Optimizing Performance of the Defense Waste Processing Facility

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Purpose

Discuss the process improvements to the Defense Waste Processing Facility (DWPF) resulting in improved efficiencies and production.

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DWPF Vitrification History

Objective:

Process (vitrify) high level waste from tank farms into a stable waste form ready for disposal in the Federal Repository

- Design started in 1977
- Construction began 1983
- Radioactive operations began March 1996
- Poured 2471 Canisters as of 3/06/08 – 9.5 million lbs of glass
- Currently processing Sludge Batch 4
- Two melters to-date
  - 1st – 1333 cans – replaced in 2004
  - 2nd – 1138 cans to date
  - 3rd – ready
  - 4th – under construction

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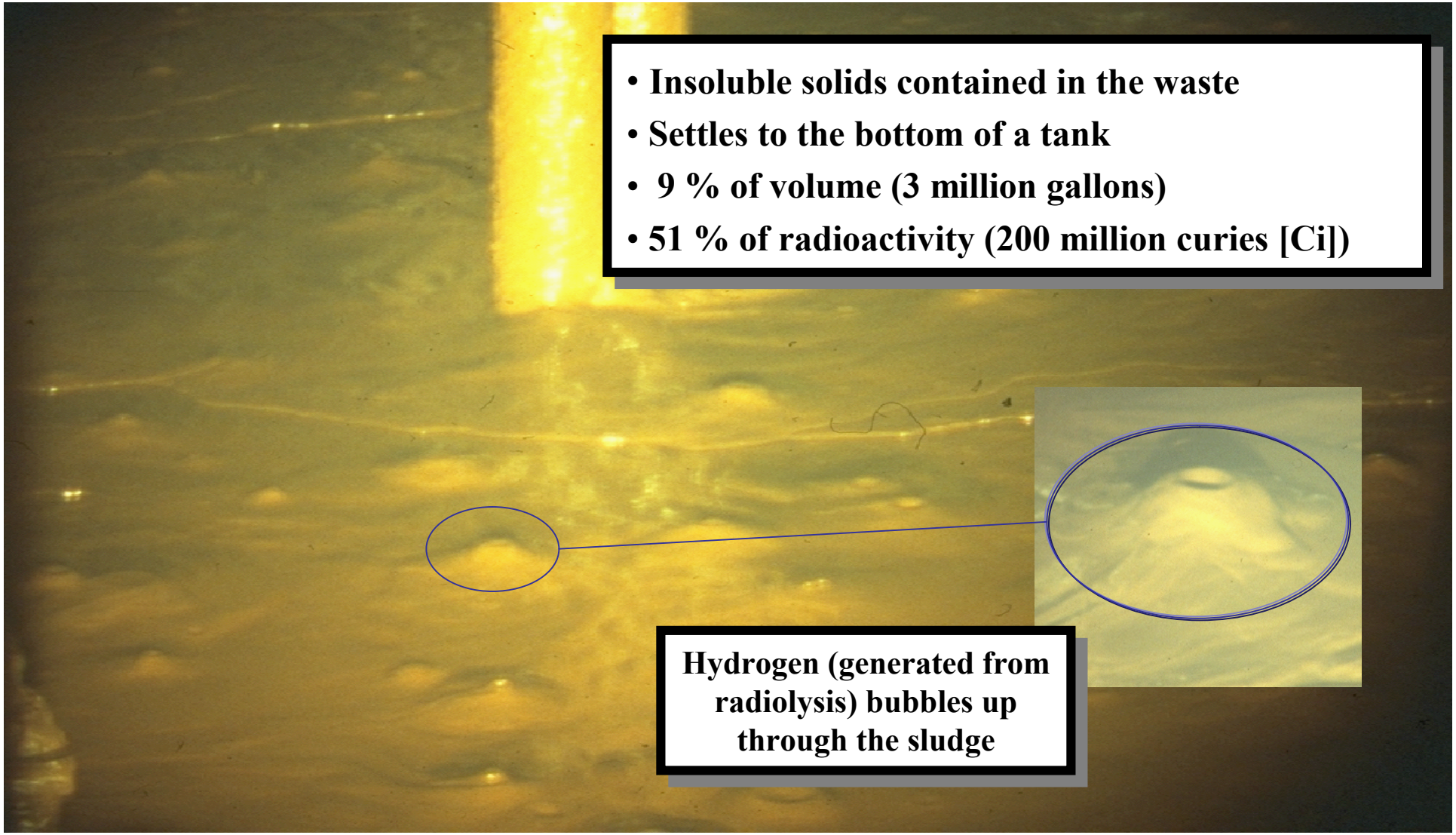
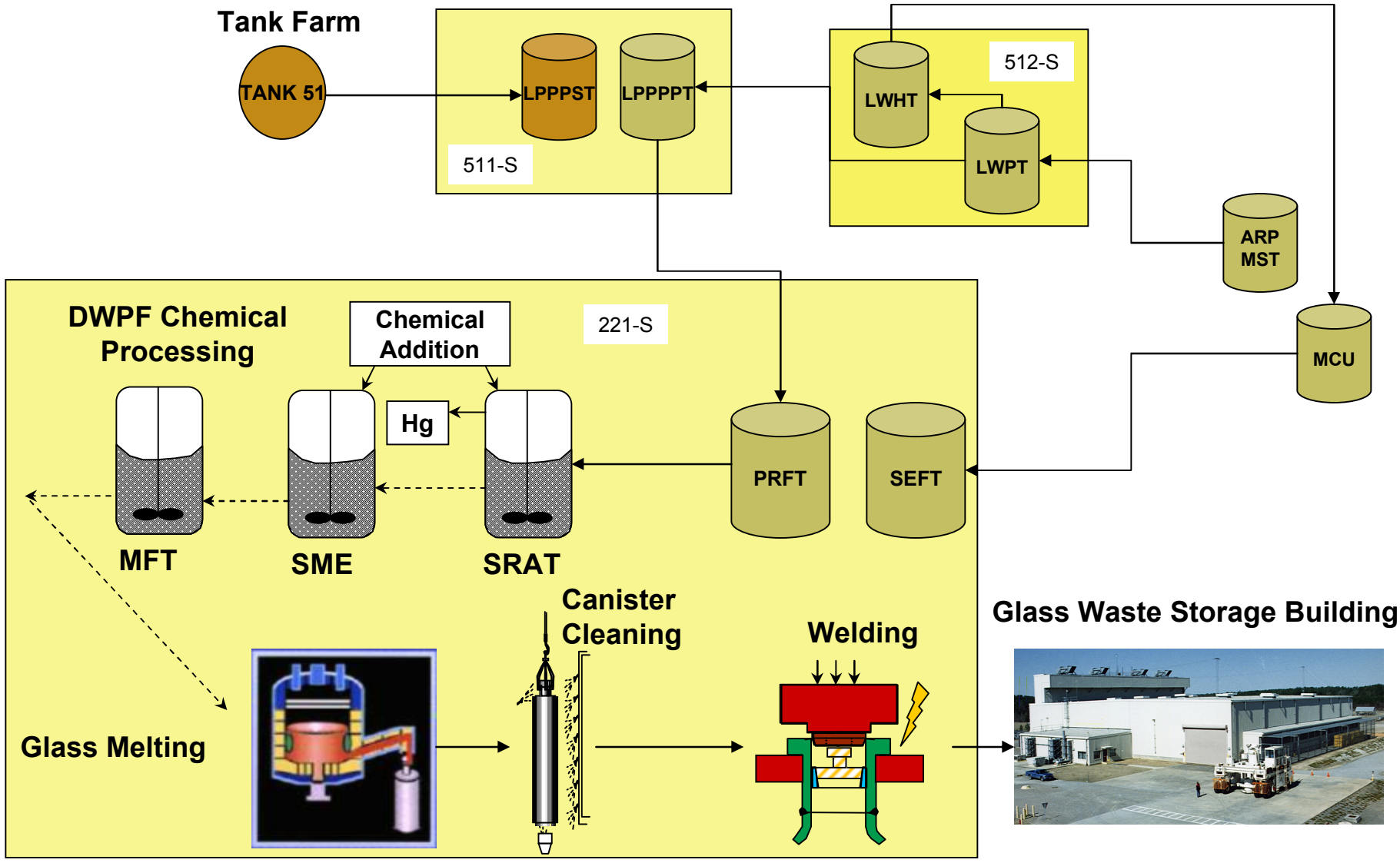
Sludge Stored in a Waste Tank



