

Network of National Laboratories for Environmental Management and Stewardship

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RadWaste Summit: Innovations from the National Labs



U.S. DEPARTMENT OF
ENERGY

NNLEMS Leadership

- The Network of National Laboratories for Environmental Management and Stewardship (NNLEMS) is a partnership of Federally Funded Research and Development Centers (FFRDC) managed by DOE.
- Savannah River National Laboratory (SRNL) is the lead laboratory for managing the NNLEMS and the SRNL Laboratory Director is the Chair. In addition, the Executive Director of the NNLEMS is a staff scientist/engineer at SRNL.
- The Co-Chair rotates amongst the national laboratories co-located at Environmental Management sites and will be the Laboratory Director or the Deputy Laboratory Director.



NNLEMS Membership

- Idaho National Laboratory
- Los Alamos National Laboratory
- Oak Ridge National Laboratory
- Pacific Northwest National Laboratory
- Sandia National Laboratories
- Savannah River National Laboratory
- Argonne National Laboratory
- Lawrence Livermore National Laboratory
- Lawrence Berkeley National Laboratory
- National Energy Technology Laboratory
- SLAC National Accelerator Laboratory



NNLEMS Organization

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Senior Advisor for Environmental
Management
Office of Environmental
Management



Carmelo Menendez
DOE-LM Sponsor
Director
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Savannah River National
Laboratory



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Laboratory Director
Sandia National Laboratory



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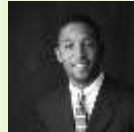
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Ken Williams
Lawrence Berkeley
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Eugene Yan
Argonne
National Laboratory



Mavrick Zavarin
Lawrence Livermore
National Laboratory



Functions

- **Response** - Identify and coordinate resources for technical support to address emergent events associated with DOE clean-up and long-term monitoring activities.
- **Review** - Identify and coordinate resources for independent technical review of DOE plans or activities.
- **Collaborate** - Supplement existing and ongoing DOE innovative applied research through collaboration with DOE contractors, DOE staff, other federal agencies, academia, and industry.
- **Policy**- Provide scientific and technical analysis to DOE and to stakeholders as directed by DOE regarding legacy waste cleanup, disposal, and long-term stewardship policy options and issues.
- **Planning** - Provide integrated science and technology perspective to support strategic planning for EM and LM at national and individual site levels.
- **Resource** - Coordinate and serve as gateway for DOE and its contractors into the broader set of 17 National Labs with EM- and LM-related capabilities that have been developed and supported across all DOE offices.
- **Consult** – Provide technical expertise to inform DOE contract decisions and language, funding allocations, and technical feasibility of contractor proposals consistent with terms and conditions of the appropriate organizational conflict of interest mitigation plan and in compliance with DEAR 952.209-72 requirements.

Recent and Ongoing Studies

- EM Studies

- **Developing a Technology Roadmap for Characterizing Inorganic Waste Media to support Retrieval and Disposition**
- **NDAA Section 3125 Follow-on Study of Hanford Supplemental Low Activity Waste**
- **R&D Roadmap for Accelerating Hanford Tank Waste Cleanup**
- Independent Technical Review of the Groundwater Management Strategy for Cr and RDX Plumes at the LANL Site
- EM National Groundwater Management Strategy
- Technical Support to ETEC

- LM Studies

- **Independent Assessments for Risk Reduction of LM Sites**
- Technical Support to EM and LM Implementations of DOE Climate Action Plan (EM and LM funded)
- Strategic Topical Teams
- Moab Technical Assistance
- Jana Elementary School, Missouri*
- Dupont Chambers Works FUSRAP Site*

*US Army Corps of Engineers funded

Roadmap for Characterization Needs of Spent Columns of CST

- Roadmap summarizes what is known about crystalline silicotitanate (CST) properties that may impact storage, retrieval, and disposal and identifies areas where additional information is needed related to characterization of this media.
- Technology areas discussed include:
 - Cesium Loading
 - Lab Scale Column Testing
 - Large Scale Testing
 - Technology Demonstrations
 - Computer Modeling
 - Cesium Desorption
 - Media Decomposition
 - Impact of Non-Target Species
 - Gas Generation
 - Dry Storage
 - Rheological Properties
 - Grinding
 - Retrieval from Columns
 - Media Vitrification
 - Column Design, Operation, and Performance
 - Hydrogen Generation During Storage

Treatment Alternatives for Hanford Supplemental Low Activity Waste

- Section 3125 of the Fiscal Year 2021 National Defense Authorization Act (NDAA21), directs DOE to enter into an arrangement with a FFRDC for continued analysis of Approaches for Supplemental Treatment of Low-Activity Waste (LAW) at Hanford Nuclear Reservation
- Supplemental LAW treatment capacity needed to meet mission schedule objectives



- WTP LAW does not have capacity to treat all LAW without impacting the HLW processing mission duration.

Pairwise Comparison: Performance vs. Promptness

Criterion 1 – Long-Term Effectiveness

Better ↑

Highly Effective, Low Uncertainty		FBSR 1B	Grout 1B Grout 2B	Grout 4B	
Effective, Low Uncertainty			Grout 1D		
Highly Effective, Moderate Uncertainty					Grout 6
Effective, Moderate Uncertainty		FBSR 1A	Grout 1C Grout 2C Grout 5A Grout 5B		
Moderately Effective, Moderate Uncertainty	Vitrification 1		Grout 1A Grout 2A	Grout 4A	
	2050 Operations, 2075 Completion, High Risk (Schedule)	2040 Operations, 2070 Completion, High Risk (Technical)	2036 Operations, 2068 Completion, Low Risk	2027 Operations, 2065 Completion, Moderate Risk	2027 Operations, 2065 Completion, Low Risk with Flexibility

Better →

Criterion 2 – Implementation Schedule and Risk

Recommendation

- *DOE should expeditiously secure and implement multiple pathways for off site grout solidification/immobilization and disposal of LAW in parallel with the DFLAW vitrification process.*
 - **Rapid Risk Reduction** – DST space, Accelerate Waste Retrievals, Waste Stabilized
 - **Environmental Protection** – Reduce on-site disposal inventory, off-site disposal with no credible pathway to potable water
 - **Flexibility** – Can route LAW treatment and disposal selectively
 - **Mitigate Risk** – Have multiple licensed off-site treatment and disposal facilities with selection based on sampling
 - **Time to Enable Transition(s)** – If on-site treatment and/or disposal are pursued, benefits from operating experience
 - **Reduction or Elimination of Need for Future Capabilities**
 - **Minimize Financial Demands** – Closest to current funding levels
 - **High Likelihood of Successful Implementation and Mission Completion**

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