Office of Environmental Management Technology Program Update

September 25, 2024
Environmental Management (EM)
Site-Specific Advisory Board (SSAB) Chairs Meeting
Oak Ridge, Tennessee

U.S. DEPARTMENT OF ENERGY | OFFICE OF ENVIRONMENTAL MANAGEMENT

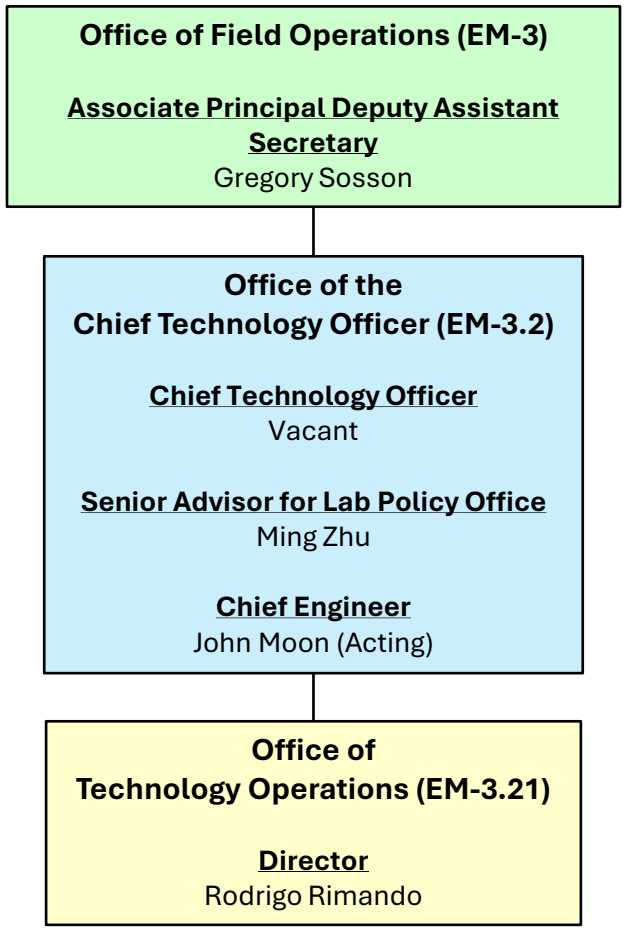
Dedicated to safety. Committed to the environment. | energy.gov/EM

Topics

- Office of the Chief Technology Officer
- Technology Portfolio
- Key Partnerships
- Final Perspectives

Office of the Chief Technology Officer

Office of the Chief Technology Officer



❖ Office of the Chief Technology Officer (CTO), EM-3.2

- Centralizes headquarters leadership for the technology program.
- Develops strategies, policy, and guidance for the technology program in support of the EM mission.
- Promotes increased collaboration with other federal executive departments, independent agencies, and the international community to foster information and technology sharing.

Office of the Chief Technology Officer (continued)

- **Senior Advisor for Laboratory Policy Office**
  - Coordinates and integrates National Lab expertise, capabilities, and activities.
  - Provides stewardship of Savannah River National Laboratory.
  - Provides program management leadership to the Network of National Laboratories for Environmental Management and Stewardship.
- **Chief Engineer**
  - Advocates for technical design consistency throughout the EM complex.
  - Supports the execution of engineering best practices.
  - Offers input on the defensibility of engineering approaches and identifies options to increase effectiveness in the EM mission.

Office of the Chief Technology Officer (continued)

❖ Office of Technology Operations

- Responsible for the overall integration and coordination of the technology portfolio across the EM complex.
- Supports the use of state-of-the-art technology and baseline alternatives to reduce costs, accelerate schedules, and mitigate technical vulnerabilities.
- Executes and implements EM headquarters technology projects and activities.
- Manages the EM Minority Serving Institutions Partnership Program.

