U.S. DEPARTMENT OF ENERGY

SRMC SAVANNAH RIVER MISSION COMPLETION®
Integrated Mission Completion Contractor

Salt Waste Processing Facility (SWPF)
Continued Optimizations

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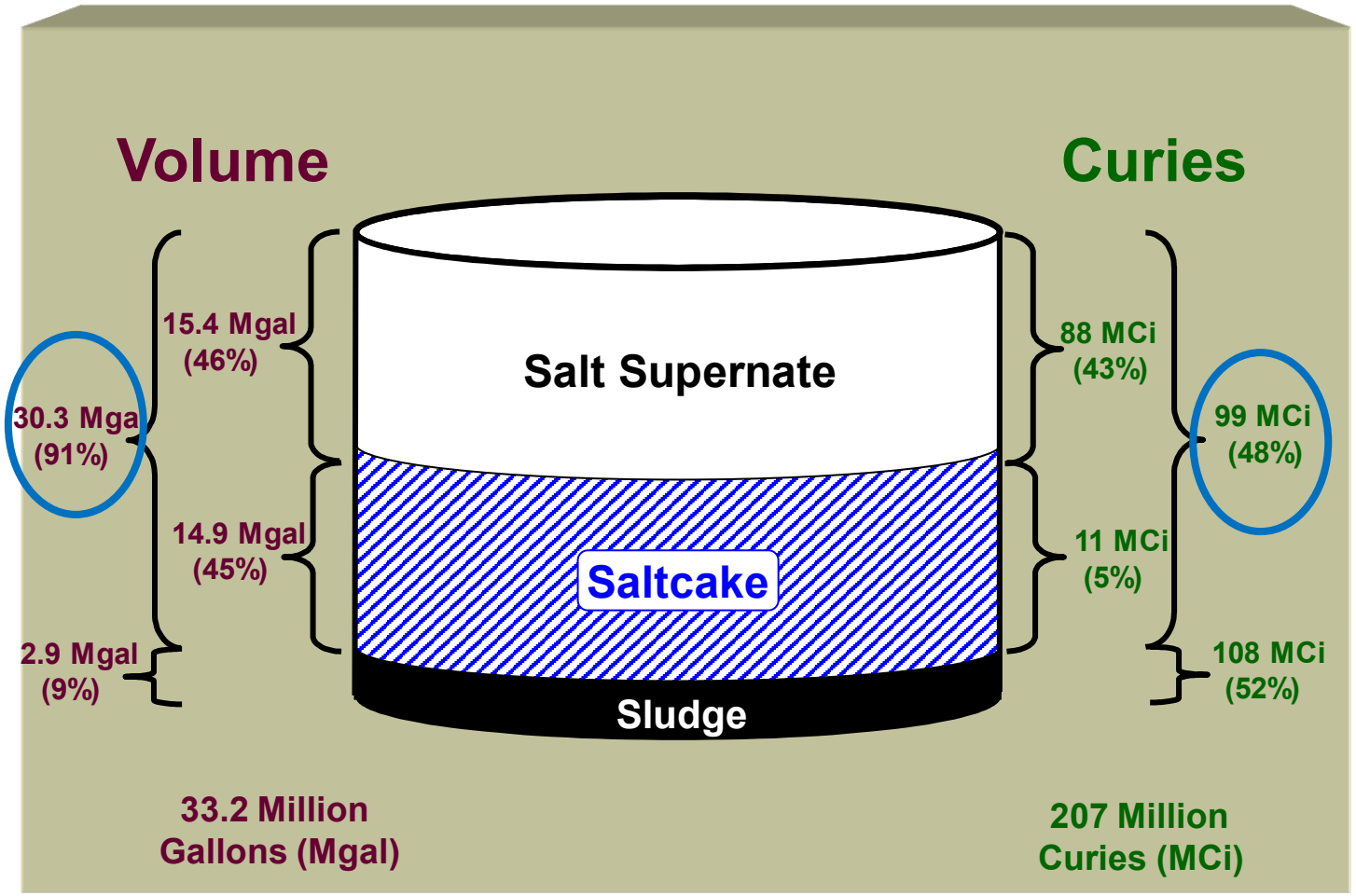
Savannah River Mission Completion

