



## Retrieval and Closure Operations

Washington River Protection Solutions is committed to eliminating the risk posed by the 53 million gallons of radioactive and chemical waste stored in 177 underground tanks near the center of the Hanford Site some 25 miles north of Richland. This commitment includes the safe removal of waste from the 149 aging single-shell tanks, many of which date back to the early days of the Manhattan Project during World War II.

Up to 67 of the single-shell tanks have leaked as much as a million gallons of radioactive and chemical waste to the surrounding soil. Pumpable liquids were removed from all 149 single-shell tanks years ago to reduce the risk of future leaks. But the tanks continue to hold waste materials in the form of saltcake, sludges, interstitial liquid, and in some tanks a bottom layer of hardened, insoluble materials. To date solid and liquid waste has been retrieved from seven single-shell tanks and transferred to newer, safer, double-shell tanks. Retrieval is also under way in several other tanks. By the end of FY08 more than 1,500,000 gallons of waste had been retrieved.

## Technologies

Removing waste from the single-shell tanks is one of the most complex challenges in the Department of Energy system. Tanks were built to put waste in, not take it out, creating a number of physical obstacles that must be overcome. In addition, the radioactive and chemical environment inside the tanks requires all work be performed by remote control. Adding to the challenge is the variety of waste forms in the tanks which requires a variety of tools and techniques to do the job. Many of these tools and techniques had to be developed for our specific needs. They include:

- Salt Cake Dissolution which sprays water from above the waste to dissolve and mobilize the solid material so it can be pumped
- Acid dissolution which uses oxalic acid to dissolve the hardened material at the bottom of the tank
- Modified sluicing which uses less water and lower pressure than traditional sluicing methods
- High Pressure Mixer which inserts a high pressure jet of water directly into the waste to thin it so it can be more easily pumped
- Remote Water Lance which uses high pressure water at very low volume to break up hardened material on the bottom of the tank
- FOLDTRACK is a track-mounted device with a blade on the front that can stretch itself out to be lowered into a tank, then reconfigure itself to push waste to the pump
- Vacuum retrieval which injects low volumes of water at high pressure to mobilize the waste and vacuum it out almost as fast as it is introduced
- Selective dissolution removes certain isotopes, such as Cesium 137, with minimal dissolution of the saltcake waste
- A telescoping robotic arm known as the Mobile Arm Retrieval System (MARS) is being designed to carry a variety of tools to all parts of an underground storage tank enabling it to remove all of the different waste forms found inside the tanks

## Single-Shell Tank Integrity

The single-shell tanks are long since past their original design life. As such, maintaining the structural integrity of the tanks is essential, because they will continue to hold solids and sludges until all the waste can be sent to the newer double-shell tanks (DSTs) and then eventually to the nearby Waste Treatment Plant which is still under construction.

With the support and direction of the Department of Energy's Office of River Protection, Washington River Protection Solutions has convened an independent panel of experts to review all pertinent information and programs regarding construction, operation, and integrity monitoring of Hanford's 149 SSTs. The panel's task is to provide recommendations to enhance the existing program of



monitoring the integrity of the SSTs, and propose methods to better inspect and assess them, as well as potential response actions for leaking tanks. The work of the expert panel is expected to increase the ability to accurately assess the tank integrity condition and gain confidence in the SSTs

remaining structurally sound through the retrieval and closure period. The panel is made up of nationally recognized experts in numerous engineering and scientific disciplines associated with SST integrity.



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