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T<sup>2</sup> FACT

In 1656, Christian Huygens, a Dutch scientist, made the first pendulum clock, regulated by a mechanism with a "natural" period of oscillation. Huygens' pendulum clock had an error of less than 1 minute a day, the first time such accuracy had been achieved. His later refinements reduced his clock's errors to less than 10 seconds a day. Around 1675, Huygens developed the balance wheel and spring assembly. This improvement reduced wristwatch errors to less than 10 minutes a day.

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T<sup>2</sup> EVENTS

FLC Southeast Regional Meeting Savannah, Ga. September 13-16, 2005

FLC Mid-Atlantic Regional Meeting Cumberland, Md. September 13-15, 2005

FLC Mid-Continent/Far West Regional Meeting Monterey, Calif. September 13-16, 2005

FLC Northeast Regional Meeting Albany, N.Y. September 21-23, 2005

2005 Technology Transfer Society Meeting Kansas City, Mo. September 28-30, 2005

LES Annual Meeting Phoenix, Ariz. October 16-20, 2005

Scientific Conf. on Chemical & Biological Def. Research Timonium, Mary. November 14-17, 2005

## Y-12 IMPROVES WATER, HABITAT CONTINUOUS MONITORING LEADS TO IMPROVED WATER QUALITY FOR EAST FORK POPLAR CREEK

by William Wilburn

"The Surface Water Hydrological Information Support System (SWHISS), an early-warning system for East Fork Poplar Creek (EFPC) in Oak Ridge, Tennessee, embodies the Y-12 National Security Complex's responsible stewardship of the environment," said Gary Beck, an environmental engineer in Y-12's Clean Water Compliance (CWC) group.

"For more than 5 years a PC-network version of SWHISS (pronounced swiss) has been used to support efforts to improve water quality and the habitat of EFPC," said CWC geologist Steve Field. The system monitors water quality indicators in real time as well as the creek's flow.

Y-12 Technical Computing programmer Buddy Cate developed the PC-based system. Instruments continuously measure the creek's flow rate; temperature; dissolved oxygen; and specific conductance (the water's mineral or dissolved ion content), chlorine and pH levels.

Designated system users follow the creek's status on desktop PCs, accessing instrument data (transmitted via telephone modem) through the Y-12 computer network. Irregularities trigger audible alarms, computer screens reveal trouble spots, and a spill response



Y-12 environmental technician Mike Elliott performs maintenance and calibration tasks at a SWHISS Station.

coordinator inspects the site if necessary. Situations can be assessed in minutes rather than hours, said Beck.

SWHISS is a monitoring tool that enables users to quickly locate and remedy environmental upsets. "Because our alarm limits are below regulatory threshold limits, we can be directed to a 'red flag' area and address it before it becomes a genuine problem," Field noted.

Beck recalled a specific incident when SWHISS detected abnormal chlorine levels. Dispatched to the creek, a coordinator saw fish congregating near outfalls discharging spring water. A malfunctioning pump was discovered.

See Y-12 Improves Water, page 4

## MISSILE DEFENSE TECHNOLOGY FURTHERS BREAST CANCER RESEARCH

by Debra Valine, Editor, The Eagle

Breast cancer.

Those are two words that can strike terror in your heart, especially if you are hearing them in the doctor's office.

Medical research into breast cancer has come a long way, and today more women are surviving the disease because of early detection through yearly mammograms. But mammograms do not detect all breast cancers.

The U.S. Army Space and Missile Defense Command's Technical Center is investigating whether missile defense technology can be used to improve mammogram imagery.

At the seventh annual Space and Missile Defense Conference, held Aug. 18 in Huntsville, Ala., Col. Craig Shriver of the Clinical Breast Care Project at Walter Reed Army Medical Center in Washington, D.C., told attendees that missile defense technology and breast cancer research terminology are surprisingly similar and that early results in the investigation look promising.

"When given a reading of 'abnormal,' mammography has an error rate of more than 80 percent in predicting cancer accurately," Shriver said. Up to 15 percent of known cancers are not seen on mammograms. Up to 80 percent of ab-

See Breast Cancer Research, page 2

## LOS ALAMOS SCIENTISTS CLEAN WASTEWATER

by Jeffrey J. Stewart, Business Development Executive, LANL

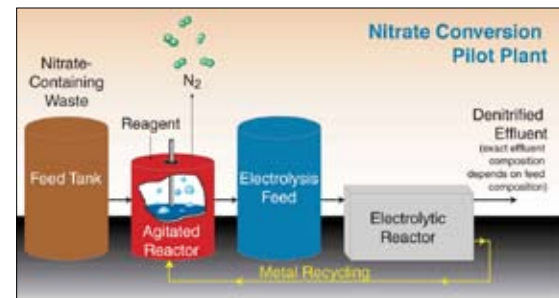
Scientists at Los Alamos National Laboratory (LANL) are bringing to market their inexpensive way to cleanse wastewater of nitrate pollution.

Nitrates (NO<sub>3</sub>) are among the most common water pollutants and are well known to cause algae blooms in lakes and rivers.

