



# Update to SRNL Strategic Objectives

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**Dr. Terry A. Michalske**  
Laboratory Director  
November 15, 2010



**SRS CAB Meeting**

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# Evolution of the Savannah River National Laboratory

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## **Savannah River Laboratory - established 1954**

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

## **Savannah River Technology Center – 1992**

**Continued support to Savannah River Site (SRS)**

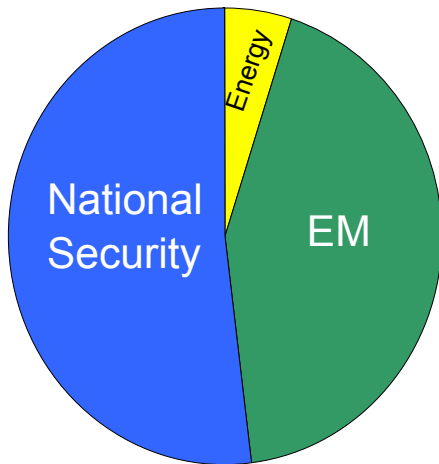
**Diversified technological focus**

## **Savannah River National Laboratory - 2004**

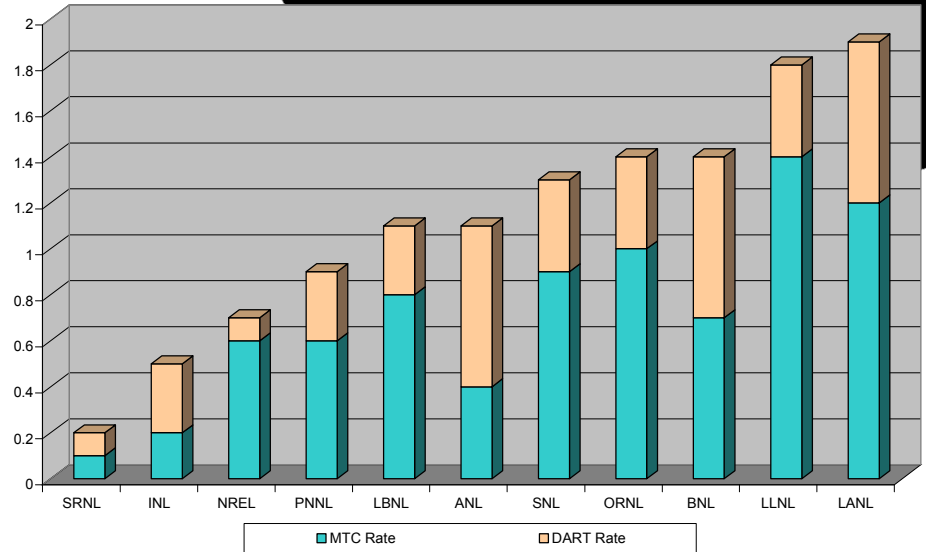
**Expanded role for DOE/EM and broader national security missions**

# SRNL at a Glance

- 945 Staff; ~ \$210M (FY10)
- Safest Laboratory
- Broad Science & Engineering
- Multi-Program Laboratory



SRNL FY10 Revenue



# Our Greatest Strength: Our People

- Internationally recognized
- Involved in their professions
- Committed to the next generation



