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

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Breakthroughs for the Northwest

Richland, Washington

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Ultrasonic technology may aid cleanup efforts

A team of researchers at Pacific Northwest National Laboratory and University of Washington is developing an ultrasound technology to monitor particle size in sludge waste, which could be an important part of cleanup efforts at Hanford.

The U.S. Department of Energy has millions of gallons of radioactive liquid and sludge wastes that must be retrieved from underground storage tanks. Monitoring sludge particle size while transferring waste through pipelines can prevent waste from plugging the pipeline.

Led by scientist Margaret Greenwood, the researchers' concept for measuring particle size is based on work being done in optics at the University of Washington and work in ultrasonic spectroscopy being done at PNNL. Although still in the basic research stage, the ultrasonic diffraction grating method could lead to creation of a non-invasive sensor for slurry. The sensor would monitor particle size in real-time on pipelines transporting radioactive wastes. This technique also has widespread potential applications in many other industries, such as pharmaceuticals, food processing and petrochemicals.

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Energy management system sparks savings

An energy management system developed at Pacific Northwest National Laboratory and installed at a New York City Housing Authority boiler plant in Manhattan has delivered cost savings of more than $300,000 in its first year.

Decision Support for Operations and Maintenance®, or DSOM®, is a state-of-the-art monitoring and diagnostic system that optimizes system performance. Under a contract with the New York City Housing Authority, the system went online in 2001 at the Smith House central boiler plant, which provides steam and hot water to 12 housing units, covering nearly one million square feet.

Developed for the U.S. Marine Corps, DSOM® was first implemented at two major Corps facilities. In every installation DSOM® improved process efficiency, reduced maintenance expenses, extended equipment life and cut energy consumption and associated harmful emissions. DSOM® received an R&D 100 Award for technology innovation in 2001. For more, see **http://www.pnl.gov/news/notes/spring02.htm.**

Sizing up seismic shakes

Millions of earthquakes occur around the world every year. Distinguishing between naturally occurring earthquakes and manmade phenonmenon can be a challenge. The vast majority are naturally occurring phenomena. However, some of this seismic shaking doesn't originate with Mother Earth. Sometimes hard-to-read seismic signatures offer only slight variations. At Pacific Northwest National Laboratory, statisticians have developed sophisticated mathematical algorithms to differentiate between natural phenomenon and manmade events. The complex methods developed by PNNL statisticians are helping seismologists around the world determine if they are detecting a shift in the earth's crust or the results of a nuclear test detonation.

Battelle gives $100,000 to train Eastern Washington teachers

Battelle will give $100,000 over the next three years to support a statewide science education reform project that will train more than 300 K-8 teachers in Eastern Washington. The first installment of $33,500 was awarded in April.

The gift supports the Washington State Leadership and Assistance for Science Education Reform, or LASER, project. The National Science Resources Center launched LASER in 1998 as a collaboration between states, school districts and businesses to create and sustain science education reform at the regional level. The $100,000 Battelle donation will be used by LASER to create professional development "modules," or training materials and programs, which will be used to train more than 300 teachers who instruct about 34,000 students in 20 school districts around Tri-Cities and Yakima.

Battelle, which operates PNNL for the Department of Energy, has given LASER $110,000 over the past four years for leadership workshops, curriculum fairs, teacher training and awareness building. For more, see **http://www.pnl.gov/news/2002/laser.htm.**

Urban air quality—the difference between night and day

Pacific Northwest National Laboratory and a collaboration of researchers measured the differences in air quality at sunrise in Phoenix, Ariz., in one of the most comprehensive studies ever done on the vertical structure of air pollution over a major urban area. Armed with this data collected in summer 2001, researchers are studying air pollution at sunrise in an effort that could help urban areas better manage their air quality problems.

Researchers are trying to determine how various mechanisms interact under a wide range of meteorological conditions. The dry Southwest climate keeps nighttime pollutants trapped near the ground until warmed by the sun the following day, making Phoenix an excellent place to do such a study. The Department of Energy is concerned about air pollution derived from energy consumption as it impacts national energy policy. The scientific knowledge from this study is expected to be applicable to other cities in the arid Southwest as well.

The Office of Science featured this research at **http://www.science.doe.gov/feature_articles_2002/March/.**

Top inventor for 2002 announced

He developed a new technique for measuring occupational exposure to radiation that resulted in Pacific Northwest National Laboratory's first million-dollar royalty license. He holds 13 U.S. patents and has numerous foreign patents and patents pending. And, now PNNL's Steve Miller has been named Battelle's Inventor of the Year for 2002. Battelle operates PNNL for the U.S. Department of Energy.

A staff scientist, Miller holds several patents on Optically Stimulated Luminescence (OSL), which has greatly improved gamma and beta dosimetry. His OSL research earned an R&D 100 award in 1992. The OSL technology was licensed to Landauer Inc. in 1994 and forms the basis of one of its commercial dosimeter products, used to measure occupational exposure to radiation.

The Inventor of the Year Award honors a Battelle staff member who, through outstanding career achievements and creativity, has significantly expanded Battelle's intellectual property portfolio. Accordingly, this individual has enhanced Battelle's ability to commercialize technology to better serve its customers, the marketplace and society. Miller designed and now manages an Optically Stimulated Luminescence Laboratory at PNNL. He currently is developing medical dosimetry products and high-dose dosimetry for food irradiation and medical product sterilization.

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