Technology Portfolio

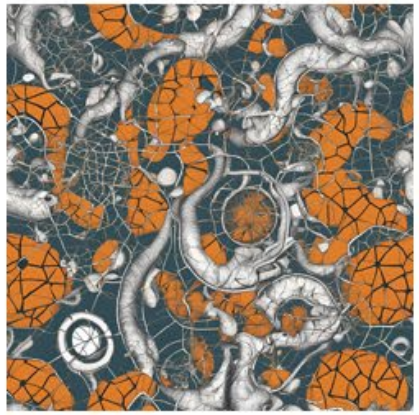
Framing Technology Operations

EM Technology Activity Types

Knowledge Acquisition

Data & Information

Reduce Technical Uncertainty



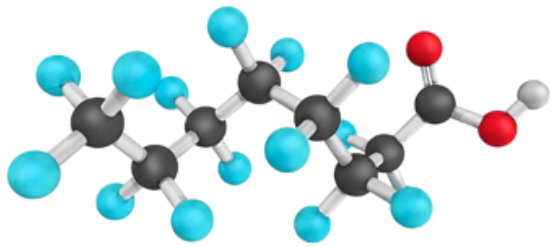
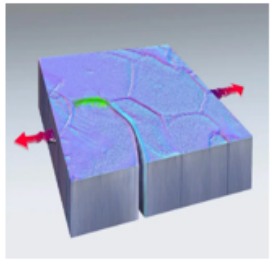
Asset Acquisition

Hardware & Software

Enhance Work Performance & Quality

Framing Technology Operations

EM Technology Maturation Phases and Readiness Levels								
1	2	3	4	5	6	7	8	9
Discover		**Design**		**Demonstrate**			**Deploy**	
Observe and report **basic principle.**	Formulate technology concept and application.	Experiment, test, and analyze **proof of concept** or key function, behaviors, or reactions.	Validate in a **laboratory environment**.	Validate a **design model** in a **representative** environment.	Demonstrate **a design prototype** in a **relevant** environment.	Demonstrate **design solution** in an **operational** environment.	Technological **solution completed**, functionally proven, and **operationally qualified**.	Technological **solution proven** through successful **mission operations**.





Technology Projects Portfolio

Knowledge Acquisition				Asset Acquisition				
Discovery Phase		Design Phase		Demonstration Phase			Deployment Phase	
TRL 1	TRL 2	TRL 3	TRL 4	TRL 5	TRL 6	TRL 7	TRL 8	TRL 9

134 Technology Projects

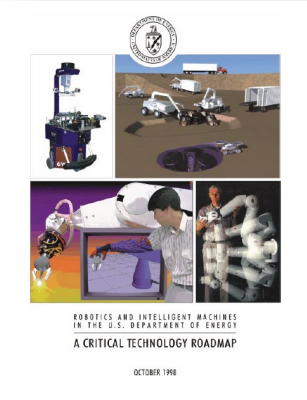
89 Projects	42 Projects	3 Projects

Lead Principal Investigators

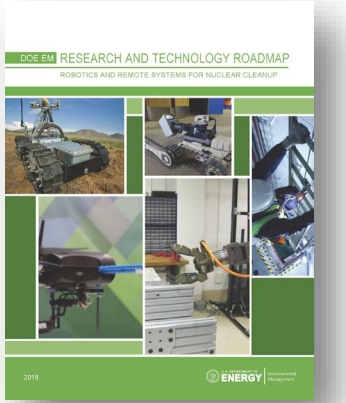
National Labs: 21 Projects Universities: 68 Projects	National Labs: 38 Projects Universities: 2 Projects Cleanup Contractors: 2 Projects	National Labs: 3 Projects

