

News Wire from Idaho National Engineering and Environmental Laboratory – Home of Science and Engineering Solutions

Welcome! The INEEL News Wire is designed to deliver regular news about current advances in research and technology at the multiprogram Department of Energy's Idaho National Engineering and Environmental Laboratory (INEEL), located in Idaho Falls, Idaho. Published by the INEEL Communications Directorate, the INEEL News Wire delivers each news summary to your desktop with links to the entire article at our website. Soon, the INEEL News Wire will be available at <http://www.inel.gov>, along with an archive of previous editions.

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Engineer outlines INEEL Wireless Test Bed to Homeland Security Conference

Washington, DC, July 9 – Lynda Brighton, Project Engineer, Idaho National Engineering and Environmental Laboratory (INEEL) Wireless Test Bed, will join noted speakers like Senator Conrad Burns (R-MT) Chairman, Senate Subcommittee on Communications at WCA 2003, the Mobile and Wireless Solutions, Homeland Defense Training Conference in Washington July 9. More than 1,000 communications professionals are expected at this important security conference, which will be held at the New Washington, DC Convention Center.

Brighton will speak about the testing capabilities and capacities for the recently inaugurated INEEL Wireless Test Bed, located in Idaho Falls. The INEEL is a science-based, applied engineering national laboratory dedicated to supporting the U.S. Department of Energy's missions in environment, energy, science and

national security. The INEEL is operated for the DOE by Bechtel BWXT Idaho, LLC.

For more information on this conference and speaker schedules visit http://www.homelanddefensejournal.com/conf_mobile_2003.html

Construction of Waste Excavation Demonstration Facility Completed

Idaho Falls, June 26, 2003 – Bechtel BWXT Idaho, LLC has announced the completion of the glovebox excavator method facility, which will allow buried waste retrieval to begin six months ahead of schedule at the U.S. Department of Energy's Idaho National Engineering and Environmental Laboratory. The glovebox excavator method project is designed to demonstrate buried waste retrieval at Pit 9, located at the INEEL's Radioactive Waste Management Complex.

"Completing construction this far ahead of schedule demonstrates our commitment to accelerating cleanup as safely and efficiently as possible," said Susan G. Stiger, vice president and project manager for the Idaho Completion Project, which manages the cleanup of the federal facility. "Thanks to the hard work and dedication of the construction and management team on this project, we will be able to start retrieval operations as much as six months early."

An agreement between the DOE, the state of Idaho and the U.S. Environmental Protection Agency requires the demonstration of waste excavation from Pit 9 to start by March 31, 2004. The current plan is to start excavating waste this fall.

DOE, the EPA and the Idaho Department of Environmental Quality will use the information gathered during the retrieval to help evaluate final remediation alternatives for the remaining buried waste. Under terms of the federal Comprehensive Environmental Response, Compensation and Liability Act, also known as the Superfund law, the agencies are required to implement a remediation plan that is protective of human health and the environment. Waste retrieved during the demonstration project will be characterized for safe, compliant and temporary onsite storage until disposal in an off-site repository is approved.

The Subsurface Disposal Area is a 97-acre site in the western section of the RWMC. It contains an active shallow-land-burial area for the permanent disposal of solid, low-level waste. The area also contains pits and trenches, including Pit 9, where mixed transuranic and low-level waste was buried between 1954 and 1970. Much of the transuranic waste buried at the INEEL consists of contaminated clothing and equipment. This waste was shipped to the INEEL primarily from the Rocky Flats Plant near Golden, Colo. and was the product of Cold War nuclear weapons production.

The Idaho Completion Project is focused on reducing risk and completing cleanup work from past INEEL missions by 2012. The project is managed by Bechtel BWXT Idaho for the U.S. Department of Energy.

Link to complete news story and background on the INEEL website:

http://newsdesk.inel.gov/press_releases/2003/06-30Pit9demonstration.htm

Inland Northwest Research Alliance – INRA – names new President

Idaho Falls, June 24, 2003 – The Inland Northwest Research Alliance (INRA), a consortium of eight research universities in the northwestern United States, announced the election of a new president. Dr. George Dennison of the University of Montana was selected as the second president of the organization.

A unique program, INRA is a nonprofit, scientific and educational organization, which fosters collaborative research programs to educate America's future scientists and engineers. The total research and development budget for the member universities in 2003 is the equivalent of the eighth largest institution of higher education in the United States, in terms of research funding. INRA promotes research and practical applications in environmental sciences, national security and energy.

Paul Kearns, INEEL vice president and deputy Laboratory director, said, "Together, we have developed a relationship among the INRA universities and the INEEL that has produced progress for the nation through key scientific research, a pipeline of advanced educational opportunities and vibrant cooperation among our regional constituencies."

INRA is a partner with Bechtel National, Inc. and BWX Technologies in the management and operations contract of the Department of Energy's Idaho National Engineering and Environmental Laboratory.

