

## Radioactive Chemical Processing



Tracy Rudisill is an expert in the separations processes used at SRS.



Dr. David Hobbs is investigating the use of materials SRNL and SRS have developed (especially from the liquid waste process) in medical and wastewater treatment applications.

## Introduction and History

SRNL has in place an impressive array of radiochemical processing skills focused on the design, development, and efficient operation of industrial and radiological processes, including waste treatment and disposal. This core capability combines engineering, chemistry, physics, mathematics, materials science, and other technical fields to examine the fundamental science and engineering of the integrated processes.

SRNL has proven its radiochemical processing and waste treatment technology capabilities by supporting SRS nuclear material and waste processes for over five decades and consulting on nuclear processing challenges at other DOE sites and throughout the world. Our strength lies in applying the most effective technologies to the demanding production environments inherent in the nuclear fuel processing cycle. We support operations ranging from major industrial radiochemical processing to mobile treatment units in the areas of actinide materials production, transuranic and solid radioactive waste, liquid effluent treatment, waste immobilization and medical applications. Specific SRNL expertise includes the following:

### Actinide Materials Processing and Characterization

Stabilization, purification, disposition, and characterization of actinide materials have been essential elements of the site's mission from historic nuclear defense missions through the site's current environmental management and nuclear nonproliferation missions. SRNL has led the design and development of specialized technologies to enable the safe and effective processing and characterization of actinide materials. These core capabilities, still used to meet current mission objectives, can easily be targeted to assist the processing of non-nuclear materials.

### Materials and Handling Expertise

- Plutonium (239 and 238 isotopes)
- Uranium (highly-enriched, depleted, and natural uranium)
- Neptunium
- Americium
- Solutions
- Oxides
- Alloys
- Metals
- Impure mixtures
- Radiochemical hoods
- Glovebox operations
- Shielded cell operations

### Core Capabilities

- Fuel Processing Cycle
- Dissolution
- Precipitation and filtration
- Solvent extraction (e.g., mixer settlers, centrifugal contactors)
- Ion exchange
- Characterization
- Storage and Surveillance

# Radioactive Chemical Processing



Dr. Michael Poirier has expertise in solid/liquid separations and fluid mixing.

## Contact

**Steve Wach**  
803-725-3020  
steve.wach@srn1.doe.gov

**Savannah River National  
Laboratory,**  
Bldg. 773-41A  
Aiken, SC 29808

**srnl.doe.gov**

APRIL 2009

## Transuranic and Solid Radioactive Waste Treatment

SRNL technologies related to solid low-level radioactive mixed and transuranic waste include techniques for:

- Disposing of wastes and environmental modeling
- Stabilizing and reducing the waste
- Controlling air pollution
- Decontaminating facilities and equipment
- Closing facilities
- Immobilization methods, including grout, glass, ceramic, and other waste forms
- Assessing transport of radionuclides in the environment

## Liquid Effluent and Highly Radioactive Liquid Waste Treatment

SRNL develops, evaluates, and supports technologies to remove the following contaminants from liquid wastes:

- Radioactive contaminants
- Heavy metals
- Hazardous and organic chemicals

SRNL has special expertise in utilizing the following separation methods:

- Filtration
- Solvent Extraction
- Ion exchange
- Electrochemical treatment
- Reverse osmosis

SRNL has capabilities in:

- Sampling
- Mixing/pumping/rheology
- Filtration (Solid/Liquid and Air)
- Materials of construction
- Process development

## Waste Immobilization

SRNL has studied the behavior in glass of nearly every element in the periodic table. SRNL has produced more than a million pounds of glass by vitrifying wastes from a variety of industrial environments. Through these activities, we have developed special expertise in the following areas:

- Waste characterization
- Waste form/flowsheet development and modeling
- Melter technology
- Off-gas systems (to remove pollutants from air emissions)
- Mixing/pumping/sampling/rheology
- Simulant development
- Materials of construction
- 

# We Put Science To Work™

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