

## Tank Closure Cesium Removal

Tank Closure Cesium Removal (TCCR) is a pilot demonstration of innovative technology to assist in the acceleration of tank closure at the Savannah River Site (SRS). TCCR is a supplemental at-tank process that is removing cesium, a highly radioactive element, from Cold War-era salt waste at SRS.

TCCR utilizes an ion exchange process for the removal of cesium from liquid salt waste to provide a supplemental treatment capability to support the acceleration of waste retrieval and tank operational closure efforts. Building on the experience of commercial nuclear plant decontamination and following the disaster response associated with Fukushima, the modular TCCR technology selectively removes the cesium component of the bulk salt waste effectively and efficiently. A commercial supplier designed, fabricated, tested, and delivered a modular cesium removal system which has been deployed next to a waste tank for the treatment of liquid salt waste. The unit consists of three modular skids: a main process enclosure housing the systems and components to treat the waste; a separate ventilation skid to provide environmental conditioning and contamination control; and a control skid to house the operating and video monitoring systems.

The salt waste passes through the modules, including a pre-filter and multiple ion exchange columns. The waste stream is treated with an engineered resin inside the ion exchange column to remove the cesium.

Once the ion exchange media in a column becomes loaded with cesium to the extent practical ("spent"), the column (with media) is removed from the system and replaced with a new ion exchange column loaded with fresh media. The spent column is transported to an interim safe storage location at SRS.

The demonstration TCCR unit has been upgraded to process waste that has a cesium concentration approximately ten times greater than previous batches. This upgraded unit is referred to as TCCR-1A. Some of these enhancements included a smaller diameter ion exchange column (20-inch diameter to a 19-inch diameter), the addition of a flush bypass line and passive ventilation modification, upgraded pre-filters for better filtration, and relocation of the control area to a low-dose area.

The decontaminated discharge is sent to the Saltstone Production Facility for on-site disposal.

### Key Facts:

- Demonstration operations began in January 2019.
- TCCR operates in batch processes.
- TCCR processed nearly 300,000 gallons of salt waste over three batches in 2019 and 2020.
- TCCR-1A restarted salt waste processing in January 2022.
- Savannah River National Laboratory provided research and development on the engineered resin and safety basis aspects of TCCR.



*TCCR utilizes ion-exchange columns to remove cesium from liquid waste.*



U.S. DEPARTMENT OF  
**ENERGY**

The Savannah River Site is owned by the U.S. Department of Energy. Savannah River Nuclear Solutions is the management and operations contractor at the Savannah River Site. Savannah River Mission Completion is the liquid waste contractor at the Savannah River Site.

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