

LOS ALAMOS NATIONAL LABORATORY
CURRENTS



April 2009

*CMRR goes green
Energy storage, conservation ... and more
Safeguarding information technology
Think positive, change your life*

My View

Energy-wise for a brighter future

How important is it to conserve energy? That is a big question for many of us at the Laboratory who are looking toward the future with an eye on energy use and availability. Without hesitation, I can assure you it is very important.

In the coming years, Los Alamos must consider the availability of energy resources as we identify new goals and projects. For example, as we move forward with our plans to transform the Los Alamos Neutron Science Center into MaRIE (Matter-Radiation Interactions in Extremes), our energy needs will increase beyond what we currently use at LANSCE. The same holds true for our supercomputing initiatives and numerous other activities in the upcoming years.

The more we can do with our day-to-day activities to lighten the energy load, the more energy will be available to support new initiatives and maintain our essential capabilities. The more efficient we become, the smaller the load on our aging infrastructure, and the better prepared we will be to meet new challenges in the future.

As we go forward, we hope to grow our energy research at the Lab and become a leader in discovering new technologies and methods to improve not only our energy efficiency but the nation's as well. As we build new facilities, such as the CMRR, we will design and construct them to be as energy efficient as possible, but we won't stop there. We will continue to look for ways to improve the energy efficiency of our current facilities by incorporating efficient lighting and improving the efficiency of our heating and air-conditioning systems. We also are looking at installing renewable energy resources on site and using the energy produced for ourselves and Los Alamos County. And we will need your help.

Each of us should not underestimate our ability to contribute to energy savings. We can start by doing simple things like turning off computers and lights at the end of the workday or when away from our work areas for long periods and only using space heaters when we really need them. Instead of turning on the space heater to ward off a chill, we can put on a sweater or jacket for added warmth.

The future holds many challenges, but by working together, we can make it much brighter by being energy-wise today.

—Mike Mallory, principal associate director for Operations



Leroy N. Sanchez

About the cover: Nicole Seguin of CMRR Division stands in front of special energy-efficient windows in the new Radiological Laboratory, Utility, and Office Building part of the Chemistry and Metallurgy Research Replacement Project. See Page 4 for story. Photo by Richard C. Robinson

Lab scientists selected American Physical Society Fellows

Five Los Alamos scientists are 2008 American Physical Society (APS) Fellows. The APS Fellows program recognizes members who have made advances in knowledge through original research and publication or who have made significant and innovative contributions in the application of physics to science and technology. The title of Fellow is bestowed each year on no more than 0.5 percent of current Society members.

Robert C. Albers of Physics of Condensed Matter and Complex Systems (T-4) is an internationally recognized expert on the role of electronic structure on the physical properties of complex materials. According to the APS, he was recognized “for his pioneering work on the theory of f-electron elements and materials, and its implementation into robust computational methods for use by experimentalists to interpret Extended x-ray Absorption Fine Structure spectra.”

Eli Ben-Naim, also of T-4, is an expert in nonequilibrium statistical physics and a leader in granular matter. He was recognized for his “broad contributions to granular physics, traffic flows, and nonequilibrium statistical physics.”

Christopher Fryer of Computational Physics and Methods is an authority on the study of core-collapse supernovae. He received the APS Fellowship “for his leadership in and contributions to theoretical and computational high-energy astrophysics through multidimensional simulations that demonstrated the importance of three-dimensional convection and neutrino transport in core-collapse supernovae explosions.”

George Kyrala of Plasma Physics is an expert on ultrahigh speed diagnostics of lasers, x-rays, and the plasmas they generate. He was named an APS Fellow for his “outstanding experimental and theoretical contributions to understanding ionization and excitation processes in matter, and for pioneering efforts in developing and using x-rays produced by short-pulse laser matter interactions in ICF and high-energy density physics experiments.”

Sanjay Reddy of Nuclear and Particle Physics, Astrophysics, and Cosmology has significantly advanced our understanding of superfluid matter as measured in cold atom experiments and observed in astrophysical environments. He was cited for “fundamental contributions to our understanding of the roles of strangeness and superfluidity in dense matter, and their effects on neutrino transport in neutron stars and supernovae.”

Barnes named Physics deputy division leader

Cris Barnes is the new deputy division leader for Physics Division. Barnes earned his bachelor's degree in physics from the University of Chicago and his doctoral degree from Princeton in astrophysical sciences. He joined the Laboratory as a technical staff member in the former CTR Division in 1981 and was one of many who joined Physics Division when CTR was disbanded. He was the group leader for Plasma Physics, became program manager for C4 and C10, and spent a year on a change-of-station assignment with the Office of Defense Science at the National Nuclear Security Administration.