Nitrates also can cause human health problems by chemically altering the structure of hemoglobin in such a way that blood no longer carry oxygen. In

infants, this effect causes "blue baby" syndrome and can lead to death. In adults, nitrates have been linked to spleen hemorrhages and cancer.

More drinking water sources are closed because



See Los Alamos Water, page 4

## ARGONNE SIGNS \$5M DEAL

by Neil MacDonald  
Federal Technology Report

In its largest technology licensing deal to date, Argonne National Laboratory (ANL) last week licensed worldwide exclusive rights to the SyncMatrix technology portfolio to All Hazards Management, LLC, of Denver, Colo.

The \$5-million dollar license agreement and three-year research agreement was facilitated through ANL's Office of Technology Transfer.

A unique toolset of emergency preparedness software developed at ANL, SyncMatrix enables development of fully integrated, coordinated and synchronized emergency plans. It displays information visually to enable first responders to deliver a multijurisdictional response to a terrorist attack or natural emergency.

See Argonne Deal, page 5

## NASA SIGNS FIRST CRADA



Left to right: Fitz Walker of Bartron Medical Imaging, LLC and Drs. Jennifer Diederich and Alan Lurie of the University of Connecticut School of Medicine view dental x-ray images with the Med-Seg™ viewer.

NASA officials have announced the signing of the agency's first Cooperative Research and Development Agreement (CRADA).

Signed with Bartron Medical Imaging, LLC (New Haven, Conn.), the agreement will enable the joint development of a three-dimensional (3-D) version of NASA Goddard Space

Flight Center's Recursive Hierarchical Segmentation Software (RHSEG).

Bartron currently uses the 2-D version of RHSEG software in its Med-Seg™ imaging device, which is used to analyze medical images (i.e., x-rays and mammograms) for disease diagnosis and management.

By extending the software's capabilities to three dimensions, Bartron's device may be able to produce a much finer detail view of all sides of abnormalities such as tumors or lesions, thereby drastically improving very early diagnosis and treatment of disease.

This is the first time NASA has relied solely on CRADA authority to enter into a cooperative agreement. In the past, Space Act Agreements (SAA) have been primarily used for partnerships.

However, under an SAA NASA has no authority to agree in advance to issue a partner See NASA Signs First CRADA, page 4



# FED LABS FLASH | TECHNOLOGY TRANSFER NOTES

## FOREST LAB MEETS ABOUT CHINA TECH FUTURE

In an effort to understand the potential impact that China's rising investments in forestry and forest products are likely to have on global markets and on North American and other forest-based industries, scores of policy-makers, researchers and economic-development specialists are expected to join manufacturers, consultants and investors for a three-day conference next year.

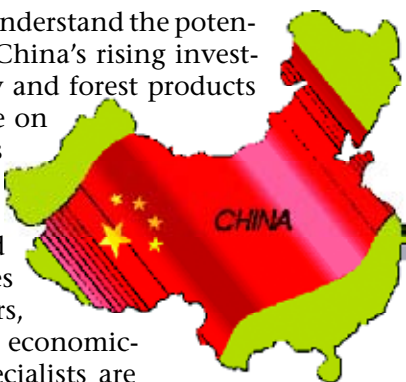
Planned topics include understanding China and Chinese business conditions, China's wood products consumption, meeting China's demand for wood fiber, China's competitive structure, and trade and investment in China's forest markets.

The conference, titled *China's Boom: Implications for Investment and Trade in Forest Products and Forestry*, is scheduled for January 18-20, 2006, in Vancouver, BC, Canada.

Sponsoring organizations are the Forest Products Society, the University of Washington's Center for International Trade in Forest Products (CINTRAFOR), Forintek Canada Corporation (Canada's wood products research institute), RISI/Paperloop (a leading provider of information about forest products industries), and the USDA Forest Service's Forest Products Laboratory.

The rapid expansion of Chinese manufacturing capacity in plywood, flooring, furniture and other wood products has led to major changes in worldwide markets for wood and wood products. For example, according to published figures, China's plywood manufacturing capacity increased nine-fold from 1993 to 2004, enabling China to become an exporter of plywood.

China also has become the world's largest producer of MDF (medium density fiberboard) and second-largest producer of paper and paperboard.



## BERKELEY LAB WINS 3 R&D 100 AWARDS

Scientists at the Department of Energy's Lawrence Berkeley National Laboratory (LBNL) have garnered three R&D 100 Awards, *R&D Magazine's* picks for the 100 most technologically significant new products of 2005. This is the first time since 1992 that LBNL has captured three of the prestigious awards in a single year.

The 2005 awards go to LBNL's Optical Sound Restoration System, the Neural Matrix CCD, and the Ion Mobility Analysis for Rapid Identification of Cardiovascular Disease Indicators.

The Optical Sound Restoration System restores audio data on all types of mechanical sound carriers, including 2D discs and 3D cylinders, without physical contact. This non-contact method is the first technology that enables preservation of early recordings without inflicting further damage on the media and allows greater automation of the restoration process than other techniques.

In collaboration with Cellular Bioengineering Inc., LBNL researchers developed a technique for growing large arrays of networked neurons, in virtually any pattern desired, on the prepared optical surface of a charge-coupled device (CCD). This bioelectronic device interfaces with up to a million living neurons to provide data on neuronal activity. It is currently being developed for the detection of toxins and may one day be used in restorative medicine.

