Savannah River Remediation

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System Plan Revision 19

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Purpose

Fulfill Savannah River Site Citizens Advisory Board request for briefing on Revision 19 of the Liquid Waste System Plan

Agenda

- Liquid Waste System Overview/Status
- Rev 19 Inputs & Assumptions
- Rev 19 Results
- Summary

SRS Liquid Waste Program

(status through March 2014)

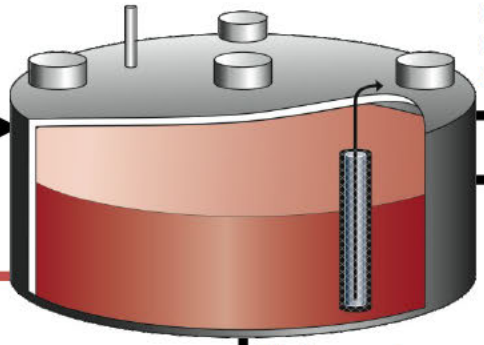
Operational Goals
- ✓Radionuclides to glass
- ✓Chemicals to Saltstone
- ✓Tanks closed

Legend:

ARP	Actinide Removal Process
DWPF	Defense Waste Processing Facility
MCU	Modular Caustic Side Solvent Extraction Unit
SWPF	Salt Waste Processing Facility

Legacy Liquid Waste

43 tanks, 37 Mgal
280 MCi



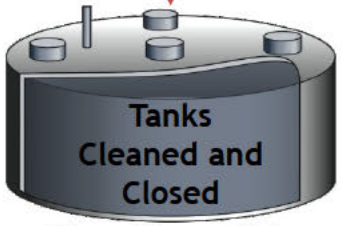
Salt waste
7.0 Mgal
treated

Salt Processing

SWPF
(under construction)

Sludge waste
3.7 Mgal
treated

Radionuclides



<1% radionuclides
remain in tanks

51 Tanks
- 6 grouted & closed
- 2 heel removal complete
- 6 BWRE complete
- 70% empty (old style)
- 14% empty (new style)

>99% radionuclides
to glass

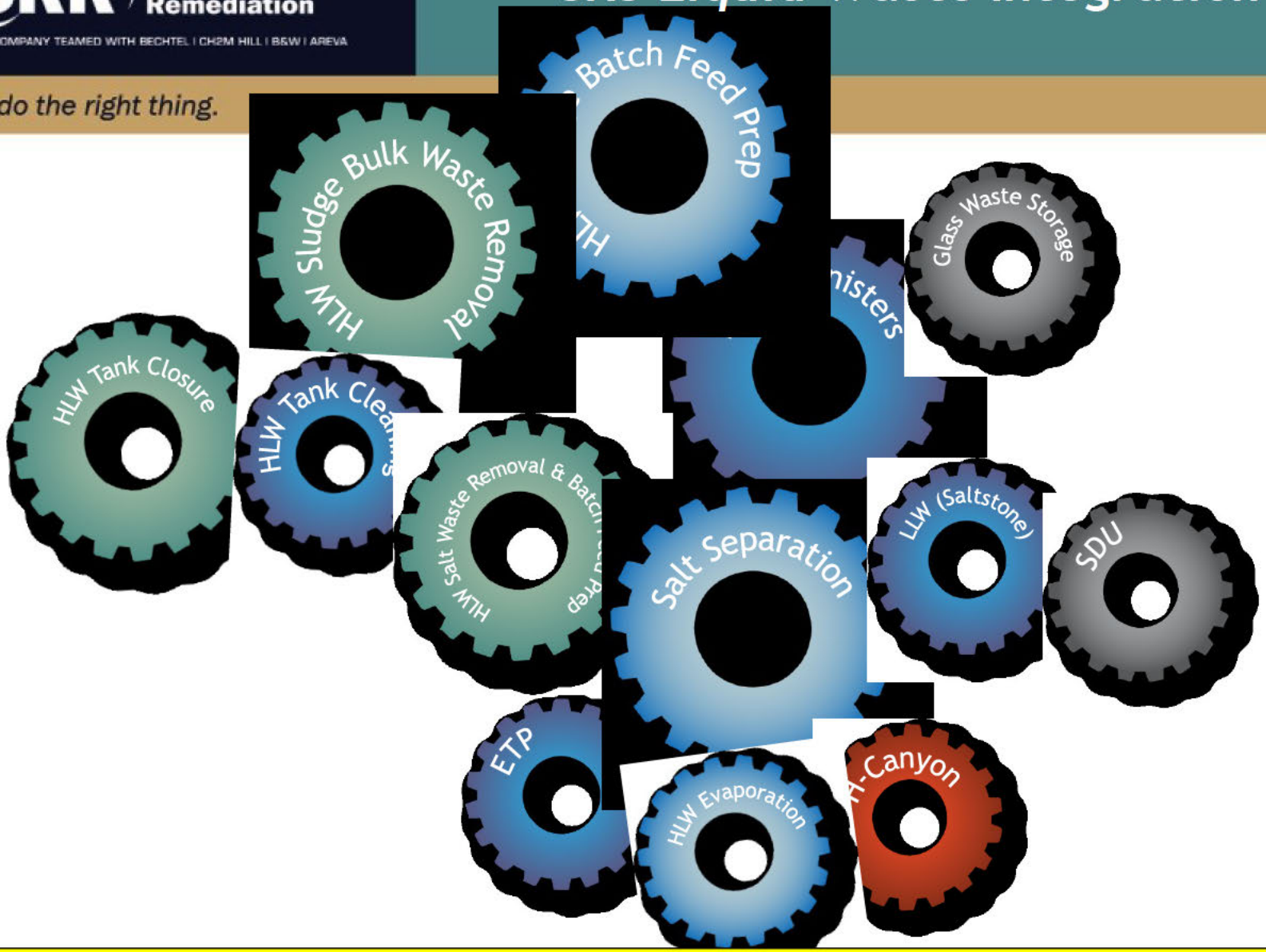
Poured 3,781 cans of projected 8,582
53 million curies immobilized in glass