Research and Technology Development Roadmaps

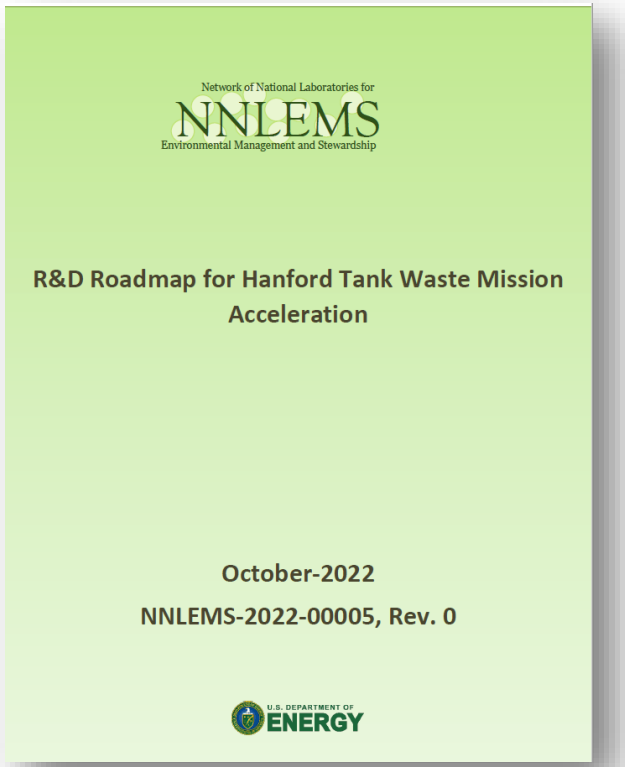
- **Hanford Accelerated Tank Waste R&D Roadmap**
  - Currently executing 13 projects
- **Current Roadmap Activities**
  - Deactivation and Decommissioning
  - Soil and Water Remediation
  - Nuclear Cleanup Robotics and Remote Systems



1998 EM Robotics Roadmap

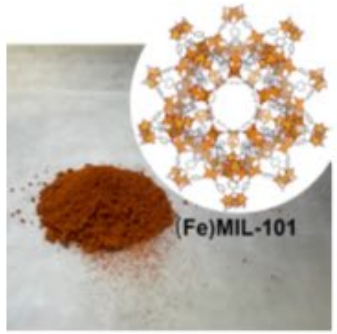


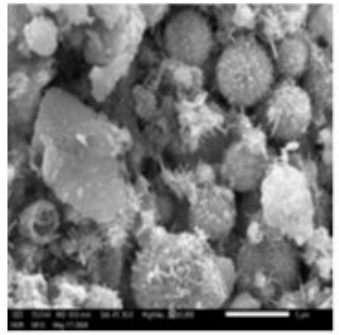
2018 EM Robotics Roadmap



Technology Hot Topics

Advanced Engineered Materials






Modular Systems



Test Beds



Advanced Sensors



Technology Hot Topics

Artificial Intelligence

Digital Tools

Robotics and Remote Systems

Connected Worker Devices

Key Partnerships

Network of National Laboratories for Environmental Management and Stewardship (NNLEMS)

- **Partnership of DOE National Labs**
  - Idaho National Lab
  - Los Alamos National Lab
  - Oak Ridge National Lab
  - Pacific Northwest National Lab
  - Sandia National Labs
  - Argonne National Lab
  - Lawrence Livermore National Lab
  - Lawrence Berkeley National Lab
  - National Energy Technology Lab
  - SLAC National Accelerator Lab
- **SRNL is the lead laboratory for managing the NNLEMS**
- **SRNL Lab Director is the Chair**
- **Co-Chair rotates among the member labs**

