

# NEWSLINK

FEDERAL LABORATORY CONSORTIUM FOR TECHNOLOGY TRANSFER

OCTOBER 2001 VOL. 17, NO. 9

## INEEL Programs Manage Nuclear Fuel

What happens to Department of Energy (DOE) managed nuclear fuel after it is no longer of use? Who is responsible for this spent fuel, and where does it go? And, whatever happened to the damaged fuel from the Three Mile Island (TMI) accident in 1979?

Idaho National Engineering and Environmental Laboratory (INEEL) operates two DOE-sponsored programs that provide the answers to these questions—the National Spent Nuclear Fuel Program (NSNFP) and the INEEL Spent Nuclear Fuel Program. Each program is dedicated to the safe storage and ultimate disposal of DOE spent nuclear fuel (irradiated fuel that has not been reprocessed), and each fulfills different objectives to meet that mission.

Addressing nationwide DOE issues, the NSNFP provides technology solutions and guidance to coordinate and manage the complex disposal process at DOE spent nuclear fuel operating sites. The program also supports the DOE's repository program by performing analyses and research regarding the final disposal of all DOE spent nuclear fuel.

The INEEL Spent Nuclear Fuel Program manages spent nuclear fuel operations and ensures safe storage at INEEL and at the Nuclear Regulatory Commission's (NRC) licensed independent spent fuel storage installation at Fort St. Vrain, Colo. INEEL has an active spent fuel management program that includes the storage, drying, and transportation of spent fuel.

### Stewards of TMI Fuel

Since the TMI accident, the INEEL Spent Nuclear Fuel Program has played a lead role in accident analysis and



Trailer carrying a shipping cask from Three Mile Island is carefully aligned to push the shielded canister into a spent fuel storage module at INEEL's spent fuel storage installation.

recovery, and core debris retrieval, transport, and safe storage. After six years of complex planning and work, INEEL safely transferred TMI's extensively damaged Unit 2 core debris from wet pools to safe, dry, NRC-licensed horizontal storage modules at Idaho Nuclear Technology and Engineering Center, thereby meeting the DOE's commitment to Idaho. During the lengthy transfer process—which took less time than expected—342 canisters of core debris were successfully removed from wet storage, dried, prepared for shipping, loaded, transported, and inserted into the storage modules for final disposal outside Idaho.

The NSNFP has two main objectives: research and development (R&D), and national leadership, which involves decisions regarding temporary storage and final disposal of the fuel. NSNFP's R&D program is developing a standardized canister in which to package all DOE spent nuclear fuel. Designed to handle more than 250 types of spent nuclear fuel, each canister measures 15 or 20 feet long and 18 or 24

## Remediation Technology Spins Off to Success

An American dream that originated a few years ago at INEEL is a reality today at **North Wind Environmental, Inc. (NWE)** of Idaho Falls. A new bioremediation process invented by INEEL scientists cleans chlorinated solvents in contaminated groundwater. Large-scale tests and evaluations have proven that this process provides great efficiency and benefits. The technology has been spun off into a business that has garnered nearly \$3 million in projects in only two months.

At INEEL's Test Area North, scientists attempted to restore an aquifer that had been contaminated by a two-mile-long plume of organic sludge (trichloroethene, or TCE) wastewater that had been injected into the aquifer over a period of 15 years. A standard bioremediation process replaced the usual pump-and-treat method, but it was only after sodium lactate was added to stimulate bacteria that the tests demonstrated dramatic enhancement of the biodegradation of TCE. The new process also speeds up TCE dissolution and should cut the time needed to eliminate the source. Now an established EPA/Idaho-approved process, the new bioremediation treatment (applied in the source area) is being used in conjunction with natural attenuation of most of the dissolved plume. This two-pronged attack is expected to save \$23 million at the Test Area North facility.

### Best B.E.T.

"It's been really exciting!" said **Kent Sorenson**, NWE Director for

Please see **NUCLEAR**, p. 2

Please see **REMEDIATION**, p. 2



## FED LABS FLASH

*Technology transfer news, notes, and events within the federal lab community*

### September 11...

FLC DOD Agency Representative **Cynthia Gonsalves** remembers where she was during the terrorist attack on the Pentagon September 11.

"I was on the road next to the Pentagon when the plane hit," she wrote in an e-mail sent to another FLC member. "I never saw the plane, but heard and felt the explosion. I was protected from the flames and smoke by the overpass (I was at the south parking exit). Everyone in my office is safe."

