SRNL™ Savannah River National Laboratory factsheets

CORE COMPETENCY

Chemical & Radiochemical Processing

Tracy Rudisill is an expert in the separations processes used at SRS. Recent activities include the measurement of plutonium and americium solubility in simulated alkaline waste solutions, the recovery of plutonium from refractory residues using a sodium peroxide fusion process, and the development of a recovery flowsheet for unirradiated neptunium targets.

Overview

SRNL has in place an impressive array of chemical and 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 chemistry, physics, mathematics, materials science, and other technical fields to deal with the principles underlying such processes.

SRNL has proven its chemical processing and waste treatment technology capabilities by supporting SRS nuclear material and waste processes for over five decades. Our strength lies in applying the most effective technologies to the demanding production environments found at SRS. We support operations ranging from major industrial chemical processing to mobile treatment units in the areas of actinide materials production, transuranic and solid radioactive waste, liquid effluent treatment, and waste immobilization. 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, and americium
- Solutions, oxides, alloys, metals, and impure mixtures
- Radiochemical hoods, glovebox operations, and shielded cell operations

Core Capabilities

- Dissolution
- Precipitation and filtration
- Solvent extraction (mixer settlers, centrifugal contactors)
- Ion exchange
- Gas generation measurements (includes thermogravimetric analyses/ mass spectrometry and surface area measurements)

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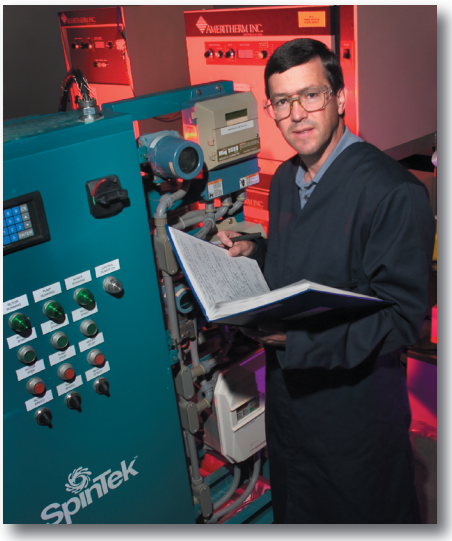
Chemical & Radiochemical Processing



Dr. Michael Poirier has expertise in solid/liquid separations and fluid mixing. Some of his research programs focus on developing processes to remove contaminates from liquid waste streams and developing mixing strategies to ensure chemical processes work as designed.

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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

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 organic chemicals
- Biological contaminants

SRNL has special expertise in utilizing the following solid/liquid separations:

- Electrochemical treatment
- Reverse osmosis
- Ion exchange
- Biological treatment
- Immobilization

SRNL has capabilities in:

- Sampling
- Mixing/pumping/rheology
- 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

Dr. David Peeler's interests include general glass science, immobilization of high-level, low-level, and actinide-bearing wastes, and waste form development and uncertainty analysis. Recent work includes the recovery of precious metals from inorganic/organic host matrices, development of process control strategies for waste vitrification, and designing glass formulations for waste.

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