PNNL Coastal Security Institute: A National Asset

Ensuring the security of the world's coastal areas is a staggering task. The United States alone has 95,000 miles of coastline. Our near-shore regions are home to about two-thirds of the nation's population, as well as major industries, ecologically and economically important natural resources, and some of the world's busiest maritime traffic.

Providing breakthrough solutions to meet that challenge is the mission of the Coastal Security Institute of the Department of Energy's Pacific Northwest National Laboratory. As part of PNNL's national security mission, the Institute addresses critical needs in four areas—intelligence analysis, homeland security, national defense and global security.

About the Institute

The Institute is located at PNNL's Sequim Marine Research Operations on the northeast coast of the Olympic Peninsula. The laboratory is a world leader in developing methods for detecting and measuring pollutants in marine environments. That experience now is being applied to the development of technologies to protect coastal areas worldwide.

The Institute also has access to the facilities and more than 3,900 researchers and staff located at the PNNL main campus in Richland, Wash. Resources include the William R. Wiley Environmental Molecular Sciences Laboratory, which contains some of the world's most powerful scientific instruments and high-performance computing systems.

Solutions for the nation and the Northwest

The Institute has two primary goals. The first is to address the full spectrum of national and homeland security concerns by developing methods to more accurately and rapidly detect, identify and characterize dynamic coastal environmental phenomena and events. The second is to provide a full set of measurement, assessment and interpretation tools and capabilities to federal, state, tribal and local governments, and also to groups in the commercial sector charged with the security of the United States coastal zone.

A portable buoy validates satellite signals and monitors water quality parameters in coastal, estuarine and inland waters. Optical and environmental sensors collect and transmit user-programmable data in near real time.

As it addresses urgent security concerns, the Institute serves on multiple levels. Nationally, it is a resource for marine science and engineering solutions that are applicable, not only to national and homeland security, but also to environmental missions.

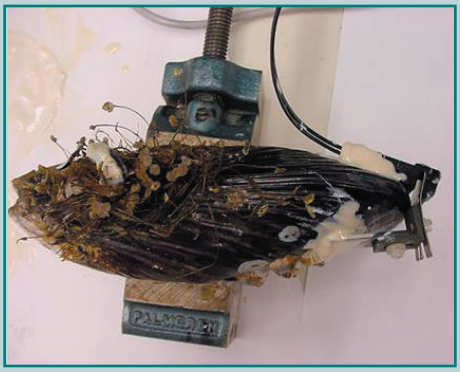
In the Pacific Northwest, the Institute is applying knowledge gained in performing its national mission to the priorities of federal, state and local agencies responsible for the security of the region's borders.

The Institute also is establishing a network to create high-technology economic growth—teaming with state, local and tribal governments, as well as university and corporate partners, to attract new research and development business to the Olympic Penninsula.

Project Profile: Closing in on WMDs

PNNL is working with government clients to lead the science and technology development for creation of a new generation of technologies to rapidly acquire, analyze and interpret evidence of weapons of mass destruction, or WMDs, in marine and coastal environments. Through this congressionally mandated effort, PNNL researchers will:

- Evaluate the use of living marine systems, such as clams and mussels, as biosensors to concentrate and detect the presence of biological, chemical or nuclear materials in coastal waterways, beaches and estuaries.
- Investigate novel nanomaterials as surrogate collectors and sensors that can rapidly capture and classify chemical and biological materials in marine environments.
- Enhance imaging technologies so intelligence and law enforcement agencies can better identify and describe potential terrorism targets.
- Develop and improve computer models that can analyze what happens to a chemical or bioagent



A blue mussel is fitted with a sensor to record the behavioral response (opening and closing) in the presence of a contaminant.

Breakthrough science and technology

The Institute leverages PNNL's broad science base to achieve advances in many areas, including:

- Coastal assessment, remediation, and restoration, including coastal and near-shore mapping and monitoring, port and harbor security and coastal vulnerability assessment
- Detection systems, such as marine and biosensors, biomonitors and living organisms
- Remote sensing
- Fate and transport modeling
- Ultra-low-level chemical analysis
- Contaminant effects evaluations and risk assessment
- Signature collection, analysis and characterization
- Information gathering and analysis, geospatial analysis, 3D visualization and data fusion.

The Institute also can provide research, development, testing and evaluation for a variety of coastal warfare scenarios, as well as technologies for remotely operated aerial and underwater vehicles.

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