



**Pacific Northwest
National Laboratory**
Operated by Battelle for the
U.S. Department of Energy

Sharing THE Excitement OF Science AND Technology

Breakthroughs
for the
Northwest

Richland, Washington

June 2002

Washington governor tours PNNL

Governor Gary Locke learned more about how Pacific Northwest National Laboratory can contribute to solving regional issues and to the governor's state economic strategy when he visited the Laboratory on May 29.

After a welcome by Laboratory Director Lura Powell and Keith Klein, manager of the Department of Energy's Richland Office, Gov. Locke toured the Graphics Visualization Lab for an introduction to systems biology and computational sciences. Next, he visited the Cellular Observatory and other laboratories in the William R. Wiley Environmental Molecular Sciences Laboratory.



Later in the tour, Gov. Locke learned about how PNNL's science and technology efforts can be used to help address regional security issues in areas such as transportation and energy. The governor was briefed on the Laboratory's expertise in training first responders to deal with weapons of mass destruction as well as in developing sensors that detect and identify weapons of mass destruction.

Gov. Locke also attended briefings on PNNL's work with bio-products, accelerated cleanup at the Hanford Site and regional climate change.

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Fast glass!

Researchers at Pacific Northwest National Laboratory and the Savannah River Technology Center have developed a more efficient formula for vitrifying radioactive waste. Vitrification is a process that combines concentrated radioactive waste with glass-forming materials. Scientists at PNNL and SRTC have applied glass property models to develop a new frit or glass-forming material. This new formula, Frit 320, showed a melt rate 20 percent faster than the previous frit in small scale melter tests. Frit 320 also allows more waste to be incorporated into the glass when combined with a new technology developed by SRTC and is expected to yield significantly higher melter throughput. By allowing more waste to be mixed into each batch of glass and producing it faster, this new glass formula may significantly reduce the cost of vitrifying waste, an integral part of cleaning up the nation's nuclear waste. The Defense Waste Processing Facility at the Savannah River site in South Carolina has incorporated Frit 320 into its operating plans for the future.



PNNL's Cellular Future makes cover of *Chemical and Engineering News*

A cover story about Pacific Northwest National Laboratory appeared in the May 20 issue of *Chemical & Engineering News*. The piece, written by the magazine's reporter Jeff Johnson, describes PNNL's role as a multiprogram national laboratory, complete with a purpose and mission different from DOE's nearby Hanford Site.

In addition to an overview of PNNL, the article covers topics such as PNNL's priorities in chemistry and biosciences and its role in science and technology for environmental cleanup of sites such as Hanford. Specific research projects, including solid oxide fuel cells, a technology used in pathogen detection and a virtual computer model of a rat's lung, are also described in the article. To review the May 20, 2002 issue of *Chemical & Engineering News* online, see <http://pubs.acs.org/cen/coverstory/8020/8020PNNL.html>.

Advancing treatment of autoimmune diseases

Researchers at Pacific Northwest National Laboratory have launched a partnership with Russian scientists and two U.S. companies to develop a more effective treatment for combating autoimmune diseases. Nearly 50 million Americans are afflicted with autoimmune diseases, such as insulin-dependent diabetes, rheumatoid arthritis, lupus and multiple sclerosis, which erupt when the immune system mistakenly attacks itself rather than protects itself.

Russian scientists have created unique humanized antibodies to gamma interferon, a protein that when overproduced triggers and exacerbates various autoimmune conditions. This work is a major step toward creating a much-improved treatment for certain autoimmune diseases. Until recently, most treatments employed antibodies derived from mice, which are effective only temporarily before the human body rejects them.

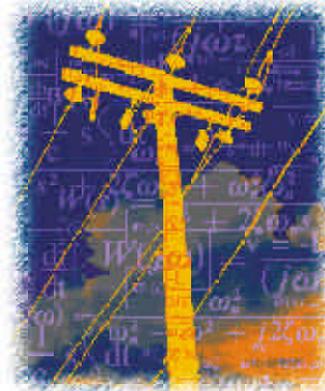
The Russian research, accompanied with a treatment method developed by Advanced Biotherapy, appears promising. During the past year, PNNL scientists have worked closely with Russians to verify research results, monitor progress, and identify and secure a viable commercial partner if the antibody proves effective. The collaboration represents the latest commercial venture between a former Russian weapons facility, a DOE national laboratory and U.S. industry under DOE's Initiatives for Proliferation Prevention program.

Grid Friendly™ controller helps balance energy supply and demand

Pacific Northwest National Laboratory has developed a device that helps manage electricity at the power grid level, which may provide more reliable power grids, lower electricity bills for consumers and a cleaner environment.

The Grid Friendly™ controller, a two by two-and-a-half inch circuit board, is at the heart of Grid Friendly™ appliances. Installed in refrigerators, air conditioners, water heaters and various other household appliances, this device would monitor the power grid and turn appliances off for a few seconds to a few minutes in response to power grid overload. When power plants cannot generate enough power to meet customer needs, Grid Friendly™ appliances would reduce some of the load on the system to balance supply and demand.

The Grid Friendly™ controller is being incorporated in another PNNL innovation called the Rooftop Diagnostician. This remote monitoring device evaluates a building's rooftop air-conditioning systems, uncovering problems that could lead to wasted energy and occupant discomfort. As a component of the Rooftop Diagnostician, the Grid Friendly™ controller would help manage large amounts of demand. For more information, see <http://www.pnl.gov/main/highlights/grid.pdf>.



A license for Lab-in-a-Box

Pacific Northwest National Laboratory licensed its Lab-in-a-Box technology to Bellhaven Applied Technologies of Kennewick, Wash., on May 7. The non-exclusive license allows Bellhaven to manufacture and sell the system for use in mining, construction, power generation and manufacturing machinery, as well as for potential military applications.

PNNL's fluid analysis/diagnostics system will provide equipment owners with real-time information that can help prevent unscheduled maintenance and failure in large, expensive machinery. It allows for continuous testing and provides information on demand and automatic notification if lubricating or hydraulic oil parameters fall outside predetermined limits.

Instant access to crucial information about the condition of oils and the machines in which they are used can predict machine health and detect faults well in advance of malfunctions. This ability helps to prevent possible downtime, allowing the machine maintainer to schedule maintenance and order parts long before any costly failures arise.

For more information about these items or about Pacific Northwest National Laboratory, contact:

Ginny Sliman, Editor
Phone: 509-375-4372
Fax: 509-375-6550
E-mail: virginia.sliman@pnl.gov

Pacific Northwest National Laboratory
P.O. Box 999, K1-39, Richland, WA 99352
Toll-free: 1-888-375-PNNL
Web address: <http://www.pnl.gov>

