

ENVIRONMENTAL MANAGEMENT

Providing scientifically defensible solutions for nuclear waste management and complex environmental remediation challenges.

PRIORITIES

Reduce risks to the startup and operations of first-of-a-kind radioactive waste processing facilities

Enable waste processing improvements to increase efficiency and reduce mission lifecycle costs

Provide independent technical bases for near- and long-term clean-up decisions

Identify and address technical gaps to reduce environmental risks

Deliver engineering solutions for remediation of complex sites

Identify adaptive management approaches to achieve end states and site closure



MISSION

We are committed to restoring the environment for a cleaner future. We provide impactful, risk-informed scientific and technical results to safely complete cleanup of the environmental legacy from nuclear weapons development, government-sponsored nuclear energy research, and other complex environmental challenges.



WHAT WE DO

Rooted in a broad understanding of complex systems, our innovations provide crucial science-based and risk-informed solutions to national and international waste management and environmental remediation challenges. Our strategically focused research, analyses, and technological contributions are saving the nation billions of dollars through cost avoidance, while also reducing the risks and time frames for cleanup of legacy waste.

Pacific Northwest National Laboratory has helped advance the Hanford Site environmental management mission since the 1960s. Our historical knowledge and unique scientific and technical expertise—including chemical and nuclear processing, systems integration, environmental remediation, and site stewardship—are foundational to the successful cleanup of legacy waste at Hanford and similar complex sites. We manage and support over 100 projects annually across multiple sponsors, including the U.S. Department of Energy and DOE Site contractors in priority mission areas.

KEY PROJECTS

- Tank Integrity and Life Extension
- Tank Waste Processing and Flowsheet Maturation
- Advanced Glass and Optimization Program
- Deep Vadose Zone – Applied Field Research Initiative
- Environmental Remediation: Adaptive Site Management
- Ecological Assessment and Restoration
- Radiation Dosimetry and Calibration

FACILITIES & EQUIPMENT

Radiochemical Processing
Laboratory

Wasteform Development
Laboratory

Radiological Exposures
and Metrology Laboratory

Subsurface
Laboratory

Marine and Coastal
Research Laboratory

Radiological Microscopy
Suite

Radioactive Test
Platform

Process Development
Laboratory High Bay

Tank Integrity
Qualification Platform



Environmental Remediation

- Adaptive site management
- Geophysical monitoring
- Remediation science and systems
- Subsurface science



Radiation Measurement

- Calibrations
- Dosimetry
- Irradiation sciences
- Materials in extreme environments



Waste Processing

- Fluid dynamics and scaling
- Tank waste chemistry
- Wasteform development
- Safety basis



Environmental Restoration

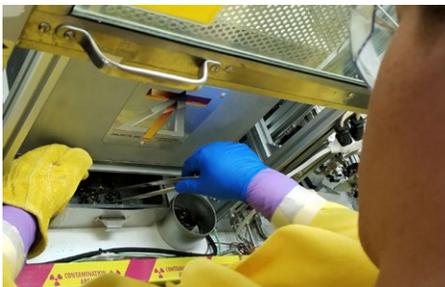
- Decision support strategies
- Predictive modeling
- Data collection and analysis
- Technology development

ACCOMPLISHMENTS



Tank Integrity and Life Extension

Extending the life of underground waste storage tanks—and avoiding hundreds of millions of dollars in replacement costs—through advanced nondestructive evaluation sensing, robotic crawler deployment, and data analytics with machine learning to detect and interpret flaws under the tank bottoms.



Waste Processing Operations

Establishing the baseline—over 50 years—for tank waste treatment, including the original vitrification process and ongoing research and development for filtration, radiochemical separations, glass formulations, secondary waste treatment, and wasteform disposal using state-of-the-art experimental methods and integrated test platforms.



Tank Safety Basis

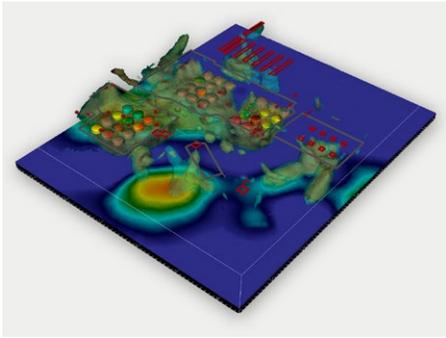
Evaluating the safety basis of underground waste storage tanks by developing science-based solutions for chemical hazards—including “burping,” vapors, and deep sludge mixing—and by assessing the structural integrity to enable greater storage capacity and safely install access ports for waste retrieval equipment.



Environmental Effects of Energy Development

Informing natural resource management with deep expertise in animal behavior in riverine and in coastal environments, wetlands habitat health, experimental data collection and analysis, modeling, and sensor development for freshwater, estuarine, coastal, and offshore regions.

ACCOMPLISHMENTS



Remediation of Complex Sites

Providing international leadership in the development, maturation, and deployment of advanced technologies to solve complex issues in the contaminated subsurface environment—stemming from our support of soil and groundwater remediation in Hanford’s Columbia River corridor and Central Plateau deep vadose zone.



Flowsheet Optimization

Supporting DOE efforts to increase Direct Feed Low-Activity Waste operational flexibility, resolve the long-term, potentially high-impact challenges associated with increasing the waste loading of glass waste forms, and provide glass standards to support analysis during waste qualification activities at the Hanford Waste Treatment and Immobilization Plant.

CONTACTS

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ABOUT PNNL

Pacific Northwest National Laboratory draws on signature capabilities in chemistry, Earth sciences, and data analytics to advance scientific discovery and create solutions to the nation’s toughest challenges in energy resiliency and national security. Founded in 1965, PNNL is operated by Battelle for the U.S. Department of Energy’s Office of Science. DOE’s Office of Science is the single largest supporter of basic research in the physical sciences in the United States and is working to address some of the most pressing challenges of our time.