University Partnering

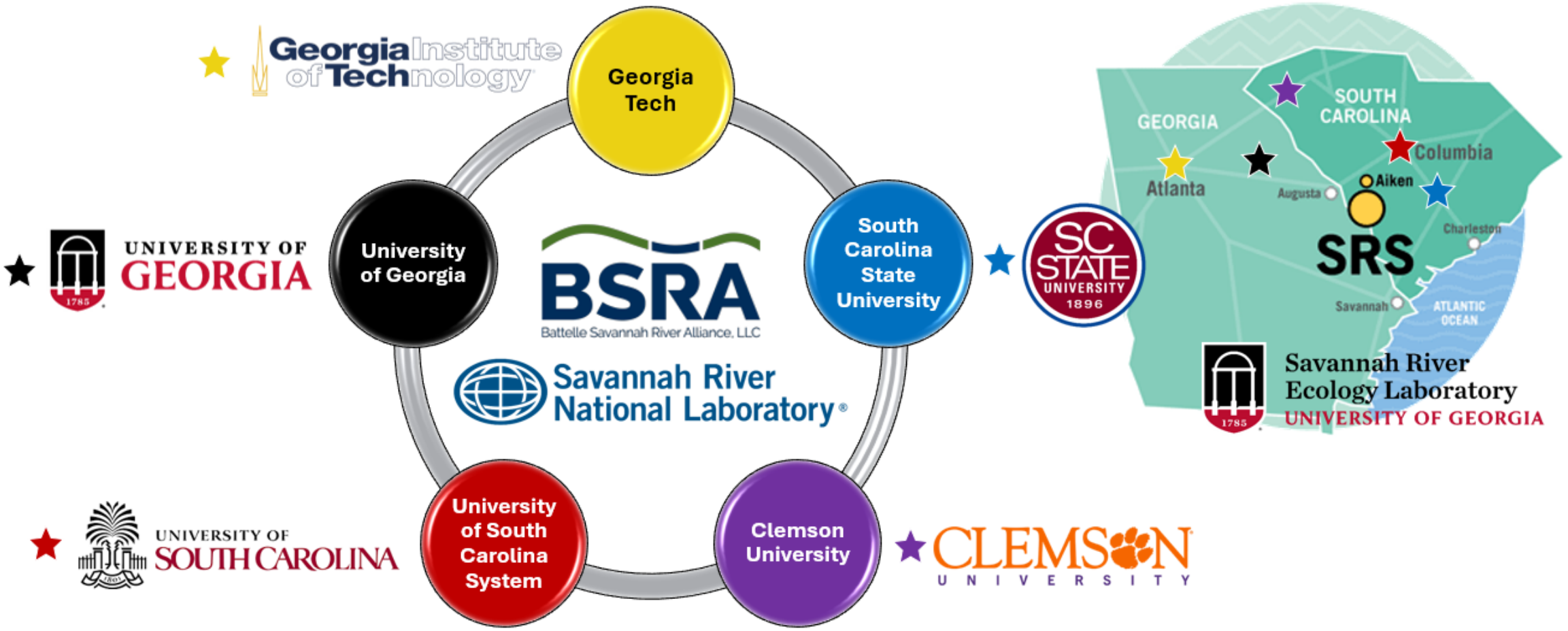
❖ Generational Workforce

- ♦ EM promotes the education and development of next generation workforces in STEM-related disciplines that complement the mission of legacy cleanup
- ♦ The enduring mission of legacy cleanup requires maintaining a highly-trained, technically skilled, and diverse workforce

❖ EM Minority Serving Institutions Partnership Program

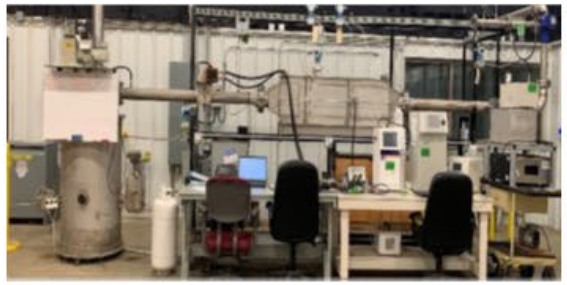
- ♦ Minority representation is an important part of EM's vision
- ♦ MSIPP provides students and graduates of Minority Serving Institutions with hands-on education and experience by supporting collaborations among the MSIs, EM field sites and project offices, and DOE national laboratories

National Lab – University Partnerships



Early University Partnerships

MISSISSIPPI STATE UNIVERSITY™
INSTITUTE FOR CLEAN ENERGY TECHNOLOGY



VANDERBILT UNIVERSITY

CRESP
CONSORTIUM FOR RISK EVALUATION WITH STAKEHOLDER PARTICIPATION

DOE-FIU Workforce Development Program

FIU Applied Research Center

BEST COLLEGES U.S.News NATIONAL UNIVERSITIES PUBLIC 2022

Minority STEM Students

Science, Technology, Engineering, and Mathematics (STEM) students come from majors including: Mechanical Engineering, Electrical Engineering, Computer Engineering, Environmental Engineering, Civil Engineering, Chemistry, Computer Science, and Mathematics.