# A Multi-Program National Laboratory



## Environmental Management

Waste Treatment Technologies

Materials Stabilization and Disposition

Remediation and Clean-up Technologies



## National and Homeland Security

Tritium Technology

Plutonium Technology

Homeland Security Support

Non-Proliferation Technology

Nuclear Forensics



## Energy Security

Hydrogen Storage Technology

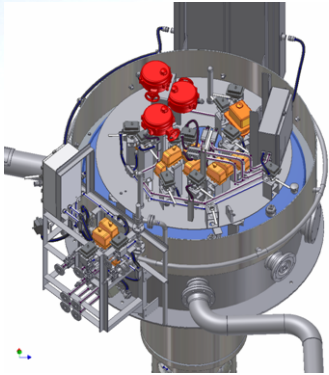
Production of Hydrogen

Fuel Cycle R&D

Renewable Energy Research

# SRNL Innovation: Putting science to work for broad national priorities

## Environmental Management



Small Column  
Ion Exchange  
module

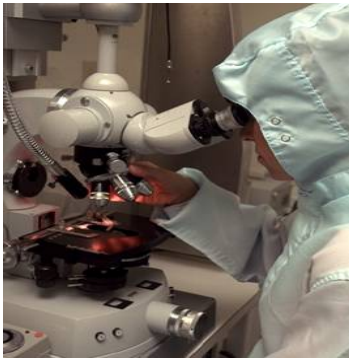


Rotary Microfilter

## National and Homeland Security



FBI



Forensics



Wind Turbine Drive  
Train Test Facility



Testing SODAR to  
measure off-shore  
wind

# Our Facilities

Main Campus



Aiken County's  
Savannah River  
Research Campus

Hydrogen Technology  
Research Laboratory



Aiken County  
Technology Laboratory

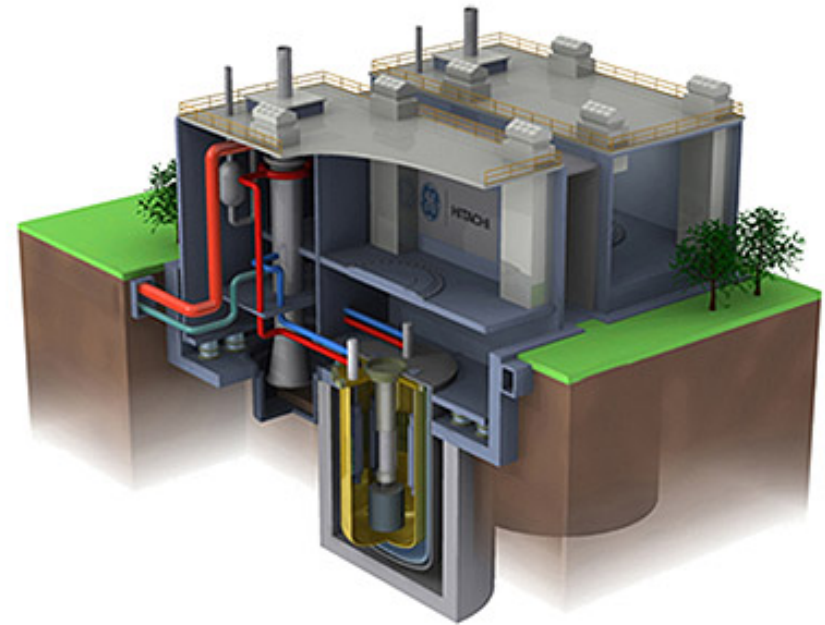


# The Future: Clean Energy Initiative

*Private Sector owns the Energy System*

*– Government can help mitigate:*

- **Technology Risk**
  - Science & Technology (S&T) tools and application
- **Market Risk**
  - Renewable Portfolio Standards (RPS)
  - Renewable Fuel Standards (RFS)
  - Permitting
- **Capital Risk**
  - Loan Guarantees
- **Operations Risk**
  - First Adopter

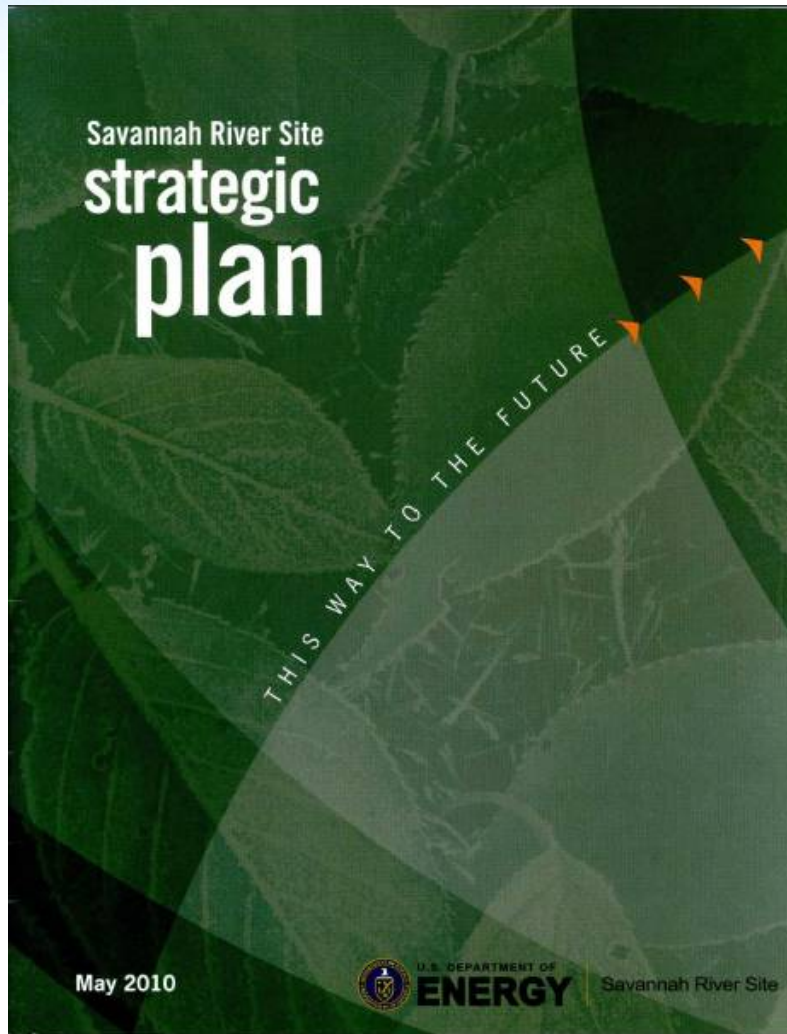


PRISM Power Block

**Building confidence in new systems**



# SRNL Achievements in Support of SRS Strategic Plan



SRNL missions support the DOE goals to maintain U.S. global leadership in science and engineering, to build a competitive and sustainable clean energy economy and to reduce nuclear dangers and environmental risks.