Inert chemicals

<<1% radionuclides
to saltstone

15 Mgal grout dispositioned
containing 414 kCi

SRS Liquid Waste Integration



Safe receipt from H-Canyon, treatment, and disposition of SRS liquid waste requires synchronization of several highly interdependent nuclear facilities and chemical operations

System Planning

- Changes to System Plans are driven by:
  - Advances in Technology
  - Change in Sequencing
  - Acceleration Opportunities
  - Funding Adjustments

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- August 2013 inputs and assumptions (modified April 2014 & May 2014) for Rev. 19 of the Liquid Waste System Plan:
  - $407.1M new Budget Authority (BA) to the LW contractor in FY14
  - $430M/yr (constant dollar funding) to the LW contractor FY15-FY19
    - Includes Line Item funding, including assigned contingency, for SDUs beginning with SDU-7
    - Includes Glass Waste Storage Project (GWSP) Line Item beginning in FY15
  - $525 M (in FY20 and escalated thereafter) per year until the end of the program.
    - Includes $80M/yr (in FY20 and escalated thereafter) for operation of SWPF

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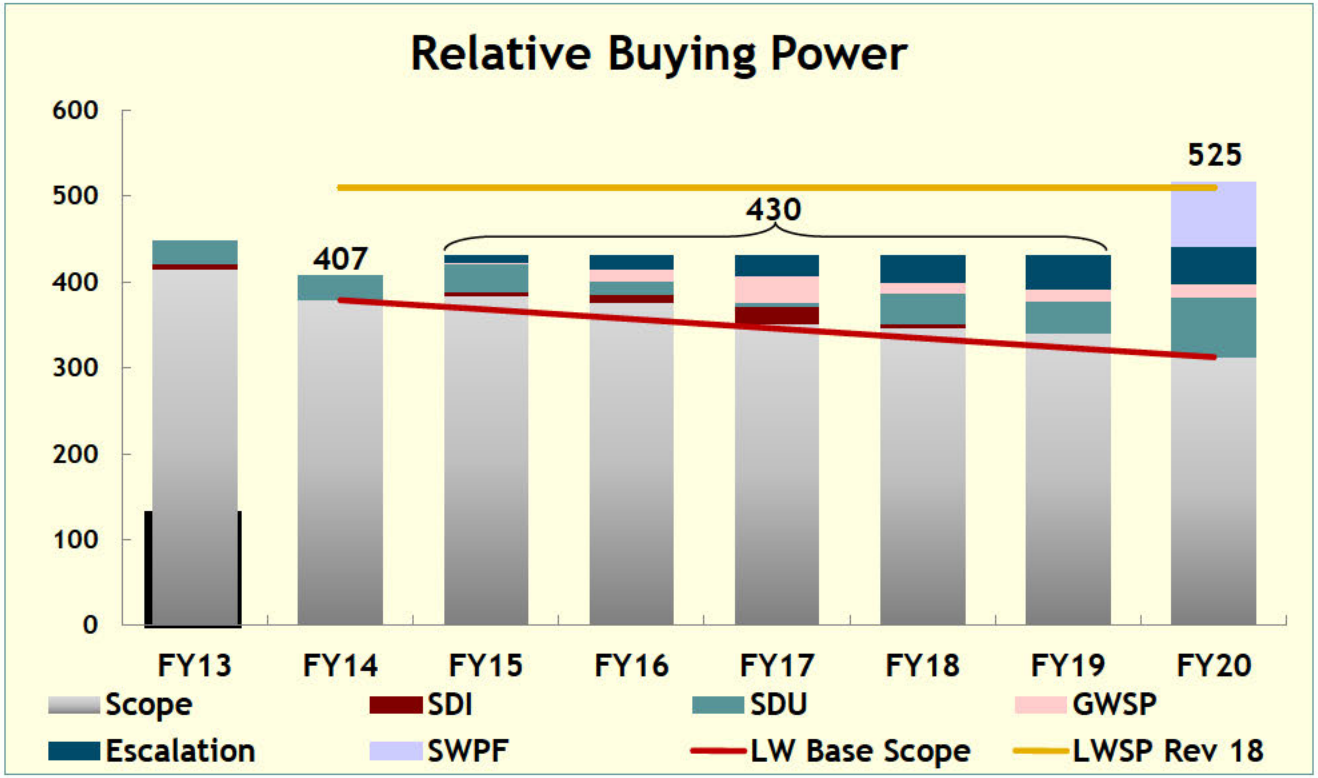


