

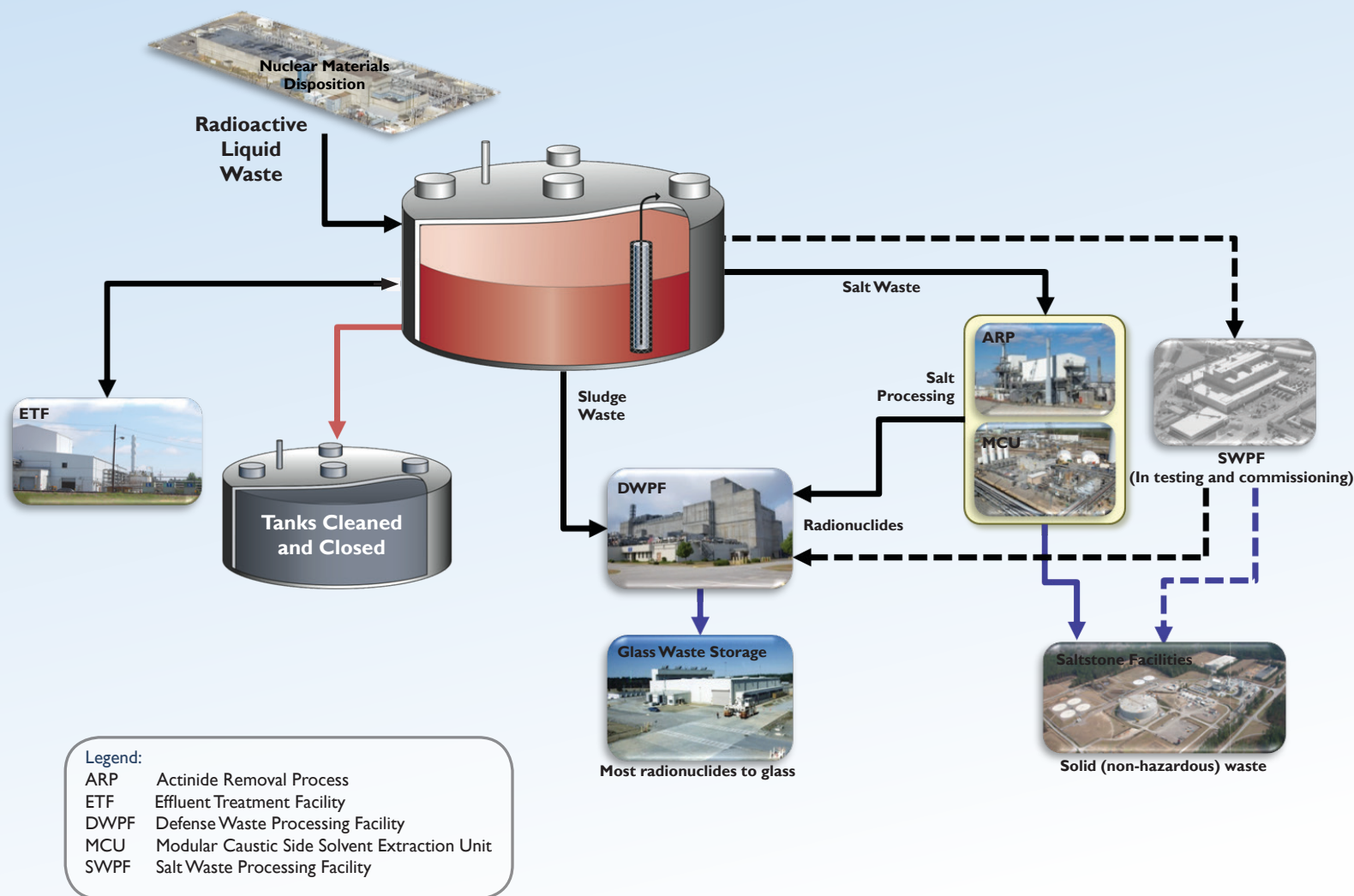


## FACT SHEET

# Radioactive Liquid Waste Facilities

Radioactive liquid waste is generated at the Savannah River Site (SRS) as by-products from the processing of nuclear materials for national defense, research, medical programs, and outer space missions. The waste, totaling about 35 million gallons, currently is stored in 43 underground carbon-steel waste tanks grouped into two “tank farms” at SRS.

