AVANTech

Water Treatment Services

Full and Engineering Scale Test Systems

Low Active Waste Pretreatment System (LAWPS)

AVANTech has the facilities and capabilities to perform bench, engineering, and full scale testing of non-radioactive processes and systems.

Millions of gallons of radioactive and chemical wastes from nuclear weapons production are stored in underground tanks at the Hanford Site, located in the state of Washington. A portion of this waste is known as supernatant, and it contains a measurable concentration of soluble cesium-137 (^{137}Cs) and nonradioactive sodium and aluminum based salts.

The Low Active Waste Pretreatment System (LAWPS) will treat the tank supernatant waste by separating undissolved solids through a cross-flow filtration subsystem and by removing cesium using a spherical resorcinol formaldehyde (sRF) based ion exchange subsystem. The solids and cesium removed will be returned to the Double Shell Tank (DST) System for future treatment by the Waste Treatment Plant (WTP) high level waste pretreatment and vitrification plant.

Tank Waste Simulant Storage Tanks

Full Scale Acrylic sRF Column

Treated waste containing mostly non-radioactive salts will be stored in lag waste storage tanks and sampled to confirm the treatment process efficacy. Treated waste compliant with waste acceptance criteria will be fed to the WTP LAW vitrification facility.

The Hanford tank farms contractor, Washington River Protection Solutions (WRPS), is currently implementing a technology maturation plan (TMP) to confirm that the proposed filtration and ion exchange equipment meets technology readiness levels associated with DOE Order 413.3B. The TMP incorporates both engineering scale and full scale equipment testing with waste simulant that closely matches the characteristics of waste supernatant currently stored at Hanford.

Full and Engineering Scale Test Systems

WRPS is currently implementing portions of the TMP through a contract with AECOM. As a member of the AECOM Team, AVANTech is currently responsible for the following scope of supply:

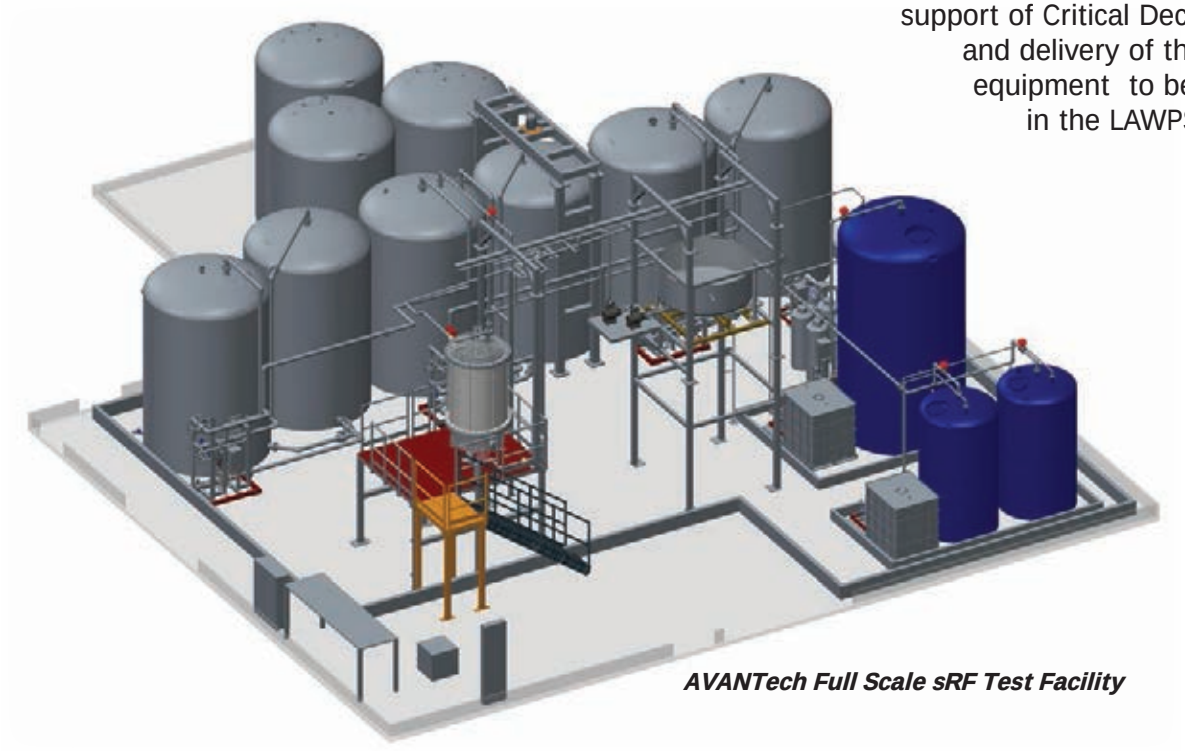
- ✓ Design, manufacture, and supply of 1/9th scale (engineering scale) components that includes:
  - » cross-flow filter for undissolved solids removal, and
  - » sRF ion exchange column for cesium removal
- ✓ Design and manufacture of a full scale sRF test facility that includes the supply of a translucent sRF ion exchange column made from acrylic
- ✓ Implementation of full scale sRF testing with waste simulant at its facility in Columbia, South Carolina, which includes:
  - » Tanks, pumps, piping, and components for operation of sRF resin with 20,000 gallons of waste supernatant simulant
  - » Test procedure development
  - » Operator training
  - » Test implementation
  - » Use and storage of sRF resin provided as Government Furnished Equipment
  - » Disposition of all chemicals and simulant associated with the tests

A rendering of AVANTech's full scale test facility is provided in the figure below. At this facility, AVANTech is performing the following tests to gather data necessary to demonstrate the effectiveness of the sRF ion exchange system:

- ✓ Operation of sRF resin to exhaustion to determine volumetric throughput
- ✓ Demonstration of ion exchange column resin loading, elution, regeneration, and resin removal operations
- ✓ Demonstration of neutralization of the elution/ regeneration streams
- ✓ Demonstration of operation of emergency cooling capability
- ✓ Evaluation of gas generation/retention/release

The key focus of the full-scale equipment sizing was to maintain process velocities, residence time, and chemical performance equal to those planned for the full scale LAWPS facility. The translucent sRF column enables real-time observations of resin bed stability, internal flow characteristics, and mixing dynamics – all of which aid stakeholder knowledge about the ^{137}Cs removal process.

The equipment and test results provided by AVANTech will allow WRPS to mature the LAWPS to technology readiness level (TRL) level 6 in support of Critical Decision-2 and delivery of the actual equipment to be used in the LAWPS facility.



AVANTech Full Scale sRF Test Facility

AVANTech

▪ 803.407.7171 ▪ 2050 American Italian Way, Columbia, South Carolina 29209
▪ 865.539.9000 ▪ 2680 Westcott Boulevard, Knoxville, Tennessee 37931
▪ 509.943.6706 ▪ 2155 Robertson Drive, Richland, Washington 99354
▪ info@avantechllc.com ▪ **www.avantechllc.com**