- Using these inputs, two significant impacts of the lower funding levels are realized:
  - SWPF is not supported at its rated capacity upon startup
  - After grouting Tanks 5, 6, 12, & 16 no tanks are grouted until 2024

System Plan Revision 19 Specific Results

- SWPF operations not supported at rated capacity
  - Sufficient salt batch blend tanks not available at SWPF startup
  - ARP/MCU operations limited due to funding and SDU space
  - Funding for DWPF enhancements not available until FY20 with completion in 2022
  - ELAWD II enhancements and increased staffing at Saltstone not funded until FY24
  - Inability to afford sludge waste removal at a pace sufficient to support desired canister and salt throughput
  - Limited canister storage locations prior to completion of the GWSP

- Comparison of SWPF capability versus predicted throughput modeling shows a cumulative difference of over 18 million gallons between FY19 and FY24, representing an additional two years to the Liquid Waste lifecycle

Fiscal Year	SWPF Capacity	Rev 19	Delta
FY19	4.625 Mgal	4 Mgal	-0.625 Mgal
FY20	7.2 Mgal	3 Mgal	-4.2 Mgal
FY21	7.2 Mgal	3 Mgal	-4.2 Mgal
FY22	9 Mgal	6 Mgal	-3 Mgal
FY23	9 Mgal	6 Mgal	-3 Mgal
FY24	9 Mgal	6 Mgal	-3 Mgal
Total	46.025 Mgal	28 Mgal	-18.025 Mgal

System Plan Revision 19 Specific Results (Continued)

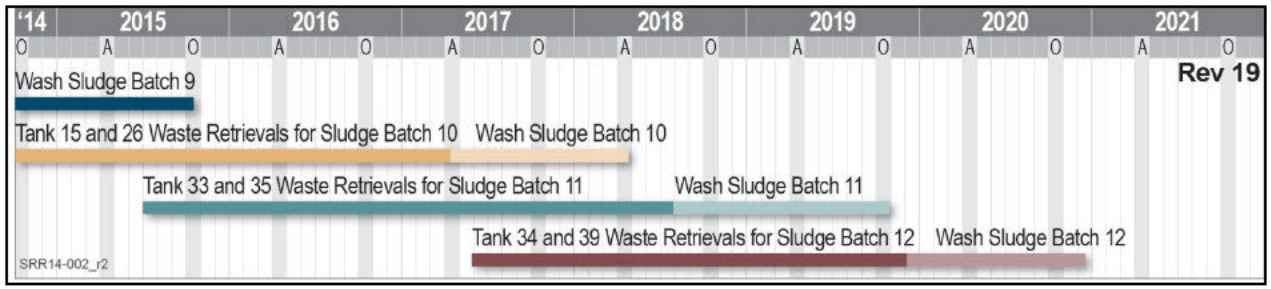
- Tank Closure Activities
  - Grouting of Tanks 5 and 6 completed in FY14
  - Grouting of Tanks 16 and 12 to be complete in FY16 (FFA date: FY15)
  - Given the Rev 19 inputs, next tank grouting occurs in 2024

- Interim Salt Processing
  - ARP/MCU operations provide tank space for preparation of sludge batches for DWPF, support of waste receipts from H-Canyon, progress towards closure of old-style tanks, and support of SWPF upon startup in 2018
  - ARP/MCU will utilize NGS
  - ARP/MCU throughput is determined by:
    - Operator staffing levels at Saltstone & ARP/MCU
    - Availability of Saltstone Disposal Unit space
    - Availability of canister storage
    - Funding to perform sludge waste retrievals
  - Salt processing at ARP/MCU will continue until 6 months prior to SWPF startup then shutdown for transfer line modifications to tie SWPF in to the Liquid Waste System

