



LIQUID WASTE OPERATIONS

A supplement to the
SRS Environmental Report for 2009



Savannah River Remediation (SRR), the liquid waste operations contractor at the Savannah River Site (SRS), continued the SRS tradition of posting another exemplary environmental compliance record in 2009, as liquid waste operations continued to minimize impact to the off-site public and the surrounding environment.

Liquid Waste Operations

High-activity waste is highly radioactive liquid waste that results primarily from the reprocessing of spent nuclear fuel. The waste contains both transuranic waste and fission products in concentrations requiring permanent isolation from the environment.



Many of the SRS waste tanks were built in the 1950s.

SRR continues to manage and disposition approximately 37 million gallons of high-activity liquid radioactive waste (about 400 million curies), which is stored in 49 large, shielded, and underground tanks grouped into two tank farms. Twenty-nine tanks are located in the H Area Tank Farm and 20 in the F Area Tank Farm. All SRS tanks are built of carbon-steel inside reinforced concrete containment vaults.

During the year, the major waste streams coming into the tank farms included transfers from H Canyon and a low-activity waste stream from the Defense Waste Processing Facility (DWPF). Fresh waste received from the processing of the spent nuclear fuel separates into two parts:

- A sludge (which contains most of the radioactivity) that settles on the bottom of the tank.

- A watery “supernate” that occupies the area above the sludge.

The supernate is transferred to an evaporator system, where it is processed further. The evaporator system reduces the volume of this supernate. As the concentrated supernate cools, salts, a waste material, precipitate to the bottom of the receipt tank. This solid, commonly known as salt cake, generally forms in the evaporator concentrate receipt tanks. The sludge layer remains in its original tank until a sludge processing campaign is executed. This campaign consists of seven steps over three to six years culminating in the operationally closing of waste tanks.



SRR has committed to operationally closing 22 old-style waste tanks during its six, plus two-year option contract. In 2009, 11 of the 22 tanks were in one of the seven closure steps.

Liquid Waste Operations Facilities

Both SRS tank farms have their own evaporator systems. F Tank Farm has one operating system (2F), while H Tank Farm has two (2H and 3H). These evaporators recovered over 3.4 million gallons of tank space in 2009.

As a result of excellent performance by the 2H Evaporator in 2009, the total storage space inside the DWPF recycle feed tanks exceeded 200 days. Reaching this performance milestone meant that if, for some reason, the evaporator was not in



2H Evaporator, located in H Tank Farm

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use, the DWPF would be able to operate and send recycle wastewater to storage tanks for more than six months without the use of an evaporator.

Not since February 2003 has there been this amount of storage space available in Tanks 21, 23, 38 and 41, which are the tanks receiving DWPF recycle waste water that feed the 2H Evaporator.



DWPF worker during canister fill

SRS has successfully conducted this space reclamation operation in the tank farms since 1960, when the first evaporator facilities began operation. Without these evaporator systems, SRS would have required 86 additional waste storage tanks – at about \$50 million each – to store waste produced over the Site's lifetime.

The Extended Sludge Processing Facility, one of the two DWPF pretreatment operations in the Liquid Waste Operations area, washes sludge (settled insoluble waste) to reduce the concentration of sodium salts, which ensures glass quality when the sludge is processed at DWPF. The facility has processed four of the 17 sludge batches that will be required to vitrify all the high-activity waste sludge. A fifth batch currently is being processed at DWPF, while a sixth batch is being prepared.

The washed and dewatered sludge is transferred to DWPF, which then processes the sludge from the original waste by combining it with glass frit. The mixture is heated until it melts, then it is poured into stainless-steel canisters to cool. The glass-like solid that forms contains the highly radioactive material and

seals the material off from the environment. Another word for this process is “vitrification.” The sealed canisters will be stored at SRS until a federal repository is established.

Disposition of salt waste processes via the Deliquification, Dissolution, and Adjustment (DDA) process into the Saltstone Production Facility (SPF) began in March 2007, and the last transfer of DDA waste was made on September 6, 2009. Some 2.8 million gallons of salt waste (a combination of 1.2 million gallons of low-activity salt waste and other waste) was transferred.

The DDA process involved removal of the majority of the Cesium-137 contamination from salt cake by draining the liquid from the tank (Deliquification). The remaining dry salt cake, with low activity, is dissolved with water (Dissolution) and transferred to a hold tank. This material was then mixed with other waste, chemicals and water as necessary (Adjustment) to ensure it met the Waste Acceptance Criteria for disposition at the SPF.

Construction continued on the Salt Waste Processing Facility (SWPF) at SRS. The facility will treat highly radioactive salt solutions currently stored in underground tanks at SRS and prepare these solutions for ultimate disposition.



The Actinide Removal Process (ARP)

While the SWPF is being constructed, SRR continues using similar technology on smaller scales to avoid impact to future tank closure and sustain operations for DWPF and H Canyon.

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An interim salt waste processing program began operation in April 2008. The program integrates a set of salt-decontamination processes designed to eliminate nearly all of the radioactive isotopes from about one million gallons of salt solution per year until the SWPF becomes operational. The Actinide Removal Process (ARP) and Modular Caustic Side Solvent Extraction Unit (MCU) work together as an integrated system to remove radioactive isotopes from salt waste solutions prior to its transfer to the Saltstone facilities.

Accomplishments

SRR became the Liquid Waste Operations contractor on July 1, 2009. The facilities included in the liquid waste contract are the two tank farms and their attendant three evaporators, DWPF, Saltstone facilities, and ARP MCU. The contract focuses on waste disposition that leads to accelerated tank closure.

The tank farm evaporators recovered over 3.4 million gallons of tanks space in 2009 through evaporation of the watery supernate that resides atop the sludge in the tanks. The 3H evaporator system contributed 395,891 gallons to the recovery of space during 2009. The 2H evaporator system contributed

81 canisters by pouring 106 canisters in the first six months of the SRR contract, resulting in over 405,000 pounds of hazardous waste being glassified for safe storage. Since beginning operations in March 1996, 2,845 canisters have been filled with glassified waste resulting in over 11 million pounds of waste in safe storage.

During 2009, the SPF processed over 2.3 million gallons of salt waste material. In December of 2009, the



The Saltstone Facility and disposal vault

SPF experienced its highest processing production rate ever, processing approximately 510,365 gallons of salt waste.



The Defense Waste Processing Facility (DWPF)

more than 2.2 million gallons during the year, while the 2F evaporator system contributed 748,637 gallons.

The DWPF exceeded its 2009 contract target of filling

The interim salt waste processing facilities processed over 689,000 gallons of salt waste in 2009 and on two occasions attained a processing rate of four to six gallons per minute, which is the standard SRR needs to achieve its tank closure commitment.

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