LWO-SPT-2009-00079

SRS Program Status

EM-21 Technical Exchange

Neil Davis

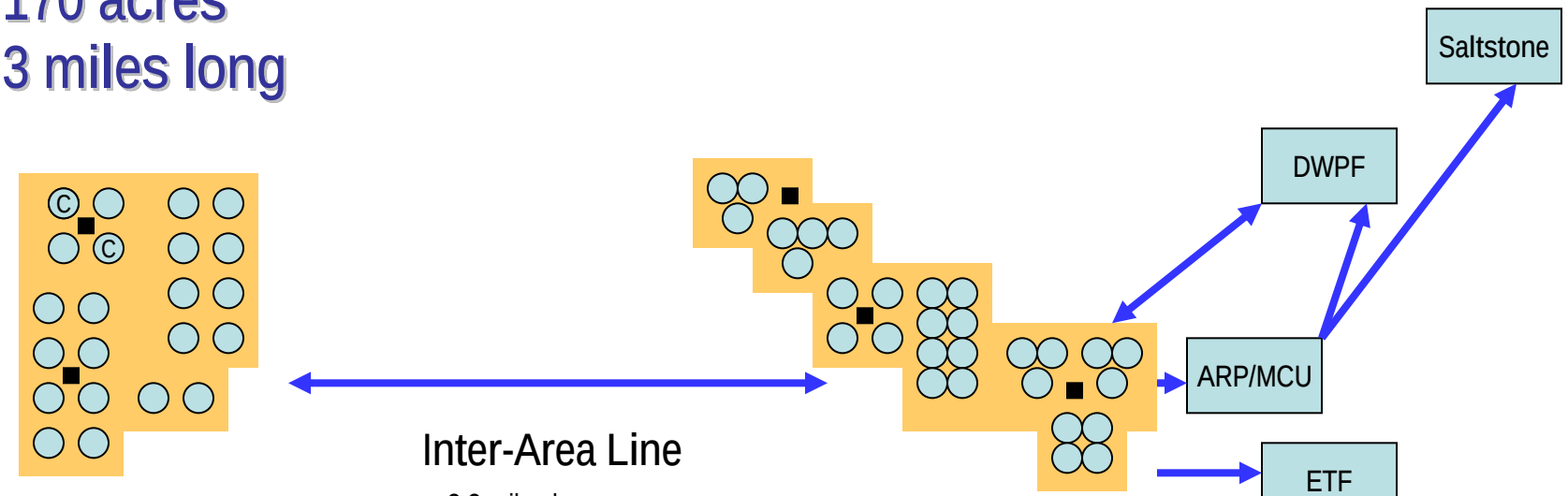
May 19, 2009

SRS LWO Mission

- Receive waste
- Store waste safely
- Vitrify waste
- Process salt waste
- Dispose of LLW
- Close tanks
- Enhance all of the above

SRS LWO Facilities

170 acres
3 miles long



F Tank Farm

- 22 tanks
- 1 evaporator (2F)

