SRNL
SAVANNAH RIVER NATIONAL LABORATORY
Operated by Savannah River Nuclear Solutions, LLC
We Put Science To Work

The Savannah River National Laboratory

Dr. Terry A. Michalske, Director

Evolution of SRNL

Savannah River Laboratory - established 1951

R&D to support the Savannah River Plant's mission of producing nuclear materials for the national defense

Savannah River Technology Center - 1992

Continued support to Savannah River Site (SRS)

Diversified technological focus

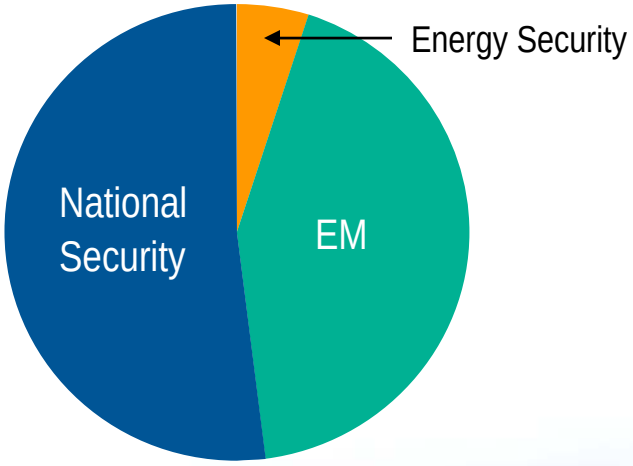
Savannah River National Laboratory - 2004

Expanded role for DOE/EM and broader national security missions

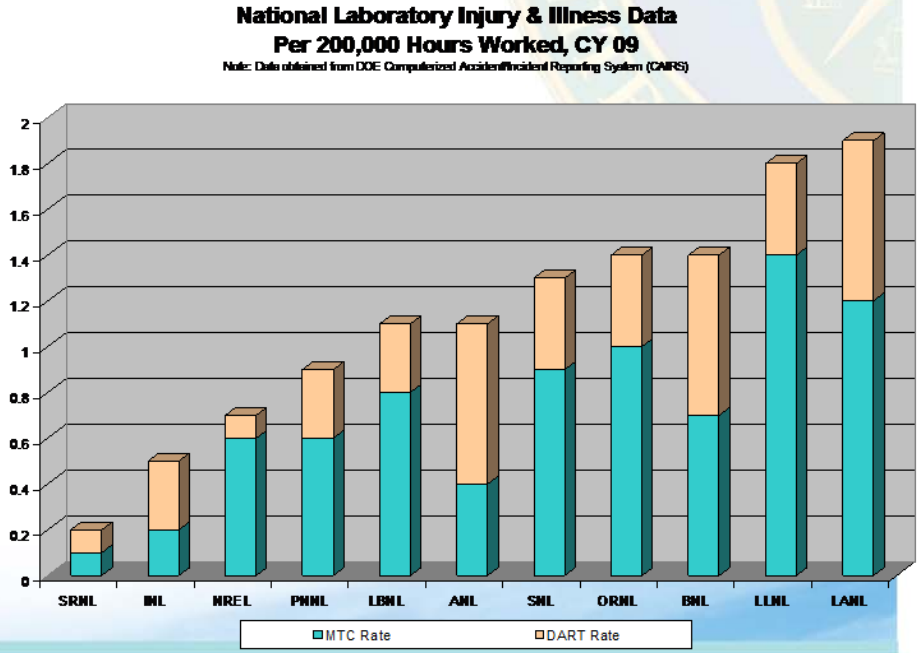
SRNL at a Glance

- **945 Staff; ~ $210M (FY10)**
- **Safest Laboratory**
- **Broad Science and Engineering**
  - Nuclear Materials Detection, Handling and Processing
  - Light Elements

Multi-Program Laboratory



SRNL FY10 Revenue



Our Facilities

Aiken County's
Savannah River
Research Campus

Our Greatest Strength: Our People

Internationally recognized ▪ Professional leadership ▪ Building the next generation

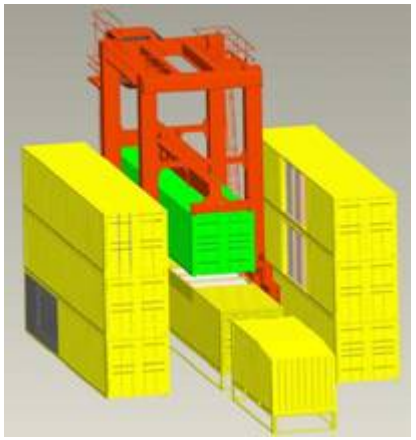








Multi-Program National Laboratory



Environmental Management

- Waste Treatment
- Materials Stabilization and Disposition
- Remediation and Cleanup
- Assessments and Verification