### Environmental Leaders Discuss Energy Efficiency on Capitol Hill

**Will Kirksey**, Senior Fellow of CERF/IEEC, was recently invited to Washington to discuss the remarkable growth and innovation occurring in the areas of green technology and energy efficiency with political leaders in the environmental and energy technology fields. The discussion was intended to provide the Senate with current information and a range of perspectives as it considers these controversial issues.

Kirksey suggested that a paradigm shift within the design and construction industry is necessary to

meet the demands of the 21st century for both economic competitiveness and quality of life. "The industry must rethink the infrastructure from the ground up, as this determines how energy is produced and consumed, and the resultant environmental impact of human action," he said.

Copies of Kirksey's discussion can be obtained by sending an e-mail with your name and address to [press@cerf.org](mailto:press@cerf.org).

**For more info:** Will Kirksey, 202-785-6420, [wkirksey@cerf.org](mailto:wkirksey@cerf.org)

### FLC Elections Upcoming

FLC regional elections are being held in the Far West, Mid-Atlantic, and Northeast regions. The new officers will begin their terms January 1, 2002.

Anyone interested in running for Regional Coordinator or Deputy Regional Coordinator, please contact the current Regional Coordinator listed below or the FLC Management Support Office.

**For more info:** Julie Chambliss- FLC-MSO, [jchambliss@utrsmail.com](mailto:jchambliss@utrsmail.com); Mike Sullivan- Far West Region, [sullivanme@navair.navy.mil](mailto:sullivanme@navair.navy.mil); Rich Dimmick- Mid Atlantic Region, [dimmick@arl.army.mil](mailto:dimmick@arl.army.mil); Dorry Tooker- Northeast Region, [dorry4678@aol.com](mailto:dorry4678@aol.com)

## NUCLEAR from p. 1

inches in diameter so as to fit inside a transportation cask. The newly developed canister passed the NRC's rigorous 30-foot drop test by maintaining its integrity and not leaking. When filled, the canisters will be permanently welded shut and stored until a repository is available.

In collaboration with DOE labs and universities, NSNFP also develops materials and other cost-effective technology solutions and information on managing spent nuclear fuel.

### Non-DOE Customers

NSNFP also addresses similar spent fuel management issues of non-DOE lab customers, such as Atomic Energy of Canada, Ltd. Program experts identify the key issues and then act as a broker—matching problem solvers with customers for spent nuclear fuel projects. Explained Sheryl Morton, Advisory Engineer, "We know the capabilities and resources of the DOE complex and can apply those special capabilities to the needs of the customers," as well as provide technical guidance. INEEL heads up the project and collaborates as needed with other labs, such as Pacific Northwest National Laboratory and Argonne National Laboratory, each of which offers its unique expertise to solve customers' spent fuel management process needs.

**For more info:** Sheryl Morton, 208-526-8247, [slm@inel.gov](mailto:slm@inel.gov); [www.inel.gov/major-programs/national-focus.shtml](http://www.inel.gov/major-programs/national-focus.shtml)

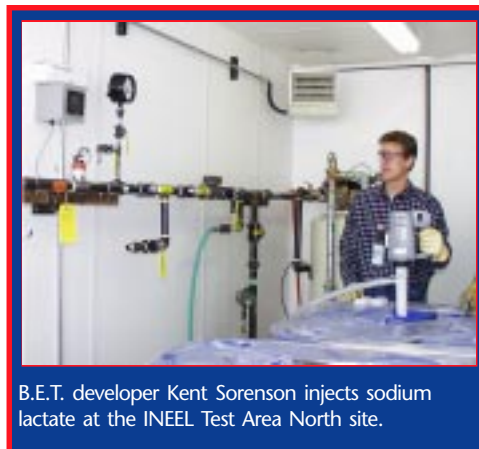
## REMEDATION from p. 1

Applied Research and former INEEL lead scientist on the remediation project. Encouraged by the development of and interest in the technology, he said, "One of its greatest benefits is that it helps nature do what it wants to do anyway." The Bio-

availability Enhancement Technology—B.E.T. is its commercial name—is also cheaper than many conventional treatment methods, does not use hazardous materials, and is done

underground, so there are no secondary wastestreams. In addition, Sorenson said, it's low maintenance—"You just inject lactate every couple of months and let it do its thing."

A patent on the technology was filed in June 2001 and is currently pending. A newly formed company, SRP



B.E.T. developer Kent Sorenson injects sodium lactate at the INEEL Test Area North site.

### **Nash Wins 2001 CERF Award for Industry Advancement**

The Civil Engineering Research Foundation (CERF), an affiliate of the American Society of Civil Engineers, recently announced that **RADM David J. Nash, CEC, USN (Ret.)** is the winner of the 2001 Henry L. Michel Award for Industry Advancement of Research.