## Savannah River National Laboratory Mission

SRNL "puts science to work" to create and deploy practical, high-value, cost-effective technology solutions. In 2006, SRNL was designated as the DOE Office of Environmental Management's Corporate Laboratory to provide critical technical solutions to enable and accelerate meeting the nation's environmental cleanup requirements. As the applied research and development laboratory at SRS, SRNL serves DOE and the nation by helping to complete missions at SRS, throughout DOE, in other federal agencies, across the country and around the world. DOE's vision for SRNL is to be the nation's premier applied science laboratory in Environmental Management, National and Homeland Security, and Energy Security by delivering world-class innovative performance in national defense and homeland security technologies, alternative energy technology and cleanup.

SRNL's key roles are to address the challenges of cleaning up the environmental legacy of the nation's weapons program and provide key support for national security, homeland security and energy security objectives; to utilize technical expertise to provide vital national and regional support in promoting U.S. energy independence and the broader goals of DOE; to assist U.S. industry with global competitiveness; to support the safe and efficient cleanup of SRS; and to provide technical leadership for future SRS missions.

SRNL's three-fold mission is to enable the success of SRS operations; to provide technical leadership for future site missions; and to utilize its technical expertise to provide vital national and regional support in achieving the broader goals of DOE and the federal government in a safe manner.

### SRNL Strategic Objectives:

- Position SRNL for transition into a financially self-sustaining, distinct business unit
- Establish SRNL as a preferred partner for industry, universities and small businesses in developing leading edge technologies in support of industrial, economic and educational strength of the United States
- Expand and mature SRNL's role as the EM Corporate Laboratory and lead a growing EM Engineering and Technology program to reduce the risk associated with legacy defense nuclear and industrial cleanup
- Develop and implement major new initiatives in the form of Centers of Excellence to provide science-based approaches to the DOE-EM mission
- Establish SRNL in a leadership role for hydrogen storage, production and delivery technology development
- Translate SRNL's historic strength in hydrogen storage and materials science into the basis for a new generation of robust, long-life, energy storage technologies
- Develop regional, national, and global partnerships that extend SRNL's capability to utilize biotechnology and renewable energy sources to achieve sustainable energy independence
- Apply skills developed in environmental management and atmospheric sciences to develop new and innovative approaches to carbon cycling, attribution, capture, and sequestration
- Continue SRNL's leadership role in tritium technology and component evaluation programs that ensure the safety and reliability of the nation's nuclear deterrent
- Expand SRNL's role in providing critical intelligence collection, analysis, and products that enable best-informed decisions by federal agencies and policy makers
- Reinvigorate a highly valued applied science resource for National Security and Homeland Security agencies fighting threats from terrorism
- Enhance SRNL's impact on global security through broad participation in the nation's nuclear nonproliferation efforts
- Establish a sustainable Department of Defense support effort in conjunction with appropriate partner institutions and companies
- Secure additional sponsors, missions, and funding, including development of enduring funding sources, to support laboratory infrastructure to meet needs for future growth while sustaining safety performance excellence



SRNL research

# SRS Strategic Plan - SRNL Strategic Objective 1

Position SRNL for transition into a financially self-sustaining business unit

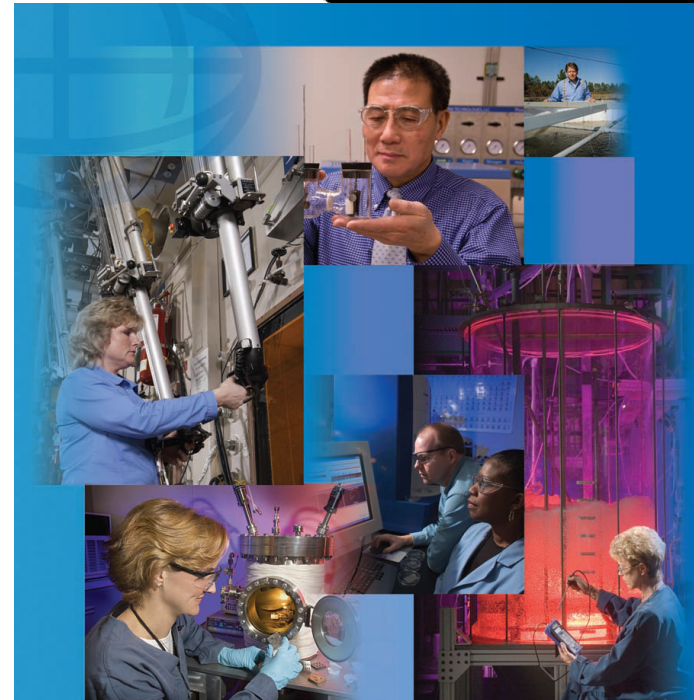
- A plan was developed in FY09 and updated in FY10 on SRNL becoming a financially self-sustaining, distinct business unit
- Working on compiling necessary information to submit a Project Baseline Summary (PBS) request for SRNL



