



**Pacific Northwest
National Laboratory**
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Sharing *THE* Excitement OF *Science* AND *Technology*

Breakthroughs
for the
Northwest

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Exploring the implications of global warming

Pacific Northwest National Laboratory scientists are using computer models to estimate the impact of global warming on water resources in Washington's Yakima River Basin. These innovative modeling techniques are helping water resource managers make better decisions by illuminating potential tradeoffs between cost and risk.

Future climate simulations created in the Yakima project indicate more rain falling in fall and winter, resulting in less natural water storage in the form of snowpack. Less winter snowpack would mean an earlier runoff with water levels peaking as early as March rather than May as in past years.

This change may significantly impact the migration of fish populations in the Yakima River. Storing increased runoff in the fall and winter and releasing it during the time of the historical spring snowmelt may be one approach to solving this problem. However, when considering changes in operating procedures, water resource managers must also consider other, often conflicting, water uses such as irrigation. PNNL research is aimed at helping water resource managers make increasingly difficult decisions about how to use water resources in the future.

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University of Oregon students create plan to clean up water



A team of students from the University of Oregon's Business and Law Schools has compiled a business plan for deploying Self-Assembled Monolayers on Mesoporous Supports (SAMMS) in municipal water supply treatment plants to remove arsenic from drinking water.

SAMMS is a technical capability strategy developed by Pacific Northwest National Laboratory that combines molecular self-assembly and mesoporous materials to clean heavy metals from water supplies. Mesoporous ceramics are glass honeycombs in which the holes are about the size of the DNA double helix. This creates a huge amount of surface area in a very small volume. The honeycombs are coated throughout with a special coating that will selectively bind a particular kind of heavy metal or radionuclide.

Stringent new Environmental Protection Agency guidelines go into effect Jan. 1, 2006, significantly lowering acceptable arsenic limits in drinking water and many municipalities across the nation will not be able to meet the new guidelines with existing technologies. The UO business plan for SAMMS was entered in a national level business competition in December.

DOE grant advances research into new markets for corn

A \$2.4 million research grant from the Department of Energy will allow Pacific Northwest National Laboratory, the National Corn Growers Association and Archer Daniels Midland to extend their research on corn fiber utilization by two and a half years. The aim of the research is to convert corn fiber to higher value products, thereby opening new markets for corn growers. Under the agreement, the partners intend to economically derive high-value chemicals and oils from lower value corn fiber. In doing so, they plan to demonstrate a sizeable leap in technology.

The project ranges from purifying and characterizing trace amounts of chemicals to designing and constructing a pilot plant capable of recovering high-value carbohydrates at a production level.

PNNL announces director of Homeland Security Office

Dr. Ned Wogman will manage Pacific Northwest National Laboratory's newly established Homeland Security Office. Wogman will direct the Lab's \$70 million research and development portfolio in homeland security activities.

PNNL has been helping secure the nation's homeland long before Sept. 11, 2001. The Lab's programs range from training and equipping first responders with the tools necessary to respond to terrorist attacks using chemical, nuclear or biological weapons to protecting, assessing and monitoring the nation's critical infrastructures, such as dams, power grids and financial systems.

Researchers at PNNL currently support programs funded by the Departments of State, Energy and Defense; U.S. Customs; Federal Bureau of Investigation; the Internal Revenue Service; other government agencies and private companies. In addition, Wogman will oversee PNNL's million-dollar, internally funded science projects that are geared to addressing future science and technology challenges facing homeland security experts.

PNNL expands blood serum protein library



Using liquid chromatography and mass spectrometry instrumentation, PNNL scientists identified and characterized nearly twice as many proteins in blood serum than previously noted, providing a greater library of proteins to study for potential use in disease diagnosis.

In a significant scientific advance, researchers at Pacific Northwest National Laboratory have identified or confirmed 490 proteins in human blood serum—nearly doubling the number of known serum proteins, according to a paper accepted for publication in the December issue of *Molecular and Cellular Proteomics*.

“We have performed the most extensive identification of proteins in serum to date,” said Joel Pounds, corresponding author and a PNNL staff scientist. “We studied blood serum because it holds clues to all the major processes in our bodies. We need to know what proteins exist in that serum to know how they might be used to predict disease susceptibility, monitor disease progression or diagnose disease.”

These clues include proteins that “leak” from dead and dying cells and proteins secreted into blood or released from tumors. Identifying these proteins allows scientists to conduct additional studies to define each protein's functional role in cells and the body.

Studying blood serum proteins is a natural fit for scientists at PNNL, which has a strong proteomics capability. A proteome is the collection of proteins expressed by a cell under a specific set of conditions at a certain time. PNNL

scientists have developed unique technologies that allow for more thorough analysis of proteins and have studied the proteome of ovarian cancer as well as other disease states.

Laboratory celebrates “triple crown” of operations

A record of safe and effective operations has landed Pacific Northwest National Laboratory ISO 14001 certification. ISO is a standard developed by the International Organization for Standardization for environmental management systems.

The Laboratory adds this honor to two additional environment, safety and health (ES&H) achievements – implementation of Integrated Safety Management in 1998 and the Voluntary Protection Program Gold Star status in 2001. PNNL is the first Office of Science Laboratory to attain these “triple crown” accomplishments in ES&H.

“The triple crown is not an end, but a beginning. We have the opportunity to make similar strides in Quality, and to not just maintain, but improve on our safety and environmental record,” said Roby Enge, director of PNNL's Environment, Safety, Health and Quality Directorate.

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