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SRNL is a DOE National Laboratory
operated by Savannah River Nuclear Solutions.

Facts

about Savannah River National Laboratory

U.S. DEPARTMENT OF ENERGY • SAVANNAH RIVER SITE • AIKEN • SC

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SRNL Fast Facts

- > National Laboratory for DOE Office of Environmental Management
- > Supporting customers at SRS, DOE and other federal agencies nationally and internationally
- > Applied research, development and deployment of practical, high-value and cost-effective technology solutions in the areas of national security, clean energy and environmental stewardship
- > Operated by Savannah River Nuclear Solutions for the U.S. Department of Energy near Aiken, S.C.

Contact Information

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Gas Transfer Systems and Reservoir Development

Gas Transfer Systems and Reservoir Development

The Savannah River Site (SRS) is rich in history for its involvement in the nation's nuclear defense program. For over 50 years, SRS and the Savannah River National Laboratory (SRNL) have developed the expertise necessary to be the premier laboratory for tritium processing and its relation to new reservoir design. SRNL is the bridge between the weapon Design Agencies and the Savannah River Tritium Enterprise. While providing essential daily technical and laboratory support to Tritium Operations, SRNL also develops the technologies required for modernization and infrastructure modification.

SRNL Provides Unique Expertise and Capabilities in Gas Transfer Systems

Tritium reservoirs provide nuclear warheads with the boost gas necessary to enhance the yield of a warhead primary component. At SRNL, we make sure the reservoirs, valves and other components are operating properly so that the tritium and deuterium gas get to where it is needed and the system will function as designed.

Expertise supporting the tritium mission at SRS comes from many disciplines that cut across SRNL, such as technologies and expertise in the fields of weapons, stock-pile surveillance, gas transfer processes and tritium effects on materials. At SRNL, we have the experience and expertise necessary to perform research and support Design Agencies during each step of the process, from the selection of components and materials for advanced reservoir design, to the development of loading procedures for seamless adaptation with existing processes and technology in the Tritium Facilities.



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Reservoir Development

At SRNL we are constantly applying new technology to enhance the reliability and performance of our stockpile. SRNL functions as the technical bridge between the Design Agencies and the SRS Tritium Facilities when new reservoir designs are developed. The Weapons Technology Group scientists and engineers are involved early in the design phase, interfacing with the Design Agencies to ensure that the needs and capabilities of the plant are considered when new systems are being developed. Recent programs for reservoir development included the 1X and 2X Acorn reservoirs and the 4T Terrazzo reservoirs. Development of these reservoirs has been completed and all are currently in production in the Tritium Facilities. NNSA is now forecasting life Extension Programs for several weapons systems. The next anticipated development program will be the W87 ALT 360, and the B61 LEP gas transfer system, which is planned to utilize Acorn-type systems.

A Multi-Service Laboratory

In support of reservoir development, SRNL has the unique facilities needed to support development of new Gas Transfer Systems. We develop preload processing methodologies for acorn systems as well as develop loading and examination techniques for Terrazzo systems. SRNL handles high pressure hydrogen/deuterium, which are used as simulants in the development of tritium reservoir vessels in the High Pressure Hydrogen Lab in 774-A, where development reservoirs are loaded. Closure welds or pinchwelds are performed on the development reservoirs in 723-A, using the system that is also the development system for pinchwelds for the Tritium Facilities reservoir welders.

Once loaded and welded, the reservoirs are function tested to validate gas deliveries. This is performed in an Environmental Conditioning chamber in 723-A, where they are assembled with a simulated warhead pit or receiver, explosively actuated valves, as well as temperature and pressure instrumentation. Also included are instruments to measure gas deliveries real-time (Real Time Mass Spectrometry) and capillaries which will carry gas from the receivers to a low mass, high resolution Finnigan Mass Spectrometer for a very accurate analysis of the gas composition. There is also a laser installed with the Environmental Chamber. It is used to vent gas trapped in the reservoir being tested, which allows a complete mass balance of all of the gas from the reservoir being tested.

This collection of facilities and capabilities allow SRNL to perform all of the activities necessary to develop a new gas transfer system reservoir. Once developed, these technologies are transferred to the Tritium Facilities where the process is implemented using tritium. Developing the technologies using simulants in SRNL eliminates the hazard of performing development using highly radioactive tritium and makes the transition to the Tritium Facilities essentially seamless.

Reservoir Development Projects

Current Projects

- W76-0 1X
- W76-1 2X
- W88 3T
- W88 4T
- W80-3 SP1103
- Tritium Thermoelectric Generator

Future Projects

- B61 LEP 3X
- W87 ALT 360 SP1115
- W78/W88-1 Acorn
- LRSO Acorn

A Area Facilities

- Acorn Lab
- Terrazzo Labs
- Inert Glovebox capability
- 774-A High Pressure Hydrogen Lab
- 723-A Environmental Chamber for Development Reservoir Function Testing
- 723-A Low Mass High Resolution Mass Spectrometer

