Savannah River Remediation
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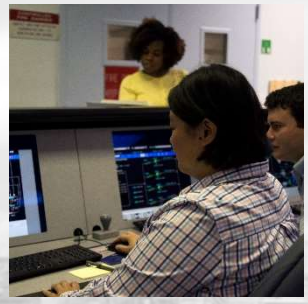
September 2019 CAB Meeting

September 23, 2019



RELIABILITY ENHANCEMENTS AT THE SALTSTONE PRODUCTION FACILITY

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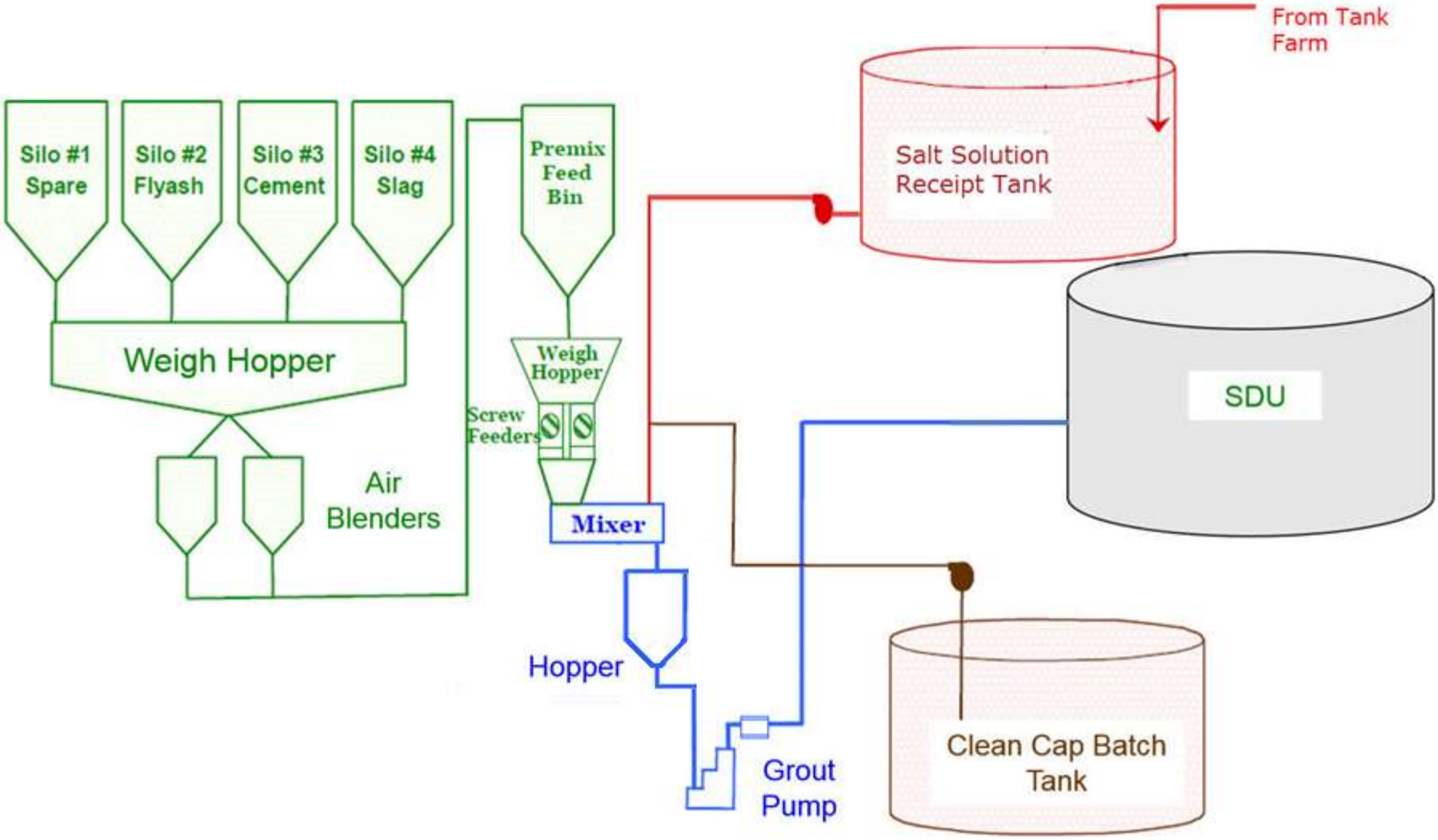
SRR-WSE-2019-00019

