Glass Formulation for DWPF:
Current Status, Goals, and Future Challenges

David K. Peeler
Senior Fellow Engineer
Environmental & Chemical Process Technology

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Increasing Waste Throughput

1) Process Faster  →  Increase Melt Rate
   - More canisters per year
   - Reduce production time and mission cost

2) Make Fewer DWPF cans  →  Increase Waste Loading
   - Less canisters containing more waste
   - Reduce production time and mission cost
   - Reduce canister storage and disposition cost

*Higher waste throughput ultimately reduces the total number of years the HLW system is operated (significant cost avoidance)*
Approaches to Improve Waste Throughput

Primary efforts to improve waste loading and/or melt rate in the areas of:

- Reducing conservatism in process control models
  - Without compromising process or product performance issues
- “Shifting” the frit development strategy
  - “Global” (one frit fits all) concept → “tailor” a frit specifically to each sludge batch
- Making physical additions to the melter
  - “Glass pump” followed by implementation of bubblers (ES/VSL)
Historical Perspective

Sludge Batches 1A, 1B, and 2 used Frit 200

- Nominal waste loadings (WL) were ~28%

Implementation of waste throughput approaches resulted in significant increases in WL

- SB2 (Frit 320): nominal 34% WL
- SB3 (Frit 418): nominal 38% WL
- SB4 (Frit 510): nominal 34% WL
  - High waste throughput: SRAT/SME rate limiting
- SB5 (Frit 418): nominal 33% WL
  - Fissile loading limited
- SB6 (Frit 418): nominal 36% WL
- SB7a and SB7b (Frit 418): nominal 36% WL
- SB8 (Frit 803): projected to start processing in May 2013
Future Challenges

- Development of a single frit that will be robust to:
  - Significant changes in sludge compositions within a sludge batch assuming flowsheet swings from sludge-only to coupled (salt processing) operations are not dampened
  - Meeting WL expectations or canister production goals with significant compositional shifts for a given sludge batch

- Updating models to account for higher volume throughput of salt waste processing streams (ARP/MCU and SWPF) and potential alternatives

- Supporting development of the High-Level Waste Systems Plan to:
  - Identify potential technical issues with future processing scenarios
  - Develop blending and washing strategies to optimize processing windows for future sludge batches