Network of National Laboratories for NNLEMS Environmental Management and Stewardship

Overview of the Laboratory Missions for Environmental and Legacy Management

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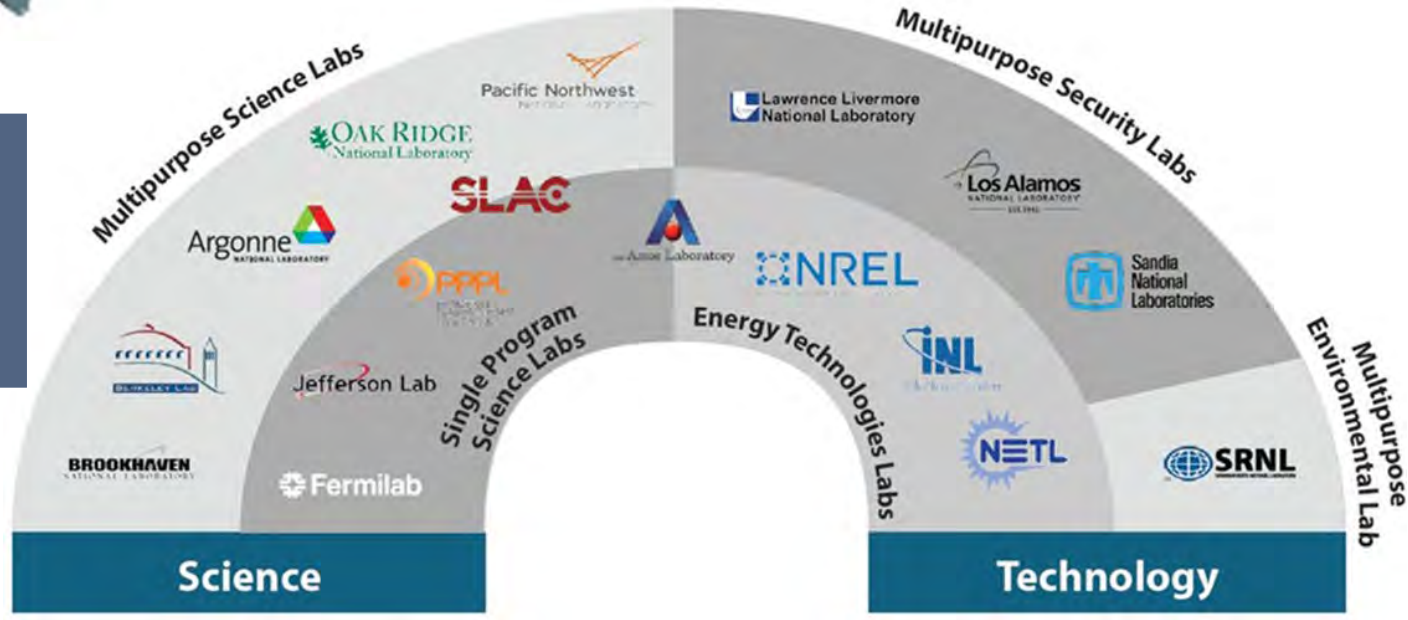
RadWaste Summit: Innovations from the National Labs

U.S. DEPARTMENT OF ENERGY

- 17 United States Department of Energy (DOE) National Laboratories.

- The Savannah River National Laboratory (SRNL) is the lead Environmental Management & Legacy Management Laboratory with a strong National Security Program.

NNLEMS



Environmental Management Laboratory Programs

- Science & Technology Programs
  - Work with each clean-up site to strengthen technical basis for remediation
  - Identify longer-term strategic challenges, alternate approaches, at the site and for HQ
  - Identify and mature focus areas for cross-cutting science and technology investment
- Programmatic Collaborations
  - Network of National Laboratories for Environmental Management & Stewardship (NNLEMS) led by SRNL
  - Minority Serving Institution Partnership Program (MSIPP) managed by SRNL
  - Regulatory Center of Excellence (RCE) sponsored by EM, led by SRNL and its contractor partners, and in collaboration with NNLEMS

Regulatory Center of Excellence
U.S. Department of Energy
Managed by
SAVANNAH RIVER NATIONAL LABORATORY