# SRS Strategic Plan - SRNL Strategic Objective 2

**Establish SRNL as a preferred partner for industry, universities, and national laboratories in developing leading edge technologies in support of increasing the economic and educational strength of the United States**

- 33 Active Non-Federal Sponsor Work for Others Agreements
- 7 Active CRADAs
- 13 Joint Intellectual Property Agreements (11 with universities)
- 44 University Adjunct Faculty Positions
- 2 University Technical Consulting Agreements
- 4 University Memorandums of Agreement (and 2 additional in progress)
- 1 University Alliance Agreement (SRNS and Clemson have signed. Four others in progress)
- 70 Technologies available for licensing
- 6 U.S. Patents issued
- 19 Active Commercial Patent Licenses
- 47 Invention Disclosures
- 3 Active Copyright Licenses



# SRS Strategic Plan - SRNL Strategic Objective 3

Expand and mature SRNL's role as the EM Corporate Laboratory and lead the EM Engineering and Technology program to reduce the lifecycle costs of defense nuclear and industrial cleanup. Develop and implement new technologies in the form of Centers of Excellence to provide science-based solutions to the DOE-EM mission

- **Supporting EM on technologies to accelerate tanks closure and reduce lifecycle costs at SRS and Hanford:**
  - Development and testing of small-column ion exchange technologies
  - Development of next-generation solvent and sorbent for SRS Modular Caustic Side Solvent Extraction Unit (MCU) and Salt Waste Processing Facility (SWPF) processes
  - Testing of fluidized-bed steam reforming process for low-activity waste



# SRS Strategic Plan - SRNL Strategic Objective 3 (Continued)

- **Providing support to EM Office of Technology Innovation and Development in organizing project reviews and conducting national-level technical exchanges**
- **Developed SRS process flowsheets for disposition of legacy nuclear materials enabling:**
  - Spent Nuclear Fuel dissolution for Univ. of Missouri research reactor assemblies
  - Potential future increased Canyon Pu processing rates through new technology development (Vacuum Salt Distillation and Peroxide Fusion)
  - Dissolution and processing flowsheets for Pu oxide stored in 3013 cans
  - Defense Waste Processing Facility (DWPF) sludge batch analyses and processing through laboratory demonstrations
  - Inventory reductions at Y-12 Aberdeen, and other DOE Sites
  - DWPF disposition of excess Np-237 and Pu-239 for significant cost avoidance
- **Developed and started a Center for Applied Separations Science and Engineering, partnering with Georgia Tech, Vanderbilt, and Oakridge National Laboratory (ORNL)**



## SRS Strategic Plan - SRNL Strategic Objective 3 (Continued)

- Technical support on SRS Transuranic (TRU) Waste container overpack failure and glove puncture investigations
- SRNL led DOE-EM Tank Waste Research and Development Plan effort
- SRS Composite Analysis (1,300 page report) for radiological waste was completed and being used by DOE-HQ as a model for the Complex
- Memorandum of Agreement (MOA) between SRNL and Chernobyl Center's International Radioecology Laboratory enables collaboration on radioecology research



# SRS Strategic Plan - SRNL Strategic Objective 4

**Establish SRNL in a leadership role for hydrogen storage technology development. Translate SRNL's historic strengths in chemistry and materials science into the basis for a new generation of storage technologies**

- Completed successful second year for Center of Excellence for Hydrogen Storage - Created reversible route to generate high capacity H<sub>2</sub> storage material, aluminum hydride, for application in areas spanning energy technology and synthetic chemistry
- Prepared designs for a Hybrid Sulfur cycle water-splitting process for the Next Generation Nuclear Plan Project for Idaho National Laboratory (INL)
- SRNL teams with Celgard, ESim, and NC State on separator performance used in lithium-ion batteries
- Dr. Ragaiy Zidan honored by DOE Energy Efficiency & Renewable Energy (EERE) for outstanding R&D in hydrogen storage material work



# SRS Strategic Plan - SRNL Strategic Objective 5

**Develop regional, national, and global partnerships that will lead to the development of new technologies and processes to utilize biotechnology and renewable energy sources to achieve energy independence**

- Sodar deployed on offshore platform as wind measurement tool. This is a first of a kind in South Carolina – this will allow wind speed measurements up to 200 meters
- Dr. Thomas Sanders to lead the SRS Clean Energy Initiative
- SRNL and Hyperion Power Generation Inc., announced an agreement that, with DOE approval, could lead to deployment of a small modular nuclear reactor at SRS
- SRNL primary team member on Large Wind Turbine Testing Facility in Charleston
- SRNL/Center for Hydrogen Research utilize, through a DOE program, hydrogen powered Ford vans for the Aiken Area
- SRNL assists DOE Fuel Cycle R&D Program in eliminating UREX process waste stream
- SRNL chaired International Atomic Energy Agency (IAEA) Technical Meeting on Practices of Wet and Dry Storage of Spent Nuclear Fuel





# SRS Strategic Plan - SRNL Strategic Objective 6

Apply skills developed in environmental management and develop new and innovative approaches to carbon cycle sequestration

