



**A Technical Resource
for Government and
Private Industry**



Innovations for Environmental Monitoring and Site Stewardship

Managers of federal sites and private industrial operations initially responded to site contamination by undertaking extensive cleanup and monitoring programs. However, the slow pace of cleanup with rising costs has suggested strongly that cleanup may take years, if ever, to complete. This realization has shifted priorities to protecting human health and ecosystems through environmental stewardship and long-term monitoring.

Responding to these challenges, the Pacific Northwest National Laboratory has developed comprehensive monitoring programs and advanced scientific and technological solutions for long-term stewardship of waste sites. We conduct comprehensive environmental monitoring programs for the U.S. Department of Energy at Hanford, and we perform monitoring and assessments for other clients at federal, private and international sites.

Through technical innovation, we have increased the efficiency of monitoring programs and developed better techniques for long-term management of hazardous and radioactive wastes. Our innovations include

Monitoring Services

- contaminant sampling and analysis
- ecological risk assessment
- human health risk assessment
- public involvement
- risk communication
- DQO-based monitoring designs
- database management
- advanced visualization techniques
- contaminant fate and transport modeling

- sensors that accurately locate and identify subsurface contamination
- predictive tools that determine the long-term performance of waste isolation and containment systems
- fundamental research to determine the mobility and natural attenuation of contaminants
- in-situ techniques that contain, immobilize, or destroy contaminants and waste forms in place
- comprehensive programs based on long-term monitoring, natural and cultural resource protection, and environmental stewardship.

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**Pacific Northwest
National Laboratory**
Operated by Battelle for the
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Project Experience

Our multi-media monitoring programs and technologies help clients reduce costs, meet stewardship objectives and solve problems involving natural resources, remediation decisions, and contamination of the environment including groundwater, surface water, soils, vegetation, fish and wildlife.

Hanford Groundwater Monitoring — Since 1976, we have directed the groundwater-monitoring program for DOE at the Hanford site, which has extensive groundwater contamination from 45 years of operation as a defense-production facility. The program is unique in its efficient integration of RCRA, CERCLA, and radiological monitoring requirements. Another major element is a site-wide groundwater model, which was developed to predict the cumulative impacts of past Hanford operations on contaminant discharges to the Columbia River.

The Surface Environmental Surveillance Project (SESP) — For over 35 years, we have monitored soils, air, surface water, sediments, natural vegetation, agricultural products, fish, and wildlife to measure the impacts of Hanford operations on the accessible environment. Analytical activities include measuring trace levels of radionuclides; metals; anions; thio-ureas; organic compounds including volatiles, PCB's, and pesticides; and ambient external radiation levels. Monitoring results are summarized in an integrated assessment of chemical and radiological exposure to the public and ecological environment.

Hanford Science and Technology Program — Our work for DOE also includes management of an applied research program dedicated to solving Hanford's key soils and groundwater problems. The collaboration with other national laboratories and private contractors focuses on contaminant migration mechanisms in the groundwater and vadose zone. The research agenda was established in an "S&T road-mapping" exercise involving Hanford contractors, regulators, stakeholders, and tribal representatives. Current studies are examining contaminant migration beneath high-level waste tanks and precipitation-induced infiltration through the vadose zone.

Environmental Management at Ft. Lewis, WA — We are helping the U.S. Army Forces Command manage an installation restoration (IR) program for a contaminated site. The primary objective is to develop a comprehensive remediation plan that identifies source areas, contaminant plumes, and the most appropriate cleanup remedies. For the program, which involves field-testing of innovative cleanup technologies, we are collaborating with the U.S. Army Corps of Engineers, the U.S. Geologic Survey, private contractors, the base management team, and local stakeholders.

PEMEX Project — In work for the Mexican Petroleum Institute (PEMEX) and the University of Mexico, we developed a comprehensive environmental protection program for petroleum refinery operations in the State of Tabasco. The program is identifying ways that production wastes and discharges from petroleum exploration may have impacted human health and ecosystems. Specific tasks focus on impacts from hydrocarbon pollution in surface water bodies and the Gulf of Mexico. In addition to monitoring, we are identifying remedies to mitigate the problems.