Link to complete news story and organization's website:

<http://www.inra.org/>

INEEL Scientists Develop Bio Threat Detection Capability

Idaho Falls, June 4, 2003 – In the winter of 1996-1997, over 1,600 bison migrating from Yellowstone National Park into Montana in search of food were killed to prevent the possible spread of brucellosis to cattle ranging near the northern boundaries of the park, thus destroying Montana's brucellosis-free status.

Brucellosis is an infectious bacterial disease caused by the *Brucella* species. It is called a zoonosis because the disease can be transmitted from animals to humans, particularly cattle through contact with reproductive tissues or consumption of infected, unpasteurized milk. In animals such as cattle, bison,

elk, sheep and goats, the disease can reduce reproductivity. In humans, it is called undulant fever, Malta fever or Bang's disease, but is seldom fatal. There is no effective human vaccine.

INEEL molecular biologists Frank Roberto and Deborah Newby are developing a quick, safe, accurate method to detect the brucellosis strain, *B. abortus*, in the field. Roberto and Newby are designing a DNA-based field assay using a field-portable, real-time polymerase chain reaction (PCR) system.

PCR is a technique for copying and amplifying the complementary strands of a target deoxyribonucleic acid molecule. Using a DNA sample and primers (consisting of the four chemical components that make up genetic material), the DNA target can be duplicated millions of times. It is the sequence of the nucleotides that make any species unique, or in humans, every individual unique. The INEEL scientists developed the specific primers that began the copying process for *B. abortus*.

Bioterrorism threat. "Domestic bioterrorism is a real threat. We saw that with the anthrax scare," said Newby. "But with the exception of *Bacillus anthracis* and *Yersinia pestis* (plague), not much validated work has been done on the detection of other pathogenic threat agents."

A strain of *brucella*, *B. suis*, was the first microorganism developed in the former U.S. biological weapons program, primarily because of the ease with which it can be spread through aerosol routes of infection. *Brucella* strains remain a concern from the biological warfare and bioterrorism perspective, even though they were recently reclassified as Category B agents.

Agricultural Concern. "In our area, brucellosis is primarily an agricultural concern," said Roberto. "The current field methods for detecting the disease in bison, cattle or elk are not very accurate. It's comparable to saying you have measles because you have the antibodies. You may have had it as a child and are now immune."

Roberto and Newby can prepare the DNA from cattle, bison or elk blood samples in less than an hour and using PCR, can confirm active infection of *B. abortus* in another 45 minutes. This method, validated through culture testing, also reduces false-negative and false-positive results.

The U. S. has spent an estimated \$3.5 billion to eradicate bovine brucellosis and worldwide, it is even more of a problem.

Link to complete news story on the INEEL website:
<http://www.inel.gov/featurestories/06-03bison.shtml>
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Equipment discoveries in seismology make mapping cheaper and easier

Idaho Falls, May 28, 2003 – Two unique devices--developed at the U.S. Department of Energy's Idaho National Engineering and Environmental Laboratory (INEEL) and designed for downhole seismic surveying--are making seismic mapping easier and less expensive for seismologists, while providing improved resolution of the Earth's subsurface.

The first device is an impulsive unit that ignites a gas to create subsurface disturbances for seismic imaging. The second employs a newly designed downhole (below ground) geophone to detect subsurface motion. The technologies will support the DOE mission in national energy security.

Reloading Seismic Source. The impulsive unit assists seismologists in identifying geology where oil or natural gas might exist under the Earth's surface.

The infinitely rechargeable seismic source unit is in a cylindrical canister and is lowered subsurface (boreholes, under water, excavations, etc.). The device uses electrolysis to generate hydrogen and oxygen gases that can be ignited on command from the surface to produce a controlled explosion or "bang." The resulting impulse produces a subsurface seismic disturbance for geological surveying or imaging to support oil, gas exploration and hydrological assays. Unlike other seismic imaging sources, the INEEL device reloads itself while below the surface, thereby making it able to "re-fire" indefinitely without returning to the surface.

"This device will save time and money because a single pair of conductors can continuously reload and re-fire at any depth without removing the unit from the subsurface," said Phillip West, INEEL researcher and lead engineer on the project. "It is so simple and inexpensive that it could even be deployed for permanent installation for subsurface reservoir management."

The unit has also proven inexpensive, and easily deployed and operated. A field prototype has been tested in downhole test wells using simple power supplies and two small (24 gauge) conductors, demonstrating its viability for many applications.

New Downhole Geophone. The second development, a suite of downhole geophone modules, also is used for seismic imaging applications. Geophones detect microscopic earth motions. Current commercial models are attached mechanically, or clamped to the walls of a borehole. This takes time and increases operating costs. The new types of geophones developed by the INEEL come in either nonclamping or quick-clamp-and-release models. Both have been successfully tested in shallow wells and each provide clear image resolution similar to the standard fixed-clamped geophones.