National and Homeland Security

- Nuclear Defense
- Plutonium Technology
- Homeland Security
- Nonproliferation
- Nuclear Forensics

Energy Security

- Hydrogen Production and Storage
- Nuclear Fuel Cycle R&D
- Renewable Energy Research

SRNL Innovation Impacts Broad National Priorities

Environmental Management

Small Column Ion Exchange module

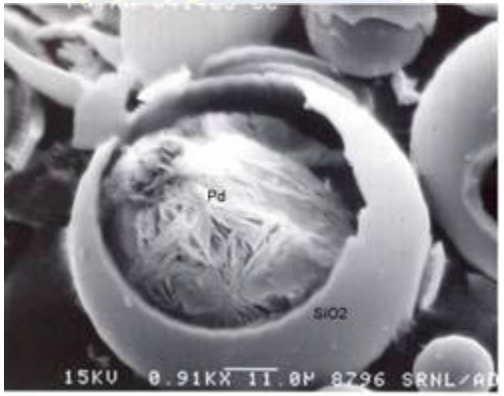
Rotary Microfilter

National and Homeland Security

FBI Forensics

Tracking and tagging technology

Energy Security



Porous wall hollow glass microspheres

Testing SODAR to measure off-shore wind

Broad Science and Engineering Proficiencies

- Integrated chemical process development
  - Laboratory, bench, and pilot scale
  - Strong analytical chemistry capability
- Materials development and analysis
  - Metallurgy, ceramics, and polymers
  - Synthesis and performance
- Process and engineering modeling
- Radioactive process development and plant support
- Nuclear engineering
- Mechanical engineering, remote systems, and robotics
- Environmental science
- Biotechnology
- Atmospheric sciences