Savannah River Remediation’s (SRR) Liquid Waste Program consists of high hazard operations, which includes complex engineering, procurement, construction, and waste treatment and disposal in order to close these waste tanks. Below is a diagram of the process.

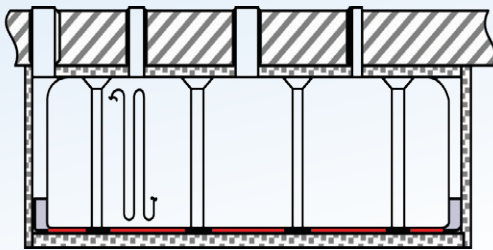




## FOUR TYPES OF WASTE TANK DESIGNS:

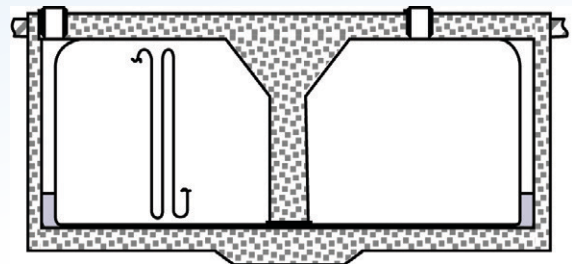
### Type I Tanks

- 12 tanks; built between 1951-1953
- 750,000 gallon capacity; 75 feet in diameter by 24.5 feet high
- Partial secondary containment with leak detection
- 3 Type I tanks are operationally closed and grouted
- 9 tanks containing a total of about 3.5 million gallons of waste
- 5 of these tanks still storing waste have leaked into the annulus space; the amount of waste stored in these tanks is kept below the known leak sites that have appeared over the decades of operation, and there are no active leak sites



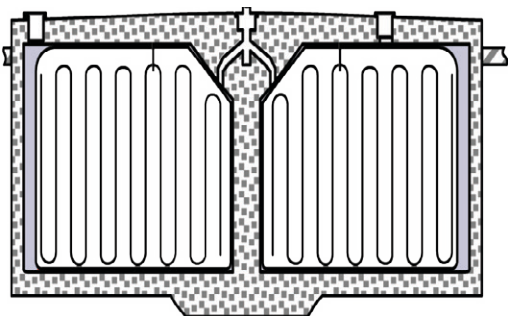
### Type II Tanks

- 4 tanks; built between 1955-1956
- 1 million gallon capacity; 85 feet in diameter by 27 feet high
- Partial secondary containment with leak detection
- 1 tank is operationally closed and grouted
- 3 tanks containing a total of about 1 million gallons of waste
- Tanks still storing waste have leaked waste into the annulus space



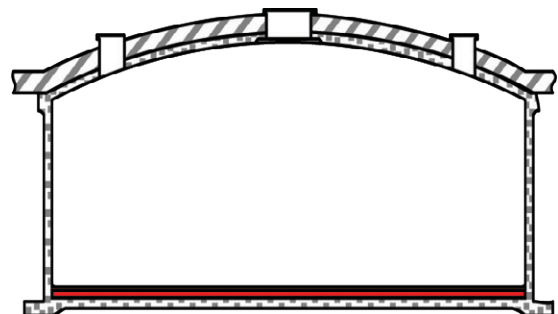
### Type III/IIIA Tanks

- 27 tanks were built between 1969-1981
- 1.3 million gallon capacity; 85 feet in diameter by 33 feet high
- Most modern tank farm design at SRS, including heat stress relief on the tank walls to prevent cracking
- Full height secondary containment with leak detection
- Contain about 27.42 million gallons of waste
- No tanks have leaked