Agenda

- Process Overview
- Facility Background
- Enhanced Low Activity Waste Disposition (ELAWD) Project Technical Approach
- Major Process Equipment
- Residual Reliability Challenges and Associated Modifications
- Summary
- Q&A

Process Overview



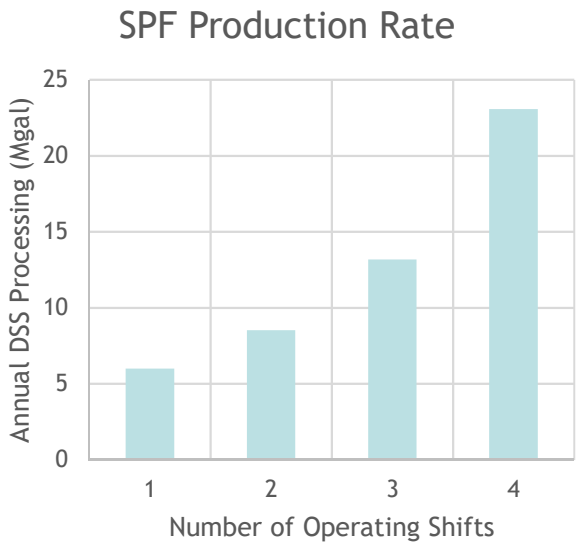
Facility Background

- **Facility commissioned in 1990**
  - Original design basis capacity for 6Mgal/year of decontaminated salt solution (DSS)
  - Days-only operating schedule due to high instantaneous processing rate
- **Salt Program delayed in mid-1990s**
  - Operation limited to small volume receipts from Effluent Treatment Facility
  - Facility generally destaffed, operated for brief campaigns when sufficient waste inventory had accumulated
- **Interim Salt Disposition (ISD) initiated mid-2000s**
  - Typical throughput of 1-2Mgal/year of DSS
  - Radionuclide content of DSS higher than original design basis, forced redesign of several major process components
- **Operational Experience in 2009-2010 showed unsatisfactory reliability, repeated pluggage occurrences at mixer outlet and grout pump hopper outlet**
  - Enhanced Low Activity Waste Disposition (ELAWD) Project initiated to improve reliability

ELAWD Technical Approach

- **Phase I**
  - Modifications necessary to ensure repeatable and reliable operations from day to day
    - Larger grout pump hopper with larger inventory to better accommodate short-term flow deviations
    - Modified shutdown automation to eliminate timer-based actions in favor of process indications
    - Spare mixer procurement to allow for rapid changeout
  - Field installation in 2012
  - Highly successful, zero system pluggages since completion of Phase I

- **Phase II**
  - Modifications necessary to support higher annual throughput anticipated from the Salt Waste Processing Facility
    - Balance of Plant modifications for extended shift operations
    - Upgraded silo dust collector to allow for simultaneous truck unloading
    - Multiple modifications to eliminate equipment obsolescence
      - Process Air Compressors
      - Premix Screwfeeders
    - Improved aeration flow to silos to increase storage capacities