Citizens Advisory Board
July 30, 2024

Celebrating 30 Years CAB

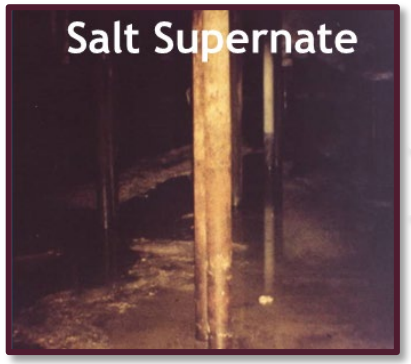
Inside the Tanks



Inventory values as of 2024-03-31

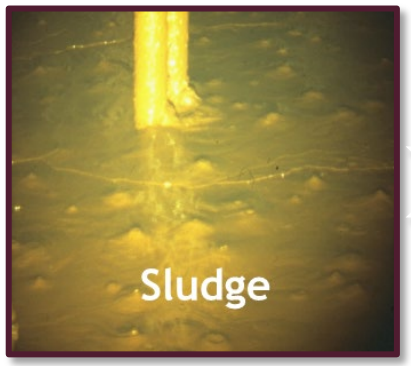
Similar to

Table salt



Similar to

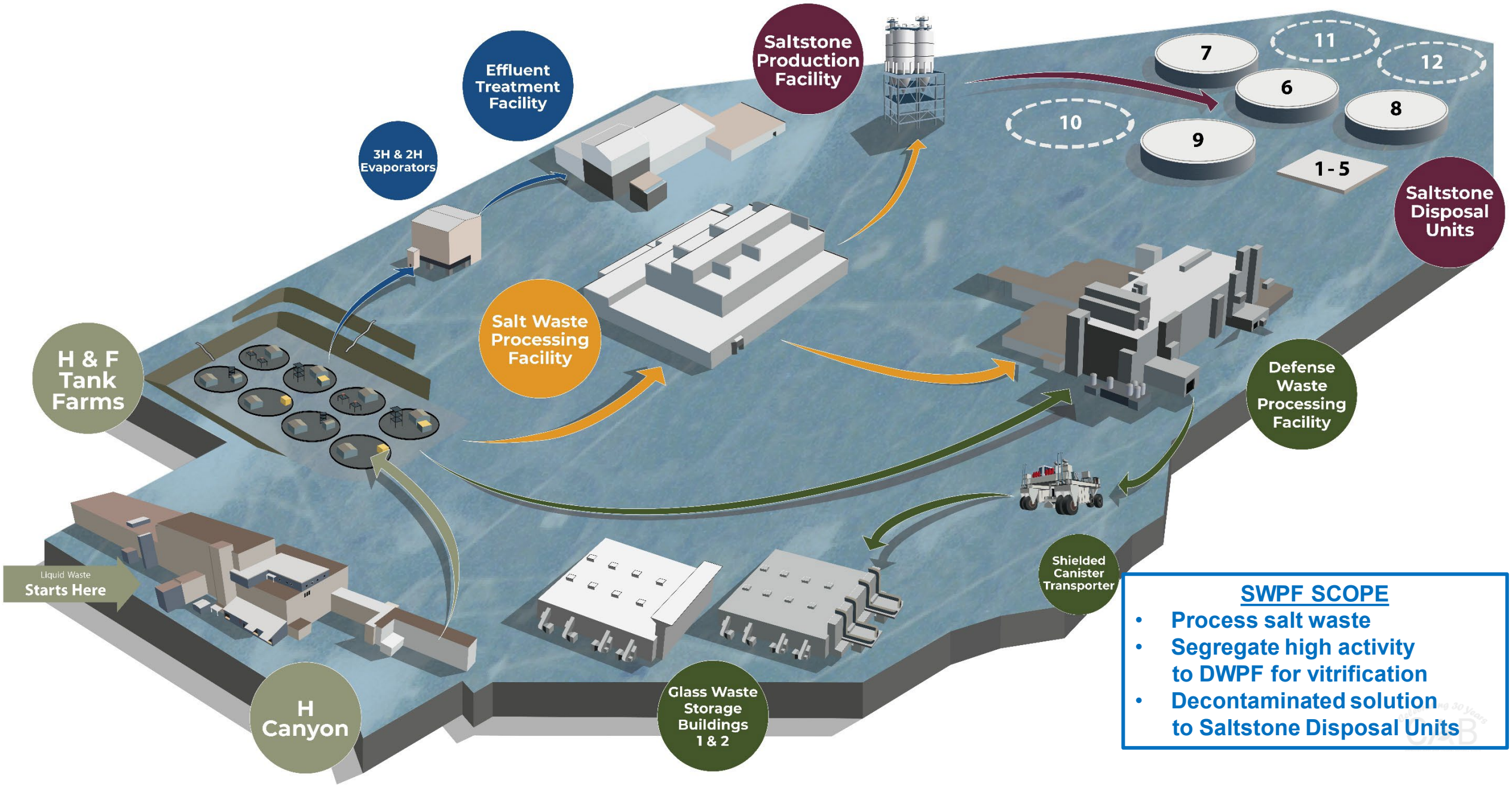