Fiscal Year	ARP/MCU Production Forecast (kgal)
FY14	800
FY15	1,500
FY16	1,200
FY17	2,000
FY18	1,000

System Plan Revision 19 Specific Results (Continued)

- Sludge Processing
  - DWPF canister production synchronized with ARP/MCU production
  - GWSB 2 had 822 available canister storage locations at start of FY14
  - Limited storage capacity in GWSB 2, and expected timing of the GWSP line item, limits DWPF operation until FY19
  - Bulk sludge waste retrievals and sludge batch washing and qualification are limited to just-in-time supply



Fiscal Year	Expected Canister Production
FY14	125
FY15	155
FY16	135
FY17	170
FY18	160
FY19	275
FY20	275
FY21	275
FY22	275
FY23	275

System Plan Revision 19 Specific Results (Continued)

- Saltstone Disposal Unit (SDU) Construction
  - SDU required to support grout production and salt treatment at either ARP/MCU or SWPF
  - Without available SDU space, Salt treatment cannot occur
  - SDU construction costs have significant impact to overall funding profile
  - SDUs must be available as follows to prevent impacting planned salt processing:

Saltstone Disposal Unit	Need Date
SDU 6	May 2017
SDU 7	October 2021
SDU 8	December 2023
SDU 9	September 2025

Rev 19 Results

Parameter	Revision 18	Revision 19
Final Type I, II, and IV tanks BWRE complete	2023	2028
Final Type I, II, and IV tanks complete operational closure	2028	2032
Complete bulk sludge treatment	2026	2030
Complete bulk salt treatment	2028	2033
Complete heel treatment	2032	2039
SCIX for supplemental salt waste treatment	Yes	No
Next generation extractant for increased SWPF throughput	Yes	Yes
Maximum canister waste loading	40 wt%	40 wt%
Nominal annual canister throughput rate	275	275
Total number of cesium-only canisters produced	0	0
Radionuclides (curies) dispositioned in SDF within LW Strategy	Yes	Yes

Alternative Case

- Maximize salt treatment by supporting SWPF at rated capacity
  - LWSP Rev 19 § 5.1

Maximize SWPF Throughput

- Scope
  - DWPF Enhancements, ELAWD Phase II, SPF @ 24/7, Accelerate Sludge BWRE
  - Enhance ARP/MCU production
  - Accelerate SDU Construction
  - Increase GWSB #1 capacity
- Results

Fiscal Year	Rev 19 ARP/MCU	Alt Case ARP/MCU	Rev 19 SWPF	Alt Case SWPF
FY14	800	800		
FY15	1,500	1,500		
FY16	1,200	1,200		
FY17	2,000	4,700		
FY18	1,000	2,350		
FY19			4,000	4,625
FY20			3,000	7,200
FY21			3,000	7,200
FY22			6,000	9,000
FY23			6,000	9,000
FY24			6,000	9,000
Total	**6,500**	**10,550**	**28,000**	**46,025**

Parameter	Rev 19	Alt Case
Final Type I, II, & IV tanks BWRE complete	2028	2027
Final Type I, II, & IV tanks grout complete	2032	2031
Complete bulk sludge treatment	2030	2028
Complete bulk salt treatment	2033	2031
Complete heel treatment	2039	2037
SCIX for supplemental salt waste treatment	No	No

Rev 19 Addendum

- Currently under development - Due August 15, 2014
- **While maintaining risk reduction, emphasize removing waste from old-style tanks and providing enhanced capability for feeding SWPF**

Summary

Lessons Learned from Rev 19 modeling:

- Importance of SWPF in lifecycle planning
- Importance of near term salt processing
- Need for SWPF support projects
- Need/Importance of SDUs

Acronyms

ARP	Actinide Removal Process
BWRE	Bulk Waste Removal Efforts
DOE	Department of Energy
DOE-EM	Department of Energy – Environmental Management
DWPF	Defense Waste Processing Facility
ELAWD	Enhanced Low Activity Waste Disposal
FFA	Federal Facilities Agreement
FY	Fiscal Year (October 1st – September 30th)
GWSB	Glass Waste Storage Building
LWSP	Liquid Waste System Plan
MCi	Million Curies
MCU	Modular Caustic-side Solvent Extraction Unit
Mgal	Million Gallons
NGS	Next Generation Solvent
SCIX	Small Column Ion Exchange
SDI	Salt Disposition Integration
SDU	Saltstone Disposal Unit
SRR	Savannah River Remediation, LLC
STP	Site Treatment Plan
SWPF	Salt Waste Processing Facility