

Salt Waste Processing Facility

Nuclear material production operations in the 1950s at Savannah River Site (SRS) generated liquid radioactive waste currently stored in the remaining 43 underground waste tanks in the F and H Area [Tank Farms](#). The Salt Waste Processing Facility (SWPF) is the key facility at SRS to process about 90% of this waste.

Waste stored in the tanks can be characterized as either “salt” or “sludge” both containing highly radioactive residues. The sludge waste, which is insoluble and settles to the bottom of a waste tank, generally contains insoluble radioactive elements in the form of hydrated metal oxides.

The salt waste contains soluble metal ions, including most of the soluble radioactive cesium and some trace quantities of entrained sludge. The salt waste in the tanks includes a solid saltcake that has crystallized out of solution and a concentrated salt supernate. The supernate contains most of the soluble

cesium and limited amounts of entrained sludge and require treatment at the SWPF. The saltcake in the tanks is dissolved by adding inhibited water. The resultant salt solution is treated at the SWPF.

Since 1996, SRS has been removing the sludge waste from tanks, pre-treating and delivering it to the [Defense Waste Processing Facility](#) (DWPF) for final treatment. The DWPF was built to vitrify concentrated high-activity tank waste into a stable form and store it for eventual permanent disposal. The Saltstone Production Facility (SPF) was constructed to immobilize and dispose of low activity decontaminated salt waste. To effectively utilize these existing facilities for liquid radioactive waste disposition, a processing capability was needed for separating and concentrating the high-activity constituents from the salt waste solutions resulting from [tank closure operations](#).



An aerial view of the Salt Waste Processing Facility at the Savannah River Site



The SWPF separates and concentrates the highly radioactive waste—mostly cesium, strontium, actinides, and waste slurry—from the less radioactive salt solution. The process begins by transferring the waste from H Tank Farm to SWPF where it undergoes a two-step cleanup process.

The first step, called the Alpha Strike Process, removes strontium and actinides (uranium, plutonium, etc.) from the waste. The Alpha Strike Process in SWPF involves adding a chemical to the salt solution that binds with the strontium and alpha emitting radioactive contaminants in the salt solution. The waste is then filtered to remove the MST that has bound to the alpha and strontium materials. These high-activity solids are then transferred to DWPF to be combined with sludge waste and immobilized in glass.

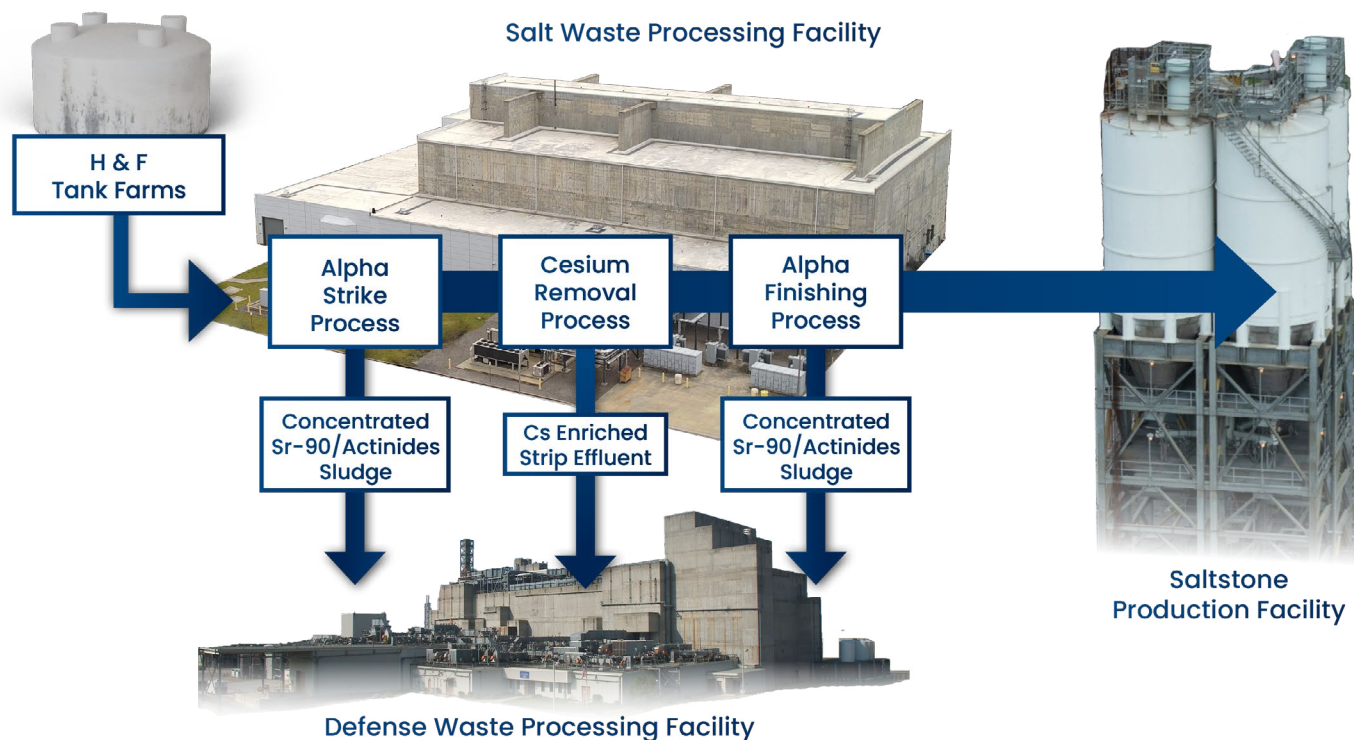
The remaining filtered salt solution is then sent to the second step in the SWPF process: the Caustic Side Solvent Extraction (CSSX) process. This step is designed for the removal of radioactive cesium. Using principles involving centrifugal force and a specially engineered solvent, CSSX divides the high-activity salt solution into two waste streams. The cesium is removed and sent to DWPF to

be combined with sludge waste and immobilized in glass.

The remaining decontaminated salt solution (DSS) from SWPF is transferred to the Saltstone Production Facility, where it is mixed with dry materials to form a grout. The saltstone grout solidifies into a monolithic, non-hazardous, solid low-level waste form safe for permanent disposal onsite inside [Saltstone Disposal Units](#) (SDU).

The first batch of radioactive waste, approximately 4,000 gallons, was transferred to SWPF on Oct. 5, 2020 beginning “hot” commissioning of the facility. SWPF successfully completed the hot commissioning testing phase of operations in January 2021, having validated radiation shielding, environmental emissions, and product waste acceptance requirements while processing over 320,000 gallons of radioactive liquid waste. SWPF then entered full operations and processed just over 2,000,000 gallons of salt waste during its first year of operations.

Since startup, SWPF has processed more than 15 million gallons of radioactive salt waste. SWPF continues to achieve multiple records in salt processing.



A diagram of the Salt Waste Processing Facility process



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