Pancake syrup



Similar to

Peanut butter

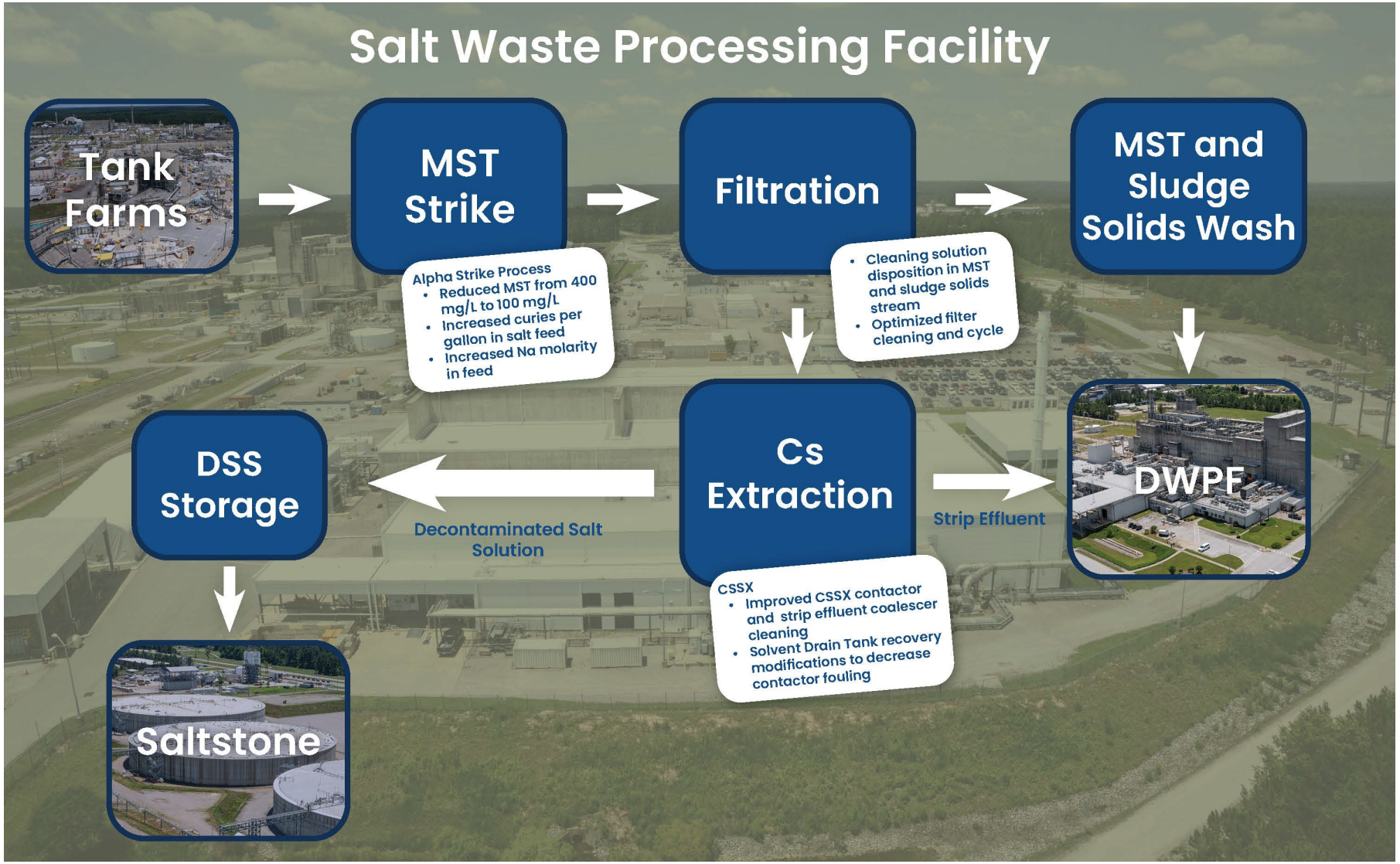
SRS Liquid Waste Facilities



SWPF SCOPE

- Process salt waste
- Segregate high activity to DWPF for vitrification
- Decontaminated solution to Saltstone Disposal Units

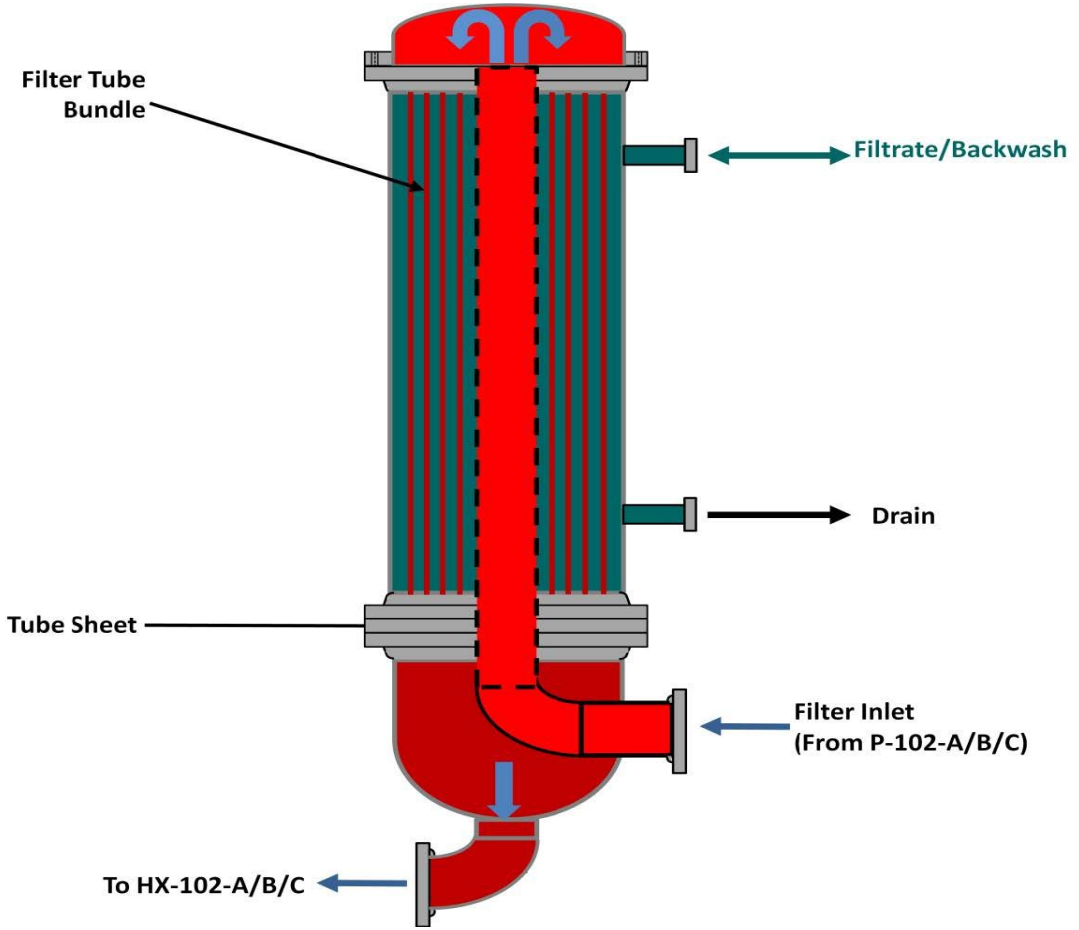
SWPF Process Overview



SWPF Key Process Systems - ASP

- **Alpha Strike Process (ASP)**
  - Add Monosodium Titanate (MST) to form chemical bond with radioactive Actinides – Strontium, Plutonium, etc.
  - MST/Actinide solids then separated by large filters

