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

Overview of the U.S. Department of Energy Office of Environmental Management Mission

Jeff Griffin, Ph. D.
EM Advisor &
Associate Laboratory Director
Environmental Stewardship Directorate
Savannah River National Laboratory

August 6, 2018

Outline of Presentation

- **Overview of EM Mission**
- **Scope of EM's Cleanup Challenge**
- **Organization of the EM Program**
- **Approaches and Tools Utilized by EM**
- **Path Toward Completion**
  - Hanford Site Progress
  - Savannah River Site Progress
- **Strong Record of Success**
  - Rocky Flats
  - Fernald
- **Keys to Success**
- **Sharing and Learning in Collaboration with Japan**

EM Mission Today

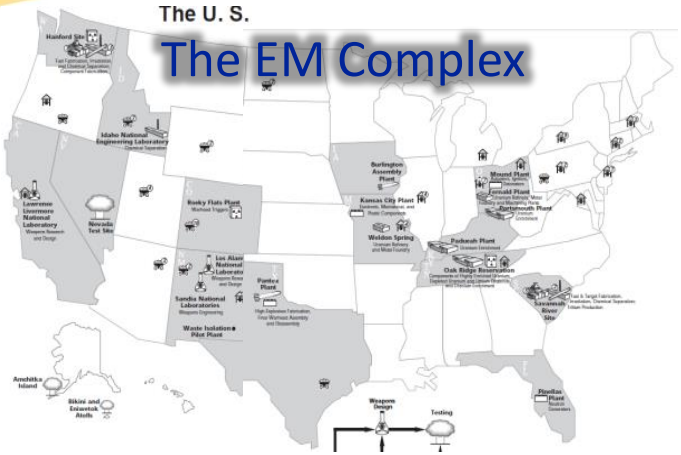
EM is charged with completing cleanup of the most complex nuclear waste sites in the U.S. as safely, effectively and efficiently as possible.






- U.S. government's 3rd highest liability – environmental remediation obligations
- Facility D&D, tank waste disposition, TRU and low level waste disposal, groundwater and soil remediation, storage and disposal of spent fuel and other nuclear materials
- Complex regulatory environment with active stakeholders
- Approximately $6.5 billion annual budget
- Approximately $300 billion lifecycle cost to go
- Utilizing best in U.S industry
- Innovative cleanup solutions
- Focus on the field - safety paramount

Magnitude of EM Cleanup Challenges



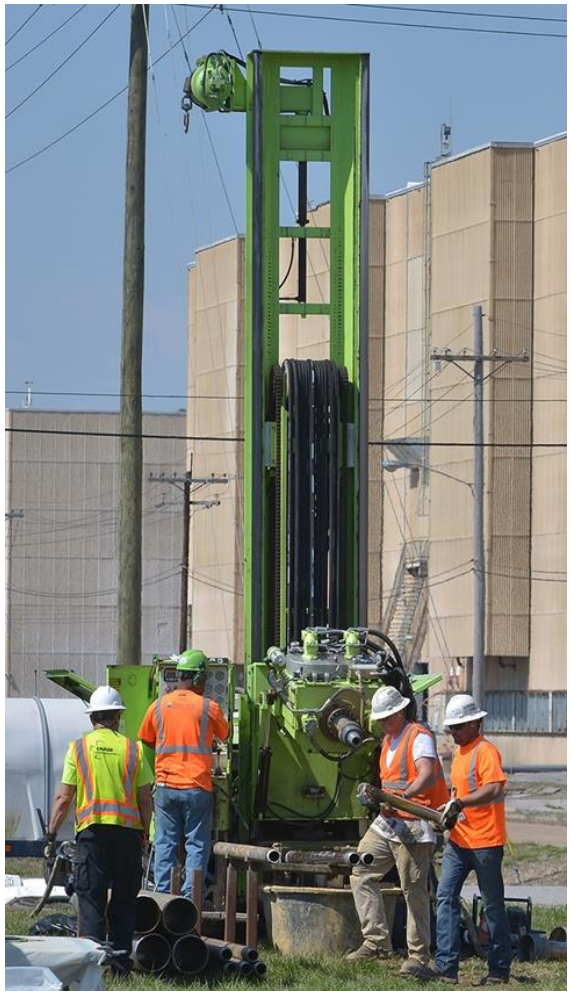
Initial Challenge:

- 107 waste sites
- Over 8000 square km
- 5000 contaminated facilities
- Almost 400 million liters liquid radioactive waste
- 700,000 tons depleted uranium
- 40 million cubic meters of contaminated soil
- Over 6.5 trillion liters of contaminated groundwater

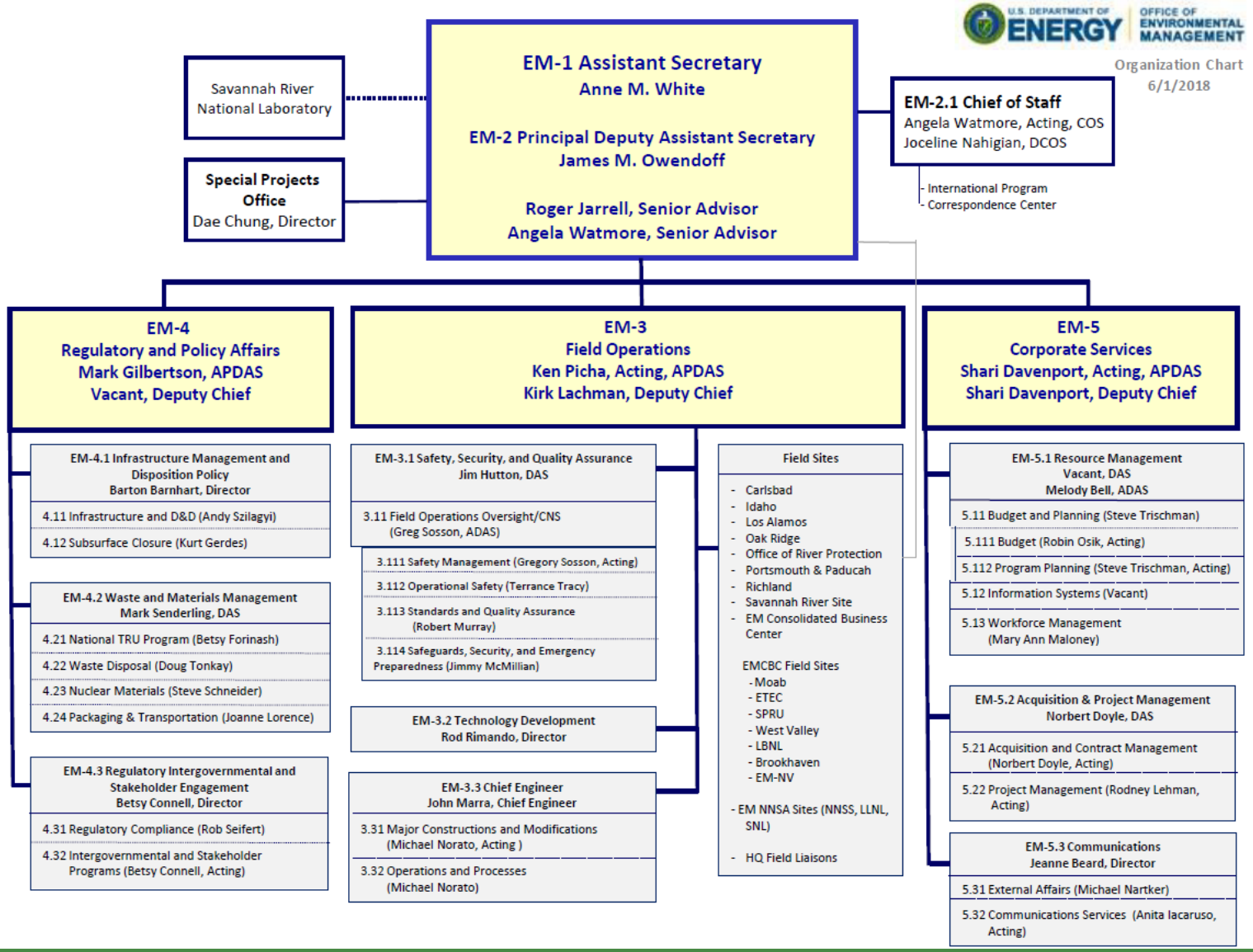
Progress Through Action

Progress to Date:

- Closed 91 EM sites, leaving only 16
- Reduced overall cleanup footprint by 90%
- Transformed radioactive liquid waste into 4000 canisters of safe, stable glass (Savannah River)
- Remediated about 75% of soil/groundwater release sites
- Completed D&D of a site's entire uranium-enrichment gaseous diffusion buildings (Oak Ridge)
- Operating only separations facility in U.S. for nuclear material disposition
- Established nation's only deep geological repository (WIPP)



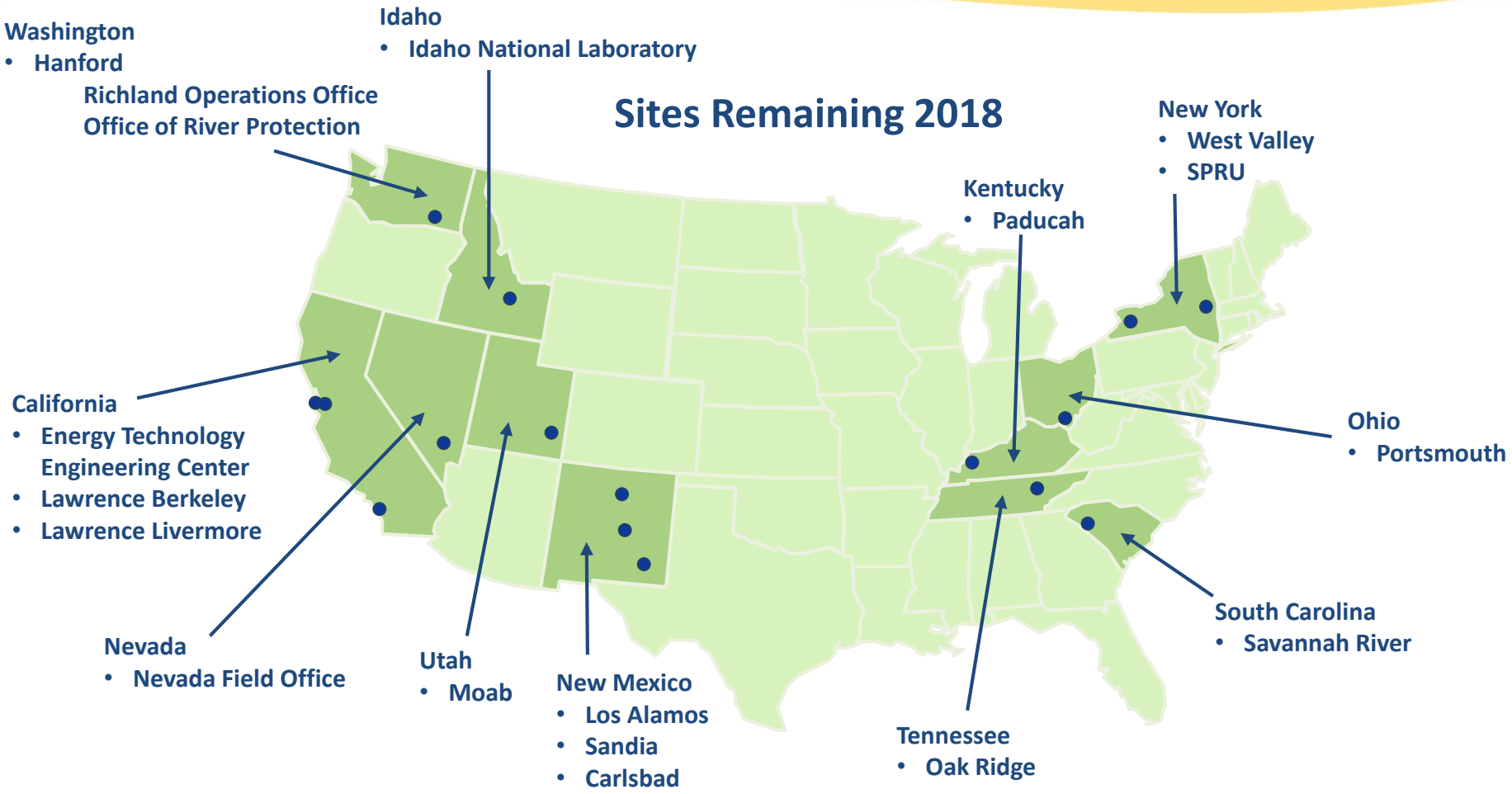
EM- Focused on the Sites



EM's Project Management Approach

- Focus on end-states
  - Work with regulators/communities early and often
- Approach used: Manage contract, not contractor
- Partner with contractors
