

# Tank Waste Risk Reduction at SRS

*Past, Present and Future*

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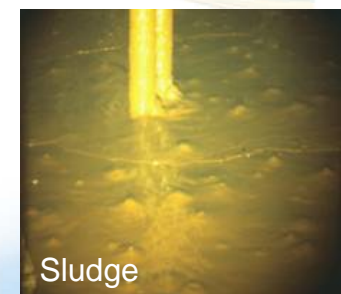
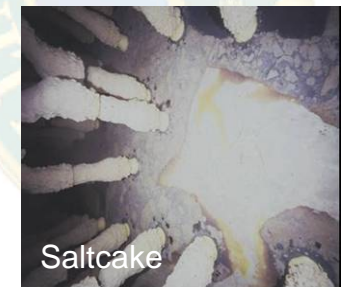


# Liquid Waste Program Operations

*"Liquid waste at SRS is the single greatest environmental risk in South Carolina"*

## Program Focus

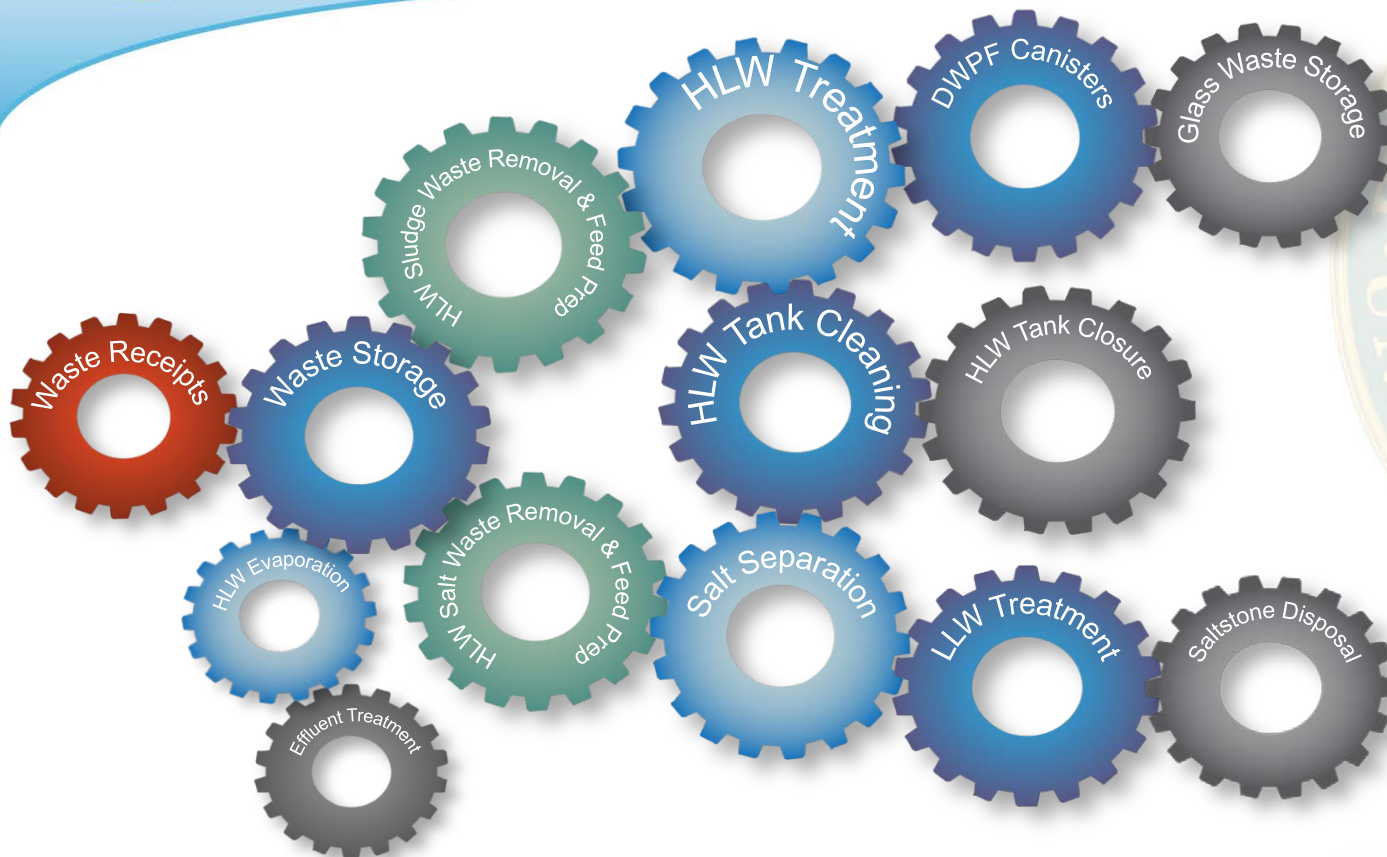
- Safely storing 36 million gallons of radioactive liquid waste
- Operating major nuclear facilities to support H-Canyon missions and to treat and disposition tank waste
  - Operating interim salt waste processing system
  - Vitrifying highly radioactive radionuclides at the Defense Waste Processing Facility (DWPF)
  - Disposing low level residuals in Saltstone Disposal Units (SDUs)
  - Constructing the Salt Waste Processing Facility (SWPF)
- Emptying, cleaning and closing waste tanks