RADM Nash is presently program director of the Southeast Michigan Program at the Warren Technical Center Campus of **General Motors Corporation**, where he is leading the Parsons Brinckerhoff team that is assisting General Motors in managing 22 new construction and renovation projects—including the complete renovation of the \$2.2 million GSF Vehicle Engineering Center and rehabilitation of the \$1 million GSF Powertrain Facility.

CERF established the award in 1996 in honor of the late Henry L. Michel, past CERF chairman and chairman emeritus of Parsons Brinckerhoff, Inc. The award recognizes leaders in the design and construction industries whose dedication and vision for CERF and the industry have provided the cornerstones for improving the quality of life around the world through design and construction research.

### **Argonne Named to DOE "100 Best" List**

Four **Argonne National Laboratory (ANL)** accomplishments are among the 100 best scientific and technological accomplishments of the **Department of Energy** during the 20th century. The DOE developed the list to "demonstrate [its] commitment to save consumers money and improve [their] quality of life."

The four ANL technologies include the development of the 308-nm excimer laser for surgery and other medical applications, the development of green solvents, the decontamination and decommissioning of Chicago Pile 5, and the process to recover and clean flexible polyurethane foam from automobile shredder residue.

ANL's green solvents technology was also chosen for an Energy@23 award and a Bright Light award.

The Energy@23 awards — the name recognizes that the DOE is 23 years old — were chosen by a panel of citizen judges "for their top-flight contribution to American consumers." The Bright Light awards are based on the same criteria, but specifically honor five of DOE's "most recent consumer-oriented innovations ... hatched between 1999 and 2000."

For more info: [www.ma.doe.gov/energy100/list.html](http://www.ma.doe.gov/energy100/list.html) **NJL**

**\*\*\* UPDATE YOUR BOOKMARKS to [www.federallabs.org](http://www.federallabs.org) \*\*\***

Technologies Inc., has licensed the technology and will manage the intellectual property and licenses. Sorenson and the two other scientists who worked on the technology at INEEL are the principals of SRP. JRW Technologies, Inc. supplies the lactate, and any consulting company with the specific expertise to employ the process can simply purchase the required materials from JRW.

### **Bright Future**

Taking on the fledgling process was a natural transition for NWE, an established minority-owned environmental services firm. NWE provided the infrastructure, which minimized the startup costs. In return, the INEEL spinoff brings new technologies and talented staff to NWE. After licensing the technology, NWE set up its Remediation Technologies (RT) Division, which in turn will create new jobs in the groundwater remediation industry.

The future looks bright for the RT Division; large potential military and private industry markets exist. Manufacturers that have used chlorinated solvents often will have problems with groundwater contamination and are therefore potential candidates for B.E.T. NWE's RT Division will continue to develop the technology and look for ways to optimize, improve, find new applications, and then apply them commercially.

In addition, Sorenson added, "An important goal is to maintain a relationship with INEEL for further research and collaboration." **NJL**



## **T2 on the Web**

### **The National Alliance of Clean Energy Business Incubators**

<http://www.nrel.gov/technologytransfer/entrepreneurs/inc.html#all>

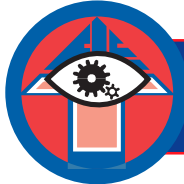
The National Alliance of Clean Energy Business Incubators, established in 2000 by the **National Renewable Energy Laboratory (NREL)**, is an alliance of leading business incubators dedicated to providing business and financial services tailored to the needs of the clean energy community.

Business incubators accelerate the growth and success of entrepreneurial companies through an array of business support resources. Access to advice from leaders in the energy community, in-house consulting, strategy reviews, financing referrals, introductions to potential partners, and marketing and public relations aid are only a few of the provided services.

The Alliance is committed to strengthening its network and welcomes new energy companies, venture firms, angel investors, nonprofits, government organizations, and others committed to supporting the clean energy industry.

The Alliance is ready to support a broad portfolio of clean energy technologies including, but not limited to renewables, microturbines, fuel cells, power quality, energy efficiency, alternative fuels, transportation, and energy-related e-commerce and information technologies.