- Completed establishment of a Carbon Flux Supersite at SRS to monitor and support research on CO<sub>2</sub> exchange in the terrestrial ecosystem
- Completed a study of improved techniques for CO<sub>2</sub> emissions source attribution
- SRNL creating a carbon cycling process through the conversion of abundant cellulose to liquid fuels for automobiles and to other high value chemical products
- Developing Thermal Energy Recovery Aqueous Separation (TERAS) as a novel carbon capture and storage process
- Research on CO<sub>2</sub> gas separation applications



# SRS Strategic Plan - SRNL Strategic Objective 7

**Continue SRNL's leadership role in tritium technology and component evaluation programs that ensure the safety and reliability of the nation's nuclear deterrent**

- Implemented an automated control system for the Mini-Thermal Cycling Absorption Process (TCAP)
- Designed, fabricated, and loaded prototype tritium thermoelectric generators (TTGs) for potential military field applications
- SRNL procures \$1.1M analytical instrumentation for characterization of material for Tritium
- SRNL provided 9 presentations at the recent International Tritium Conference in Japan demonstrating SRNL's leadership in tritium technology



# SRS Strategic Plan - SRNL Strategic Objective 8

**Expand SRNL's role in providing critical intelligence collection, analysis, and products that enable best-informed decisions by federal agencies and policy makers**

- **Established new national capability, an FBI Forensic Laboratory at SRNL to perform traditional forensics on radiologically contaminated evidence-Ribbon Cutting Ceremony June 3**
- **SRNL helps organize and was Test Director for Law Enforcement Tagging & Tracking Demonstration in Alaska**
- **Accreditation renewed for SRNL Nuclear Forensics Analysis Center for FBI support**
- **Modeled estimation of maritime encounter probabilities for Defense Nuclear Detection Office (DNDO)**



# SRS Strategic Plan - SRNL Strategic Objective 9

**Become a highly valued applied science resource for National Security and Homeland Security agencies fighting threats from terrorism**

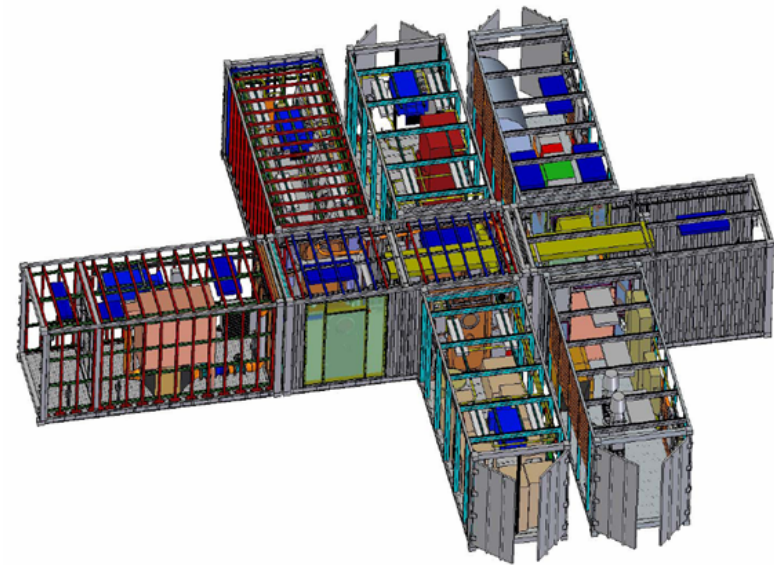
- **Advanced Technology Demonstration Characterization Team receives DNDO Award for characterization support of new rad detectors**
- **Integrating and testing rad monitors for port cargo containers for DNDO**
- **Led National Institute Justice (NIJ) meeting to identify law enforcement cooling needs**



# SRS Strategic Plan - SRNL Strategic Objective 10

**Enhance SRNL's impact on global security through broad participation in the nation's nuclear nonproliferation efforts**

- **Mobile Systems for Nuclear Materials Treatment**
- **Weapons of Mass Destruction (WMD) Commodity Identification Training for nuclear and biological conducted in Slovenia, Turkey, Poland, Serbia, Hungary, Greece and for Department of Homeland Security (DHS) Immigration and Customs Enforcement**
- **Developing bagless transfer system glovebox, robotic manipulator system, and Pu oxide packaging system for the Pit Disassembly & Conversion project**
- **Water Chemistry Control System designed by SRNL used for Serbian fuel recovery**



# SRS Strategic Plan - SRNL Strategic Objective 11

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**Establish a sustainable Department of Defense support effort in conjunction with appropriate partner institutions and companies**

- **Assisted Defense Threat Reduction Agency (DTRA) in developing and demonstrating Unmanned Aerial System for sample collection, radiation field mapping**
- **SRNL, Idaho National Laboratory (INL), and Clemson awarded \$1M from DoD to incorporate aerobic processes to remedy large chlorinated solvent plumes**
- **Working with DoD and SC National Guard on training infrastructure needs at SRS for DoD applications**