# Liquid Waste Program Integration



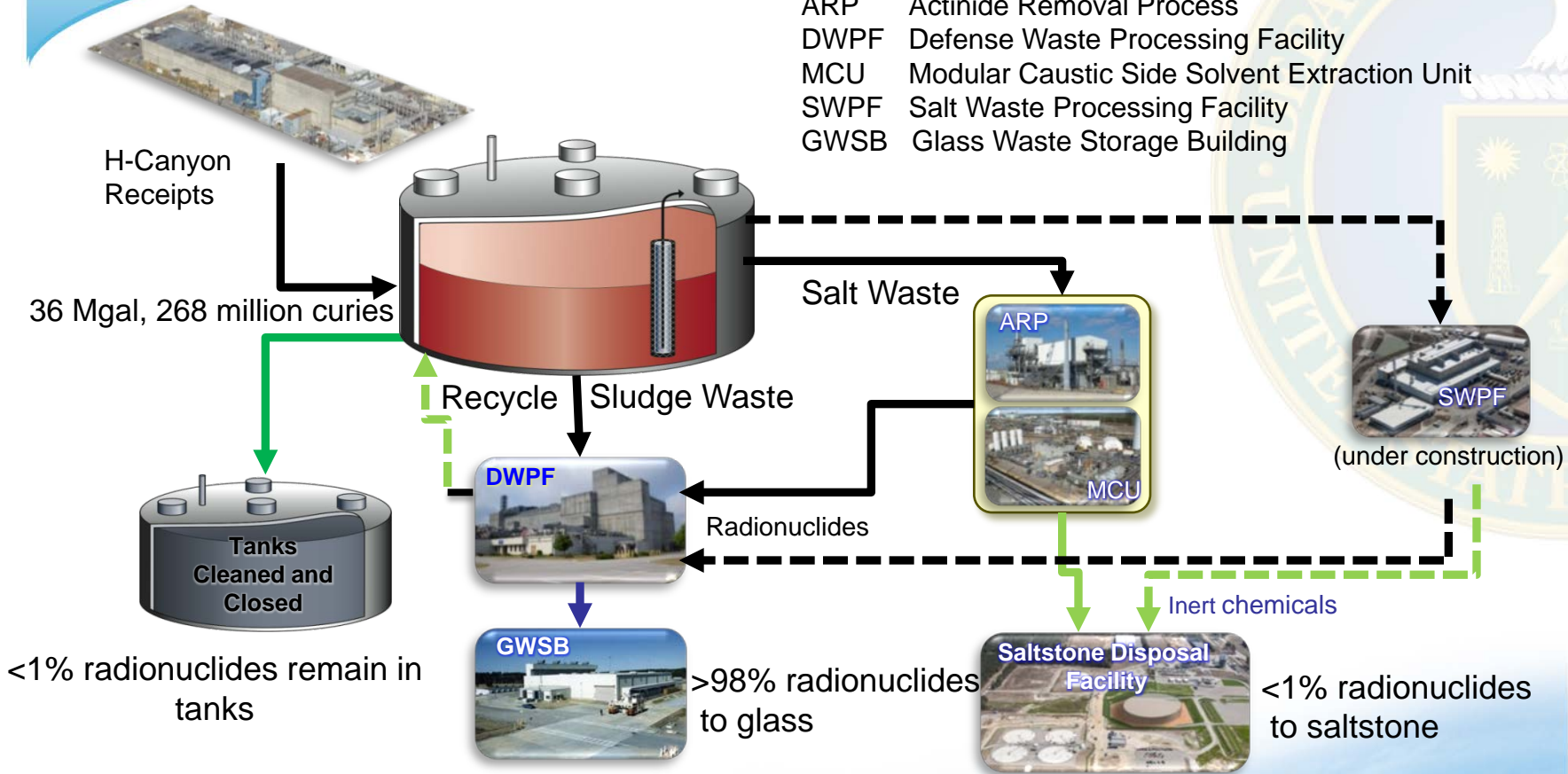
*Safe storage, treatment, and disposition of SRS liquid waste requires synchronization of several highly interdependent nuclear facilities and chemical operations*