For more info: **Dr. L. Marty Murphy, 303-275-3050, [lawrence\\_murphy@nrel.gov](mailto:lawrence_murphy@nrel.gov)**



## TECHNOLOGY WATCH

*Federal laboratory technologies available for technology transfer*



### **AUTOMOTIVE** **Soy-Based Car Parts a Distinct Possibility**

The Agricultural Research Service (ARS) reports that soybean oil can replace the lion's share of petroleum-based resin used in automotive parts manufacturing. Using soybean oil, scientists at the ARS's National Center for Agricultural Utilization Research (NCAUR) and the University of Arizona (UA) have developed polymer slurries to form the molds traditionally used in forming auto body parts for cars and trucks. The slurries are guided by new computer technologies to form shapes without molds.

This technology, called solid freeform fabrication (SFF), creates parts and other shapes without molds by the repetitive addition of thin layers, controlled by a computer-driven

program. The computer program traces a series of lines to make a layer. Successive layers build up into a solid part.

U.S. farmers produce more than 12 billion pounds of soybean oil annually, and surplus oil frequently exceeds one billion pounds. Yet only 300 million pounds of soybean oil are used in industrial applications. Substituting biodegradable soybean oil for petroleum-derived resins can make SFF environmentally attractive to industry, and the result will be an overall increased demand for soybeans.

**For more info:** <http://www.ars.usda.gov/is/AR/archive/aug01/oil0801.htm>



A soy-based polymer slurry being tested by chemist Sevim Erhan can be used with or without molds to make small toys or manufacturing parts.



### **AGRICULTURE** **New Tanning Process Good for Industry and the Environment**

A technique developed more than 10 years ago—and only now successfully engineered—removes hair from cattle hides immediately after slaughter. This spells good news for tanneries, which now have the potential to reduce bacterial contamination of meat in a protocol that is friendlier to the environment than conventional methods.

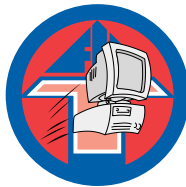
Animals enter the slaughterhouse with many microorganisms on their hides, some of which are pathogenic to humans.

One reason this de-hairing process hasn't been adopted is the projected high cost of waste treatment associated with it. Recent improvements developed by researchers at the ARS Eastern Regional Research Center, Wyndmoor, Pa., in collaboration with Future Beef Operations, LLC, a start-up beef-processing company, permit recycling of sulfide, recovery of the removed hair, and an overall reduction in the impact of the process on the environment.

This patented method starts with spraying a solution of sodium sulfide onto the carcass hide. The substance breaks protein bonds within hair fibers so they can be removed. A sulfide-neutralizing agent is then applied to complete the process.

The tanning industry benefits immensely, allowing the packer to remove the bulk of the hair, split the hide, and send the top (grain) layer for tanning and the rest (corium) for other uses. This saves time and expense compared to the traditional handling of the entire hide. It also permits early-stage inspection of the hide's grain layer, reducing shipments of low-quality hides to tanners.

**For more info:** <http://www.arserrc.gov/www/>



### **COMPUTERS** **Museum Visitors Like Virtual Reality Dig**

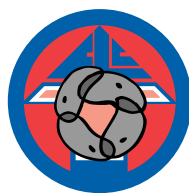
"Don't touch" is the usual sign found near priceless artifacts displayed at museums. But this summer, visitors to the Seattle Art Museum were encouraged to interact with objects found in a Chinese sacrificial burial plot via a new technology called the Virtual Reality Dig developed by Pacific Northwest National Laboratory (PNNL) and the University of Washington's Human Interface Technology Laboratory (HIT Lab).

The system uses a PNNL-developed gesture-recognition hardware and software immersive environment called the Human

Information Workspace, or HI-SPACE, that allows visitors to explore an archeological site by virtually "brushing" away or "digging" through dirt to find artifacts. Once artifacts are exposed, the HIT Lab's Augmented Reality Toolkit projects them onto a screen where visitors interact with them.

Industry could use this technology for human-computer interaction and collaboration, such as national security, city planning, education, and entertainment. The dig was on display until August 12.

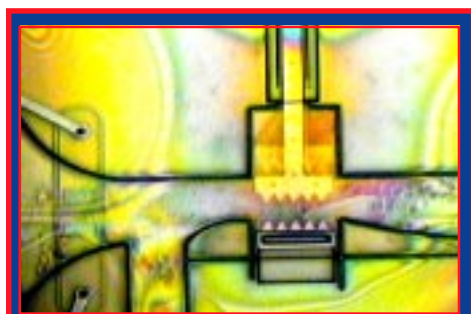
**For more info:** [pnl.media.relations@pnl.gov](mailto:pnl.media.relations@pnl.gov), 509-375-3776



**BIOTECHNOLOGY**  
**Pac-Man-Like**  
**Microstructure**  
**Interacts with Red**  
**Blood Cells**

Silicon microteeth that open and close like jaws—in a microchannel about one-third the width of a human hair—have been developed at **Sandia National Laboratories**.