FIU

#1 in nation in awarding bachelor's and master's degrees to Hispanic students.

58,000 Enrolled in Fall 2022

5th largest U.S. public university by enrollment

98% Hiring Rate* After Graduation

Tomorrow's Workforce

*This number is based on 125 Fellows out of 127 that have completed the program and joined workforce with in DOE, federal, state and local gov't agencies and STEM industry upon graduation, 18 DOE-EM and 1 DOE-LM Fellows are currently in the program, 15 graduated from FIU and pursued graduate studies at other universities and 46 left the program before graduating

"The DOE-FIU Fellowship program allowed me to gain hands-on research experience, solving real-life problems with FIU-ARC engineers and DOE national laboratory scientists. Thanks to these collaborations, I had five peer-reviewed journal publications upon graduation. Always GANAS! A forever and ever DOE Fellow"
Silvina Di Pietro (DOE Fellow - Class of 2015)
NNSA Graduate Fellow & Postdoctoral Researcher

"DOE EM has benefited tremendously from our partnership with FIU. The caliber of the DOE Fellows are top-notch, especially in the STEM disciplines, in meeting our mission objectives."
Melody C. Bell (EM 70 acting DAS)
DOE Environmental Management

20 Students hired by DOE, national labs, and DOE contractors

19 Students hired by federal, state, and local government agencies

86 Students hired by private STEM industry

A "pipeline" of minority engineers specifically trained and mentored to enter the Department of Energy workforce in technical areas of need.

More info at http://fellows.flu.edu

Revision Date: August 18, 2023

EM Minority Serving Institutions Partnership Program

- **10th Anniversary, 2014 – 2024**
- **Key Features**
  - Internships
  - Savannah River Environmental Sciences Field Station
  - Graduate Fellowship Program
  - Postdoctoral Fellows Program
  - STARS Fellows Program
  - Competitive Research Awards
  - Financial Assistance (Grant) Awards




New STEM Professionals

DEPARTMENT OF ENERGY PROUDLY CELEBRATES

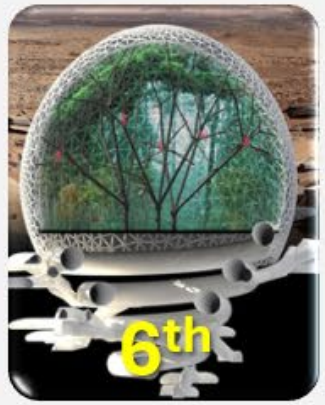
NATIONAL HISPANIC HERITAGE MONTH

ENERGY.GOV

Other Partnerships

Final Perspectives

Mission Completion during the 7th Industrial Revolution?



1765
Coal
Steam
Mechani-
zation

1860
Electricity
Steel
Chemicals
Comms
Production

1969
Fission
Electronics
Telecomms
Computers

2000
CPS
IoT
Renewables
Robotics
AI/ML

2030
Fusion
Sustain-
ability
Deep Space
HRC
Cognition

2060
?

2090
?

Mission
Completion
in 2091

Mission Completion by Workforce Generations B, Γ, Δ, and E?

Silent Generation
1928 – 1945

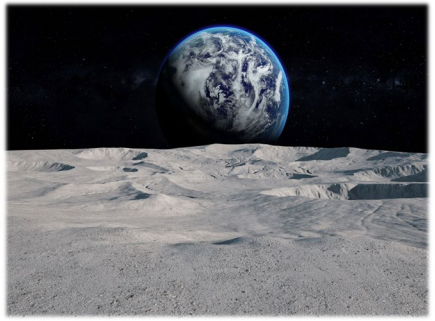
Baby Boom Generation
1946 – 1964

Generation X
1965 – 1980

Generation Y (Millennials)
1981 – 1996

Generation Z
1997-2012

Generation Alpha
2010 – 2024



Generation Beta
2025 – 2039

Generation Gamma
2040 – 2054

Generation Delta
2055 – 2068

Generation Epsilon
2069 – 2082

Mission Completion
≈ 2091

Thank You

Rodrigo Rimando
Director, Office of Technology Operations
rodrigo.rimando@em.doe.gov