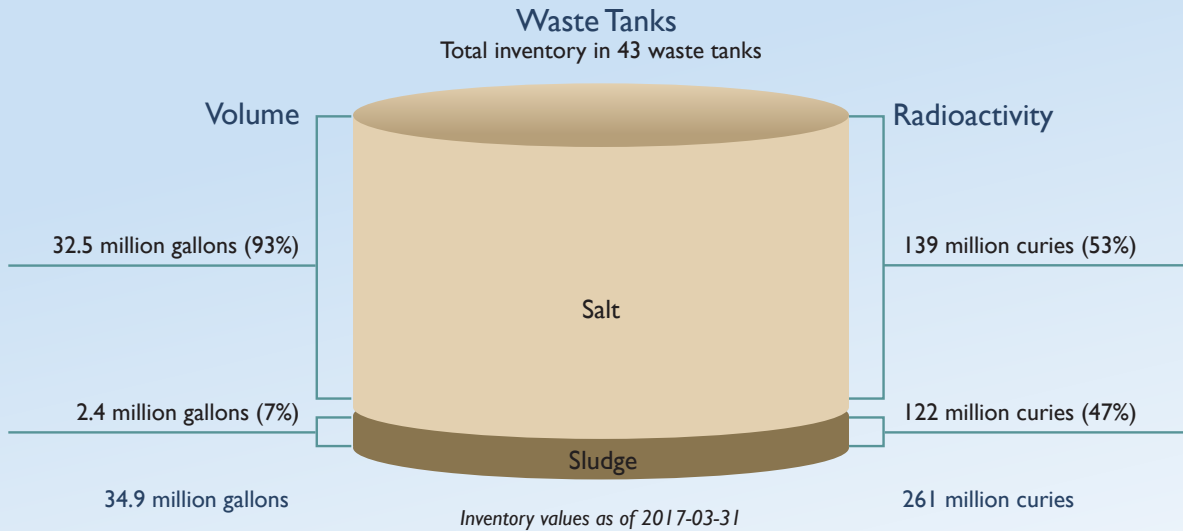
### Type IV Tanks

- 8 tanks were built between 1953-1963
- 1.3 million gallon capacity; 85 feet in diameter by 34.5 feet high
- Has leak detection but no secondary containment
- 4 tanks are operationally closed and grouted
- None of the 4 tanks still storing waste have leaked
- Contain about 3.16 million gallons of waste



The Type I, II and IV tanks do not meet current secondary containment requirements established by the State of South Carolina and the U.S. EPA and will be emptied, and closed first in accordance with a federal agreement.

## WASTE TANK INVENTORY



## EVAPORATORS

While the waste is stored in the tanks, a sludge settles on the bottom of the tank and a liquid salt waste resides on top of the sludge. Since the processing of nuclear materials began, more than 160 million gallons of radioactive liquid waste has been received for storage into the tank farms, far exceeding the 59 million gallon capacity of the 51 underground radioactive waste tanks. The salt waste is reduced to about 30 percent of its original volume by evaporation. The condensed evaporator “overheads,” or water removed from the waste, are transferred to the Effluent Treatment Facility for final cleanup prior to release to the environment. As the concentrate cools, a portion of it crystallizes, forming solid salt waste.

### 2H Evaporator, located in H Area

- Single-stage, bent-tube design
- Began operating in 1982

### 3H Evaporator, located in H Area

- Single-stage, bent-tube design
- Began operating in 2000



## DEFENSE WASTE PROCESSING FACILITY

The Defense Waste Processing Facility (DWPF), located in S Area, immobilizes the radioactive high-level liquid waste by vitrifying it into a solid glass waste form.

- The waste and borosilicate glass “frit” are mixed together forming melter feed for the DWPF melter.
- The waste/glass mixture is fed to the melter and heated to approximately 2,100 degrees Fahrenheit (1,150 degrees Celsius) forming molten glass.
- The molten glass is poured into stainless-steel canisters to cool and harden.
- Each canister is 10 feet tall and 2 feet in diameter.
- The canisters are sealed, decontaminated on the outside, welded shut, and stored onsite in a building designed for safe interim storage until a federal repository is available.
- DWPF has produced 4,158 canisters since processing radioactive waste began in March 1996.

