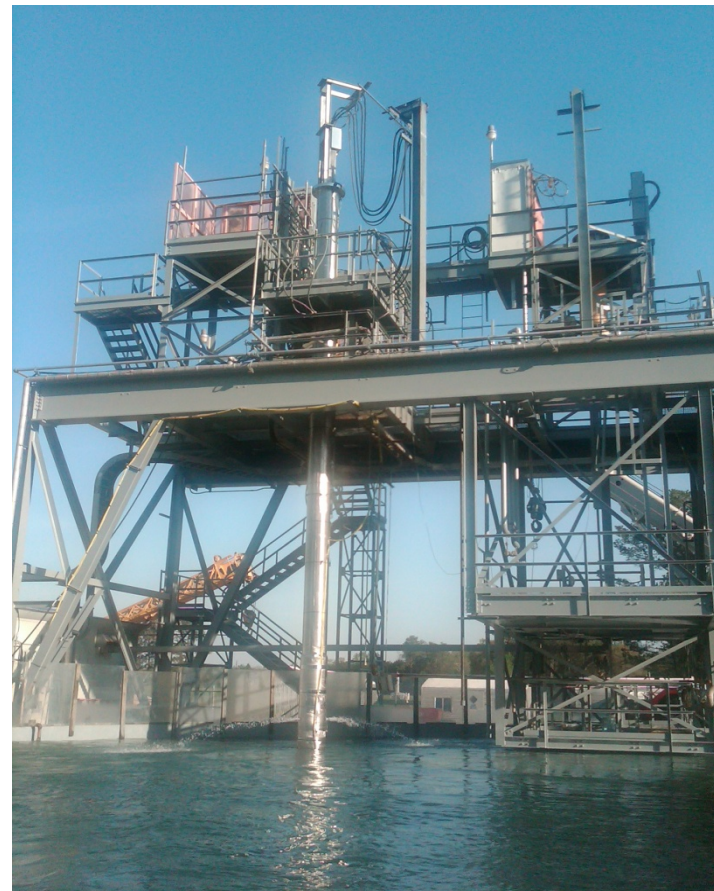
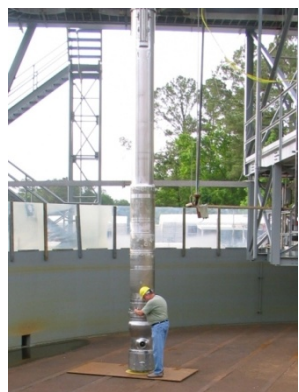
Tank 13 Upgrades – Scope

- Disassembling and removing existing equipment
- Riser probing to identify potential interferences in the tank
- Procuring and installing three submersible mixer pumps, a submersible transfer pump, electrical substation, and electrical equipment skid
- Tying the transfer pump into an existing transfer line
- Procuring and installing flow instruments, hydrogen level monitors and alarms, and purge and ventilation alarms



Tank 13 Upgrades – Highlights

- Three submersible mixer pumps were procured and tested:



Installing the pump into the test stand

Testing at the TNX Facility



Tank 13 Upgrades – Highlights

- Three submersible mixer pumps were installed into the tank:



Disassembling and removing existing equipment



Installing the pump into the tank



Tank 13 Upgrades – Highlights

- An electrical substation skid and an electrical equipment skid were fabricated and installed to provide power for the pumps and other tank top equipment:



Electrical substation



Inside Electrical Equipment Skid



Installing the Electrical Equipment Skid on pad

Connecting the tank pumps to Electrical Equipment Skid

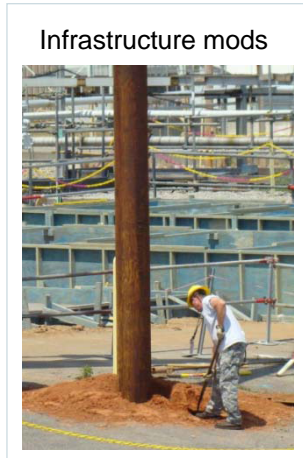


Tank 13 Upgrades – Highlights

➤ Other infrastructure improvements:



Hydrogen analyzer



Transfer line excavation and installation



Purge exhaust stack



Inlet HEPA filter housing



Tank 13 Upgrades – The Big Picture



Electrical substation and equipment skids

Tank 13 Aerial View

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Conclusion



- Defense Waste Processing Improvements well underway
- Canister Storage is ongoing with a third building in planning
- Plutonium Disposition path through liquid waste system is still undetermined
- Tank 13 infrastructure modifications will be virtually complete by the end of September