Inter-Area Line

- 2.2 miles long
- Pump pits at each end
- High point in the middle

H Tank Farm

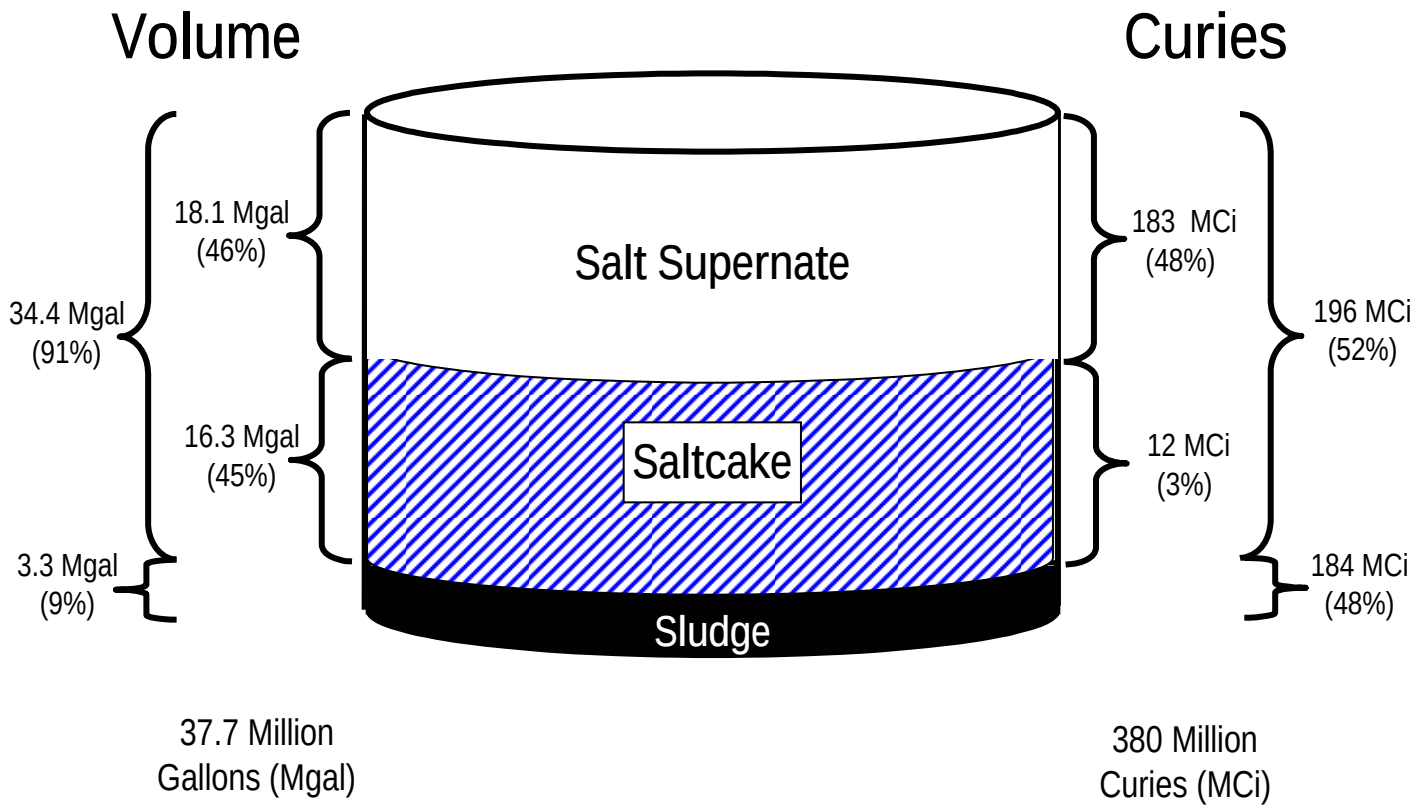
- 29 tanks
- 2 evaporators (2H & 3H)
- Most volume reduction and all pre-treatment occurs in H Area

Receive Waste

- Maintain available tank space
- Support critical site missions
  - H Canyon
  - Feed prep
  - Tank closure
- About 4,900 kgal/year
  - H Canyon @ 300
  - DWPF @ 1,900
  - ETF @ 120
  - IW/Chemicals @ 2,500

Store Waste

36-39 Mgal over last few years



Store Waste

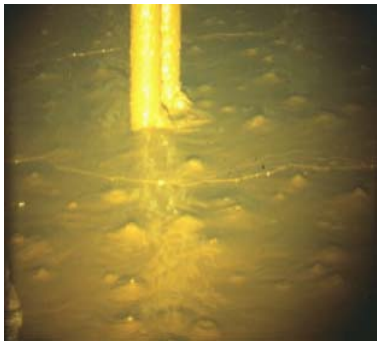
- Maintain tank integrity
- Volume reduce to enable future receipts
  - 3 operating evaporators (2F, 2H and 3H)
  - 4.0 to 4.5 Mgal/year space gain
  - Will shut down 2F ~2015 and 3H ~ 2020

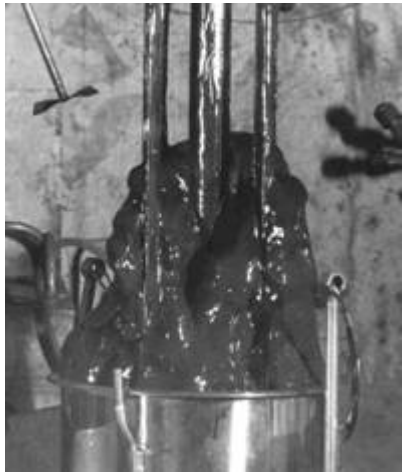
3H Evaporator

Evaporator Pot Internal

Vitrify Waste

- Sludge Batches
  - 17 sludge batches defined
  - Currently feeding SB#5
  - Prepping SB#6
- Sludge Removal
  - Currently removing sludge from Tanks 4 & 12 for SB#6
  - Tank 13 design complete and in early construction for SB#7
- Low Temperature Aluminum Dissolution
  - Complete for SB#5, saves ~100 cans
  - Task ready for SB#6
    - Will save ~100 cans, but more importantly
    - Will enable us to prep and process this batch!