Ion Mobility Analysis technology is a medical diagnostic process for rapid, cost-effective analysis of blood lipoprotein size, distribution, and particle subclass quantities based on their aerodynamic electrical mobility.

This technique provides far more data about the full range of lipoproteins and more accurate and faster measurement of particle sizes than current methods. It is likely to become a standard preventive test for all adults with coronary heart disease; with early diagnosis, appropriate treatment plans can be designed to stop heart attacks before they happen.

## BROOKHAVEN DEVELOPS "THRAXVAC"



*Carl Czajkowski, a BNL scientist, and Barbara Panessa-Warren, a biology consultant for BNL, examine electron microscopy images of ThraxVac's anthrax spore destruction process.*

Researchers at the U.S. Department of Energy's Brookhaven National Laboratory (BNL) have developed a device, dubbed "ThraxVac," that can collect and kill anthrax and other bacterial spores. The patent-pending device has been licensed to Circle Group Holdings, Inc., a public company based in Mundelein, Ill.

ThraxVac vacuums up anthrax and other bacterial spores, then "tricks" the spores into germinating through heat and moisture, thus making them vulnerable to injury.

The newly activated spores are then bombarded with alpha particles, a form of radioactivity that does not penetrate skin or clothes. The alpha particles kill the spores, rendering them nontoxic.

Carl Czajkowski, a BNL scientist, and Barbara Panessa-Warren, a biology consultant for the lab, thought of the idea for the invention in 2001 shortly after several anthrax incidents in the U.S. were widely reported. Czajkowski said, "We thought there must be a better way to clean up anthrax, other than using harsh chemicals that are dangerous to humans and to the environment. Also, chemicals often can't do the job thoroughly."

ThraxVac is expected to be as portable as a home vacuum, or it can be retrofitted as part of a building's heating, ventilating and air conditioning system, where it would kill bacteria and spores.

*Breast Cancer Research, from page 1*

normalities that need biopsy are not cancer. "This means that a million people are going through surgeries or procedures to find the 200,000 with cancer.

"These 'unnecessary' biopsies will cost the health care system \$4.2 billion. Even so, mammograms are the best tool we have right now. Therefore, we must do everything possible to improve mammography," stated Shriver.

Working with SMDC, Shriver hopes to improve specificity in mammograms. Surgeons need more information to advise patients on what action to take to combat the disease.

"Mammograms will not do it alone," Shriver said. "When a woman decides to have a lumpectomy and radiation for cancer treatment, the cancer can come back in the same breast. In fact, there is a 12 to 15 percent chance that it will because we cannot know if we are getting all of it out."

Using missile defense algorithms to analyze mammograms, Shriver believes surgeons can see how big and what shape the cancer is, and use that information to improve planning for breast cancer surgery when the breast is to be spared.

"I discovered in (the very first) conversations with Jess Granone (director, SMDC's Technical Center) that similar algorithms are used for missile defense," Shriver said. "These algorithms (for breast cancer) work by classifying spots and identifying areas of interest in a background of 'clutter'... similar to analysis of

mammograms as well as our work in separating and identifying protein molecules from breast cancer patients – the computer doesn't care if the data it is analyzing represents protein molecules or missiles."

The team investigating this possible spinoff of missile defense technology includes Walter Reed Army Medical Center, Windber Research Institute, and SMDC.

The SMDC team is comprised of Pete Kirkland; Kevin Nash; Lee Ray, an electronics engineer in the Technical Center; and Granone. Dr. Robert Smith, a Huntsville radiologist, is donating his time to the effort as well. He is providing information about what radiologists look for when screening mammograms. That information is helpful when developing the algorithms.

"We have developed the detection and discrimination algorithms, but we still have to test them on many mammograms," said Kirkland, a senior research scientist with the Technical Center. "We can detect anomalies; however, discriminating cancerous from a noncancerous (tissue) is the big issue."

Kirkland said the team is working three specific tasks: using imaging devices to distinguish between cancerous and noncancerous anomalies; using 2-D gel protein expression to determine early if a person might have cancer; and taking clinical and lifestyle data from Walter Reed and Vital Solutions in Huntsville to de-

velop a Response Surface Model to predict the probability of patients getting cancer.

"We are working with Jeffrey Zelickson, president of Vital Solutions, Inc., to develop a database that will be used to train the Response Surface Model to predict the probability that a patient will get cancer," Kirkland said. The model being developed would likely be used for prediction in a clinical setting.

"We do not know if we got lucky on the first few things," said Nash, a Technical Center electronics engineer who is also working on the project. "We think our approach is solid, but we do not want to make any claims until we test it against a big data set. We are doing all of this in-house and it's in addition to our regular duties," Kirkland said. "It's not our primary job, but we expect payoffs for missile defense as well. If we can detect anomalies in the breast, maybe we could use the same method for missile defense to discriminate against targets in clutter. It is a very similar problem."

The final determination of the usefulness of this approach will be made by the medical community and not by engineers.