When the jaws close, they trap one of many red blood cells pumped through the microchannel. The jaws, which open and close very rapidly—



Sandia's microteeth bite in a channel that is 20 microns wide. A human hair is approximately 70 microns. (The little balls in the horizontal channel are red blood cells.)

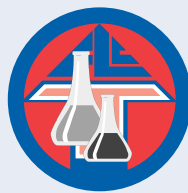
like computer game hero Pac-Man—deform captured cells and quickly release them. The blood cells travel on, regain their former shape and appear unharmed.

The goal of this technology is to puncture cells and inject them with DNA, proteins, or pharmaceuticals to counter biological or chemical attacks, gene imbalances, and natural bacterial or viral invasions. The devices can be mass-produced easily and cheaply using computer-chip production techniques.

The punctured cells could be stem cells, or cells able to change with suitable direction—possibly by gene implantation—into many tissues in the human body.

The prototype, patent-pending devices offer the possibility of considerable mechanical intervention at the cellular level because they operate rapidly and are so small that many units could operate in parallel in a relatively compact volume.

**For more info:** Jay Jakubczak, 505-844-9196, jayj@sandia.gov



**CHEMICAL ENGINEERING**  
**Surface Analyzer**  
**Detects Chemical**  
**Warfare Agents**

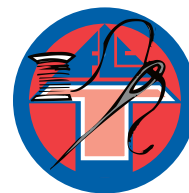
It is now possible to detect more quickly the minute residues of chemical warfare agents adhering to solid surfaces using a novel mass analyzer. Trace amounts of chemical warfare agents can be isolated within the instrument and broken apart for chemical identification.

Researchers at the **Department of Energy's (DOE) Idaho National Engineering and Environmental Laboratory (INEEL)** can detect part-per-million levels of chemical warfare agents—such as the blister agent HD or the nerve agent VX—using a novel ion-trap secondary ion mass spectrometer (IT-SIMS).

INEEL researchers are developing surface analysis instrumentation for environmental samples such as soil or plant surfaces. Using IT-SIMS, researchers bombard the surface of a sample with a polyatomic projectile to lift or “sputter” off molecules adhering to the sample surface. These molecules—secondary ions—retain the chemical characteristics of the chemical warfare agent stuck to the soil surface. The secondary ions are filtered by mass and counted. The data are displayed as a spectra (a bar graph that plots the number of ions versus their mass) that researchers then use to identify the chemicals.

IT-SIMS is applicable in chemical weapon agent detection because such chemicals are designed to be both adsorptive and persistent—to stick to any and all surfaces and to stay there. Using IT-SIMS, researchers can collect large numbers of intact ions from the sample surface and accurately identify the chemical substances. They also can analyze samples as small as 3 to 4 mg with minimal sample preparation on the order of 5 minutes.

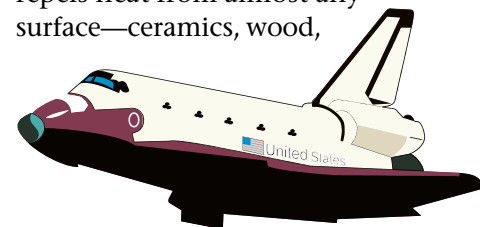
**For more info:** Garold Gresham, 208-526-6684, vrn@inel.gov



**MATERIALS**  
**Hot NASA Space**  
**Research Yields**  
**Cool Benefits**

A paper-thin coating of an innovative NASA material that prevents space vehicles from burning up during planetary re-entry may soon be available to protect your house, car, and boat from fire.

Invented at NASA's **Ames Research Center** as protection for spacecraft heat shields against fiery conditions during re-entry, Protective Ceramic Coating (PCC) repels heat from almost any surface—ceramics, wood,

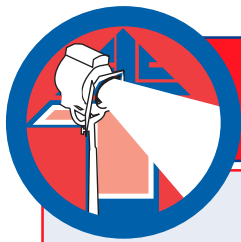


steel, plastics and fiberglass. **Wessex, Inc.**, based in Blacksburg, Va., has licensed the coating from Ames and will continue to develop and market it.

The material's ceramic components exhibit high emissivity, which means the material tends to radiate heat. This allows the protective coating to reflect heat away from the covering surface, thereby increasing the capability of materials to withstand temperature levels far beyond their normal range—from -250°F to 3,000 °F—without damage. Because the coating helps the material repel heat from its surface, the amount of heat that can be transferred to the underlying insulation is thereby decreased.