Dixon Wolf

Graves wins Postdoctoral Distinguished Performance Award

Christopher Graves of Condensed Matter and Thermal Physics received the Postdoctoral Distinguished Performance Award. The award recognizes outstanding and unique contributions by Lab postdocs.

Graves, who holds a doctorate in chemistry from Northwestern University, is a Director's Postdoctoral Fellow and a Glenn T. Seaborg Postdoctoral Fellow. Graves was recognized for his outstanding work in elucidating the organometallic chemistry of pentavalent uranium. His work, published in the *Journal of the American Chemical Society*, stimulated worldwide interest. Graves was nominated for the award by his mentor, Jaqueline Kiplinger, and will receive a framed certificate and a monetary award.

Trujillo elected to chamber board

Vangie Trujillo of Community Programs Office (CPO) was elected to a three-year term as a board member to the Española Valley Chamber of Commerce. Trujillo, who currently works on economic development initiatives in CPO, also serves the Greater Española Valley Community Development Corporation, where she has been a member for two years. In addition, Trujillo served in the past as a board examiner for Quality New Mexico.



Richard C. Robinson

Nicole Seguin and Tony Ladino make sure that ventilation ducts and other piping for the CMRR Project remain properly sealed and debris free until they are installed, which helps ensure better air quality inside the buildings.

CMRR is going “green” *Lab reducing its environmental footprint*

According to the Department of Energy, buildings account for 71 percent of America’s electricity use and 38 percent of all greenhouse-gas emissions. The United States Green Building Council (USGBC) reports “green” buildings can reduce energy use by 50 percent and carbon dioxide emissions by 39 percent.

Both buildings in the Chemistry and Metallurgy Research Replacement (CMRR) Project—the Radiological Laboratory, Utility, and Office Building (RLUOB) under construction and the planned Nuclear Facility—are registered under the USGBC Leadership in Energy and Environmental Design (LEED®) for New Construction and Major Renovation (LEED-NC) voluntary rating system. LEED-NC encourages sustainable green building and development

practices. Since its inception in 2000, it has become the nationally accepted benchmark for design, construction, and operation of high-performance green buildings, said CMRR Security and Environmental Compliance Project Manager Tony Ladino.

“It is important to design and construct buildings that are environmentally efficient,” noted CMRR Project Division Leader Rick Holmes. “Doing so is often cost efficient as well. The initial investment is not usually large when compared to the overall cost and over time, the cost savings from reduced energy usage become very significant.”

The LEED-NC rating system awards certification points in six categories: sustainable sites,

water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, and innovation and design. A total of 69 points can be achieved, leading to “certified,” “silver,” “gold,” or “platinum” certification, said Nicole Seguin, who works with the CMRR Engineering, Construction Management, Start-up, and Operations groups and the RLUOB construction subcontractor and its architect and engineering firm to ensure LEED requirements are met.

The RLUOB facility is expected to achieve at least a silver certification (33 points minimum) because of its siting, design, and construction elements, Seguin said. These include public transportation access, car and vanpool parking, habitat restoration, storm water design, reduced roof heat island effects, reduced light pollution, water-efficient landscaping, reduced fixture water use, optimized energy performance, construction waste management, regional material use, and low-volatile organic carbon-emitting materials used for adhesives, sealants, carpets, paints, and composite wood products.

“An example of an energy-efficient element is the thermal storage system, which creates ice during the night when electricity demand and cost is typically lower,” Seguin said. “During the day, air is passed over the ice to cool. The cooled air is then distributed throughout the building.”

Other practices to achieve LEED points include controlling indoor air quality during construction and commissioning the building to ensure that major systems, such as heating, ventilation, and air-conditioning systems, perform according to design.

For many years now, DOE has required planners to consider sustainable design when building new DOE facilities, Ladino said. He explained that past DOE orders required use of a third-party rating system to determine levels of sustainability. “It wasn’t until DOE Order 430.2B was issued in February 2008 that DOE decided to require use of the LEED rating system,” he said.

Energy efficiency and sustainability were included early on in the RLUOB and Nuclear Facility design, Ladino said, adding that the National Nuclear Security Administration decided in late 2004 to pursue LEED certification for the RLUOB.

The RLUOB and Nuclear Facility are the first buildings at the Laboratory to go through the official LEED certification process, Holmes said. “Although other buildings, such as the National Security Sciences Building, have LEED elements in their design and construction, these buildings were not registered with the USGBC, and they were not granted LEED certification,” he said.

The CMRR Project replaces the outdated Chemistry and Metallurgy Research (CMR) facility built in 1952. RLUOB consists of about 19,500 net square feet of radiological laboratory space, centralized utilities and services for all CMRR facility elements, office space for 350 CMRR workers, a consolidated training facility, facility incident command, and emergency response capabilities. The Nuclear Facility will consist of about 22,500 net square feet of laboratory space, special nuclear material storage space, and auxiliary equipment space.

