U.S. DEPARTMENT of ENERGY

SRS

Heavy Water Program

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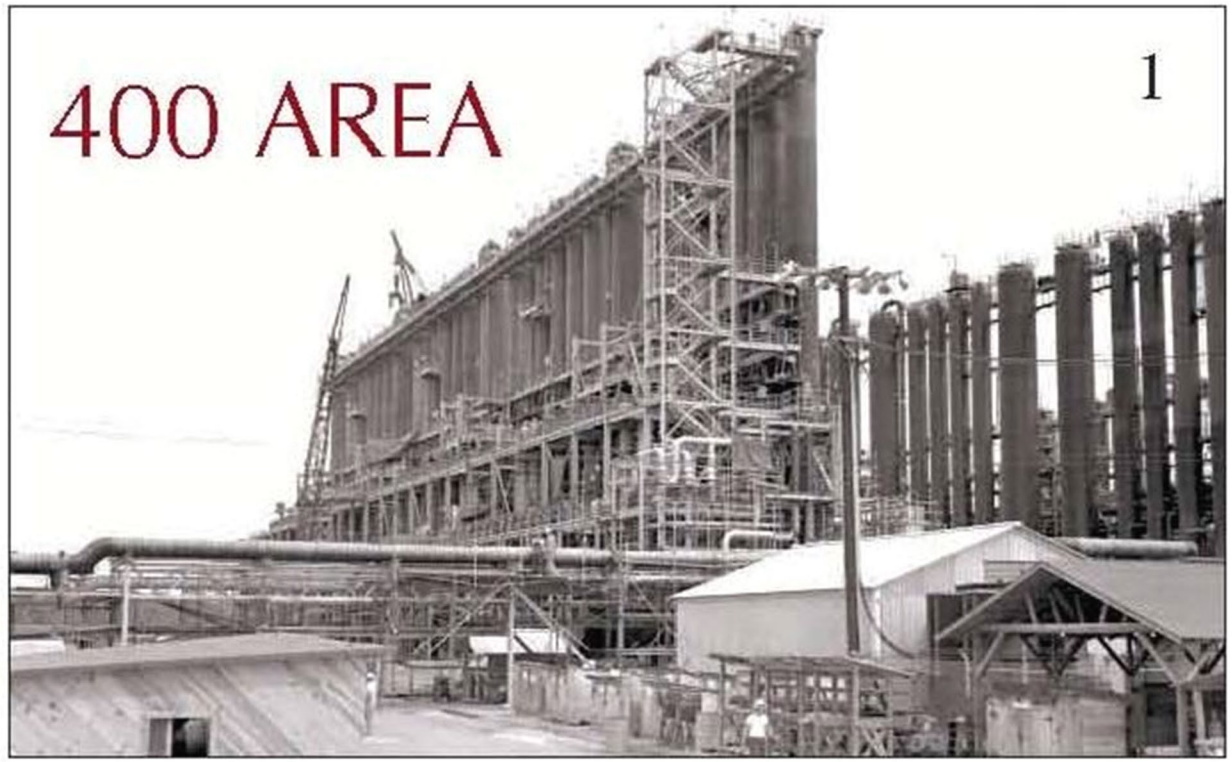
Acronyms

- µCi – micro Curies
- D_2O – Heavy Water
- DOE – Department of Energy
- DOT – Department of Transportation
- MT – Metric Ton
- l – liter
- SRS – Savannah River Site