  - Private sector companies
  - Employ over 20,000 for EM mission
- Incorporate lessons learned
  - Technical
  - Procurement/contracting
- Incentivize safety, efficiency and innov
- Set smart evaluation criteria
- Expect issues
  - Identify early to reduce impact

Moving Toward Completion



Hanford Site Progress

Background

- Cleanup mission began in 1989
- 1520 square km
- 9 reactors
- 2,300 tons of plutonium
- 210 million liters of waste in 177 tanks
- 1,715 facilities
- 2,032 waste sites

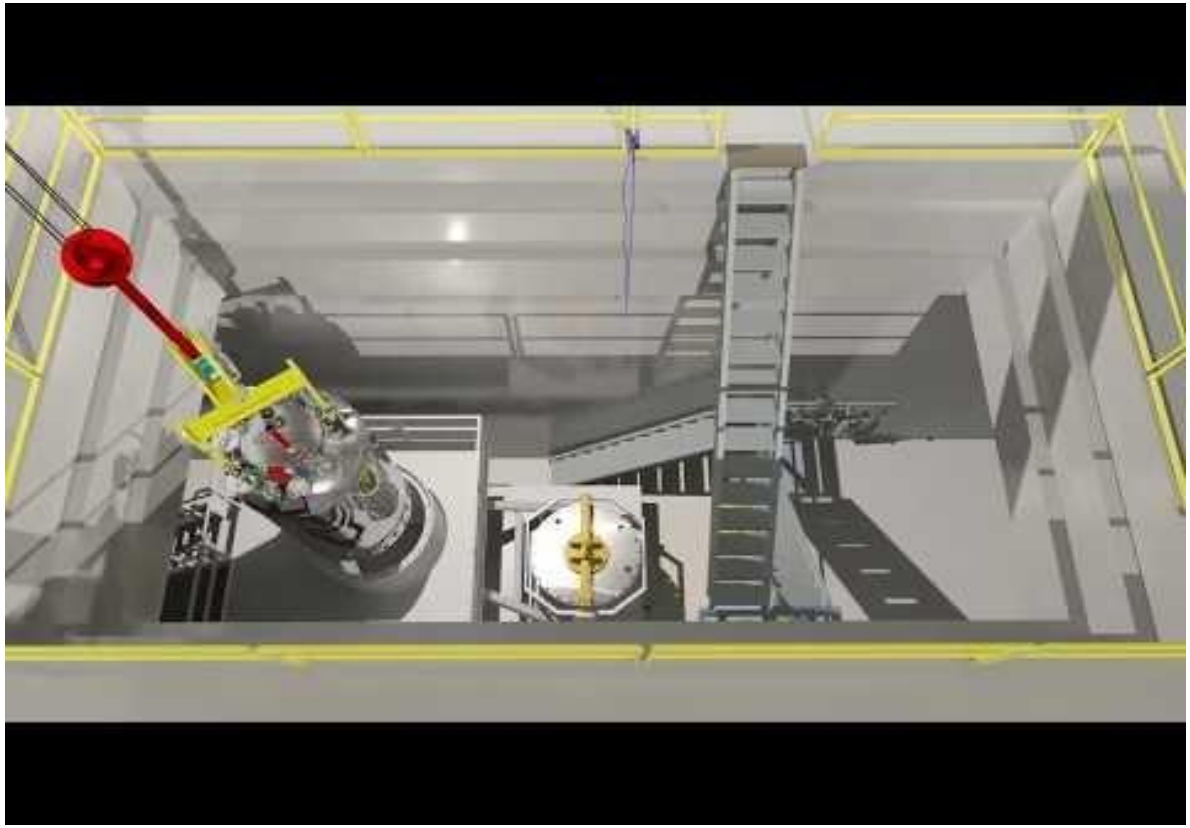
Scope

- Tank waste retrieval/disposition
- Transuranic waste and Mixed LLW disposition
- Soil/Groundwater remediation
- Decommissioning and decontamination
- Spent Nuclear Fuel