NNLEMS

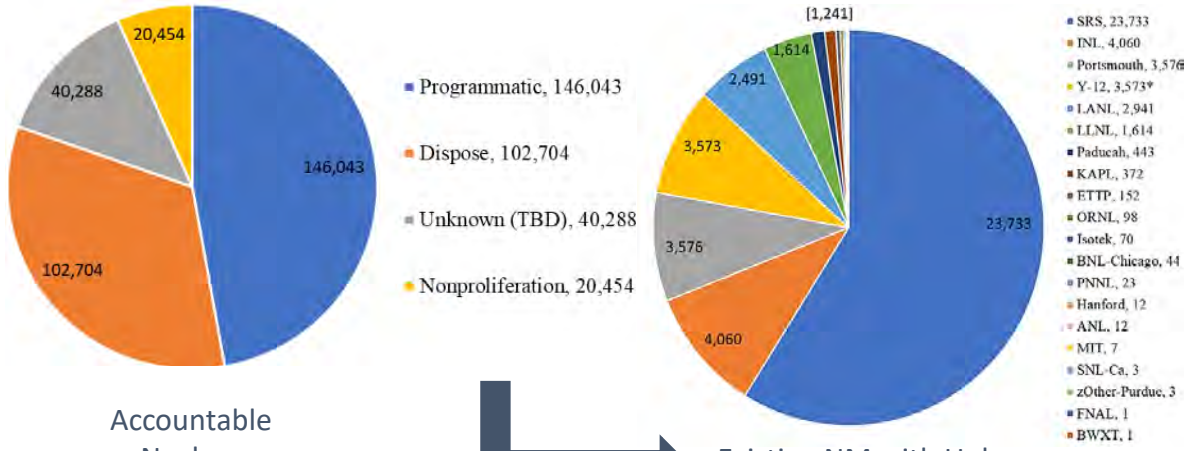
Radioactive Tank Waste Stabilization, Treatment and Disposal

- Largest liability of the EM budget encompassing:
  - Waste Retrieval & Processing
  - Waste Treatment
  - Waste Form Development and Production
  - Tank Closure
  - Cross-cutting analytical, material science & remote automation
- Science, Technology, and Flowsheets applicable to:
  - Savannah River Site
  - Hanford Site
  - Idaho National Laboratory
  - Oak Ridge Reservation
  - Commercial nuclear energy and hazardous waste operators
- NNLEMS Studies
  - Focus on Risk Reduction, Cost Avoidance, & Mission Acceleration

NNLEMS

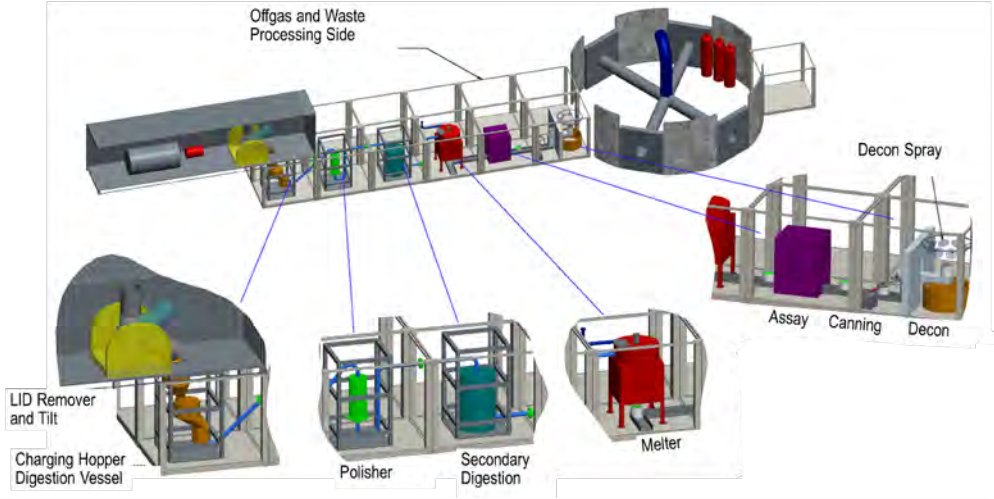
Spent Nuclear Fuel and Nuclear Materials Management & Disposition

- Nuclear Materials Disposition & Recovery
- Waste Treatment & Optimization
- Benefits
  - EM Liability Reduction
  - Future Workforce Competencies
  - Synergy with Nuclear Nonproliferation, Nuclear Energy – Advanced Reactors, and International collaborators
- Challenges
  - >40,000 To-Be-Determined Items
  - Long-Term Disposition need for Research Reactors
  - Isotope Recovery from Spent Nuclear Fuel (SNF)
  - Non-Aluminum SNF Disposition



Accountable Nuclear Materials (NM)

Existing NM with Unknown Disposition Paths (TBD)

