ASET – Actinide Science and Engineering Testbed

Objectives

- Equip the DOE complex to allow for engineering scale nuclear material processing relevant to nonproliferation and civilian uses of nuclear materials
- Develop subject-matter experts that are able to effectively learn, be informed by, and experiment with U.S. and International processing activities spanning weapons production through nuclear energy
- Integrate a multi-disciplinary S&T agenda that engages a diverse workforce across the U.S complex to develop baseline skills that can evolve and grow into a variety of nonproliferation missions.

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Stewarding Engineering Scale Nuclear Materials Processing

Opportunities to utilize nuclear materials – power production, medical procedures, industrial applications – require facilities and a knowledgeable workforce specialized in nuclear materials or actinides, such as uranium and plutonium.

While enabling very positive civilian uses, actinides are also critical components in manufacturing nuclear weapons.

SRNL's Actinide Science and Engineering Testbed, or ASET, is an adaptable nuclear facility with shielded cells, laboratory spaces and analytical capabilities enabling long-term innovative nuclear energy, nonproliferation, and safeguards science and technologies.

ASET includes capabilities for collaborators to scale-up benchtop processes allowing understanding of engineering scale operations while providing novel opportunities for workforce development.

Mission Relevance
Ensured through collaboration with USG partners

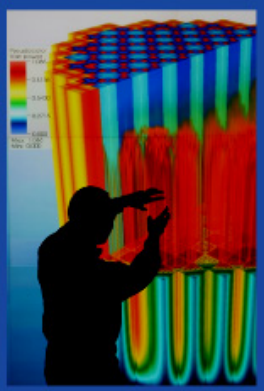
Stakeholder Transparency
Competency assessment and strategic planning using clear, rigorous, and open process

Technical Objectivity
Investment strategy based on comprehensive analyses

Enabling Infrastructure

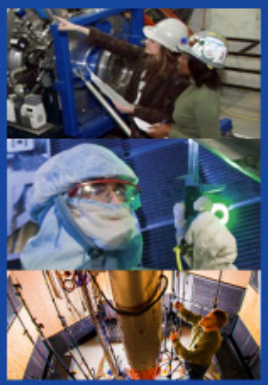
Leverage and develop research environments for advancing science and expertise

Enabling S&T



Advance understanding in technical disciplines necessary to enable nonproliferation missions

Expert Workforce



Ensure an enduring workforce with modern knowledge, skills, and experience

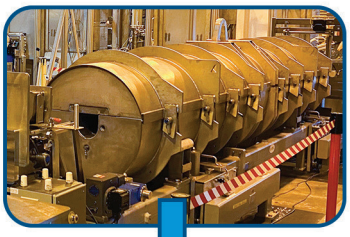
SRNL Unique Infrastructure and Capabilities

- Allows access to historic nuclear fuels from a wide variety of research and production reactors along with nuclear targets such as those from plutonium production reactors
- Provides engineering scale processing to provide opportunities to gain information not currently available from modeling or lab scale operations; enabling information to better understand closure of the fuel cycle, separations technologies and processes for detection
- Enables workforce development efforts across areas of hands-on processes, computational modeling, monitoring, and other key areas
- Staffing expertise that supported Savannah River Site H- and F-Canyon operations for past several decades
- Irradiated spent nuclear fuel (SNF) at Savannah River Site L-Reactor basin (X-10 slugs, MTR, NRX HEU) including shipping casks, fuel handling, and other SNF special handling infrastructure
- Existing SRNL infrastructure (hot cells, intermediate level cells, glove boxes, specialized equipment) with the unique capability to manipulate substantial amounts of material
- Specialized instrumentation to analyze chemical forms and radioisotopes
- Expertise gained from the NA-ESH-10 sponsored MK-18A Target Recovery Program; processing Pu targets to recover Pu-244

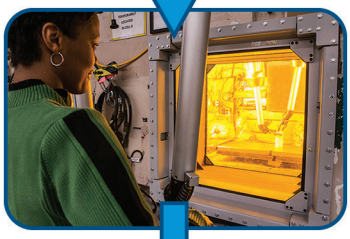
Mentoring by nuclear processing and nonproliferation experts and enabled by modern capabilities, SRNL's ASET will provide the workforce of the future with the knowledge required to meet future challenges.

Engagement with SRNL thought leaders and experts across areas of hands-on processes, modeling, monitoring, and other key areas will ensure the expertise needed to answer critical questions regarding potential proliferators, future processes and best paths forward.

Full size irradiated fuel receipt.



Shielded Cells used for fuel dissolution and first cycle solvent extraction.



Gloveboxes used for second cycle solvent extraction.

Lab-scale activities used to understand and evaluate processes.

Analytical equipment utilized to provide analysis.

Modeling utilized to further knowledge and to feed back into process knowledge.