"We have to decide whether we can do anything with this or not," Kirkland said. "We have more than 1,000 mammograms that we are processing. I think

*See Breast Cancer Research, page 4*

## FLC NEWSLINK

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FLC Management Support Office  
950 North Kings Highway, Suite 208  
Cherry Hill, NJ 08034  
856-667-7727  
856-667-8009 fax  
[www.federallabs.org](http://www.federallabs.org)



# TECH WATCH | LABORATORY TECHS READY FOR TRANSFER

## LBNL'S TENDON TECHNOLOGY

Researchers at Lawrence Berkeley National Laboratory (LBNL) have isolated, purified and begun to characterize a novel factor that is likely to enhance the healing of injuries involving damage to tendons and ligaments.

With further refinement, this promising, patented discovery called Cell Density Signaling Factor, or CDS-1, could ease the suffering of millions of people currently disabled with repetitive strain and sports injuries, and speed injured workers back to the workforce.

The timing of this research is particularly compelling; there are currently no viable therapeutics available to treat such injuries.

CDS-1 is the primary growth factor produced by embryonic tendon cells to stimulate the tendon to lengthen. Application of CDS-1 to a wound site could dramatically affect the ability of adult tendon cells to participate in the repair process. LBNL has established a strong patent position with this protein: U.S. patent number 5,741,895 has been issued and another patent is pending.

LBNL is looking for a partner to pursue CDS-1 cloning and expression analysis.

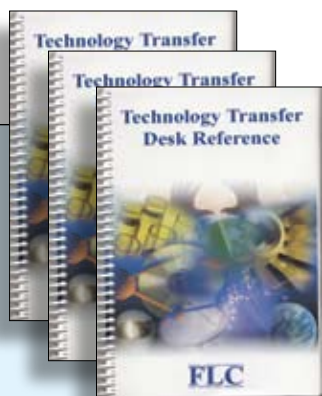
As human genome sequences fill the public databases, there is a high probability that, using this protein sequence originally isolated from chickens, LBNL can pull out the human genomic equivalent.

As human and chicken tendons are very similar tissues and develop using similar mechanisms, a molecule critical for this process should be highly conserved.

What may once have been a tedious task — finding a cDNA clone of a molecule produced in very small amounts — may now be more readily accomplished through the power of informatics.

LBNL would like to work with a partner to express, test, and commercialize this prospective therapeutic. The market for such a product is large and growing.

More info: (510) 486-6467, (510) 486-6457 (fax), TTD@lbl.gov



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## ARMY RESEARCH LAB DEVELOPS VEHICLE TRACKING SYSTEM

Acoustic technology developed by the Army Research Laboratory (ARL) has recently been used effectively by the Army to detect and track ground and airborne vehicles.

Through this technology, the acoustic emissions of ground vehicles, helicopters, and aircraft can be passively detected without the line-of-sight restrictions of radar and optical systems. The technology may also be employed for a variety of civilian uses as well.

One such application would be to provide a low-cost, passive, aircraft tracking capability for small airports where radars are not practical or affordable.

A wealth of information can be extracted from acoustic sensors, including aircraft range and velocity, bearing, and classification. Multiple aircraft can be tracked simultaneously.

When compared to radar and optical systems, acoustic sensors are very inexpensive.

With the proper environmental conditions, these sensors can detect

aircraft at long ranges and may also be used to point optical or infrared sensors to "look" in the proper direction.

When positioned in a well-defined geometric configuration, an acoustic sensor array is capable of line-of-bearing detection of aircraft in the area of coverage. When multiple



sensor arrays are used, bearings from each array can be transmitted via local communication links to a central location, where the bearing information can be correlated into aircraft position information.

Position data can then be visually displayed as an overlay on a computer-generated digital map.

This work is being performed in ARL's Sensors & Electron Devices Directorate at the Adelphi, Md. site.

More info: [www.arl.army.mil](http://www.arl.army.mil)

## LIVERMORE SEEKS INDUSTRY PARTNER TO FURTHER DEVELOP ULTRA-WIDEBAND COMMUNICATIONS

Lawrence Livermore National Laboratory (LLNL) is seeking one or more industrial partners to help further develop LLNL's ultra wide band (UWB) radar communication systems for military and government applications.

LLNL researchers have invented and developed a state-of-the-art UWB communications system based on the transmitted-reference (TR) technique.

This UWB transceiver provides through-the-wall communications capability in heavy metallic and heavy concrete indoor channels. A hardware prototype of the TR-based UWB transceiver has been successfully built and extensively evaluated in several field scenarios for harsh propagation environments such as cargo ships, where narrowband communications usually fails due to reflection from metallic surfaces.

With milliwatt transmission power, these radios are able to transmit and receive seamless live video images using 0.2 GHz bandwidth signals through three concrete floors, each 12 inches thick.