A nonclamping version of the geophone is water coupled. This means it is specifically designed to be directionally responsive to the seismic wave transmitted through the liquid in the borehole. Therefore, it doesn't have to be clamped to the borehole casing to effectively sense seismic wave transmissions.

This completely eliminates the need for electric mechanical clamping mechanisms and power control and will significantly shorten survey time and reduce costs. The units are small, lightweight and easily deployed in long arrays of many sensors. Using this process, survey time is reduced because no clamping time is required. And the long strings of sensors offer more data with fewer survey shots.

The second innovation is a quick-clamp-and-release geophone. Once inserted into the borehole, the quick-clamp-and-release geophone is hydraulically or pneumatically clamped against the borehole casing. This allows for quick extension and retraction within seconds, eliminating long clamp-up times and facilitating quick, efficient surveys.

Neither type of geophones use electric motors or clamping arms. They are less than 12 inches long, which makes them easier to deploy, and they promise to be lower in cost than traditional clamping geophones. The INEEL is seeking a partnership with a manufacturer for the regenerative seismic source and geophone modules in order to develop and test full-production-capable units.

Link to complete news story on the INEEL website:

http://newsdesk.inel.gov/press_releases/2003/05-28downhole_seismic_equipment.htm

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INEEL sends 17 Idaho teachers to learn JASON curriculum

Idaho Falls, June 16, 2003 – The U.S. Department of Energy's Idaho National Engineering and Environmental Laboratory, through grants from the Office of Naval Research, will send 17 teachers from Idaho to attend the National Educators Conference in Milwaukee, Wis., June 16-20.

The conference, which will be co-hosted by the JASON Foundation (jasonproject.org) for Education and the University of Wisconsin-Milwaukee, will feature training on the JASON Project's multimedia curriculum, and using it to support teaching and learning needs.

This year's group brings the total to 37 Idaho teachers who have received the JASON curriculum training. The curriculum has been aligned to meet Idaho education standards.

Robert Ballard started the JASON Foundation and the JASON Project in 1989 after receiving thousands of letters from schoolchildren wanting to know how he discovered the RMS Titanic. In October 2001, Ballard, the Office of Naval Research and the INEEL presented the JASON Project curriculum to Idaho Gov.

Dirk Kempthorne on behalf of the educators of Idaho.

Highlights of the conference will include presentations by world-class researchers and scientists; hands-on workshops; and technology labs designed to introduce and train educators to teach an integrated approach to life sciences, physical sciences, earth sciences, math and technology, geography, history and culture.

Earlier this year, more than 7,000 Idaho middle and junior high school students participated via satellite in JASON XIV: From Shore to Sea, a hands-on scientific experience broadcast from Alaska, to learn about the mysteries of the frozen world. Overall, the Idaho JASON Project attracted 20,000 Idaho students in a yearlong science program designed to bring the thrill of discovery to the classroom.

Complete news story, including teachers and their areas, are on INEEL website: http://newsdesk.inel.gov/press_releases/2003/06-16educator's_conference.htm
Story contact: Steve Zollinger, 208-526-9590, gaz@inel.gov

Scientist says energy use requires new technologies, approaches

Idaho Falls, June 12, 2003 – Speaking about 'Technologies That Fit a Different Future,' aviation pioneer **Paul B. MacCready** warned an audience of about 400 people at the INEEL Seminar Series that new technologies and lifestyles that use less energy must be employed. He said, the dominance of human activities and man's ever-increasing need for energy will cause difficult times during the next 100 years.

"Fossil fuel production will peak about 2010," MacCready said. "As production declines and energy prices increase, technologies that use less energy will become more important." In particular, he touted the use of today's highly efficient batteries in producing new all-electric cars, and the use of electric-assisted bicycles to enable mankind to stretch its resources farther.

MacCready's visit was part of the INEEL Seminar Series, in which nationally known scientists, engineers and other experts share their successes and ideas with the Laboratory's employees. This idea-sharing promotes scientific interaction and collaboration in support of the U.S. Department of Energy's four missions of energy security, national security, environmental quality and scientific research.

MacCready, who has degrees from Yale and Caltech, is a champion glider pilot and noted explorer of new horizons in aviation, energy conservation and the environment. Earlier in the day, he met with five Idaho Falls junior high school students to answer their science and aviation career questions.

In 1977 and 1979, MacCready's human-powered Gossamer Condor and Albatross won two prizes offered by British industrialist Henry Kremer. In 1981,

his Solar Challenger carried a pilot 163 miles from Paris to England, powered solely by sunbeams. He also has received the 1979 Collier Trophy, the 1980 Ingenieur of the Century Gold Medal, the 1982 Lindbergh Award, the 1987 Guggenheim Medal, the 2002 Aerospace Award and the 2003 Heinz Award for Technology, the Economy and Employment.

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