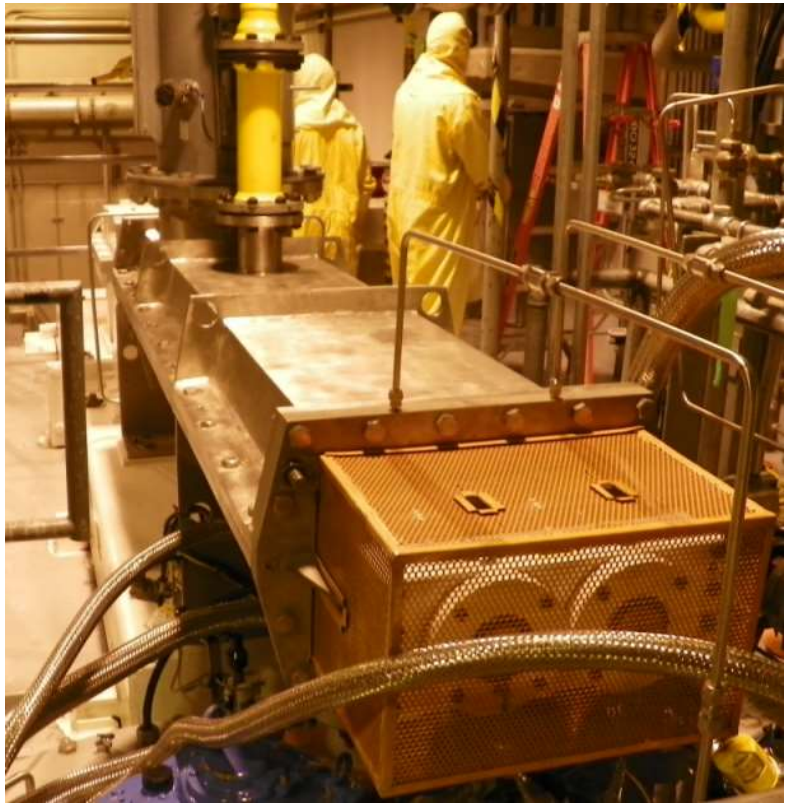


Major Process Equipment

- **Dry Feed Silos**

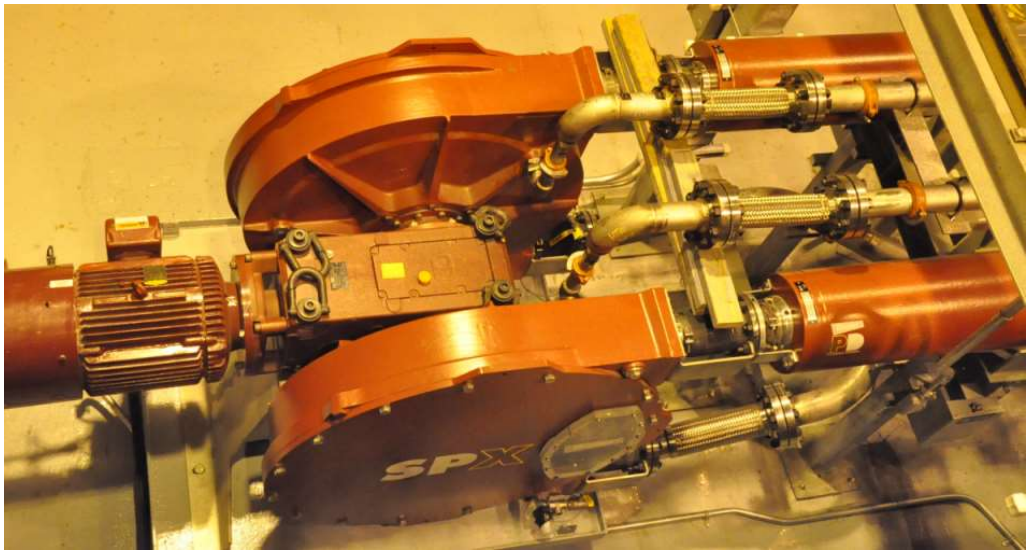
Major Process Equipment

- **Saltstone Mixer**



Major Process Equipment

- **Grout Pump Hopper and Grout Pump**

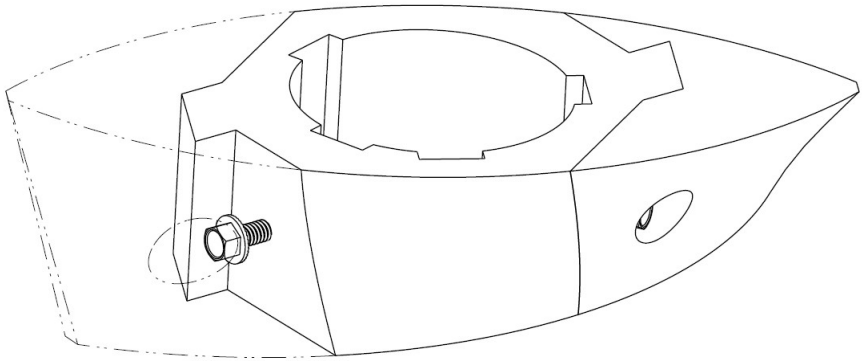


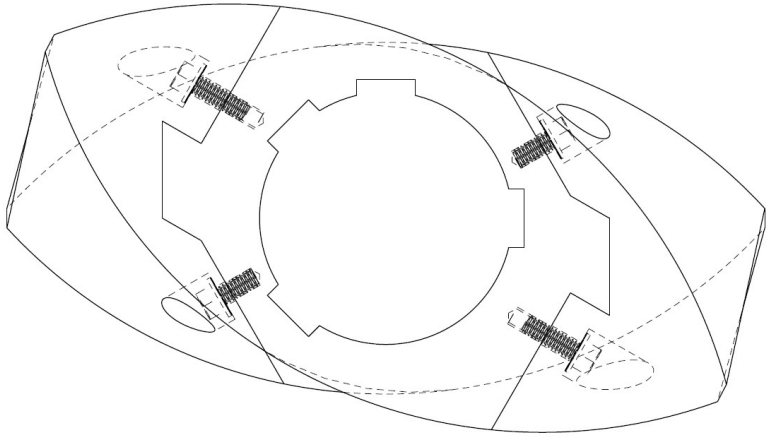
Residual Reliability Challenge- Mixer Paddle Wear

- **Abrasive wear of paddle tips upstream of salt solution inlet**
  - Results in accumulation of solid grout around inner circumference of mixer barrel
  - Causes flow restriction which leads to accumulation of premix in feed chute