### Benefits of the Technology

High performance in multi-path channels results in providing reliable communications in harsh indoor and urban environments. Low transmit power provides low probability of detection and intercept (LPI/D) communications

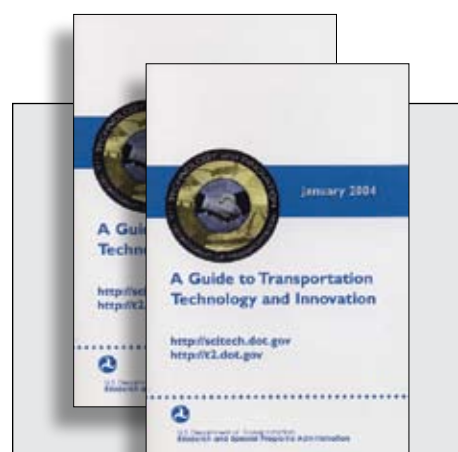
The transmitted UWB signal is capable of penetrating through multiple 12-inch-thick concrete walls and

demonstrates high performance in heavy metallic environments. With minor modifications, the transceiver can become highly resistant to various types of intentional and unintentional jamming, as well as multi-user interference.

Applications envisioned include communications for various military operations such as voice, data, and image transfer, and wireless sensor networks for medical and military applications.

LLNL is seeking industrial partners with a demonstrated ability to develop and mature early-stage technology for military and government use.

More info: [www.llnl.gov/IPandC](http://www.llnl.gov/IPandC)



### A Guide to Transportation Technology and Innovation

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## REFRESHABLE TEXT FOR BRAILLE

One of the potential benefits of advances in computer and related technologies is the prospect for improved accessibility to information services, particularly electronically stored or transmitted information, for the handicapped.

For the blind and vision-impaired, work has been done on improved accessibility by special adaptations to visual displays, by voice-based systems (voice output and, in some cases, voice input), and by touch-based devices. Each of these approaches is particularly useful for certain applications and serves a certain segment of the population of users.

Improvement in such devices producing computer-refreshable Braille text for tactile reading by the blind and visually impaired could thus be used to broaden accessibility to computer services such as electronic books, e-mail and other network access, and general computer use. Improvements in cost and mechanical reliability must be attained to facilitate more widespread use of refreshable Braille devices.

Inventors John Roberts, Oliver Slattery, and David Kardos of the National Institute of Standards and Technology (NIST) have created an apparatus and method for refreshable tactile display for Braille reading.

The refreshable Braille reader is mechanically simplistic compared to existing refreshable Braille devices, provides much of their functionality as well as additional features, and lowers user costs while improving reliability.

The reader includes a housing that has a reading aperture with a rotatable wheel assembly so that a display surface of a rotating wheel passes the reading aperture. The wheel has endless rows of openings defined there through to the display surface, a pin held in each opening and freely movable therein.

Actuators, at least equal in number to the rows of openings but substantially fewer in number than the openings, are held at a static location relative to the wheel for selectively moving pins in the rows so that Braille characters are arrayed at the display surface after passing the static location. Braille characters are thus streamed across the reading aperture of the housing.

More info: (301) 975-3084 or [otp@nist.gov](mailto:otp@nist.gov)



### Tools For Innovative Partnering: Technology Transfer Techniques

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*Breast Cancer Research, from page 2*

once we process most of those, we will have an answer.

"We are cautious because we have to be right," Kirkland said. "Whatever we do must have greater than a 90 percent probability of success. A radiologist would use this tool to help them make a diagnosis; it will not take the place of the radiologist. That is why Dr. Smith's involvement is so important to us. We have to present the data to a radiologist in a way that he can use, not the way we would normally use it."



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*Y-12 Improves Water, from page 1*

ered; a fish kill avoided. Without the early-warning capabilities of SWHISS, "fish belly-up is a first indicator," Beck explained.

SWHISS is used to determine the effectiveness of Y-12's Best Management Practices, such as tracking water runoff. The practices were implemented during modernization activities, including building demolition and new construction. The effectiveness of those practices, evident in SWHISS water quality data, has improved the ability to protect the creek's water quality as Y-12's footprint evolves.

"We're monitoring a natural ecosystem on a real-time basis," said CWC manager Lenny Vaughan. At least 7 million gallons of water per day pass through the SWHISS station, where EFPC exits Y-12. The unit is one of four stations gathering information along the creek. Upstream of the station, Lake Reality serves as "a unique spill containment system," said Beck. If a major spill occurs onsite, creek flow can be diverted into the lake to capture the spill before it leaves the Department of Energy reservation.

Established in 1991, the original creek monitoring system collected data on a DEC mainframe computer, generating reams of green-striped computer paper. Analog instruments loaded into racks at the creek stations, also referred to as houses, recorded complicated metrics from large pumps moving vast quantities of water through various cells. Eventually, there was only one person at Y-12 who could download the data from the nine-track computer tape, and he worked part-time. The DEC was replaced by a UNIX-based system. X terminals supplied users with data; but instrument reliability was problematic and labor intensive to maintain.

Cate transformed the UNIX system into today's SWHISS, a Microsoft™ Access application in which authorized users obtain creek information directly from networked desktops. The PC-based system has thus far accumulated 5 years of data—more than 14 million readings.

Beyond the designated-user access, Utilities Monitoring System person-

nel track the incoming data around the clock, and emergency management centers at Y-12 and nearby East Tennessee Technology Park also have the system.