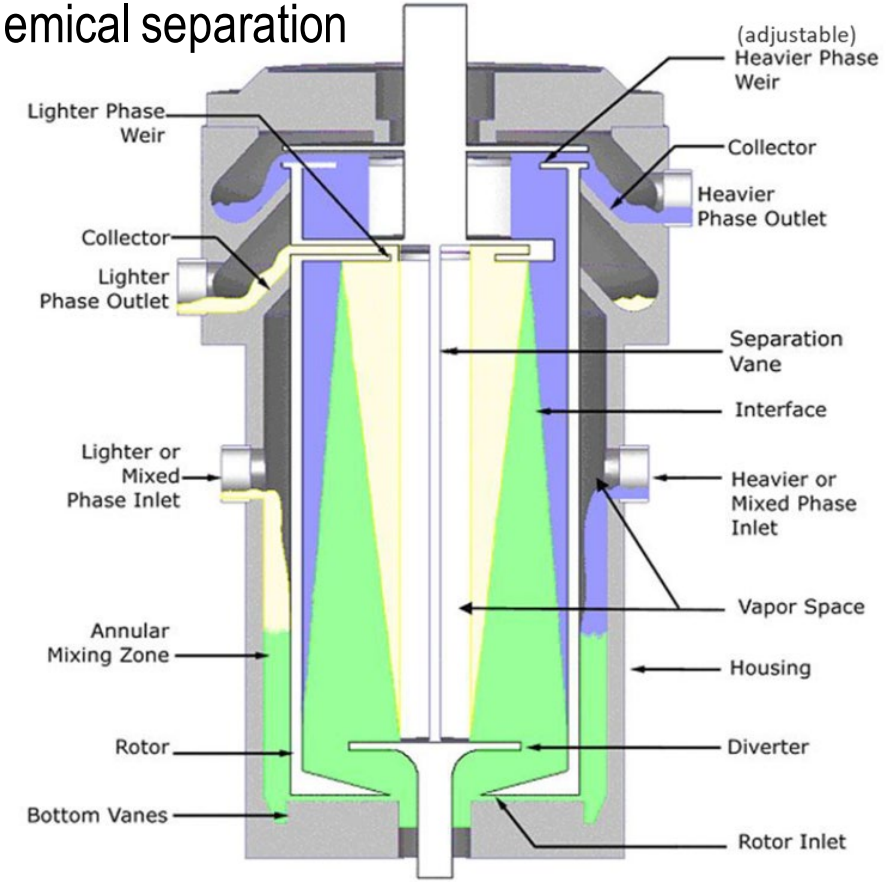
ASP Cross Flow Filter



SWPF Key Process Systems - CSSX

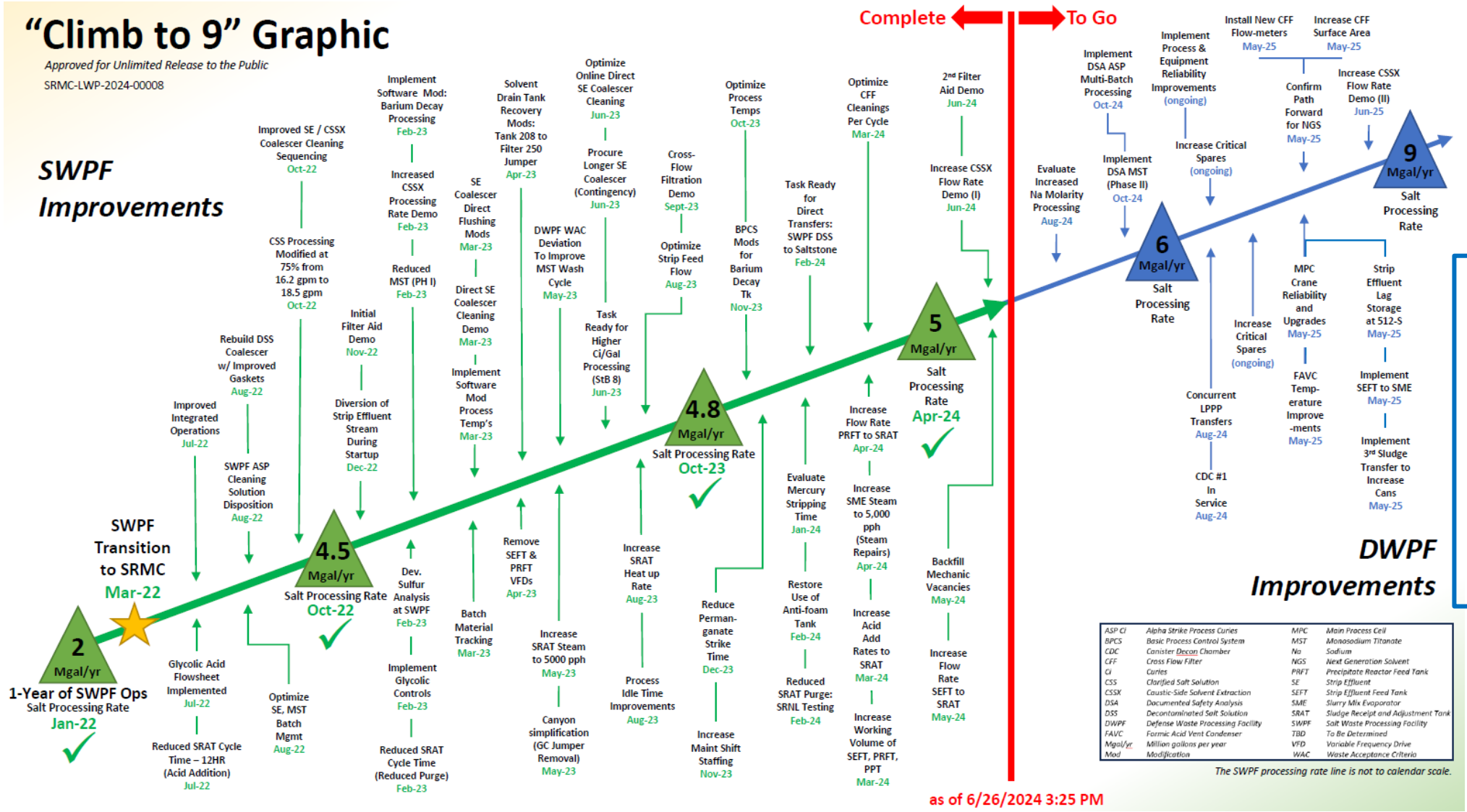
- **Caustic-Side Solvent Extraction (CSSX)**
  - Contains 36 centrifugal contactors – mechanical "mixer-settlers"
  - Extracts remaining radioactive elements (mainly Cesium) by chemical separation

CSSX Centrifugal Contactors



Centrifugal Contactor Cross-Section

SWPF Performance – "Climb to 9"



HIGHLIGHTS

- 2 Mgal First Year of Operation (Jan-22)
- Continuous Improvement since
- Recent ~6 Mgal/year
- Goal ~9 Mgal/year