  - Design changes implemented for detection/monitoring
  - Requires replacement of worn paddles (Presently every 2.5-3M gal DSS, four week outage)

Residual Reliability Challenge- Mixer Paddle Wear

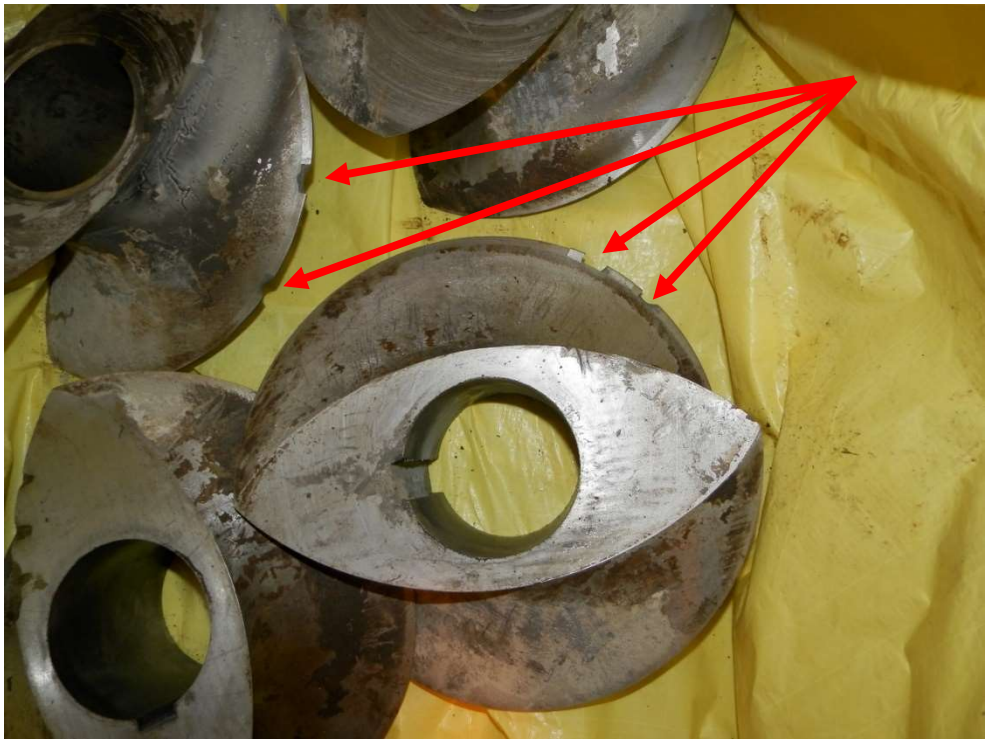
- **Resolution involves redesign of mixer internals**
  - Currently evaluating the replacement of paddles with additional screw feeder sections
  - Next step involves a redesign to the affected paddles with a two-piece design
    - Evaluate abrasion resistant materials for tips- Increase service interval to >6Mgal
    - Reduce outage time to 1 week