Environmental Science & Biotechnology


Plutonium Button


Control Room of Fractional Crystallization Pilot Scale Plant


Metal Hydride Materials for Hydrogen Storage


Robotics

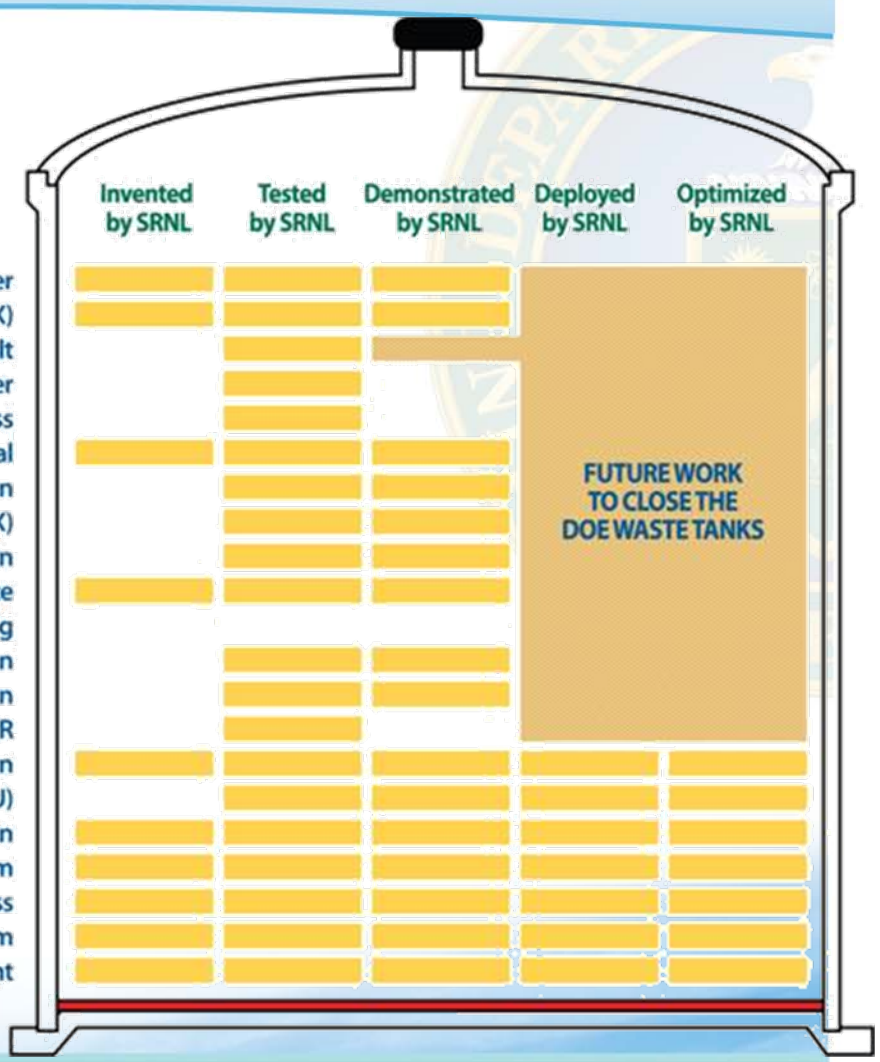

Atmospheric Sciences Center

SRNL Innovation: EM Waste Processing Technologies

1989 – Present

EM Waste Processing Technologies

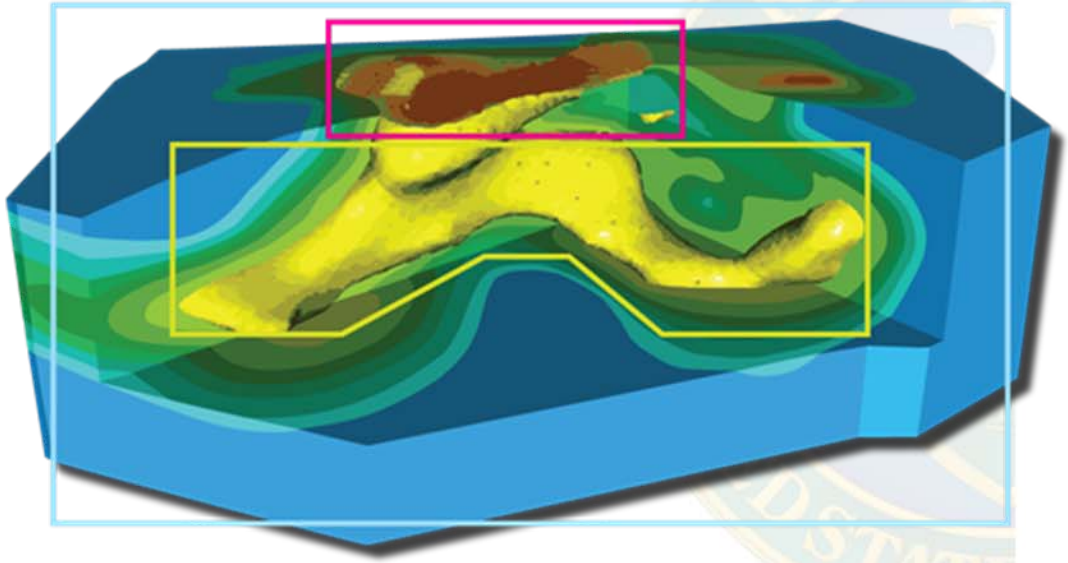
- Rad Hardened Rotary Microfilter
- Small Column Ion Exchange (IX)
- Fluidized Bed Steam Reforming (FBSR) for Salt
- Cold Crucible Induction Melter
- Iron Phosphate Glass
- Salt Waste Processing Facility (SWPF) Alpha Removal
- SWPF Filtration
- SWPF Caustic Side Solvent Extraction (CSSX)
- Hanford Waste Treatment Plant (WTP) Filtration
- WTP Strontium/Transuranic Waste
- WTP Aluminum Leaching
- WTP High-Level Waste Vitrification
- WTP Low-Activity Waste Vitrification
- Idaho Integrated Waste Treatment Unit FBSR
- Actinide Removal Process (ARP) Filtration
- Modular CSSX Unit (MCU)
- Saltstone Grout Formulation
- Saltstone Waste Form
- Defense Waste Processing Facility (DWPF) Vitrification Process
- DWPF Waste Form
- DWPF Melter and Process Equipment



SRNL Innovation: EM Groundwater and Soil Technologies

Groundwater & Soil Cleanup Solutions

for every contaminant zone
matched to the cleanup challenge
applied across all remedial investigation phases
(characterization, remediation and monitoring)



SOURCE ZONE
- Raman Spectroscopy [2,3]
- Geo VIS [2,3]
- Cone Permeameter [1,2,3]
- Laser Induced Flourescence [2,3]
- Hydrophohic Flexible Membrane (FLUTe) [2,3]
- Ribbon NAPL Sampler [1,2,3]
- Wireline Soil Sampler [2,3]
- Membrane Interface Probe (MIP) [2,3]
- In-Situ Chemical Oxidation [2,3]
- Six Phase Heating (ERH) [2,3]
- Thermal Detritiation [2,3]
- Electrical Resistance Tomography (ERT) [2,3]

