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Savannah River National Laboratory
factsheets

CORE COMPETENCY

Analytical Chemistry

(Low-level nuclear measurements & highly radioactive samples)

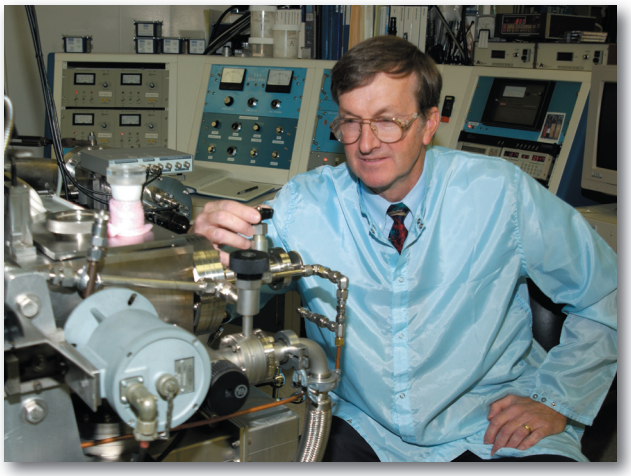
Overview

SRNL provides a full range of state-of-the-science analytical chemistry capabilities to support laboratory research programs and our customers. Analysis services include those traditionally associated with the chemical process industry, and also those needed to meet the challenges of environmental restoration activities, nuclear materials processing, and radioactive waste characterization/disposition. The strength of the organization is not only in providing analytical services, but in developing new and enhanced methods. Fifty years of nuclear operations at SRS have led to extensive analytical expertise in the following areas:

High Sensitivity Measurements

The technology of high sensitivity ultra-trace measurement of small amounts of radioactivity continues to grow and find new missions beyond the Cold War into new areas of nuclear nonproliferation, international safeguards, national security, and law enforcement. Technological advancements in this area make for a cleaner, safer, and more secure nation and world. SRNL uses its highly specialized expertise and equipment to make key contributions to our national priorities, including:

- Nuclear inspections in many countries to support international safeguards and nonproliferation efforts
- High sensitivity measurements to locate the source and measure the impact of radioactive releases on the environment and the surrounding population
- The Tracking Atmospheric Radioactive Contaminants (TRAC) vehicle, a fully-equipped mobile laboratory, to measure trace radioactive materials released to the atmosphere
- An underground ultra-low background radioactivity measurement facility, the only one in the U.S., located at SRS
- Development of remote thermal sensing technology



Dr. Justin Halverson conducts research on the development and application of mass spectrometry and nuclear spectrometry instrumentation to support nonproliferation activities. Dr. Halverson has authored numerous publications with emphasis on development and application of high-sensitivity measurement systems and methods, and has served on the former DOE Laboratory Advisory Group for Effluent Research and on the DOE Working Group on Nuclear Smuggling.

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Analytical Chemistry

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Dr. Art Jurgensen conducts research on the development and application of Thermogravimetry, X-Ray Diffraction, and X-Ray Fluorescence techniques to support hazardous and radioactive waste disposition, actinide oxide stabilization, and other materials characterization studies. Dr. Jurgensen has authored dozens of presentations and publications with emphasis on the analysis of complex radioactive matrices using these and other spectroscopic techniques. He is an active member of the International X-Ray Analysts Society and the International Association of Geoanalysts, where he participates in the certification of geological reference standards.

Analytical Measurements on Nuclear Materials

SRNL analytical chemistry capabilities have been deployed in harsh environments common in nuclear operations for over 50 years. SRNL has developed a broad expertise in characterization of nuclear materials and by-products for a comprehensive set of constituents. Expertise includes:

- Nuclear chemistry separations methods
- Elemental analyses by spectroscopy
- Trace organic compounds
- Radioactive waste glass analysis, including custom dissolution techniques
- Scanning electron microscopy capabilities utilizing a glovebox-contained unit for highly radioactive materials
- X-ray diffraction and x-ray fluorescence capabilities for analyses of radioactive materials
- Radiation shielding calculations and modeling
- Field survey capability and development of automated methods for equipment contamination measurements and nuclear material holdup measurements

Spectroscopic technologies for process monitoring is the area of basic and applied research being pursued by Dr. Laura Tovo (left) and Dr. Kristine Zeigler. On-line fiber-optic Raman spectroscopy and miniature mass spectrometry are among the various spectroscopic methods that Dr. Tovo and Dr. Zeigler are demonstrating in the process environment.

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