Able to provide heat protection for car and boat engines and various building materials, the PCC product is readily manufactured and easily applied to a variety of surfaces.

**For more info:** Victoria Kushnir, 650-604-0176, <http://ctoserver.arc.nasa.gov>



## SPOTLIGHT ON SUCCESS

Success stories from the federal lab community

# ZECA Pushes LANL Lean Coal-Based Power Generating Technology

**G**ood news for the future of coal, North America's most abundant and economic fossil fuel resource! Research by the **Zero Emission Coal Alliance (ZECA)** demonstrates the possibility of at least doubling the net efficiency of coal-based power generation, while producing a stream of relatively pure CO<sub>2</sub>, which can be permanently and safely sequestered.

**Los Alamos National Laboratory (LANL)** has applied for patents on a process that produces hydrogen from coal and water. Built on CONSOL's successful CO<sub>2</sub> Acceptor Process (from the 1970s), while relying on the cycling of calcium oxide (CaO) to drive the production of hydrogen, LANL's process significantly adds to and enhances the technology to produce separate streams of hydrogen and CO<sub>2</sub>. The hydrogen generates emission-free electricity, and the CO<sub>2</sub> reacts with abundant magnesium silicates to be permanently sequestered as a solid, inert, and stable mineral carbonate.

Generating electricity from coal for only an additional 1¢/kWh, this method compares favorably with other current generation/sequestration situations—and with no emissions.

To form ZECA, 17 entities from the U.S. and Canada with interests in coal production and using coal for electrical generation are contributing \$50,000 each. The alliance plans to pilot the process within 5 years in order to commercialize.

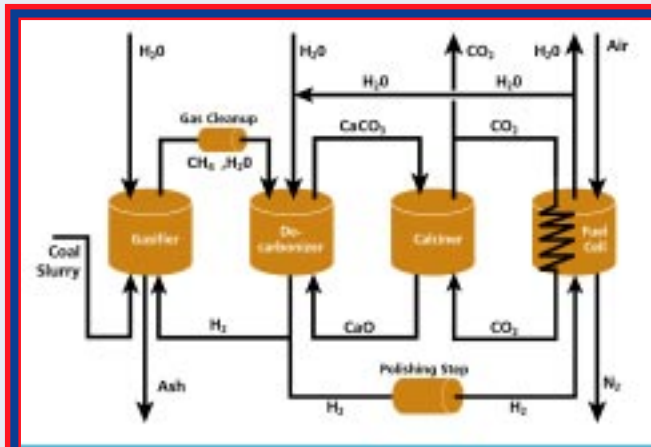
The technology fits in with DOE Clean Coal Technology programs.

ZECA is led by LANL's technology team and a business team headed by the president of the Coal Association of Canada. Funds for Phase I will allow ZECA to develop the comprehensive business and technical plans required to build the pilot plant. Third-party consultants will work closely with the management teams.

ZECA welcomes additional participants to ensure broad industry expertise and to guide technology development. The ZECA concept—coal-based

power with zero emissions—is an attractive technology for addressing perceived greenhouse gas problems. It is also potentially applicable to other processes where hydrogen could be used as a reductant or clean energy source, and could be especially useful for other mining-related activities such as smelting and refining.

For more info: J. Susan Sprake, 505-665-3613, [sprake@lanl.gov](mailto:sprake@lanl.gov) 



The LANL process produces separate streams of hydrogen and CO<sub>2</sub>. The hydrogen is used to generate emissions-free electricity, and the CO<sub>2</sub> is permanently sequestered as a solid, inert, and stable mineral carbonate.

## NewsLinkONLINE to debut January 2002

### Paper Version of NewsLink to Be Discontinued

The next issue of *NewsLink*, dated November/December 2001, will be its last hard-copy edition. However, *NewsLink* will continue to be published—as *NewsLinkONLINE*, a new and improved electronic newsletter.

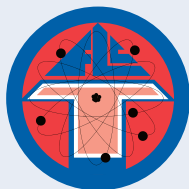
Debating with the January 2002 edition, *original NewsLink* subscribers will be e-mailed a postcard link that will take them directly to the latest *NewsLinkONLINE* issue.

Why the change? With the introduction of *NewsLinkONLINE*, we will be able to publish a newsletter in FULL COLOR and expand the number of pages per issue. This means more news, more announcements, and more technologies available for transfer. To do this with a printed version would have required a subscription fee—something we didn't want to have to institute.

