

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

Welcome! This is the latest edition of the **INEEL News Wire**, which delivers news about key issues and current advances in both research and technology at the multi-program Department of Energy's Idaho National Engineering and Environmental Laboratory (INEEL), located in Idaho Falls, Idaho and operated by Bechtel BWXT Idaho for the U.S. Department of Energy.

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Content of July 30, 2004, INEEL News Wire:

July 30, 2004 – INEEL teams win two R&D 100 Awards

Idaho Falls, ID, July 30, 2004 - **INEEL teams win two R&D 100 Awards**

For the eighth consecutive year, Idaho National Engineering and Environmental Laboratory (INEEL) teams have earned selection among the top 100 new technologies in the world by R&D Magazine. The two winning teams for 2004 include 11 INEEL members working in extremophilic microbe research and environmental monitoring technology.

Principal developer Vicki Thompson, William Apel and Kastli Schaller won for "Ultrastable Catalase Enzyme from Yellowstone Bacteria." It's an enzyme that catalyzes (starts a chemical reaction) the decomposition of hydrogen peroxide into oxygen and water at high temperature and pH.

Project team leader Richard L. Jones, along with team members Tom Clark, Joel Hubbell, Buck Sisson, Jason Casper, Terry Turner, Louis Valenti and Andrew Baumer, were chosen for the INEEL Geologic and Environmental Probe System. Called GEOPS, this new multifunction probe system safely characterizes and monitors conditions within or below suspected contaminated sites.

Enzyme

"We are honored and thrilled to have been chosen for such a prestigious award and we look forward to representing the INEEL at the R&D 100 awards banquet this October in Chicago," Thompson said.

From a unique microbe (*Thermus brockianus*) found in a hot spring pool in Yellowstone National Park, this catalase enzyme (one of a class of enzymes that

breaks down hydrogen peroxide) may make a major impact on various U.S. industries by enabling conversion to environmentally safe, cost-effective hydrogen peroxide processes as an oxidizing and antimicrobial agent.

In the textile and pulp and paper industries, hydrogen peroxide increasingly is used as an alternative to toxic, carcinogenic chlorine bleaching. In the food industry, hydrogen peroxide's antimicrobial properties are used for pasteurization of egg and dairy products, sterilization of beverage packages, and for surface disinfection of fruits and vegetables.

Thompson presented initial research results at the American Society of Microbiologists annual meeting in Washington, DC on May 20, 2003, and published a paper in the summer 2003 edition of *Biotechnology Progress*.

"High-temperature stability makes this enzyme potentially viable and economically attractive for industrial applications," said biologist William Apel. "This new catalase is stable for days where the typical performance limit under high temperature conditions for many currently marketed catalases is only minutes to hours."

GEOPS

"Earning the R&D 100 award certainly should assist us in offering our technology to characterize suspected contaminated sites throughout America and the world," Jones said. "GEOPS showcases how science and engineering collaboration can solve difficult environmental problems."

GEOPS is a breakthrough technology that for the first time allows direct characterization and monitoring within or below hazardous waste sites. Instead of relying on drilling or coring, a GEOPS probe is pushed into the ground like a needle into a pincushion.

The probe's robust, sleek steel design easily penetrates compacted overburden (soil), metal drums and other debris to depths of up to 100 meters without producing surface contamination or changing the characteristics of the waste to be sampled. The unique design assures a complete seal from any subsurface contamination during placement and operation.

GEOPS can accommodate multiple measurements, including a suction lysimeter or vapor port for use if soil moisture or vapor collection data is desired; a tensiometer to determine how tightly water is held by unsaturated soils; a soil sample retriever; and a geophone to measure ground motion velocities. This versatility offers significant cost reductions and installation advantages over current technologies, resulting in low continual operating costs. That is because GEOPS avoids waste disposal, reduces handling costs, and eliminates repetitive drilling in order to make other measurements.

The faster, cheaper and multi-function qualities also are complemented by improved safety, because it avoids the spread of hazardous or radioactive contaminants to the environment and offers a much safer working situation for people. GEOPS is valuable in monitoring and sampling any targeted subsurface area, especially abandoned and active landfills, mining areas, farms, airports and many more sites.

More information is available on both technologies at www.inel.gov.

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VIDEO REPORTS: Visit our Web site at <http://www.inel.gov> for video reports on these two technologies.

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