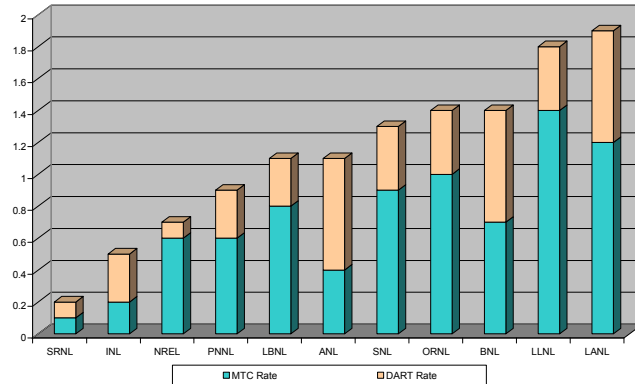


# SRS Strategic Plan - SRNL Strategic Objective 12

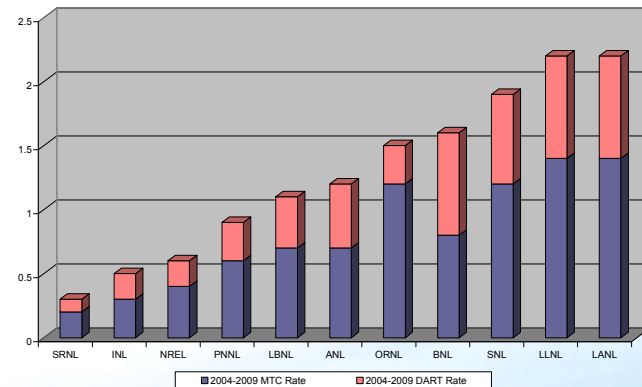
**Secure additional sponsors, missions, and funding, including development of enduring funding sources, to support laboratory infrastructure to meet needs for future growth while sustaining safety performance excellence**

- **SRNL has worked over 7M hours without an injury or illness involving days away from work**
- **SRNL retained its position as the safest National Laboratory for the 6th consecutive year and has over 7M manhours w/o a Lost Workday Case**
- **DOE-SR approved SRNL developed Institutional General Plant Project (IGPP) for capital projects. Implementation begun (\$900K spent FY10, expect \$3.5-4.4M in FY11)**

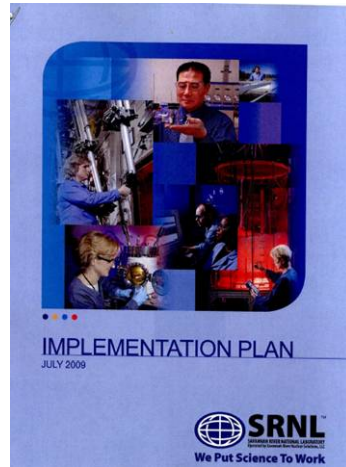
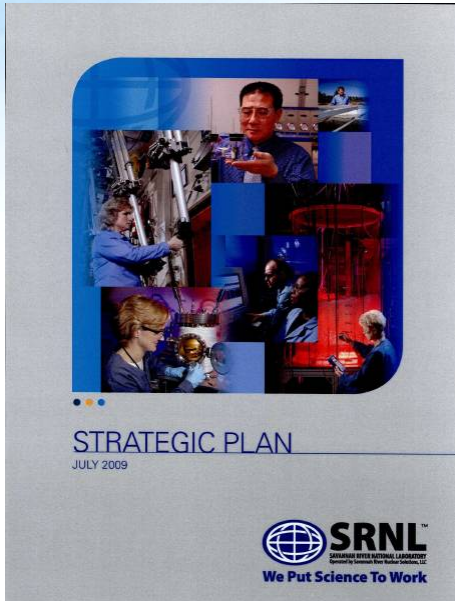
**National Laboratory Injury & Illness Data  
Per 200,000 Hours Worked, CY 09**  
Note: Data obtained from DOE Computerized Accident/Incident Reporting System (CAIRS)



**National Laboratory Injury & Illness Data  
Per 200,000 Hours Worked, CYs 04 Through 09**  
Note: Data obtained from DOE Computerized Accident/Incident Reporting System (CAIRS)



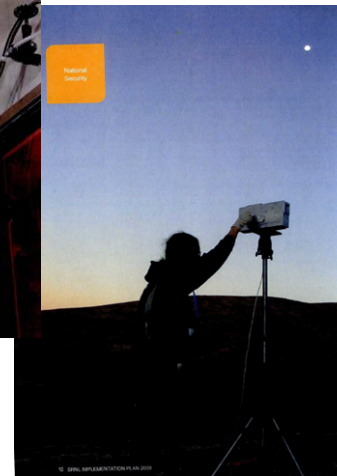
# Initiatives to Increase Funding



**Sustainable  
Environmental  
Management**



**National Security**



**Clean, Secure  
Energy**





# SRNL Implementation Plan and Implementation Tracking Tables

NATIONAL SECURITY

## Strategic Initiative

Become a highly valued applied science resource for National Security and Homeland Security agencies fighting threats from terrorism.