## EFFLUENT TREATMENT FACILITY

The Effluent Treatment Facility, located in H Area, treats the low-level radioactive wastewater — that was formerly sent to seepage basins — in accordance with a State regulatory permit. Treated streams include evaporator overheads, segregated cooling water, contaminated surface water runoff, transfer line catch tank streams, and others.

- Began operating in 1988
- Processes approximately 10 million gallons of wastewater per year
- Treatment processes include pH adjustment, filtration, organic removal, reverse osmosis, and ion exchange
- Treated waste water streams are released to a permitted outfall



## SALT WASTE PROCESSING

*Removing salt waste, which occupies 93 percent of the usable tank space in the SRS tank farms, is a major step toward emptying the Site's remaining 43 high-level waste tanks that contain approximately 35 million gallons of waste.*

### Actinide Removal Process (ARP)

ARP, one of two SRS salt-decontamination facilities, removes radioactive contaminants, such as plutonium and strontium, by adding a chemical that attaches itself to the radioactive particles and can then be filtered out. The radioactive portion is transferred to DWPF, where it is mixed with sludge waste and molten glass and poured into 10-foot-tall stainless-steel canisters which will be welded shut and temporarily stored until they can be shipped to an off-site federal repository. The remaining filtered salt solution is then sent to the Modular Caustic Side Solvent Extraction Unit. Both facilities initiated operations in April 2008.

### Modular Caustic Side Solvent Extraction Unit (MCU)

Using principles involving centrifugal force and a specially engineered solvent, MCU, the second SRS salt-decontamination facility, divides the high-activity salt solution into two waste streams. The cesium is removed and sent to DWPF. The remaining decontaminated salt waste solution is disposed of into the Saltstone Production Facility, by mixing it with dry cement-like materials to form a grout for safe, permanent disposal in engineered vaults.

### Salt Waste Processing Facility (SWPF)

The Salt Waste Processing Facility (SWPF) will process the majority of the Site's salt waste inventory. SWPF will treat highly radioactive salt solutions currently stored in underground tanks at SRS and prepare these solutions for ultimate disposition. SWPF will use processes similar to those found within ARP and MCU, but on a larger scale.

SWPF will separate key high-activity radionuclides from the low-activity salt waste using proven separation technologies of filtration and centrifugal contractors. After separation, the high-activity salt waste is mixed with sludge waste and molten glass and poured into 10-foot-tall stainless-steel canisters, which will be temporarily stored onsite until a federal repository is chosen. The remaining high-volume/low-activity salt waste will be treated and disposed of by the Saltstone Production Facility.

### Saltstone Production Facilities

The Saltstone Production Facilities treat and permanently dispose of low-level liquid waste by stabilizing it in a solid, cement-based waste form. Liquid waste is combined with a dry blend of cement, slag, and fly ash. The resulting mixture is referred to as "grout." The grout is pumped to above-ground engineered Saltstone Disposal Units, where it solidifies into saltstone, a non-hazardous waste form. The facilities began operating in 1990.



## CLOSING WASTE TANKS

As the waste is retrieved from the tanks for treatment, and the tanks are emptied and cleaned in preparation to be operationally closed by filling with grout, the U.S. Department of Energy and its contractors are working closely together to follow strict closure regulations set by the U.S. Environmental Protection Agency, and the S.C. Department of Health and Environmental Control with oversight from the Nuclear Regulatory Commission.

SRS waste tanks have provided over 60 years of safe storage for radioactive liquid waste. The goal is to eventually close all waste tanks.

For more information about the liquid waste program at SRS, please visit:

[https://www.youtube.com/watch?v=tfqYtIKX\\_o](https://www.youtube.com/watch?v=tfqYtIKX_o)

<https://www.youtube.com/watch?v=vHoOu8MLsCc>



SRR is the Liquid Waste contractor at SRS, which is owned by the U.S. Department of Energy. SRR is composed of a team of companies led by AECOM with partners Bechtel National, CH2M, and BWX Technologies, Inc.

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