# Key Liquid Waste Facilities

## Legend:

- ARP Actinide Removal Process
- DWPF Defense Waste Processing Facility
- MCU Modular Caustic Side Solvent Extraction Unit
- SWPF Salt Waste Processing Facility
- GWSB Glass Waste Storage Building





# Key Liquid Waste Facilities

## Defense Waste Processing Facility

- World's largest vitrification plant
- 36M gallons of waste awaiting disposition (268M curies of radioactivity)
- Almost all radioactivity from waste dispositioned via DWPF
  - Over 56 million curies to date
- Over 3,931 canisters filled since 1996
  - Of total 8,582 canisters anticipated



## Interim Storage of Canisters

- Glass Waste Storage Buildings
  - Seismically qualified underground concrete vaults
  - Designed for safe interim storage
- Approaching capacity of existing storage
  - GWSB 1 contains 2,206 canisters (2,314 capacity)
  - GWSB 2 contains ~1,737 canisters (2,340 capacity)
- Alternative storage concepts being implemented for remaining cans
  - Will increase capacity by 2,250 additional storage locations





# Key Liquid Waste Facilities

## Saltstone Processing Facility

- Vast majority of waste volume from tanks – but little radioactivity left in SC
- Curies left in SC treated for disposal via Saltstone Processing Facility
  - Salt solution stabilized by mixing with cement, flyash and slag
  - Resulting grout mixture mechanically pumped into concrete SDUs
- Safely processed ~8 Mgal low-level radioactive liquid salt wastes to date
  - Containing approximately 433 KCi of radioactivity



## Saltstone Disposal Facility

- Engineered low level waste disposal facility
- Non-leaching grout with low water permeability
- Initial 12-cell rectangular Vault 4 filled
- Saltstone Disposal Unit (SDU) 2 – modern watertight design – now full
- SDU 3 and 5 completed and being filled
- Currently constructing 3<sup>rd</sup> generation mega-vault SDU 6







# Key Liquid Waste Facilities

## Interim Salt Processing Facilities

- ARP/MCU operational since 2008
- Removes actinides — Strontium and Cesium (Cs-137) — from salt waste
- Nominal operating capacity >1.5 Mgal/yr
- Over 5.1 million gallons treated to date
- Decontamination and throughput exceed initial expectations
- Completed service life extension program
  - Completed installation of Next Generation Cesium Solvent in late 2014



Centrifugal  
Contactor  
Bank



Modular Caustic Side  
Solvent Extraction Unit (MCU)



Actinide Removal  
Process (ARP)

Providing operating experience for SWPF startup and initial operations



# Future Salt Waste Treatment Capability

## Salt Waste Processing Facility

This critical facility will:

- Reduce radioactive waste volume requiring vitrification
- Utilize the same actinide and cesium removal unit processes as Interim Salt Processing Facilities
- Ultimately process over 90% of Tank Farm liquid radioactive waste
- Currently developing system infrastructure to support startup and operations