### INITIATIVE DESCRIPTION

- Become recognized as a major contributor of applied technology solutions to the Department of Defense (DoD), the Department of Homeland Security (DHS) Science and Technology (S&T) Directorate, the Domestic Nuclear Detection Office (DNDO), and DHS operational organizations.
- Enter the DoD market and establish a targeted DoD program customer base, building on SRNL's corporate partner experience.
- Expand current efforts to become a primary applied technology resource for Defense Threat Reduction Agency (DTRA) programs.
- Establish SRNL as the Southeastern Testing and Evaluation (T&E) Center for DNDO and DHS S&T.
- Expand partnerships with the SRS organizations to leverage unique T&E capabilities in areas including personnel, roadways, rail, lakes, and the Health Physics Instrument Calibration Laboratory.
- Leverage SRNL's expertise in atmospheric modeling to achieve designation as a regional or national atmospheric sciences center.
- Establish SRNL as a Maritime Analysis Center for DNDO and DHS S&T.
- Expand SRNL's leadership role in Federal Bureau of Investigation (FBI) and law enforcement analytical support.
- Establish SRNL as the primary provider of nuclear forensics for the FBI and other U.S. Government agencies.
- Establish SRNL as a major provider of training programs for national security and law enforcement organizations.
- Establish SRNL as a major technical contributor to the development of a more resilient Nation.

### NEAR-TERM OUTCOMES

- Business expanded with DoD, DTRA, DHS S&T, DNDO, and DHS operational organizations.
- Membership established in the Huntsville Partnership Office.
- Multiple equipment T&E activities secured to support federal as well as non-federal agencies.
- Services expanded in FBI and law enforcement forensics, training, T&E, and consultation.
- Radiological Evidence Examination Facility (REEF) completed for the FBI on time and on budget.
- Additional training program opportunities secured that leverage core scientific capabilities to support federal agency needs.

### LONG-TERM OUTCOMES

- Business expanded with DoD, DTRA, DHS S&T, DNDO, and DHS operational organizations.
- Multiple equipment T&E activities secured to support federal as well as non-federal agencies.
- New training, testing, and evaluation center built.
- Southeastern project acquired for recovery and restoration of urban areas from chemical, biological, or nuclear agents.

