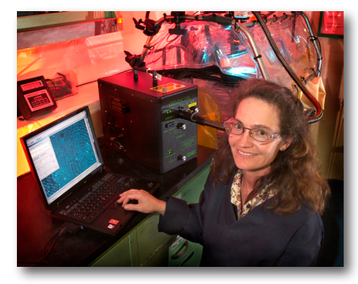
SRNL SAVANNAH RIVER NATIONAL LABORATORY

Factsheet

Savannah River National Laboratory Overview

Metal hydride materials developed for hydrogen storage



Nuclear forensics support

Savannah River National Laboratory puts science to work to create and deploy practical, high-value, cost-effective technology solutions. As the applied research and development laboratory at the U.S. Department of Energy's Savannah River Site (SRS), SRNL supports customers at SRS, throughout DOE, at other federal agencies, across the country and around the world.

DOE has designated SRNL as the "corporate laboratory" for the DOE Office of Environmental Management. In this capacity, SRNL applies its unique expertise and applied technology capabilities to reduce technical uncertainties in order to assist sites across the DOE Complex in meeting cleanup requirements.

SRNL enables its customers to achieve success through an unwavering commitment to

Safety – the best safety record of any DOE laboratory

Security – stellar record of protecting the nation's interest

Quality – integrated technology solutions that work

The laboratory serves the nation in three major program areas:

National and Homeland Security

- Tritium technology – Research and development for continuous improvement of the processes that maintain the nation's supply of tritium (the radioactive form of hydrogen used in national defense)
- Nuclear materials technology – Research and development into the safe handling and disposition of plutonium and spent nuclear fuel to advance the nation's nuclear nonproliferation goals
- Homeland security – Technologies, training and consultation for a variety of national, regional and local homeland security and law enforcement needs
- Nuclear forensics
- Monitoring and detection capabilities for nuclear nonproliferation
- Biological and chemical collection technologies for signature analyses and nonproliferation.

Energy Security

- Hydrogen technology – Technologies needed to make the wide-spread use of hydrogen practical for powering America's future, including:
  - Advanced hydrogen storage technologies for transportation applications that are safe, lightweight and cost-effective
  - Clean, cost-competitive methods for producing hydrogen, including production by nuclear energy
  - Understanding the impact of impurities on the performance of hydrogen fuel cells
  - Development and application of Codes and Standards for the hydrogen economy
- Fusion energy – A partner laboratory for the U.S. ITER project, part of an international project to demonstrate the scientific and technological feasibility of a full-scale fusion power reactor. SRNL's role is the design, fabrication, assembly, testing, and shipment of the exhaust processing system.

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U.S. DEPARTMENT OF ENERGY

Partnerships

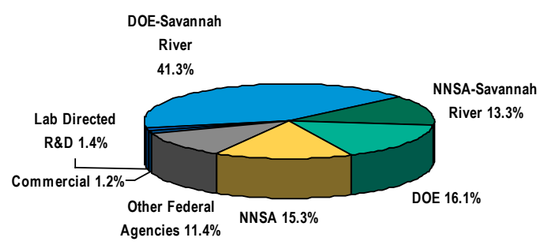
SRNL has established strong working relationships with research universities in the region, to advance a technology-based economy driven by technological innovation. In addition, SRNL forms partnerships with other national laboratories, universities and private industry … whatever combination of expertise will result in the best, most cost-effective solutions for the laboratory's customers.

Customers

SRNL has a broad customer base, including:

- U.S. Department of Energy
- National Nuclear Security Administration
- U.S. Department of Defense
- U.S. Department of Homeland Security
- U.S. Department of Justice
- NASA
- International Atomic Energy Agency
- Nuclear Regulatory Commission
- Other National Laboratories
- Commercial companies
- Academia

FY08 funding for SRNL was approximately $157M, from the following customers:



Location

SRNL is located at the Savannah River Site, a 310-square mile DOE facility in South Carolina, near Aiken, S.C. and Augusta, Ga.

Background

SRNL's tradition of putting science to work in service to the nation goes back over 50 years.

The laboratory was established in 1951 to provide technology research and development support for the Atomic Energy Commission's new Savannah River Plant. Its researchers developed technological solutions for the many challenges of building and bringing into operation five nuclear production reactors and related facilities. Over the decades, the Savannah River Plant became DOE's Savannah River Site, and the Savannah River Laboratory (or the Savannah River Technology Center, as it was later called) developed into an internationally-recognized laboratory with outstanding expertise in hydrogen technology, materials science, environmental research, robotics engineering, analytical chemistry, hazardous material stabilization, and technologies for non-proliferation and national security.

On May 7, 2004, Secretary of Energy Spencer Abraham designated the laboratory the Savannah River National Laboratory, one of only 12 National Laboratories nationwide. In early 2006, the laboratory was further designated as the DOE Office of Environmental Management's "corporate laboratory."