#### So what's required of you?

Well, obviously we'll need your e-mail address. Simply send an e-mail to [flnews@utrsmail.com](mailto:flnews@utrsmail.com), with "Subscribe ONLINE" in the subject line. You'll receive a confirmation from our editors, and the premier edition of *NewsLinkONLINE* will be on its way beginning in January.

And of course, the larger edition means more opportunity to share your own news and technologies. Lab news, success stories, T2 web sites and, of course, technologies available for transfer. Send them all to the same address as above, [flnews@utrsmail.com](mailto:flnews@utrsmail.com).



**ENERGY**  
**Water Power**  
**Dripping with**  
**Possibilities**

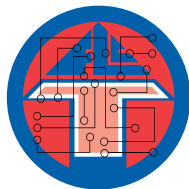
Catching a wave is one thing, actually harnessing one and making it useful is quite another. But, that's exactly what engineers at **Ocean Power Technologies (OPT)** in New Jersey are doing, with Small Business Innovation Research (SBIR) funding from the **Office of Naval Research**.

Water wheels turned by ocean waves were in place along the coast of England as early as the 12th century. But it never worked well, and recent attempts to harness the power of the sea have involved turbines, large monolithic structures and complex mechanical parts that tend to corrode over time. OPT had a better idea—two of them as a matter of fact.

The first uses piezoelectric polymers (plastics that generate electricity when bent or strained by external forces such as fluctuating water currents, for instance) by hanging bits of the material—like artificial eels—in the ocean. When placed in a current of water, the strip flexes and flaps like a pennant, thereby producing enough current to trickle charge a battery or power a sensor—about a watt per square meter.

OPT's other ocean wave power initiative involves a simple ocean buoy with an internal piston-type device, which rides up and down on the motion of the ocean waves. Connected to a cable running to shore, each buoy can generate about 20 kilowatts of power, enough to turn on the lights in up to 20 houses. OPT is in the process of developing buoys of 100-kilowatt capacity. Buoys are planned soon for Hawaii and will be operating in Australia by late summer 2001, with more proposed for the West Coast of the U.S. in the future. By grouping many buoys, OPT plans to make 1- to 100-kilowatt systems for small coastal communities and offshore oil rigs. Multimegawatt systems are on the horizon.

**For more info:** Gail Cleere, 703-696-4987, cleereg@onr.navy.mil



**ELECTRONICS**  
**New Crawler**  
**Moves Forward,**  
**Backward, Up**  
**and Down**

Engineers at **Westinghouse Savannah River Company (WSRC)** have invented a new pipe crawler designed to move through 3- to 4-inch-diameter pipes for longer distances and carrying more weight than existing crawlers.



WSRC's new pipe crawler moves horizontally and vertically, navigates 90-degree bends, and is nonscratching and nonsparking.

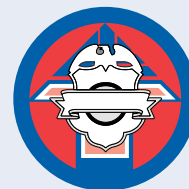
Compact and flexible, the new crawler moves horizontally and vertically and navigates 90-degree bends. An attached mini-camera transmits video images for remote inspection. Small tooling can be attached for a variety of applications.

The new crawler comprises three connected units: a front gripping unit, a center drive unit, and a rear gripping unit. Airflow in and out of air cylinders within each unit activates pistons that engage and disengage gripping feet and move the crawler forward and backward through the pipe. The automatic operation of valves that control airflow and pressure enables the crawler to move rapidly through the pipe.

The gripping feet provide a strong hold on the inner pipe surface, enabling the crawler to pull cables associated with cameras and instruments through the lengths and bends of piping systems.

A mini-camera, surrounded by LEDs, attached to the front of the crawler provides visual images of the inside of the pipe. A similar camera assembly also may be attached to the rear of the crawler. The camera and LEDs are sealed, enabling the crawler to operate in liquid-filled pipes. Sensors and special-purpose tools, such as a tool to grab objects, also may be attached.

**For more info:** Dale K. Haas, 803-725-4185 or 800-228-3843, dale.haas@srs.gov



**LAW ENFORCEMENT**  
**AFRL Says**  
**"Cheese" to**  
**Protect Images**

A new digital watermarking camera is able to protect copyrighted images in the virtual world. The result of the **Air Force Research Laboratory (AFRL) Information Directorate's** Dual Use Science and Technology effort with the **Eastman Kodak Company** (Rochester, N.Y.) and the **State University of New York at Binghamton**, this camera, now in prototype, can embed usable information in invisible watermarks, such as source and content authentication or the image's photographer, camera, location or date.