12 SRNL IMPLEMENTATION PLAN 2009

12 SRNL IMPLEMENTATION PLAN 2009

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SRNL STRATEGIC PLAN - IMPLEMENTATION TRACKING - 9/30/18 STATUS

| Strategic Objective                                                                                                          | Initiative/Action                                                    | Description                                                                                                                                                                                                                                                                                                                                                                                                   | Staff Level | Milestones/Outcomes                                                                                                                                                                                                   | Due     | Type* | Lead     | Stat.  | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                 |
|------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------|----------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| <b>Sustainable Environmental Management</b>                                                                                  | N/A                                                                  | The DOE designation of SRNL as the EM Corporate Laboratory requires SRNL to be included in the DOE and its programs, and given the Laboratory a new mission to provide regional technology assistance and solutions for cleanup efforts at DOE sites.                                                                                                                                                         | Office      | Technical Integration Office expanded to include and support fully across EM needs.                                                                                                                                   | 1/1     | IP    | Wilbanks | 100%   | Progressing. Working ongoing times with HQ for additional scope. The FY18 budget from EM-20 has additional scope included. Funding has increased approximately 30% compared to FY16, thanks to scope for increased steady state managing open-air emissions. Also contribution for research systems, etc.                                                                                                                                                                                                                                                                                      |                                                                 |
|                                                                                                                              |                                                                      | SRNL is a five-year established in EM Headquarters (HQ) in Washington, DC.                                                                                                                                                                                                                                                                                                                                    | Office      | SRNL is a five-year established in EM Headquarters (HQ) in Washington, DC.                                                                                                                                            | 1/1     | IP    | Griffith | 100%   | The working file activity at the time the focus has been on personnel management through EPA.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                 |
|                                                                                                                              |                                                                      | SRNL is a five-year established in EM Headquarters (HQ) in Washington, DC.                                                                                                                                                                                                                                                                                                                                    | Office      | SRNL is a five-year established in EM Headquarters (HQ) in Washington, DC.                                                                                                                                            | 1/1     | IP    | Griffith | 100%   | Agreement executed with EPA for the use of SRNL as an approved EM-20 site. Alena and Mark W. Bauman. Funding has been transferred, agreement paperwork being submitted. Expected to be in place by August 2018. William EPA approved by S-2, awaiting final site sign. Expected to be in place by final. Many EPA agencies are still working on EM.                                                                                                                                                                                                                                            |                                                                 |
|                                                                                                                              |                                                                      | Develop proposal to establish and implement a working model for the EM Performance Assessment.                                                                                                                                                                                                                                                                                                                | Office      | Develop proposal to establish and implement a working model for the EM Performance Assessment.                                                                                                                        | 3/3/20  | PI    | Wilbanks | 100%   | Completed and issued 10 FY18 quarterly report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                 |
|                                                                                                                              |                                                                      | Complete final review of environmental health risk assessment methodology. Provide products and services for EM operations and projects.                                                                                                                                                                                                                                                                      | Office      | Complete final review of environmental health risk assessment methodology. Provide products and services for EM operations and projects.                                                                              | 9/30/20 | PI    | S. Mares | 100%   | Submitted to EM Working System 9/30/20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                 |
|                                                                                                                              |                                                                      | Provide regional products and services to DOE EM HQ, Nuclear Material Stewardship Project, Legal/Pharm Operations, Chemical Project, and EM-20 Compliance.                                                                                                                                                                                                                                                    | Office      | Provide regional products and services to DOE EM HQ, Nuclear Material Stewardship Project, Legal/Pharm Operations, Chemical Project, and EM-20 Compliance.                                                            | 9/30/20 | PI    | Griffith | 100%   | Submitted to EM Working System 9/30/20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                 |
|                                                                                                                              |                                                                      | Complete and issue 10 FY18 quarterly report. Submitted to EM Working System 9/30/20.                                                                                                                                                                                                                                                                                                                          | Office      | Complete and issue 10 FY18 quarterly report. Submitted to EM Working System 9/30/20.                                                                                                                                  | 9/30/20 | AC    | PI       | Murray | 100%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Discussing details with EM Sponsor and will deliver up October. |
| <b>Develop and implement major new initiatives in the areas of Chemical and Biological Forensics for the DOE-EM mission.</b> | National Center for Applied Separation Science (Chemical/Biological) | The Center will create a facility for nuclear forensics (including uranium, plutonium, americium, and other actinides) and for related processes (such as DOE EM operations). Users will be able to analyze nuclear material through their laboratory with flexibility requirements through their own instrumentation requirements, as well as use existing or under development tools and/or unique methods. | Office      | Major program to establishment of National Center for Applied Separation Science.                                                                                                                                     | 9/30/20 | AC    | PI       | Murray | 100%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Discussing details with EM Sponsor and will deliver up October. |
|                                                                                                                              | Center for Environmental Remediation Research (Chemical/Biological)  | EM Center for Sustainable Remediation Research. Through this Center, SRNL will support basic and applied science and improve the capabilities of the National Laboratory, universities, and commercial industry to identify and apply the best science and technological solutions to EM challenges.                                                                                                          | Office      | EM Center for Sustainable Remediation Research and Soil Solutions at SRNL established.                                                                                                                                | 1/1     | IP    | Approved | 100%   | Funding for the EM Center received from FY18 to FY20 in FY18 and FY19. Scope has expanded to the area of: - Technical Assistance for Laboratory Operations, Facilities, and Oak Ridge Sites. - Technical and industry research at national conferences (e.g., Monterey and Bellevue) through webinars, and national funding sources for grant awards and stipends (EPA, NRC, and regional funding). - Special technical reports such as the Future State of Knowledge report and the Remediation Innovation Solutions (RIS) documentation. - Initial discussions held with new Adams for SRNL. |                                                                 |
|                                                                                                                              |                                                                      | Developed for the Large-Scale Technology Development Center, including patterns and funding opportunities. Large-Scale Technology Development Center established for transitioning technologies to the EM-20 mission.                                                                                                                                                                                         | Office      | Developed for the Large-Scale Technology Development Center, including patterns and funding opportunities. Large-Scale Technology Development Center established for transitioning technologies to the EM-20 mission. | 1/1     | IP    | S. Mares | 100%   | On hold with O'Brien's office as potential agreement.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                 |
|                                                                                                                              |                                                                      | National Packaging Certification, Training, and Maintenance Center established.                                                                                                                                                                                                                                                                                                                               | Office      | National Packaging Certification, Training, and Maintenance Center established.                                                                                                                                       | 1/1     | IP    | Ylona    | 100%   | Center of Excellence awarded to SRNL. Monitoring strong to and leadership of EM-20 work current ongoing program.                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                 |
|                                                                                                                              |                                                                      | Operational Center of Excellence established to support EM mission across the country.                                                                                                                                                                                                                                                                                                                        | Office      | Operational Center of Excellence established to support EM mission across the country.                                                                                                                                | 1/1     | IP    | Ylona    | 100%   | Long term strategy through EM-20. Center funding track in the area will include a challenge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                 |
|                                                                                                                              |                                                                      | Verification for EM-20 capability established at SRNL for EM-20.                                                                                                                                                                                                                                                                                                                                              | Office      | Verification for EM-20 capability established at SRNL for EM-20.                                                                                                                                                      | 1/1     | IP    | Griffith | 100%   | Established MOU with SRNL/Phoenix MOU with B.L. (Murray) in progress, national discussions with MOU and Texas Tech on progress collaboration, secured access to SRNL and MOU facilities.                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                 |

BUSINESS SENSITIVE  
Contains Proprietary Information - may not be released under 5 U.S.C. 552(b) or 18 U.S.C. 1905.



# SRNL Funding and Potential Funding