We Put Science To Work™

SRNL is managed and operated for the U.S. Department of Energy by Savannah River Nuclear Solutions, LLC

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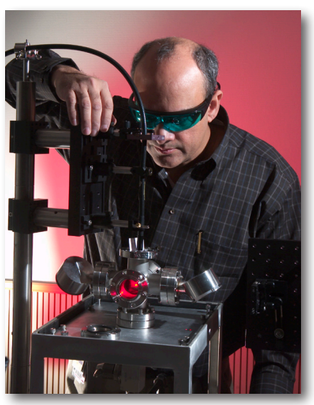
Stabilization of nuclear weapons byproducts in glass

- Nuclear energy - One of 10 national laboratories providing research and development support for the Global Nuclear Energy Partnership (GNEP), a comprehensive strategy to enable the expanded worldwide use of economical, environmentally responsible nuclear energy to meet growing electricity demand, while virtually eliminating the risk of nuclear material misuse.
- Renewable energy - Assessment and application of available renewable energy in the southeast, such as biomass, off-shore wind and solar. This includes participation in a coalition studying the conversion of cellulosic materials, such as the stems and leaves from certain plants, into ethanol.
- Unconventional energy sources - Helping the nation to harness energy sources such as oil sands, oil shale, methane from coal beds and methane hydrates. This includes the use of SRNL's biotechnology expertise to tap into these unconventional sources.

Environmental and Chemical Process Technology

- Cleanup technology – Technologies for cleaning chemical and radiological contaminants from the soil and water, including:
  - A wide range of tools that match the aggressiveness of the cleanup technology to the level of contamination
  - Use of naturally occurring microorganisms to break down or isolate contaminants
  - Techniques that harness and measure nature's decontamination abilities
- Hazardous materials disposition – Technologies to safely stabilize, immobilize, store, transport and permanently dispose of all types of legacy materials including low- and high-level radioactive waste and plutonium, uranium and other actinide materials. These include:
  - Technologies to immobilize high-level radioactive waste in a safe, stable glass form, suitable for long-term disposition
  - Technologies for immobilizing nuclear materials in cement, safely isolating them from the environment
  - Technologies for separating complicated materials into their constituent ingredients, so that each can be treated in the most efficient method
  - Disposal performance assessment modeling to insure protection of the public and environment



Development of optical methods and sensors

Expert Staff

SRNL has a total employment of over 900, including a research staff of over 700. This includes materials scientists, chemists, physicists, biologists, microbiologists, mechanical engineers, chemical engineers, nuclear engineers and a variety of other scientists, engineers and technicians. Approximately 23% of the research staff hold PhDs.

SRNL's highly skilled scientists, engineers and technicians provide timely and creative solutions to a myriad of challenges under conditions that require utmost attention to safety and security. *We put science to work* by integrating their knowledge and skills in the following core competencies:

- Radioactive chemical processing
- Glass waste forms and vitrification process development
- Application of environmental remediation technologies
- Development and qualification of nuclear material packaging
- Nuclear fuel storage and handling
- Tritium production, purification, and storage
- Hydrogen storage
- Ultra-low-level, high-sensitivity nuclear measurements

Facilities

SRNL has a variety of both unique and traditional laboratory spaces for numerous types of research and prototype development, including:

At the Savannah River Site:

- Shielded cells - special containment facilities that provide the shielding and confinement necessary for examination, analysis, and testing of highly radioactive materials
- Glovebox facilities - sealed, protectively-lined compartments with attached gloves which allow workers to handle hazardous materials safely
- Radiochemistry and analytical laboratories with contained instruments
- Remote systems laboratory - laboratory for the design, development, fabrication, and testing of unique equipment systems for use in radioactive, hazardous, or inaccessible environments
- Engineering development laboratory - laboratory for performing innovative tests and demonstrations of equipment and existing/proposed designs
- High-pressure test facility - facility with steel-walled cells for high-pressure hydrogen exposure and testing, fatigue testing, and fracture toughness testing of metal specimens
- Atmospheric Technologies Center - facility with extensive capabilities for world-wide meteorological forecasts and real-time atmospheric transport modeling and assessment
- Ultra low-level underground counting facility - one-of-a-kind facility located 50 feet below ground level with four-inch thick walls of pre-nuclear weapons era steel which allows high-sensitivity measurements of ultra-low amounts of environmental radioactivity
- Advanced fracture mechanics laboratory - laboratory with extensive capability for fracture testing in harsh environments and modeling to support system/component life extension
- Primary standards laboratory - facilities providing calibration services compliant to the requirements of the American National Standard
- Rapid fabrication facility, which produces low-cost prototypes, parts, and complete working models
- Gamma irradiation facility for testing materials' abilities to withstand radiation exposure
- Materials processing and fabrication laboratory to conduct materials processing, including powder metallurgy and solidification processing of nuclear materials
- Digital radiography facility - providing a highly sensitive and cost-effective alternative to traditional film X-rays for looking at the contents inside a container, verifying the quality of welds, detecting deformations and other uses

Shielded Cells

Atmospheric Technologies Center

At the Savannah River Research Campus:

The Savannah River Research Campus, owned by Aiken County, is a business and technology park adjacent to SRS, established to facilitate collaboration with SRNL. The Aiken County Technology Laboratory at the Research Campus opened in 2001. The 21,000 sq. ft. laboratory houses SRNL's state-of-the-art:

- Waste treatment laboratories, using nonradioactive simulants
- Environmental biotechnology laboratories

The Center for Hydrogen Research at the Research Campus, opened in early 2006, is a 60,000 sq. ft. laboratory dedicated to hydrogen storage, separation, production, and materials development activities. SRNL leases half of this facility for its Hydrogen Technology Research Laboratory, which houses unclassified and energy-related hydrogen research and development. The County is leasing the other half to universities and industries involved in hydrogen R&D.

Hydrogen Technology Research Laboratory at the Center for Hydrogen Research