— Tatjana K. Rosev



Richard C. Robinson

Tony Ladino examines an energy-efficient boiler inside the Radiological Laboratory, Utility, and Office Building.

‘It is important to design and construct buildings that are environmentally efficient.’

Lab develops new energy-storage solutions

Innovations “crucial” to nation’s energy future

As demand for energy continues to rise, policy-makers and researchers increasingly turn toward clean renewable energy sources to meet energy needs. “The world uses about 17 trillion joules of energy per second, and that rate is likely to double by 2050,” said David Thorn of Inorganic Isotope and Actinide Chemistry.

Although solar, wind, water, and geothermal power is renewable, it is not reliable, because these sources generate electricity only intermittently, Thorn said. “By increasing the use of wind and solar power, we introduce a degree of uncertainty into our electric supply and actually make the grid less stable,” he explained. If the electrical supply doesn’t meet the instantaneous demand for even a very short time, large parts of the power grid can shut down, Thorn said. To ensure that doesn’t happen, some energy must be stored, ready to be released when needed.

The Office of Science at the Department of Energy called energy storage “perhaps the most crucial need for this nation’s secure energy future.” Improving New Mexico’s ability to capture and store electrical energy would be a real plus for the state, which has the highest fractional utilization of wind energy of any state nationwide, said Albert Migliori of the National High Magnetic Field Laboratory. “There’s enough energy generated by New Mexico wind farms in March and April to run a utility grid for weeks without turning on a coal or nuclear plant,” he said.

Laboratory researchers are looking into new ways of storing electrical energy. “Conservative, incremental improvements in storage technology won’t get us there,” Thorn said. “We need revolutionary changes.” Solutions include a distributed

storage system that would equip every New Mexican home with its own storage battery, noted Migliori. “There’s already a utility grid that carries power to every New Mexico home,” he said. “What if every house had a little bit of electrical-storage capacity, say a bank of lithium-ion batteries that sat in a box beneath the electric meter?” Consumers could then use the existing grid to distribute the wind farm output to thousands of these storage boxes, eliminating the need to build new transmission lines, he explained.

Expanding the existing grid and developing mini electrical storage units for homes, buildings, and vehicles represents a significant modeling and computation challenge that the Laboratory, with its expertise in both modeling and computation, is well equipped to meet, Migliori said, adding, “It’s a wonderful opportunity.”

Excerpted from an article by Jay Schecker published in 1663 magazine.

David Thorn and Albert Migliori discuss new ways to store energy.



Leroy N. Sanchez

Computing systems whiz named LANL Star

Support from many individuals and a great group to work in helped Fatima Woody of Departmental Computing Services become a LANL Star. Woody, a computing systems professional, was recognized by the Womens' Employee Resource Group for her numerous contributions to the Laboratory.

"It's great to be a LANL Star," Woody said. "I was shocked and really happy. And I heard from many people with whom I worked in the past and I hadn't heard from for a long time."

Woody attributes much of her success to coworkers. "It's a great team," she said. "We're family—we share resources and knowledge. Our attitude is not to compete but to complement one another."

It's no wonder the computer whiz appreciates family—she's the second-youngest child of 13 and has three children of her own. "I thank God every day for my family," said Woody.

Woody sets up desktop computers, troubleshoots application issues, and mentors students. "That's one part of my job I love—teaching students," she said. She explained that she is familiar with mentoring because she had a mentor when she first joined the Laboratory as a high school student. She worked as a student at the Los Alamos Neutron Science Center from 1988 until 1991, she said.

Three degrees and 20 years later, scores of coworkers and Lab customers have come to recognize Woody's dedication and hard work. She was touched by how many congratulated her on being named a LANL Star, she said.



Sandra Valdez

Fatima Woody helps student Stephanie Vigil master a desktop application.

Woody added that the best way to give back to the Lab is by continuing to be a good employee—and by nominating other women as LANL Stars.

'That's one part of my job I love—teaching students.'

"I'm not sure how the nomination process works," Woody said. "But I hope to make a 'Star' out of someone one day."

—Erika Martinez

Piling on to tackle the nation's energy needs

Laboratory researchers have collaborated in an effort to cost-effectively turn inedible biomass, such as switch grass or corn-husks, into alternative fuel in an energy-efficient manner. The problem might seem simple enough on the surface, but it's a lot tougher than it appears.

Plant cellulose—the fibrous material that makes plants woody—is created when plants synthesize glucose (sugar) molecules into long chains. These chains bind into sheets cemented by hydrogen bonds, an electrostatic attraction between positively charged portions of a molecule and negatively charged portions. The plant spins these sheets into tough fibers.