Y-12's Emergency Management Program manager John Bolling said the continuous monitoring helps assure the state and downstream public that nothing hazardous to the environment is occurring. When situations do arise, real-time SWHISS readings enable emergency response personnel to quickly determine what mitigative actions to employ—including the option to divert the creek to Lake Reality—to ensure that the highest quality of water is maintained. SWHISS data collected at the Technical Support Center are relayed to the Emergency Operations Center, which works with state and local government personnel, and "decisions are made and assurances are given through that avenue.

"Lake Reality offers buffer time for us to take mitigative or corrective measures when necessary," said Bolling. SWHISS then monitors the creek as it exits the property downstream from the lake and "tells us what's leaving the site that we need to know about."

Bolling said SWHISS provides emergency response personnel with better detection and consequence-assessment capabilities, enabling them "to make decisions based upon facts rather than speculation"—decisions that could result in a better outcome for Y-12 and the public.

"We exercise spill response scenarios routinely," he said. Without SWHISS, he added, people would be stationed along the creek to monitor and sample the water quality. "It's always better to make real-time decisions based on real-time data."

Although the creek is scheduled to be remediated by the removal of sediments and legacy mercury contamination, noted Vaughan, SWHISS is a Y-12 Best Management Practice and not a regulatory requirement. Real-time water quality monitoring is conducted nonstop "to demonstrate that the water quality in EFPC continues to improve," Beck said.

*Los Alamos Water, from page 1*

pollution. Nitrate pollution is pervasive because nitrates are generated by many human activities. Agriculture generates nitrate pollution through fertilizer use and manure runoff.

Concentrated nitrates are generated from industries ranging from textiles to household products to pharmaceuticals.

Unfortunately, nitrates can be difficult to remove cheaply and reliably from highly contaminated wastewater. The goal of denitrification is to turn nitrates' nitrogen into harmless nitrogen gas, the gas that makes up most of the air we breathe. However, when one tries to convert the nitrogen in nitrates into nitrogen gas, there is a tendency for the chemical reactions involved to "overshoot." Instead of stopping at nitrogen gas, denitrification reactions tend to convert the nitrogen further into ammonia. As LANL scientist Stanislaw Marczak put it, "It is as though you have a bowling ball on the top of the staircase. You have to push it so it only goes three steps down but not all the way down. At the bottom of the staircase is ammonia."

Ammonia pollution can be worse than nitrate pollution, so stopping the denitrification reaction at the nitrogen gas stage is critical for effective wastewater remediation.

Faced with this general problem, environmental engineers have, for years, turned to biological reactors. Bacteria in these reactors are able—albeit slowly—to remove nitrates from contaminated water. This process takes place at municipal wastewater treatment plants. While biological reactors are able to clean low nitrate levels, high nitrate levels or contamination from other chemicals can stop the biological cleaning system dead in its tracks.

Industrial wastewater oftentimes not only contains nitrates at high levels, but also other chemicals that kill bacteria and thus halt biological denitrification. LANL faced the denitrification problem when cleaning

water that had extraordinarily high nitrate levels (100 grams per liter) contaminated with bacteria-killing heavy metals. Biological reactors were clearly out of the question, so a new, inexpensive system was needed.

Marczak, along with fellow LANL scientist Jacek Dziewinski, invented a system to clean the nitrate-laden water without biological reactors or expensive reverse-osmosis systems. The LANL approach uses inexpensive systems and chemicals such as sulfonic acid and zinc electrolysis to halt the denitrification process at the correct stage—where the nitrates produce nitrogen gas but before ammonia is produced. The system was used successfully at LANL for over half a year, and LANL filed patent applications.

The LANL process produces very clean water inexpensively. According to Marczak, "[the process] removes nitrates below the detection limit of 50 parts per billion." This is compared with the drinking water standard of 10 parts per million. In practice, the LANL process can turn highly polluted water into water at least 5,000 times cleaner than drinking water.

The U.S. Patent and Trademark Office recently awarded LANL two patents on the technologies. With the patents in hand, LANL has found a soon-to-be-announced commercialization partner. LANL anticipates that its denitrification technology will soon see use in industries where nitrate pollution is a serious issue.

While industrial wastewater treatment will likely be the most common use of the LANL denitrification system, there are other potential uses. Fish can be sensitive to nitrates, and even very low nitrate levels can be poisonous to fish. According to Marczak, large aquariums have been asking about how to apply the LANL system to clean aquarium water.

*More info: Technology Transfer Executive Charles Gibson, gibson\_charles\_e@lanl.gov, (505) 667-8087*

*NASA signs first CRADA, from page 1*

an exclusive license to the resulting technology patents. In this case, an SAA would have limited development, because Bartron investors required a guarantee of exclusivity before they would provide the necessary investment capital to proceed with the development of the 3-D version of the Med-Seg™ device.

According to Keith Dixon, patent attorney in NASA Goddard's Office of Patent Council, this CRADA grants (in advance) a partially exclusive license for the resulting technology patents within Bartron's fields of use (i.e., the diagnosis and treatment of breast cancer, cervical cancer, brain cancer, heart disease, osteoporosis, and periodontal diseases).

Under the agreement, each party will work independently. Dr. James Tilton, lead NASA researcher in the

RHSEG project, will conduct implementation and testing, and will assist with installation and integration with Bartron's hardware.

