Defense Waste Processing Facility Melter Bubblers

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Acknowledgements

- DOE-SR
- DWPF Facility Engineering
- DWPF Operations
- EnergySolutions/Vitreous State Laboratory
- SRNL
• Liquid Waste System
• DWPF Overview
• Bubblers Implementation
  – Controlled, systematic approach
  – Reliably install and operate bubblers
  – Maintain glass quality requirements
  – Enhance sludge disposition rate
• Specific Questions
  – Melter impacts
  – Cold-cap coverage: volatiles carryover
SRS Liquid Waste System

- DOE Complex Legacy Materials
- Savannah River & other Spent Fuel

H Canyon
- H Tank Farm
  - empty tanks -> closure
  - Sludge Preparation
    - ARP/MCU
    - SWPF
      - salt solution
      - Cs, Sr & Actinides
      - DWPF
      - GWSBs
        - canisters
        - Disposal

*Average of 215 canisters/year for last 10 years

**Abbreviations**
- DWPF - Defense Waste Processing Facility
- GWSB - Glass Waste Storage Building
- ARP - Actinide Removal Process
- MCU - Modular Caustic Side Solvent Extraction Unit
- SWPF - Salt Waste Processing Facility
- DSS - Decontaminated Salt Solution
Waste Acceptance Activities

- Glass quality requirements met
- REDOX control through formic acid/nitric acid
- One sample per macro-batch
*Currently rate-limiting step at DWPF
Current Glass Pump

- Glass Pump Provides ~6% Increase In Canister Productivity
• Implement bubblers in existing Glass Melter to increase melt rate/waste throughput
  – Maximize number
  – Symmetry
  – Location with respect to feed point
  – Ease of remote access
  – Minimize impact on remote jumpers
Melter Configuration
Bubbler Assemblies

- Bail
- Hanford Connector
- Accumulator
- Level Detector Ar Supply
- Bubbler Ar Supply
- Melter Pressure Ar Supply
- Alumina Sleeves
- Sleeve Retainer
- Melter Pressure Leg
- Level Detector Leg
- Bubbler Leg
- Hanford Connector
- Accumulator
- Counterbalance Weight
- Thermowell
- Sleeve Retainer
- Alumina Sleeves
- Bubbler Leg
- Bubbler Leg Supply Line
- Thermocouple
Bubblers Implementation

- Installation and operation of the bubbler systems following a safe, systematic, and controlled approach
- Testing program is being completed to determine any safety and operational impacts to the system
- Bubbler installation on track to September 2010
  - Detailed controlled startup
  - Learning process as with all enhancements/modifications to existing facilities
- Same glass quality requirements met
- Enhanced the production capacity to accelerate the sludge disposition rate
Knowledge of Bubblers

Knowledge of test programs, and previous melters operated under similar conditions, were used to develop the strategy for implementation at DWPF.
Key Parameters in DWPF Bubblers

- Cold cap is critical to the operation of the DWPF melter and will be maintained with bubbler operations
  - Minimize carryover of volatile species (e.g. halides)
  - Off-gas system life not significantly impacted
  - Minimal changes in radionuclide carryover (e.g. Tc)

COLD-CAP BUILD-UP DURING NORMAL OPERATIONS

DM1200 Experimental Melter at VSL-CUA
Summary

• Bubbler implementation strategy is a comprehensive plan to address specific technical issues and integration within the plant
  – Sludge batch planning
  – Transfer control
  – Safety analyses
  – Melter impacts
  – Glass quality
• Controlled strategy will be used to install and operate bubblers at the DWPF facility
• It is recognized that, as with any modification, there is a start-up phase and continuous improvement that will take place as the bubblers are operated and more knowledge is gained