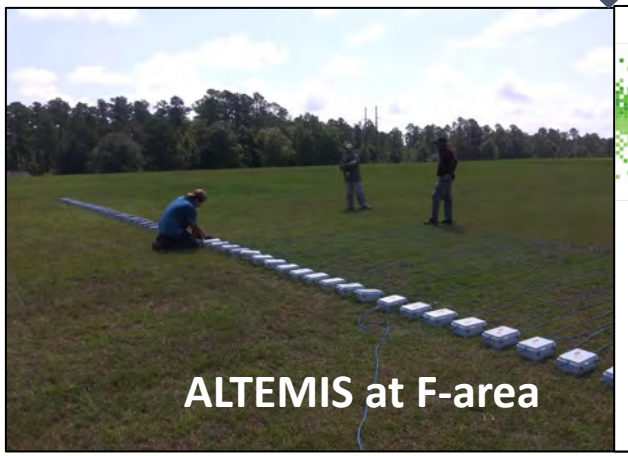


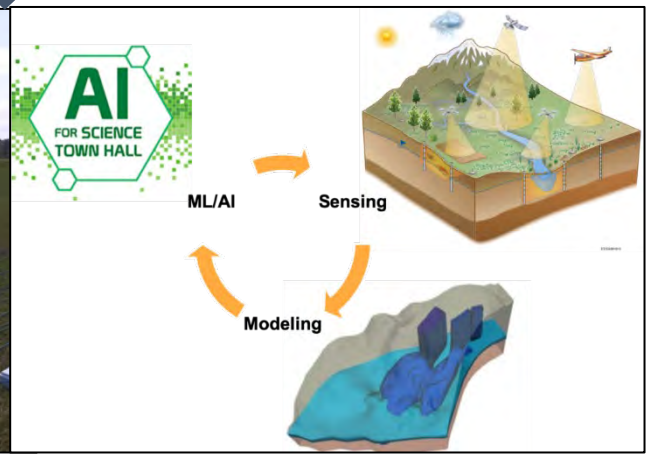
Future Vision – Next Generation Nuclear Material Processing Test Bed

Soil and Groundwater Remediation

- Millions of cubic meters of contaminated soil & billions of gallons of groundwater cleaned up over 3 decades
  - Active pump and treat systems, as well as deployed amendments and barriers
  - Remaining sites transitioning to Long-term surveillance and maintenance
    - EM and LM working closely to complete remediation at Moab and transition site to LM
- EM launched multi-phased program to develop comprehensive closure strategy for remaining plumes
  - Technology Targets developed
- Current S&T focus on innovative monitoring paradigm, Advanced Long-Term Environmental Monitoring Systems (ALTEMIS)
  - Proactive, early warning system
  - Potentially reduce monitoring costs by 80%
  - Broadly applicable toolset for humid & arid sites, with potential to identify changing site conditions and to be deployed at non-DOE sites


F-Area Soil Sampling Campaign, 2021


ALTEMIS at F-area



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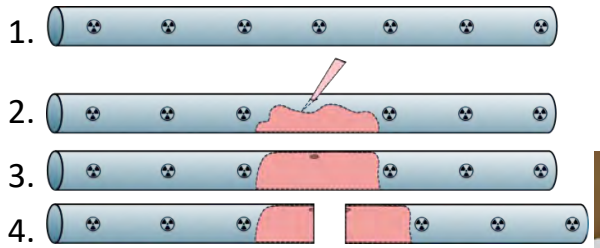
Excess Facilities Deactivation and Decommissioning (D&D)

- DOE and EM are the landlords of many excess facilities with a wide range of hazards
  - Ample opportunity for S&T advancement
  - Laboratories helping to develop technology roadmap based on lessons learned and needs
  - Broad applicability to commercial industry
- Planning for the end state of the facilities considers:
  - Worker Protection
  - Water Supplies & Public Risk
  - End-State Attainability
  - Cost & Schedule



Radiation Hardened Polyurethane Foam

NNLEMS

Waste Disposal & Site Assessment

- Laboratories provide the necessary S&T for design and assessment of EM and DOE disposal sites
  - Waste Isolation Pilot Plant
  - Future Federal Repository
  - Site disposal vaults and cells
- S&T includes
  - Material and waste form development, deployment, and performance assessment
  - Contaminant speciation and behavior in geologic and environmental conditions
  - Enhanced modeling for geologic, groundwater, and atmospheric conditions
  - Development and certification of packaging design


Waste Isolation Pilot Plant


Hanford Integrated Disposal Facility

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Legacy Management (LM) Programs


Bluewater, NM


Geoprobe sampling

- LM Technical Focus Areas
  - Provide effective and efficient long-term surveillance & maintenance
  - Manage & optimize sustainable use of legacy land and assets
  - Mitigate community impacts from cleanup and departmental missions
- SRNL Leadership and NNLEMS Efforts
  - Identify key issues at highest risk sites and recommend risk reduction strategies
  - Assess the impact of Climate Change to ensure long-term resiliency
  - Implementation of the Applied Science & Technology Plan
    - Potential activities include UAV and other long-term monitoring strategies

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