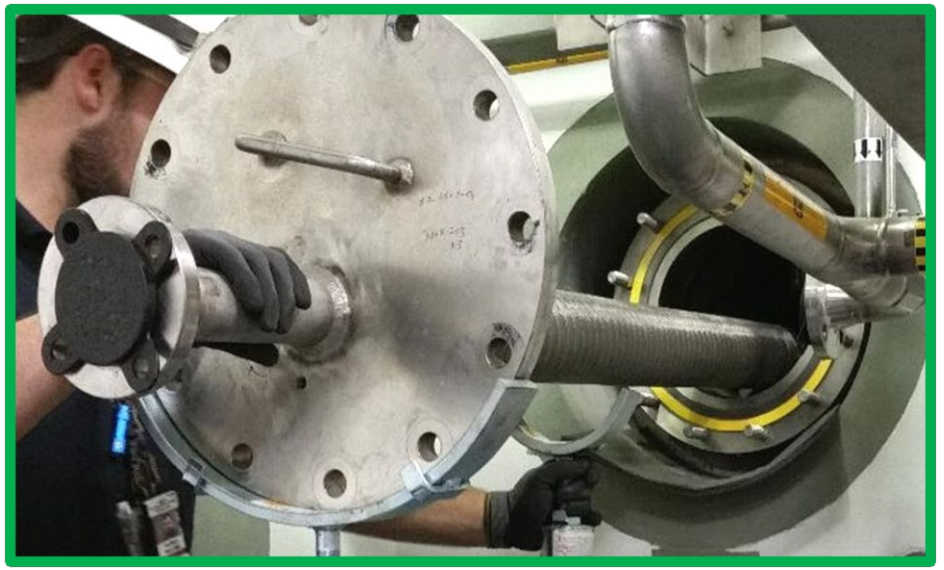
Challenges Impacting Throughput at SWPF

- Lower than expected Cross Flow Filter (CFF) performance in the Alpha Strike Process (ASP)

- Solids accumulation in the Caustic Side Solvent Extraction (CSSX) process equipment

Cross Flow Filter Bundle

CSSX Contactors



Strip Effluent Coalescer Media

Implemented – Spent Wash Discards to DWPF

- Filters flushed/washed periodically to restore flow performance
- Initial process recycled wash solution back into the system increasing risk for regeneration of solids
- Joint process change with Defense Waste Processing Facility (DWPF) to discard wash solutions with sludge

ASP Cross Flow Filter

Implemented – Reduced Monosodium Titanate (MST)

- **Reduced MST concentration by 75% (400 to 100 mg/L)**
  - Maintains high efficiency Actinide removal within regulatory permit limits
  - Reduces solids to increase cross flow filter performance
- **Secondary Benefit - Reduced solids in CSSX process**
  - Laboratory analysis indicates solids in CSSX are Titanium-bearing
  - MST is the only significant source of Titanium in SWPF
  - MST passes through the filters as a soluble species and then precipitates in CSSX

SWPF Operating Deck

Implemented – Online Cleaning of Strip Effluent Coalescer (SEC)

- **Reduced downtime for SEC cleaning by ~90% (48 hours to ≤ 4 hours per week average)**
- **CSSX includes coalescer to collect and separate fine solvent particles**
  - Solids also collect in the coalescer requiring downtime to remove by acid flush
- **Flush piping modification to allow cleaning of the SEC while continuing to operate**

