Liquid Waste Operations Overview

Larry Ling
Chief of Staff
Savannah River Remediation
The Beginning

- Request from President Truman to DuPont 1950
- Savannah River Plant Site acquired 1951
- DuPont begins operations 1952
- Westinghouse Savannah River Company assumed operations 1989
- Savannah River Remediation contract began July 2009
Facility Start-up

- Site Construction begins Feb 1951
- D-Area — Heavy Water, operations begin Aug 1952
- M-Area — Fuel & Target Fabrication, slugs produced Dec 1952
- 100 Areas — R-Reactor goes critical Dec 1953
- 200 Areas — Separations
  - 221-F operations begin Nov 1954
  - 221-H operations begin Jul 1955
- Tank Farms —
  - F-Area Tanks 1-8 built 1951-1953, received first waste 1954
  - H-Area Tanks 9-12 built 1951-1953, received first waste 1955
L-Reacto
Tanks are built at grade and then backfilled with dirt to provide shielding.
Liquid Waste Operations Mission

- Safely receive and store liquid radioactive waste
- Process that waste into stable, inert solids
- Operationally close the tanks
Waste Tanks

Type I Waste Tank
750,000 gal

Type II Waste Tank
1,030,000 gal

Type III Waste Tank
1,300,000 gal

Type IV Waste Tank
1,300,000 gal
High-Level Waste Facilities

170 acres
3 miles in length

Saltstone Processing/Disposal Facilities
SWPF
DWPF

H-Tank Farm
- 29 tanks
- 2 evaporators (2H & 3H)
- Volume reduction and pre-treatment occurs in H Area

F-Tank Farm
- 22 tanks

Inter-Area Line
- 2.2 miles
- Pump pits at each end
- Diversion boxes at each end and at high point in the middle

Effluent Treatment Facility
SRS Composite Inventory

Volume

- Salt Supernate: 33.3 Mgal (93%)
- Saltcake: 15.9 Mgal (45%)
- Sludge: 2.5 Mgal (7%)

35.8 Million Gallons (Mgal)

Curies

- Salt Supernate: 114 MCi (45%)
- Saltcake: 12 M Ci (5%)
- Sludge: 126 M Ci (50%)

252 Million Curies (MCi)

Inventory values as of 2016-03-31
Tank 5 - Chemical Cleaning Results

We do the right thing.
- Wall Crawler used to clean and inspect Tks 5 & 6 annulus wall (Tank 5 ~ 10 gallons of salt - Tank 6 ~ 90 gallons of salt)
Tank 20

We can get some tanks nearly clean

12” x 12” x 3/8” construction plates

July 16, 1996
Grouting
Saltstone Facility

- Saltstone Disposal Facility
  - Engineered disposal facility
  - Low water permeability
  - Excellent non-leaching qualities
  - Non-hazardous product

- Saltstone Production Facility
  - Aqueous waste mixed with flyash, slag and cement
Saltstone Disposal Units (SDU)
DWPF receives waste for processing from H Tank Farm. The waste is “vitrified” and poured into stainless steel canisters that are sealed and decontaminated.
Filled Canister

Materials: 304L Stainless Steel
Empty Weight: 1,150 lbs.
Glass Weight: 4,000 lbs.
Shielded Canister Transporter

- Canisters
  - Filled
  - Cleaned
  - Sealed . . .

Ready for Transport
Glass Waste Storage Building #1 provides earthquake-resistant, safe interim storage for radioactive waste canisters

Glass Waste Storage Building #2 provides interim storage for an additional 2500 canisters
Two canisters per location (vs. one can per location)
- Lower canister on support plate on vault floor (vs. cross bar support 3’ off floor)
- Upper canister placed directly on top of lower canister
- Upper canister extends into operating deck floor, but remains below grade
- Shield plug redesigned for equivalent radiological protection
• Inside vault looking across rows of canister supports

• Inside canister storage location
  • Minimum Opening in floor is 27 inch ID
  • Cross Bar Assembly is 1 ½ inch x 3 inch galvanized carbon steel bars
  • Cross Bar Assembly~ 18 ft down with 30 inch OD
  • 2 sets of guides (3 tabs each) to guide canisters
  • Bottom guides sit 5 inches above cross bar assembly
On May 12, DOE/SRR celebrated 20 years of Defense Waste Processing Facility operations and Tank 12 closure

Dr. Monica Regalbuto, Assistant Secretary for Environmental Management, keynote speaker
Back-up Slides
• **Pu-239 recovery**
  • Depleted uranium targets dissolved in nitric acid and processed through solvent extraction
  • Acidic waste stream evaporated and neutralized with sodium hydroxide
  • High amounts of radioactivity (fission products)
- **U-235 / Np-237 recovery**
  - Uranium fuel dissolved in nitric acid and processed through solvent extraction
  - Acidic waste stream evaporated and neutralized with sodium hydroxide
  - High amounts of radioactivity (fission products)

- **Pu-238 recovery**
  - Neptunium targets dissolved in nitric acid and processed through solvent extraction
  - Acidic waste stream evaporated and neutralized with sodium hydroxide
  - High amounts of radioactivity (fission products)
SRS Tank Farm Operations

We do the right thing.

H-Canyon

Overheads (to Effluent Treatment Facility)

Evaporator System

Feed Tank

Saltcake

Concentrate Receipt Tank

Evaporator

Waste Receipt Tank

Sludge

Sludge Slurry

Sludge Processing Tank

DWPF

Canisters to Federal Repository

Concentrated Supernate

Concentrate Salt Solution Storage Tank
SRS Tank Farm Operations

We do the right thing.

H-Canyon

Sludge
Waste Receipt Tank

Evaporator System
Feed Tank

Overheads (to Effluent Treatment Facility)

Saltcake
Concentrate Receipt Tank

SDU

MCU
ARP

Salt Processing Tank

Concentrate Salt Solution Storage Tank

Concentrated Supernate

Sludge Slurry
Sludge Processing Tank

DWPF

Canisters to Federal Repository
Tank Cracks...

Resulted in Waste Leaking into Annuli of 12 Tanks

- Primary Tank Wall
- Crystallized Salt Supernate

5 foot Annulus Pan