Sludge in Tank 15 and at SRNL

Submersible Mixer Pump

Vitrify Waste

- Sludge Washing
  - –After aluminum dissolution, the sludge is washed to reduce the Na concentration
  - –Planned for SB#6
  - –Generates 1.4 Mgal of spent washwater
- Can Production
  - –186 to 200 cans/year
  - –2,707 cans to date (as of 5/14/09)
  - –Higher waste loading, higher fill height than design basis
  - –Throughput limited by SRAT/SME cycle time
  - –Waste loading limited by YMP license application (897 gr/m3)

Defense Waste Processing Facility

Started rad ops Mar 1996

Vitrify Waste

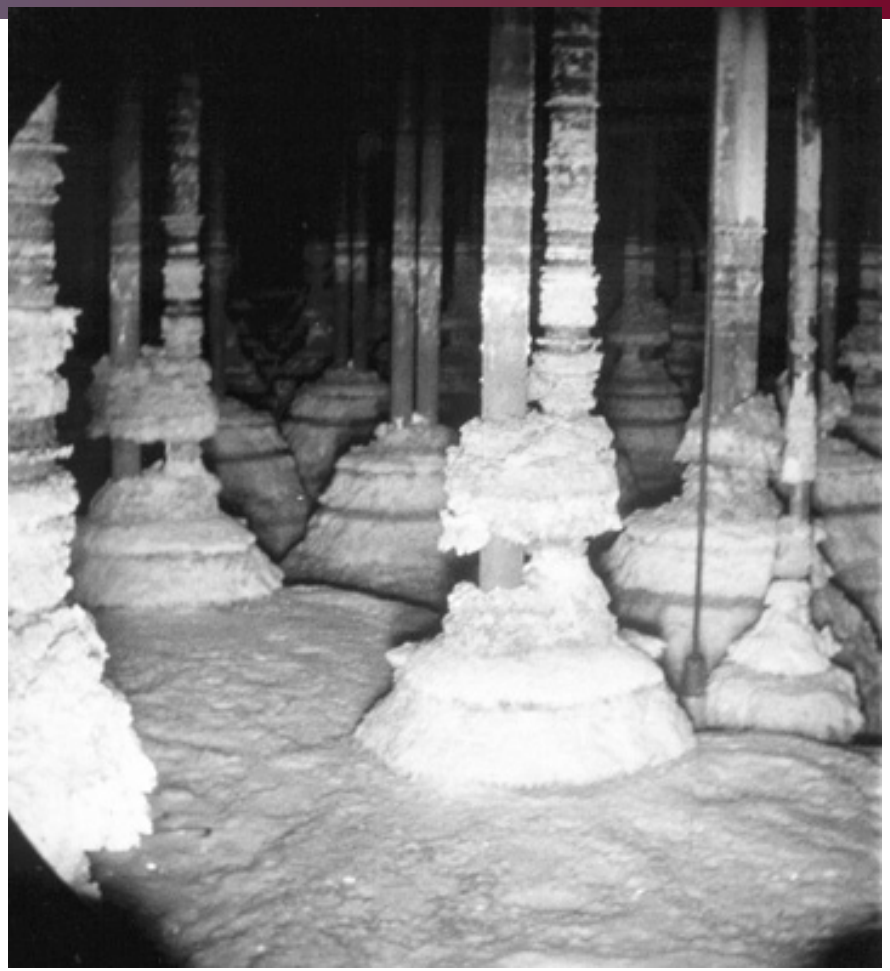
Canister Storage

- 3 GWSBs planned
  - GWSB#1 full (2,251 cans)
  - GWSB#2 filling now (456 of 2,339 spaces filled)
  - GWSB#3 needed ~2016
- Ship to YMP assumed 2017

Glass Waste Storage Building #1

Salt Processing

- Three phases:
  - –DDA
  - –ARP/MCU
  - –SWPF
- DDA (Deliquification, Dissolution and Adjustment)
  - –Select most benign salt
  - –Perform 2 physical separations to reduce Cs-137
  - –Adjust Na content and feed to Saltstone
  - –~2.5 Mgal planned
    - ~1.5 Mgal complete
  - –Closely monitored by SCDHEC



Saltcake with Supernate Removed

Salt Processing

ARP/MCU

- Also based on the most benign salt feed (>1.1 Ci/gal Cs-137)
- Reduce Sr-90 and actinide concentration
  - Adsorb on Monosodium Titanate particles
  - Ultrafiltration
- Reduce Cs-137 concentration
  - Solvent extraction
- Pilots SWPF operation
- Throughput planned for 1.2 Mgal/year, 285 kgal thus far
- Planned for a total of ~4 Mgal feed
  - Potential for more
- Also closely monitored by SCDHEC