Bartron will develop the clinical and regulatory protocol, the interface for the software and hardware, a data compression and encryption tool, and a "region labeling" tool.

Because other government agencies (e.g., DOD, EPA, etc.) routinely use CRADAs, industry is more familiar with those partnership agreements. "It is our hope," said Dixon, "that this CRADA with Bartron will stimulate more partnerships between NASA and industry."

These partnerships can benefit not only American industries, but also the American people.

More information is available at <techtransfer.gsfc.nasa.gov>.





## WORLD'S BEST TECHNOLOGY SHOWCASE WANTS YOU!

Is your platform technology ready for commercialization?

Apply now to be in the annual World's Best Technologies (WBT) Showcase, March 27-29, 2006, at the Wyndham Arlington in Arlington, Texas.

This elite national event showcases new, cutting-edge, first-to-market technologies before seed investors and licensing partners. It is produced in cooperation with the Federal Laboratory Consortium for Technology Transfer (FLC) and the National Association of Seed and Venture Funds (NASVF).

The WBT Showcase is designed to support the movement of breakthrough technologies from top universities, federal laboratories, federal agencies, and leading research institutions into the marketplace.

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Complete an online two- to three-page summary application. There's no cost to apply. Get full details at <[www.wbtshowcase.com](http://www.wbtshowcase.com)>, or contact Paul Huleatt at (602) 795-8825 or e-mail at [phuleatt@wbtshowcase.com](mailto:phuleatt@wbtshowcase.com).



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## FLC MID-ATLANTIC REGION SPONSORS NIH EXHIBIT AT BIO 2005

by John Eichelberger

BIO 2005, the annual meeting of the Biotechnology Industry Association, was held in Philadelphia June 19-22, 2005. Part science, part business, part carnival, part networking, this meeting has grown from its early days in the 1980s, when it was a small meeting of the old-boys network, into a not-to-be-missed megaevent.

Even large pharmaceutical companies, which initially did not attend the meeting, now send delegations.

Every state or nation that aspires to be a serious player in the biotechnology arena sends an impressive group of politicians, economic development personnel, scientists and celebrities. As such, these BIO meetings tend to be a favorite for anyone trying to do business deals in the life science industry.

This year, the FLC Mid-Atlantic Region sponsored the NIH Office of Technology Transfer exhibit.

The exhibit was joined by USDA, Army, NCI, NIST and DOE labs in a dedicated section called the "Federal Labs Alley."

The trade show was eminently successful for NIH, as evidenced by the steady stream of visitors and animated conversations that took place during the three show days.

A new marketing CD-ROM describing the NIH technology transfer program and its benefits to the industry was unveiled at the show.

For additional information about this event and for copies of the CD-ROM, contact Dr. Krishna Balakrishnan at (301) 435-3888 or at [balki@nih.gov](mailto:balki@nih.gov).

## APPLER BIDS FAREWELL AS FLC WDC REPRESENTATIVE

by Dave Appler

Washington, DC Representative



I want to take this opportunity to let you know that I am leaving my position as the FLC Washington, DC Representative on July 8, 2005.

It has been a distinct honor serving the FLC these last 3 1/2 years in this capacity. I have accepted a position as a consultant to

the DOD in support of its technology transfer initiatives.

I'd like to thank the many members of the FLC family who have helped make this a fantastic job.

While the FLC is in the process of filling this position, you may see an occasional communication from me as I come back to the office to check voice mail, e-mail, and mail on an interim basis at the request of FLC Chair Ed Linsenmeyer. My new office is nearby.

The FLC is a fantastic organization, and I hope to stay involved as I have been in the past.



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**2006 World's Best Technologies Showcase**  
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### Argonne Deal, from page 1

Lab officials say it's the first and only systems-based application developed to address complex planning and testing of emergency responses by multiple agencies, disciplines and jurisdictions.

"Today, nearly all emergency responses require the coordination of federal, state, regional, local and volunteer resources [to execute] a unified response to effectively handle a crisis," said Paul Hewett, a principal investigator at ANL's Center for Integrated Emergency Preparedness (CIEP). "As the complexity of emergency response planning increases, it becomes nearly impossible for an incident commander to understand and coordinate the response like clockwork," added Jacques Mitrani, another principal investigator in CIEP, part of the lab's Decision and Information Sciences Division.

"We're proud to be working with Argonne to make this unique technology available to emergency response entities worldwide," said All Hazards Management, LLC president Duane Habeck. "Whether the emergency response involves natural disasters such as fires, earthquakes or tornados, or

homeland security threats such as chemical, biological, radiological, agricultural agents or cyber attacks, the SyncMatrix software will improve response, minimize risk and save lives."

All Hazards Management intends to incorporate SyncMatrix with its existing proprietary software to create a comprehensive suite of emergency preparedness software.

SyncMatrix was developed by ANL researchers for the U.S. Army in support of the Chemical Stockpile Emergency Preparedness Program, and was later adopted by the Department of Homeland Security's Office of Domestic Preparedness as part of the Urban Area Security Initiative.

It is believed to be the first and only systems-based application developed to solve the problem of planning and testing responses to emergencies, particularly ones involving multiple agencies, teams or jurisdictions.