DWPF Process Overview



Vitrification Process

- Sludge mixed with glass formers (frit)
- Sludge/frit slurry fed to melter
- Slurry resides in melter at 1150°C for about 65 hours to permit thorough melting and mixing
- Melter heats melt pool by passing an electric current through it, i.e., “Joule” heating
- Molten glass is drawn from the melter through the melter pour spout to fill a canister
- Pour spout directs the molten pour stream into a canister while a connecting bellows provides a leak-tight seal
- Empty canisters are placed on a pour turn-table and rotated beneath the melter pour spout for filling

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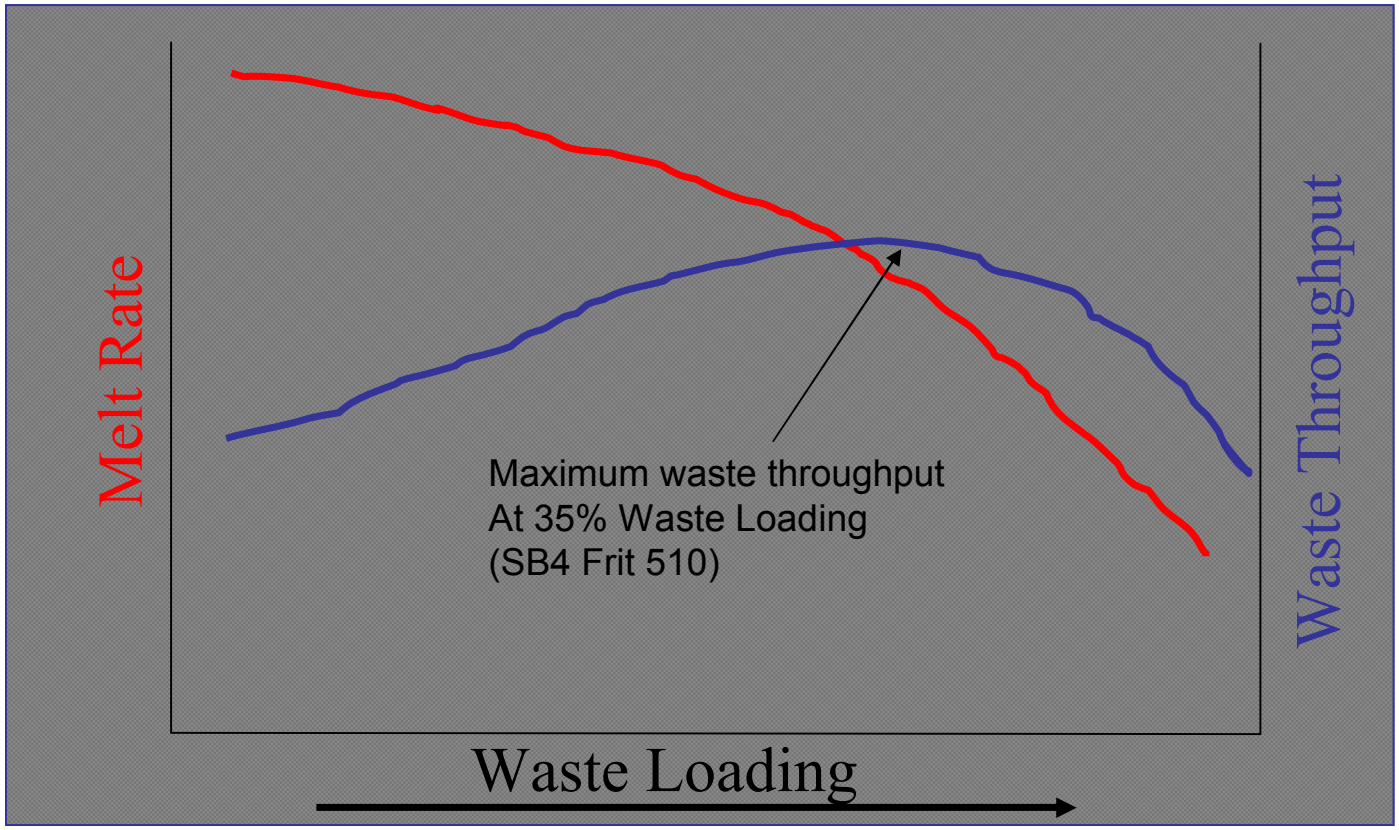
Processing Improvements