PRIMARY GROUNDWATER / VADOSE ZONE
- Cone Sipper [1,2,3]
- VOC Headspace Sampling [1,2,3]
- Strata Sampler [1,2,3]
- CPT NaI Gamma Probe [2,3]
- GeoSiphon [1,2,3]
- PHoSTer (bio) [1,2,3]
- Sulfate Reduction of Metals [2,3]
- Base Injection [2,3]
- Hydraulic Fracturing Enhanced SVE [2,3]
- Edible Oil Injection [1,2,3]
- I-129 Capture with AgCl [1,2]
- Micro CED (Bio) [1,2]
- Horizontal Wells [2,3]

DILUTE PLUME / FRINGE
- BaroBall [1,2,3]
- Microblower [1,2,3]
- Monitored Natural Attenuation (MNA) [1,2,3]
- Enhanced Attenuation (EA) [1,2,3]

Technology Key

Coding
[1] - Invented by SRNL
[2] - Tested/Demo by SRNL
[3] - Deployed/Optimized by SRNL

Moving to Strategic Role for EM Program

Rotary Microfilter

- SRS: Remove solids from salt waste
- Hanford: Currently studying for applications
- Advantages over cross-flow filter
  - Smaller footprint
  - Can be deployed in-tank
  - Higher filtration rate
- Adapted Spintek design for radioactive use
- Patented and licensed
- Funded by EM Office of Technology Innovation and Development

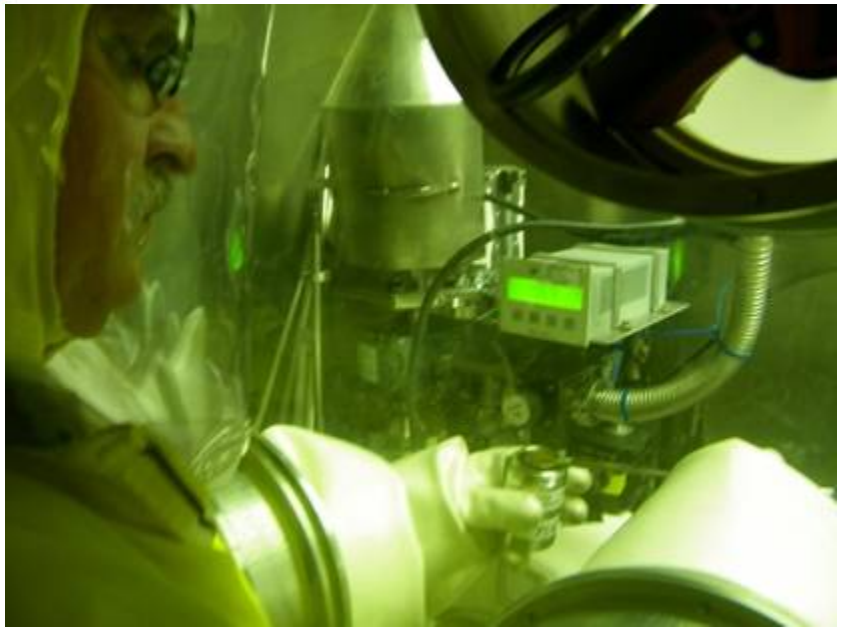
MicroCED

- SRS: Demonstration in P Area
- Naturally occurring microbes
- Destroy chlorinated volatile organic contaminants
- Less expensive, less energy-intensive
- Patented microbial consortium
  - Another SRNL microbial consortium for petroleum products
- Demo funded by ARRA

Unique Grout Formulations

- SRS: In-situ D&D of reactor vessels
- Precedent-setting approach to D&D
- Chemically compatible with subject materials
- Flowable and self-leveling
- Funded by ARRA
- Building on this work, developing grout for high-level waste tank closure
  - Funded by Site's liquid waste contractor, Savannah River Remediation

Vacuum Salt Distillation



- SRS: HB-Line processing of 3013 plutonium oxide
- Removes salts to prevent equipment corrosion
- Uses combination of vacuum, heat, reduced pressure, and cooling air
- Safe, robust and glovebox-friendly
- Avoids TRU waste generation and criticality concerns of washer approaches
- Co-developed with Site and UK's AWE

Nuclear Materials are Key to Our Nation's Future

SRS Clean Energy Initiative

- Needs
  - Reduce CO_2 footprint
  - Provide secure energy for critical missions
- Assets
  - Large available land area
  - Nuclear materials expertise
  - Highly trained and skilled workforce
- Goal: Build industry partnership and advance clean energy technology
  - Biomass
  - Grid integration
  - Small Modular Reactors (SMR)