"We sought a way to broadly deploy SyncMatrix to industry and local government agencies through existing market channels," said ANL's Office of Tech-

nology Transfer director Steven Ban. "We found such a partner in All Hazards Management that will enable SyncMatrix to reach a broad audience and serve a critical need of industry and state and local governments." The license agreement culminates work that started two years ago when the Illinois Technology Enterprise Center at ANL identified the portfolio as a high-potential candidate for commercialization.

A joint effort between the Illinois Department of Commerce and Economic Opportunity and UCTech, and the University of Chicago's tech transfer office, the center conducted the initial commercial assessment of the technology and recommended launch of a new enterprise built around the product. It also introduced the business concept to Integrated Decision Engineering Analysis, the parent of All Hazards Management.

ANL conducts basic and applied scientific research across a wide range of disciplines, and is operated for the DOE by the University of Chicago.



# FOREST PRODUCTS LAB RESEARCHERS PREVENT SPREAD OF INVASIVE SPECIES

With the prevalence of international trade today, insects and fungi can travel from continent to continent as easily as the products being shipped, and the results can be devastating. Invasive species can destroy entire forests, and remediation efforts can quickly become multibillion-dollar endeavors.

The recent introduction of destructive pests, including the Asian Longhorn Beetle and the Emerald Ash Borer, to U.S. forests prompted the chief of the Forest Service to name invasive species as one of four major threats to our nation's forest and grassland ecosystems.

Researchers at the Forest Products Laboratory (FPL) have been working to prevent the spread of invasive species by focusing on the wood packaging materials often used for international shipping.

"Approximately half of all world trade moves on wood packaging materials," said Dr. Barbara Illman, research plant pathologist at FPL. "These materials represent a major pathway for the introduction and spread of pests such as the Asian Longhorn Beetle."

Standards exist to minimize the risk of spreading invasive species through the trade of wood products such as logs and lumber.

However, wood packaging materials such as pallets, crates, boxes, and pieces of wood used to support cargo

pose an equally dangerous threat, and the international movement of these wood products has not been regulated.

Illman and Dr. William Simpson, a research forest products technologist at FPL who has since retired, both led teams to develop treatment methods for wood packaging materials.

These teams, consisting of FPL employees and partners from universities and other federal agencies, focused their work on developing heat treatment protocols to kill pests in packaging materials before they are shipped around the world. According to Illman, prevention is the key to slowing the spread of invasive species.

Taking many variables into consideration (including size, shape, density and moisture content), Simpson developed a mathematical model for estimating heating times required to eliminate the pests.

The teams also developed heat sterilization schedules for many species of North American hardwoods and softwoods.

These heat treatment protocols became the scientific basis to support new international quarantine mea-

asures for wood packaging materials.

As a member of the International Forestry Quarantine Research Group (IFQRG), Illman was able to implement the results of their research in a big way. IFQRG provides scientific

If wood packaging materials arrive in a member country without this stamp, officials at the port of arrival have the right to immediately re-export the shipment.

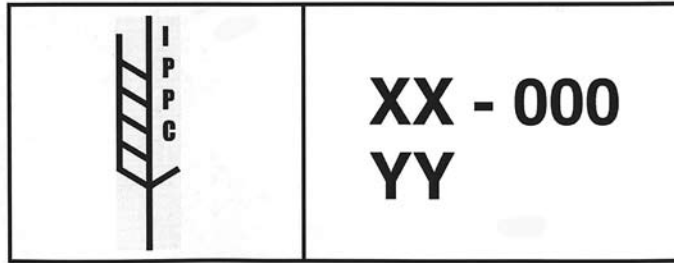
ISPM 15 has been, or is being, adopted by all IPPC member countries, including Australia in the fall of 2004, the European Union on March 1, 2005, and the United States, Canada, and Mexico by Sept. 16, 2005.

Once fully implemented, ISPM 15 will help simplify and standardize international trade requirements for wood packaging materials.

Adopting a uniform international standard for these materials will eliminate the need for countries to comply with separate standards for imports and exports.

As ISPM 15 is implemented, Illman continues to serve as a scientific advisor to national and international agencies, companies that import and export wood products, and forest health professionals. Her work in the development of heat treatments and as a member of IFQRG has had far-reaching impacts, ranging from commerce to world trade.

But it all stems from recognizing the threat that invasive species pose to the environment. "Our goal is to slow the global spread of invasive species, thereby protecting forests worldwide," said Illman. "The implementation of ISPM 15 brings us much closer to reaching that goal."



ISPM 15 requires the use of a mark on wood packaging materials to certify that proper treatment has occurred.

advice to the International Plant Protection Convention of the Food and Agriculture Organization of the United Nations. Through this group, Illman provided advice for the development of International Standard for Phytosanitary Measures No. 15, or ISPM 15. ISPM 15 requires that all wood packaging materials be heat treated to a minimum core temperature of 56°C for at least 30 minutes or treated with methyl bromide before shipping.

These methods ensure that no pests remain in the materials. Treated packaging must then be marked with an official stamp that includes an IPPC symbol, a two-letter country code, an abbreviation of the type of treatment used, and a unique number assigned by the country's national plant protection organization.

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