- Increased HLW Loading of Glass and Optimization of Throughput – 6% increase
- Glass Pump
- Heated Bellows Liner – 5% increase in attainment
- Melter Siphon Detector – 2% increase in attainment
- Melter Feed Pump Software Logic Changes – 2% increase in attainment
- Steam Atomized Scrubber (SAS) Operation vs. Recycle Water – 3% increase
- Optimized Frit

Waste Loading- Melt Rate- Throughput



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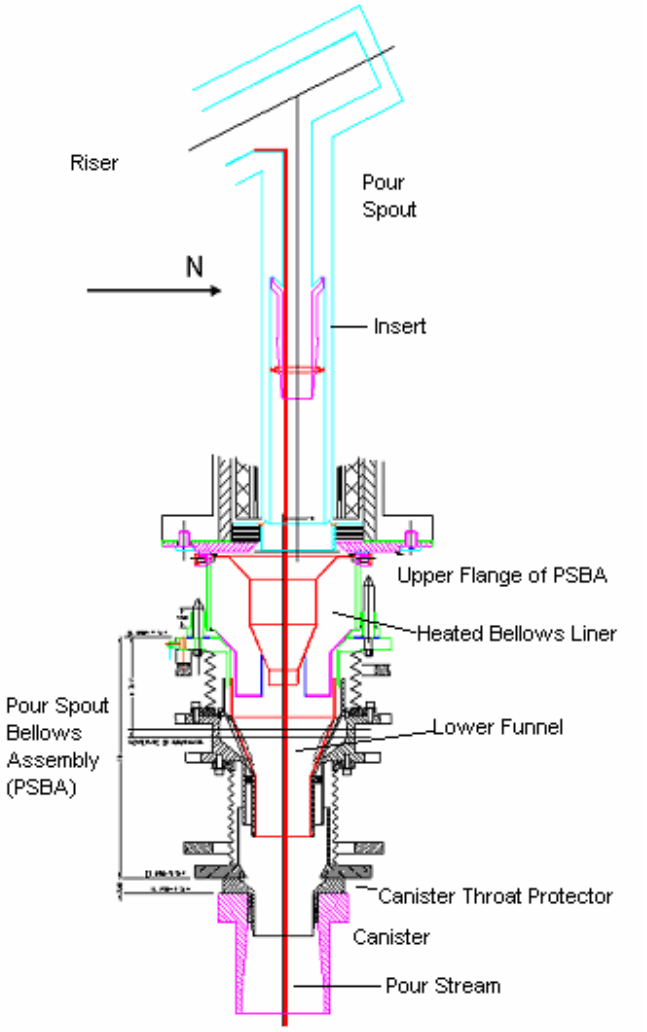
Heated Bellows Liner

- Reduced downtime for cleanouts
- Increased attainment 5%



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Other Process Improvements

- Melter Siphon Detector – 2% increase
- Melter Feed Pump Software Logic Changes – 2% increase
- Steam Atomized Scrubber (SAS) Operation vs. Recycle Water – 3% increase
- Frit Adjustments – ensures melt rate/throughput is optimized with constituents of sludge

Potential Improvements

- Gas Chromatographs (GC) – installation 3/08
  - less downtime due to GC problems
- Sludge Adjustment and Receipt Tank (SRAT) Optimization
- Technology Improvements
- Continued Monitoring of Existing Parameters

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Challenges

- Equipment Maintenance
- Spare Parts
  - Pumps
    - Precipitate Reactor Feed Tank (PRFT) Transfer Pump
    - Strip Effluent Feed Tank (SEFT) Transfer Pump
    - 512-S Transfer Pump
  - Agitators
    - Sludge Receipt and Adjustment Tank (SRAT),
    - Slurry Mix Evaporator (SME)
  - Coils - SME Coil
  - Tanks
    - SME Tank
    - Melter Feed Tank (MFT)
    - SRAT

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