Modified Flush Connection

Location on CSSX Contactor Deck

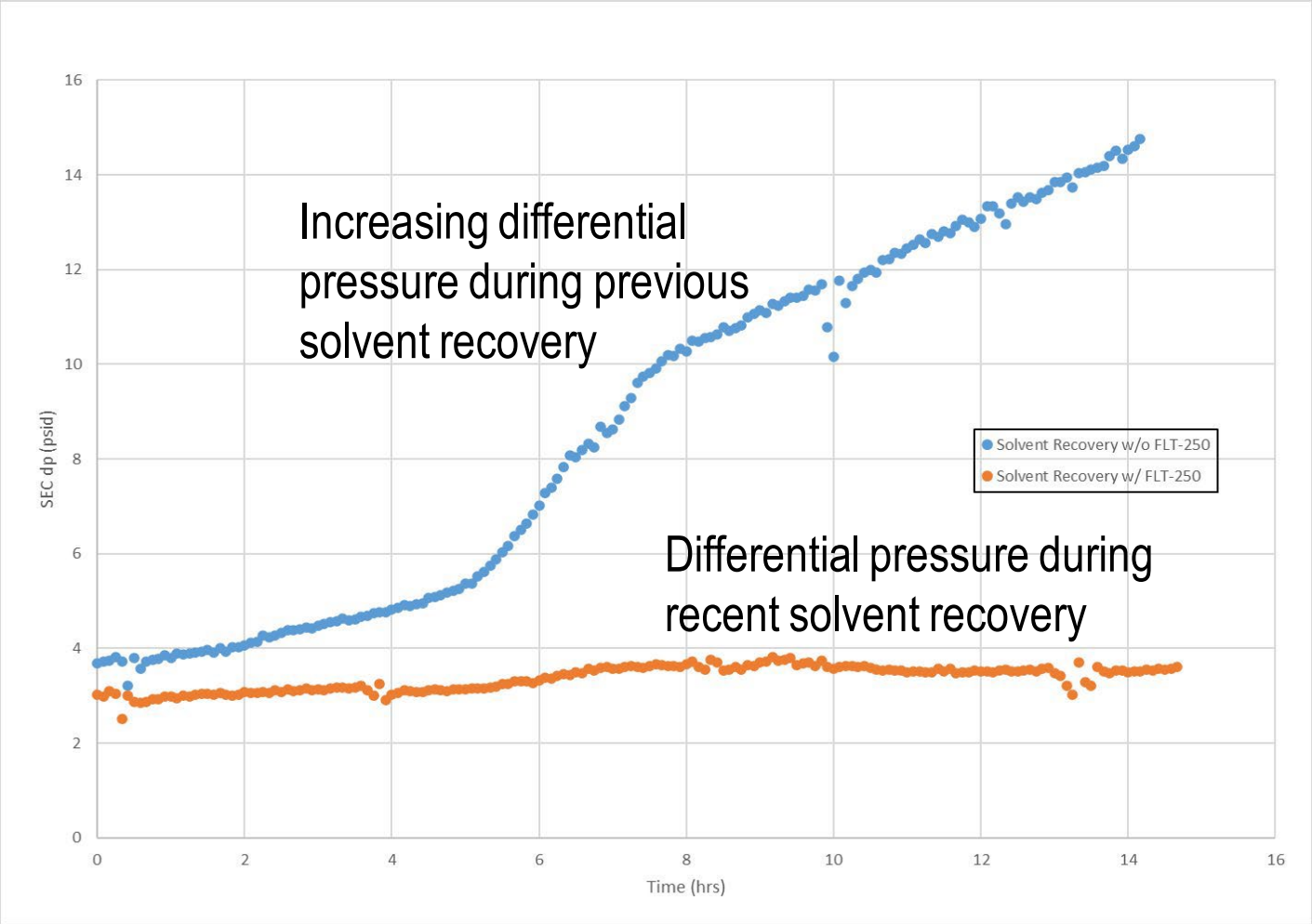
Implemented – Filtration of Solvent Drain Tank Contents

- **Various solutions collected in the Solvent Drain Tank (SDT) result in solids formation**
  - Portion reprocessed through CSSX for solvent recovery
- **Stainless steel, mesh filter located in the SWPF Laboratory Hot Cell repurposed to filter SDT contents**
  - First human entry into Hot Cell since beginning radioactive operations
  - Safely decontaminated Hot Cell to reduce general working area rates by >99% (~25 Rem/hour to ~0.2 Rem/hour)
  - Fourteen pipe cuts & welds to connect the filter to the SDT

Filter Housing Located in Hot Cell

Implemented - Filtration of Solvent Drain Tank Contents

- **Contents of the Solvent Drain Tank (SDT) are now filtered prior to and during solvent recovery**
  - Significantly reduces solids reintroduced into CSSX
  - Reduces need for SEC flushes and downtime for replacement of fouled contactors
  - Improved performance has been evident by the minimal increase in SEC differential pressure during solvent recovery



SEC Differential Pressure During Solvent Recovery

Key Improvements in Progress

- **Increased Plant Reliability/Availability across SRMC**
  - Critical spare procurements (SWPF Contactors June 2024)
- **Replacement ASP Cross Flow Filters (3)**
  - Increase length from 10’ to 16’ and number of tubes from 234 to 288 resulting in ~200% greater filter surface area
  - Vendor fabrication in progress with delivery expected January-March 2025
  - Installation during Spring 2025 Outage
- **Filter Aid Evaluation**
  - Optimizes particle size for most efficient filter operation
  - In-Plant testing and evaluation to complete in Summer 2024
- **Increased Sodium Molarity**
  - Raising sodium molarity of feed (5.6M to ~6.7M currently)
  - Reduces dilution volume, increasing waste throughput ~10%

Replacement Centrifugal Contactor

Summary

- **SWPF Ramping Up to Meet the Mission Need**
  - 300% increase from 2 Mgal/year to ~6 Mgal/year rate
  - Continuous Improvement initiatives in progress to reach ~9 Mgal/year rate

SWPF Aerial View