Progress

- Active footprint reduction of ~200 sq. km
- River Corridor Closure Contract complete
- Waste Treatment Plant for liquid waste under construction
- Pu Finishing Plant demolished
- 40 billion liters of groundwater treated
- Over 1.6 billion kg of materials disposed at Environmental Restoration Disposal Facility (ERDF)
- Moving sludge away from Columbia River (video)

Hanford Site Progress



Savannah River Site Progress

Background

- 800 square km
- 5 reactors
- Over 120 million liters tank waste in 51 waste tanks

Scope

- Tank waste retrieval/disposition
- TRU/Mixed LLW disposition
- Soil/Groundwater remediation
- Decommissioning & Decontamination
- Special Nuclear Materials Management

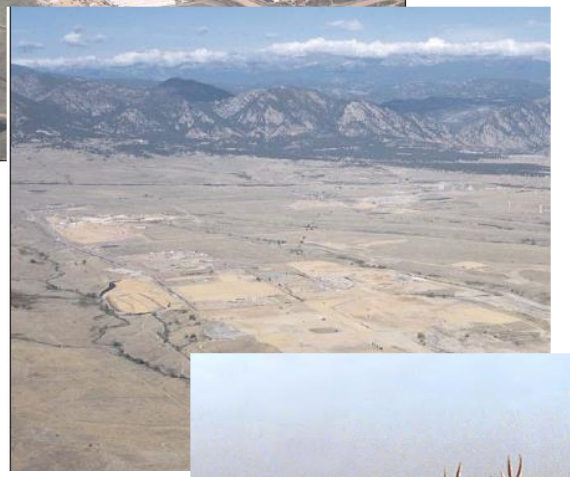
Progress

- Over 4,000 canisters of vitrified waste (50% complete) at DWPF
- 8 waste tanks closed
- Salt Waste Processing Facility construction complete – will accelerate liquid waste mission
- Over 400 of 515 waste sites remediated
- Reprocessing facility remains in operation
- Nuclear material storage capabilities – lynchpin for U.S.

Defense Waste Processing Facility

Salt Waste Processing Facility

Rocky Flats – From Nuclear Waste Site to Wildlife Refuge



Starting Point:

- 40 years of operation
- Legal cleanup agreement
- 25 square kilometer site
- 800 buildings – many highly contaminated
- 21 tons of weapons grade materials
- 100 metric tons plutonium

Challenge:

- Manage waste, materials
- Clean up, convert site to beneficial use
- Work in safe, environmentally responsible, cost effective manner

Outcome:

- Completed in 10 years for $7 billion
  - **Original estimated at $37 billion over 65 years**
- Stabilized, consolidated waste offsite
- Decommissioning and demolition of facilities
- Soil and groundwater remediation

Impact:

- National Wildlife Refuge
- Closure contract lessons
- Technological innovations

Fernald - From Nuclear Waste Site to Wetlands Preserve

Starting Point:

- 4.3 square kilometer site
- 11,000 cubic meters LLW
- 1.0 square kilometer plume under Great Miami Aquifer
- 1.7 million cubic meters contaminated soil
- 15 million kilograms uranium product

Challenge:

- First EM site to begin cleanup
- Operations halted with material in process line
- Workforce transition
- Strained relationships with stakeholders

Outcome:

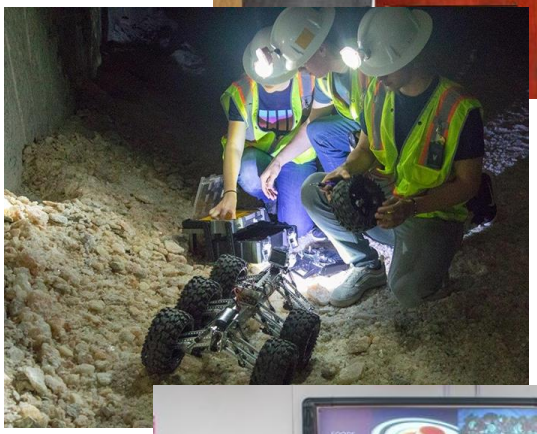
- Completed - $80 million under budget, ahead of schedule