Agenda

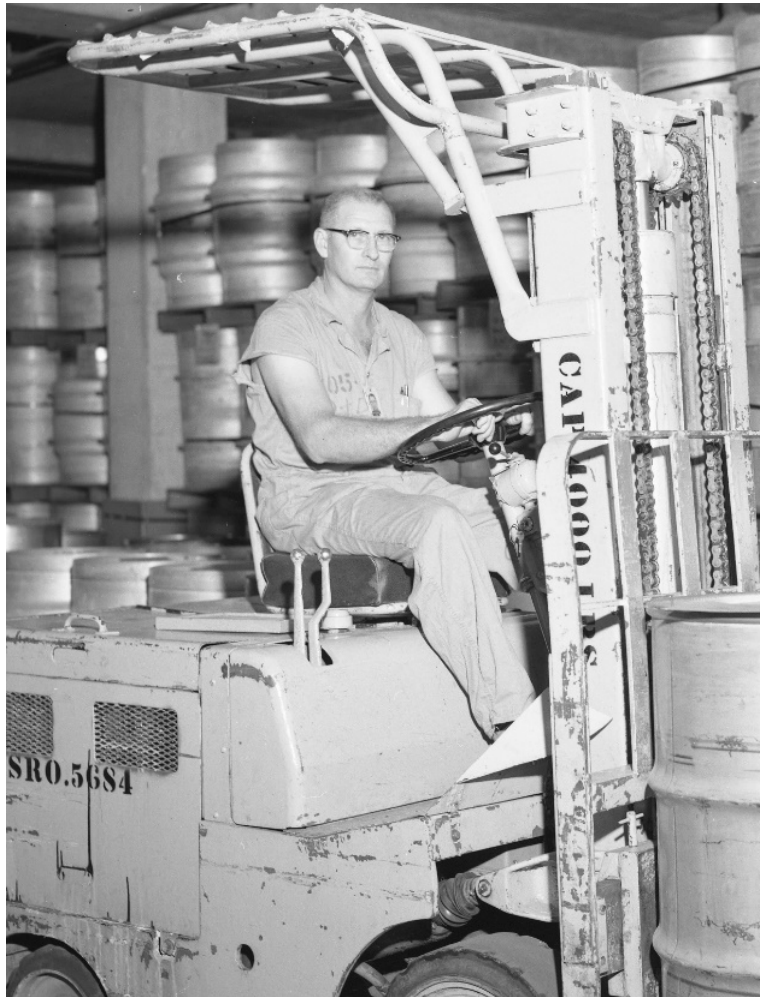
- Provide an overview of the Savannah River Heavy Water Program
  - Background
  - Current Inventory
  - Storage Protection
  - Potential Reuse Options
  - Industry Standard
  - Summary

Background



- Heavy Water = D_2O
- Heavy Water is Naturally Occurring
- Site Inventory Extracted from the Savannah River from 1950s to 1980s
- Heavy Water Was Used as a Moderator for the SRS Reactors
- Heavy Water Is A National Asset

Storage Protection



- Moderator used within the operating reactors at SRS.
  - Moderator used to thermalize fast neutrons, allowing for a sustained nuclear chain reaction
- Surplus moderator stored at K, L, C when reactors shut down
  - Stored as an asset for potential future need, as moderator no longer produced in U.S.

Quantity stored in tanks and drums

- K-Area: 1762 drums, 3 tanks
  - 161,612 Gallons
- L-Area: 5041 drums, 3 tanks
  - 330,416 Gallons
- C-Area: 0 drums, 2 tanks
  - 42,540 Gallons

- Drums
  - Two different design of drums in service
  - Roughly 2,100 drums are the new design and have been used starting in ‘92.
  - The remainder of the drums are the old design and were purchased prior to '67.
- Tanks
  - Tanks are either stainless steel, or SS-lined carbon steel

Storage Protection

- Heavy Water Presents Minimal Hazards, Primarily Due to Tritium Contamination (12-year half life).

- Leakage Mitigation
  - Predominantly Small Containers Used (55 Gallon Drums)
  - Robust Storage Containers
    - DOT Rated Storage Drums
    - Structural Sound Tanks (½" Stainless Steel Walls)
  - Containment Barrier
  - Routine Surveillance and Monitoring

- Tritium Contamination Mitigation
  - Storage Area Air Sampling (active and continuous)
  - Outfall Monitoring
  - Containment Barrier

Potential Reuse Options

- Office of Science
- Heavy Water Reactors
  - Makeup Water for Existing Reactors
- Export Control Is A Restriction
- Low Tritium Concentration and High Purity Required

Industry Standard

- Tritium Concentration
  - < 2 µCi / l Desired
  - < 5% of SRS Inventory Meets Desired Level
  - Decontamination Demonstration Underway
- Purity
  - ≥ 99.75% D_2O Desired
  - < 5% of SRS Inventory Meets Desired Level
  - Upgrading Included in Tritium Decontamination Demonstration

Summary

- SRS Is Actively Pursuing Heavy Water Reuse Options
- SRS Is and Will Continue Safely Storing Heavy Water