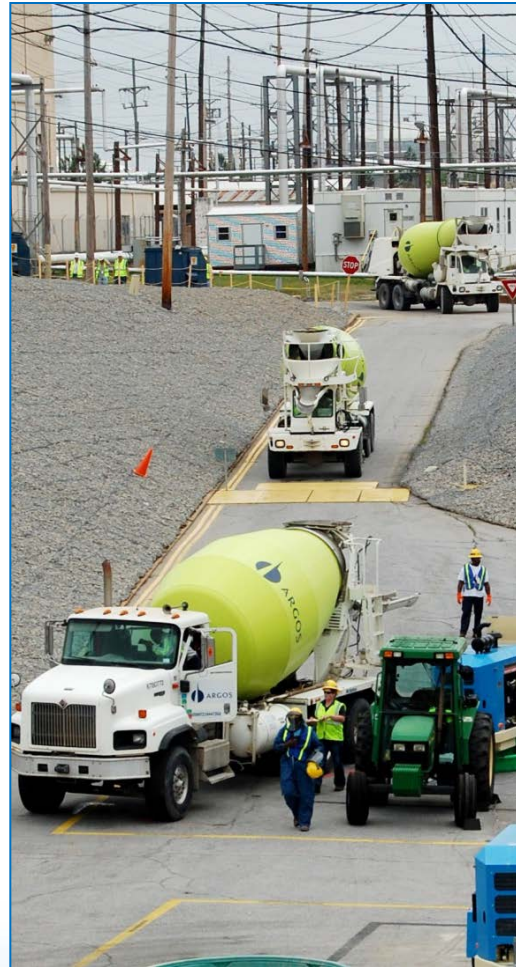




# Liquid Waste Processing End State

## Tank Closure

- All tanks will be emptied of waste, cleaned and closed
- Removal and closure of 24 “Old Style” tanks driven by Federal Facility Agreement (FFA)
- Tanks 17 and 20 closed in 1997
- Tanks 18 and 19 closed in 2012
  - *Working with regulators and stakeholders, completed ahead of FFA milestone*
- Tanks 5 and 6 closed in 2013, ahead of 2015 FFA milestone
- Tanks 12 and 16 in process





# Liquid Waste System Today

## Legend:

- ARP Actinide Removal Process
- DWPF Defense Waste Processing Facility
- MCU Modular Caustic Side Solvent Extraction Unit
- SWPF Salt Waste Processing Facility
- GWSB Glass Waste Storage Building

**Successfully Meeting Operational Goals**

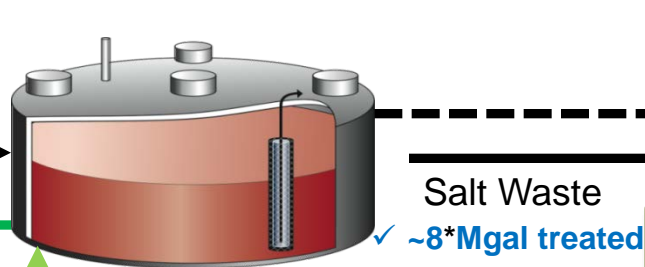
- ✓ Radionuclides to glass
- ✓ Chemicals to Saltstone
- ✓ Tanks operationally closed

**H-Canyon Receipts**  
 ✓ **Currently receives**  
 ~150 kgal/yr

36 Mgal, 268 million curies



- <1% radionuclides remain in tanks
- ✓ 6 of 51 operationally closed
- ✓ 2 more cleaned, awaiting closure
- ✓ 4 bulk waste removed
- ✓ old style – 35% of space used
- ✓ new style – 81% of space used



**Salt Waste**  
 ✓ ~8\***Mgal treated**

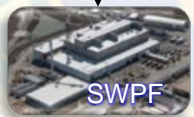
**Recycle Sludge Waste**  
 ✓ **3.9 Mgal treated**



>98% radionuclides to glass  
 ✓ **3,931 cans poured of projected 8,582 and 56 million curies immobilized in glass**



✓ **83% construction completion**



✓ **~17.2 Mgal grout disposed containing 0.43 million curies**

<1% radionuclides to saltstone

\* Salt Waste amount includes legacy Deliquification, Dissolution and Adjustment Process amount of 2.8 Mgal



# SRS Liquid Waste Program Challenges

- Delays in construction of SWPF have adversely impacted ability to meet regulatory commitments
  - Tank waste removal and closure milestones identified in the SRS FFA
  - Challenged to meet FFA milestone to close Tanks 12 and 16 in 2015
  - Removing and treating salt waste is key to meeting future FFA milestones
- Reduced program funding expectation limits opportunities to mitigate delays
  - Will seek opportunities to deploy beneficial new technologies
  - Must assure infrastructure preservation and maintenance and timely system readiness for SWPF operation





# SRS Liquid Waste Program Future Focus

- ✓ Tank waste cleanup mission remains a top EM priority
  - Continue to operate DWPF and interim salt treatment facilities
    - *Reduce risk*
    - *Maintain space for safe operations*
  - Focus on system readiness for SWPF operations
    - *Complete critical infrastructure improvements*
    - *Make space for preparing feed*
    - *Qualify feed in preparation for startup*
  - Operate SWPF to complete mission
- ✓ Progress paced by available funding
- ✓ Continue working with regulators to address milestones
- ✓ Continue supporting critical H-Canyon missions