Impact:

- Eliminated world's largest source of radon gas
- Wetlands preserve open to public
- Lasting lessons learned:
  - Importance of stakeholder/regulator partnerships
  - Getting labor on board
  - Need for technological innovation
  - Balance of on-site disposal versus offsite shipments

Keys to EM Success

- Commitment to completion mindset, “can-do” attitude
- Incentivized contracts that reward schedule and cost performance
- Strong partnerships with regulators, stakeholders, community
- Leveraging National Laboratories and industry for innovative solutions
- Preparing next generation workforce
- Removing regulatory barriers
- Timely deliberate decision-making with bias toward action

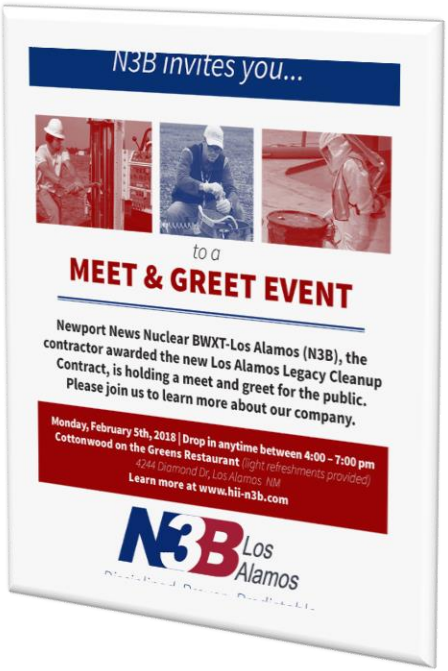


Strong Partnerships

Proactive engagement with partners is key to safe, efficient, cost-effective cleanup.

- Public education initiatives
- Open communication – newsletters, social media, site tours, meetings, events
- Site Advisory Boards
- Actively solicit input from regulators and stakeholders on key decisions
- Maximize partnerships with academia, national labs, international peers
- Maintain strong relationship with appropriators
  - Help them understand the challenges

NATIONAL CLEANUP WORKSHOP
SEPTEMBER 2018



hanford site cleanup TOURS

National Laboratory Support for EM

National Laboratories Provide Innovative Technologies and Approaches for:

- **Waste Stabilization, Treatment & Disposition**
  - Complex wide process engineering support and flowsheet development
  - Development of waste forms
  - Waste treatment technologies
- **Remediation & Cleanup of Legacy Contamination**
  - Soil & Groundwater technology development
  - Nuclear facility decommissioning technologies
- **Assessment & Verification of Effectiveness**
  - Test beds for commercial technologies
  - Modeling and performance assessment support
  - Innovative long-term monitoring approaches
  - Independent validation to support remediation

U.S. Japan Collaboration

Opportunities to leverage capabilities/expertise in areas of: immobilization of waste, packaging of HLW and SNF, repository development, D&D technologies, large-scale remediation

2011 – BLC established to strengthen support for Fukushima recovery

- Provides mechanism for dialogue on safe and secure use of nuclear energy, including response to accident
- BLC Decommissioning and Environmental Management Working Group
  - Co-chairs: EM, EPA, MOE, METI

2013 – Initiated Savannah River National Laboratory/Pacific Northwest National Lab support for TEPCO

- Sharing expertise/lessons learned
- Providing independent assessment of technologies
- Providing technology and approach options
- Since 2017, TEPCO has detailed an engineer to SRNL to assist

Sharing and Learning in Collaboration

- DOE and it's National Laboratories continue to be actively involved with the Japanese Government and technical organizations on issues of mutual concern
- Challenges related to EM cleanup are not unique to the U.S.
- While remaining scope is immense, EM is making steady and stable progress
- Successfully putting a number of tools to work to get the job done
- Shared experience and collaborations like this are keys to success

Questions?