Modular Caustic Side Solvent Extraction Unit

Contactor Bank

Salt Processing

SWPF

- This is the long term salt processing capability
- Same flowsheet as ARP/MCU
- Will process ~105 Mgal of salt solution
  - ~5 Ci/gal Cs-137
  - 2013 to 2030
- Cs-137 DF up to 40,000
- Decontaminated stream to Saltstone
- High activity & solids stream to DWPF

Salt Waste Processing Facility

under construction

Salt Processing

SWPF Support

- DOE-SR is the Design Authority
- SR has contracted LWO as staff aug
  - Design & flowsheet reviews
  - Interface management
  - ARP/MCU info sharing
  - And some design/build to support the Line Item
- Significant work scope to ensure that LWO will be able to provide continuous pre-qualified feed at 6 Mgal/year

Warehouse Facility

under construction

LLW Disposition

Saltstone

- Retrofitted to handle higher activity feed during DDA program
- Currently being upgraded to handle future SWPF
  - Organic carryover
  - Need to increase throughput (from ~ 2 to 7.5 Mgal/year)

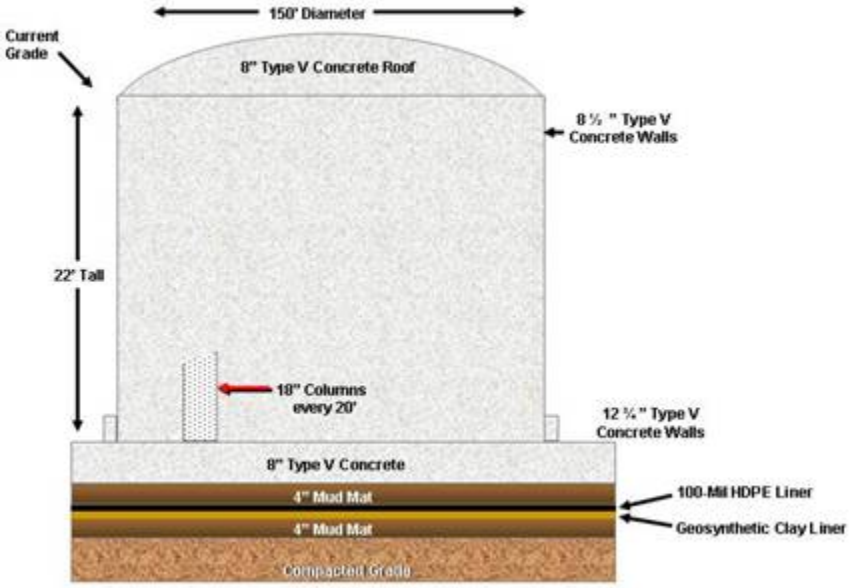
Saltstone Disposal Facility

LLW Disposition

Saltstone Vaults

Old Vault Design

New design is less like a concrete box and more like a steel tank



LLW Disposition

Effluent Treatment Facility

- Receives ~20 Mgal/year
  - Evaporator overheads
  - Potentially contaminated surface water
  - Misc very LLW streams
- Treated water to site outfall
- Reject stream to Saltstone
  - ~120 kgal/year
- Just celebrated 20th year of operations

Effluent Treatment Facility

Close Tanks

- 51 tanks at SRS
- Closure of 24 tanks driven by the FFA
  - Non-compliant
  - Plan and schedule for closure ending 2022
  - 2 already closed (Tanks 17 and 20)
  - Missed original schedule for the next 2 (Tanks 18-19)
- Dispute Resolution
  - The Regulator gave us relief on Tanks 18-19 closure, but got us to commit to interim waste removal milestones
- Current Plan
  - Tanks 18-19 must be closed 12/31/12
  - 4 more tanks must be closed 9/30/15
    - Tanks 5-6 will be 2 of these tanks

Close Tanks

Tank 18 Before Cleaning

Tank 18 During Cleaning
(Tank 19 looks similar)

Close Tanks

Tank 5 Before Chem Cleaning

Tank 5 During Chem Cleaning
(Tank 6 looks similar)

Planned Enhancements

- Increase DWPF throughput
  - Bubblers to increase melt rate
  - Places sludge prep on critical path
- Increase DWPF waste loading
  - Assuming relief on the Pu in glass limit
- Prep for SWPF startup
  - Increase Saltstone throughput
  - Infrastructure in the Tank Farms to provide pre-qualified feed
- Improve ability to clean tanks
  - Enhanced Chemical Cleaning
- Improve LLW disposition
  - New Saltstone Vault design