Residual Reliability Challenge- Grout Pump Hose Failure

- Foreign material an inherent risk with dry feeds
- Magnetic separators used to minimize inclusion into process
- Mixer inspections show separators not 100% effective

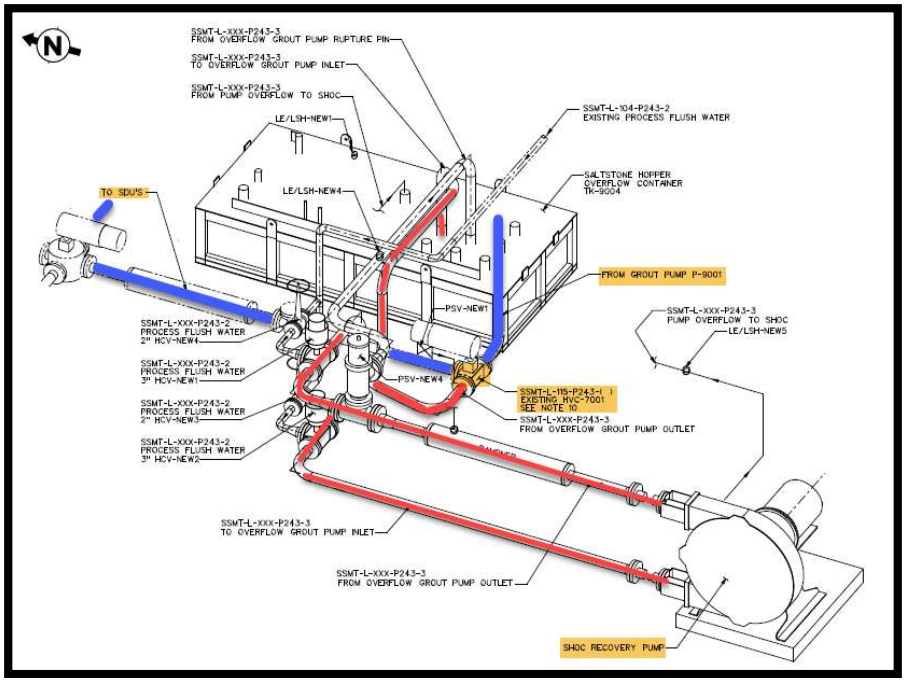


Residual Reliability Challenge- Grout Pump Hose Failure

- **Upon loss of hose integrity, process is shut down and critical equipment flushed**
- **Pump heads are piped to an overflow container**
  - Container volume limited to 450 gal by overhead crane capacity
  - Desired flush volume approx. 1800 gal
  - Balance of flush volume directed to drain tank adjacent to Salt Solution Receipt Tanks
- **Recovery requires outage to perform piping inspection/replacement and repair/replacement of grout pump**

Residual Reliability Challenge- Grout Pump Hose Failure

- **Resolution involves installation of a separate recovery pump to evacuate overflow container and return flush material to transfer line and out to SDU**
  - Multiple overflow containers not feasible due to space constraints within process room
  - Provides for complete flushing of affected piping, minimizes repair scope



Summary

- Expectations of the Saltstone Facility have varied significantly over the past 30 years
- Operational experience during ISD identified several vulnerabilities that would have limited SWPF production
- ELAWD Phase I ensured the reliable startup and shutdown of the process
- ELAWD Phase II is addressing obsolescence issues and improving dry material unloading and storage to support SWPF throughput
- Facility is actively pursuing modifications to address conditions that are the drivers of extended facility outage time