Copying, which may violate copyright and other laws, is widespread, especially on the Internet. Watermarking helps eliminate this problem and provides hidden, value-added information. No longer will copyright violators have unchecked use of images, and the military will be able to detect any image tampering and trace ownership and distribution activities.

This technology offers wide-ranging benefits to the military and civilian sectors, e.g., verifying image integrity, embedding a photographer's and/or a camera's signature, automating image dissemination and distribution, and enabling covert communication. Watermarked postage stamps and identification cards have been demonstrated; and there is the potential for driver's licenses that are quickly machine-read and verified, as well as authenticated, unaltered images taken at a crime scene that can be shown in the courtroom.

This technology also has the potential to unmask hidden data that could carry a computer virus or to mask critical information changes in a system without the user's knowledge. Illegal information or a malicious code, for example, can be embedded in an innocent dog or family photos.

**For more info:** Francis L. Crumb, 315-330-3053; crumbf@rl.af.mil

950 North Kings Highway  
Suite 208  
Cherry Hill, NJ 08034

NEWSLINK is published eight times per year by the Federal Laboratory Consortium for Technology Transfer (FLC) and the FLC Marketing and Public Relations Committee. Opinions or views expressed in NEWSLINK are those of the contributors and do not necessarily reflect those of the FLC, its officers, or its representatives.

PRSR STD  
U.S. POSTAGE  
PAID  
PERMIT #117  
SOUTHEASTERN PA  
19399

\*\*\* UPDATE YOUR BOOKMARKS \*\*\*  
www.federallabs.org

Send articles or address changes to:

NEWSLINK  
FLC Management Support Office  
950 North Kings Highway  
Suite 208  
Cherry Hill, NJ 08034  
Phone: 856-667-7727 Fax: 856-667-8009  
e-mail: flcnews@utrsmail.com  
FLC web site: www.federallabs.org

Next month's focus issue is:  
Information Technologies.

Address change? Want to be deleted from our mailing list?  
Send an e-mail to flcmso@utrsmail.com.



## COMING ATTRACTIONS

**October 24-26, 2001**

**2001 Environmental Technology Conference  
Atlanta, GA**

ETE connects buyers and sellers in the environmental management, equipment upgrade, and plant engineering marketplace. The show features an exposition, as well as conference and seminar sessions. Concurrent programs include the Plant & Facilities Expo, World Energy Engineering Congress, and the Cogeneration Congress.

[www.aeecenter.org/Shows/](http://www.aeecenter.org/Shows/)

**October 29-November 1, 2001**

**FLC-MC Lean and Clean  
Manufacturing Conference  
Albuquerque, NM**

Laboratory expertise and resources will deliver various technologies applicable to small- and medium-sized businesses and manufacturers. Sponsors and regional labs will also be exhibiting their latest and finest technologies and programs.

see [www.federallabs.org/leanandclean](http://www.federallabs.org/leanandclean)

Ann Kerksieck, [alkersieck@ualr.edu](mailto:alkersieck@ualr.edu)

**November 4-7, 2001**

**Geological Society of America  
Annual Meeting and Exposition  
Boston, MA**

For geoscience professionals, this show has an anticipated attendance of over 7,000 geology professionals whose interests are dedicated to the earth, education, and environment. Meet face-to-face with influential and key decision makers.

Brenda Martinez, 800-472-1988,  
[bmartinez@geosociety.org](mailto:bmartinez@geosociety.org)

**November 27-29, 2001**

**Partners in Environmental Technology  
Technical Symposium & Workshop  
Washington, DC**

This year's technical program, "Building on Past Successes to Address Emerging Issues," will feature comprehensive sessions illustrating how the Department of Defense is addressing emerging environmental issues by building on past successes in the development of innovative environmental technologies.

[www.serdp.org](http://www.serdp.org) or [www.estcp.org](http://www.estcp.org)  
or call (703) 736-4548

**December 2-5, 2001**

**National Commercialization  
Conference  
Mobile, AL**

This conference brings together law enforcement, technology innovators, and manufacturers to understand the needs and requirements of the law enforcement and corrections community. Includes networking opportunities, interaction with developers, and the chance to further refine technologies.

Everett Smith, 888-306-5382,  
[www.oletc.org](http://www.oletc.org)

**February 3-5, 2002**

**CyberCrime2002  
Mashantucket, CT**

Be on hand to receive white papers on: e-privacy, Internet education for educators, child online safety, Internet gaming, voting in the electronic age, and international cyber crime issues. New committees will be formed at CyberCrime2002 that will report at CyberCrime2003.

[www.cybercrime2002.com](http://www.cybercrime2002.com),  
1-800-213-4326