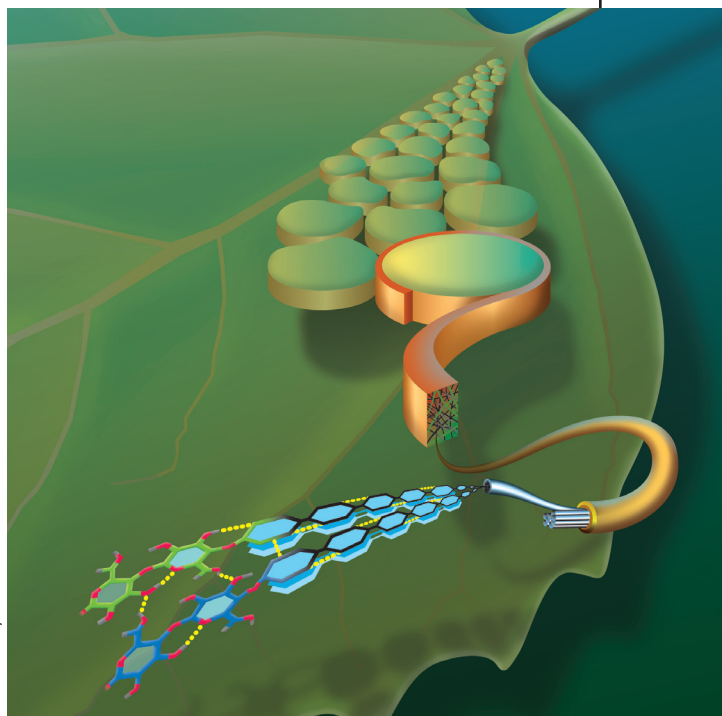
If cellulose could be broken down into sugars using cellulose-attacking enzymes, the sugars could be fermented into potential biofuels such as ethanol or butanol. Unfortunately, the fibers are tough to crack.

Researchers Tongye Shen and Gnana Gnanakaran of Theoretical Division and Paul Langan of Biosciences Division have noted a weakness in plant cells that could provide a mechanism to more easily convert plant matter into simple sugars.

Langan teamed up with colleagues from the U.S. Department of Agriculture and the French Center for Vegetable Macromolecule Research to use neutrons to view the crystalline structure of cellulose. In separate research, Shen and Gnanakaran developed a lattice-based model to examine cellulose structure.

The research showed irregularities in the hydrogen bond structure of cellulose, and that the irregularities can be induced at varying temperatures.

“We have identified a chink in the armor of a very tough and worthy adversary—the cellulose fiber,” said Gnanakaran, who leads the



Donald Montoya

Laboratory researchers are finding exploitable weaknesses in plant fibers that could help turn biomass into biofuels.

theory part of a large multidisciplinary Laboratory Directed Research and Development-funded biofuels project. Langan, who directs this project, added that “these results are some of the first to come from this team and are a step toward making biofuels from cellulosic biomass economically effective.”

Shen and Gnanakaran’s work was published this month in *Biophysical Journal*, while the work of Langan and colleagues appeared in the September 2008 issue of *Biomacromolecules*. The complementary research provided a two-pronged attack on the problem.

—James E. Rickman

Lab technology to ENABLE energy independence

Energy will be a defining issue for the next generation, according to Mark Hoffbauer of Chemistry Division. So, each day the 23-year Laboratory veteran lends his expertise to helping the nation achieve energy independence.

Hoffbauer pioneered a cutting-edge technology called ENABLE, a process that grows nitride thin films. Using ENABLE to create photovoltaic devices, he aims to more efficiently convert the sun's energy into useable electrical current than is now possible.

ENABLE, which stands for Energetic Neutral Atom Beam Lithography and Epitaxy, earned Hoffbauer an R&D 100 Award in 2006. Today, he and his colleague Todd Williamson, also of Chemistry Division, are collaborating with the solar materials team at Lawrence Berkeley National Laboratory on prototype photovoltaic device development.

"ENABLE technology allows us to grow materials at lower temperatures taking advantage of the kinetic energy of nitrogen or oxygen atoms to readily overcome barriers that otherwise often require high temperatures," Hoffbauer said. "What's exciting is that when it comes to energy and flux of atoms, we currently have no real competition from anywhere else, making our capability very unique."

Hoffbauer, who holds a doctorate in chemical physics from the University of Minnesota, explained that growing thin films and etching minute features are fundamental to the fabrication of modern semiconductors, photovoltaic devices,

light-emitting diodes, solid-state lasers, and other technologies important to our nation's energy security.

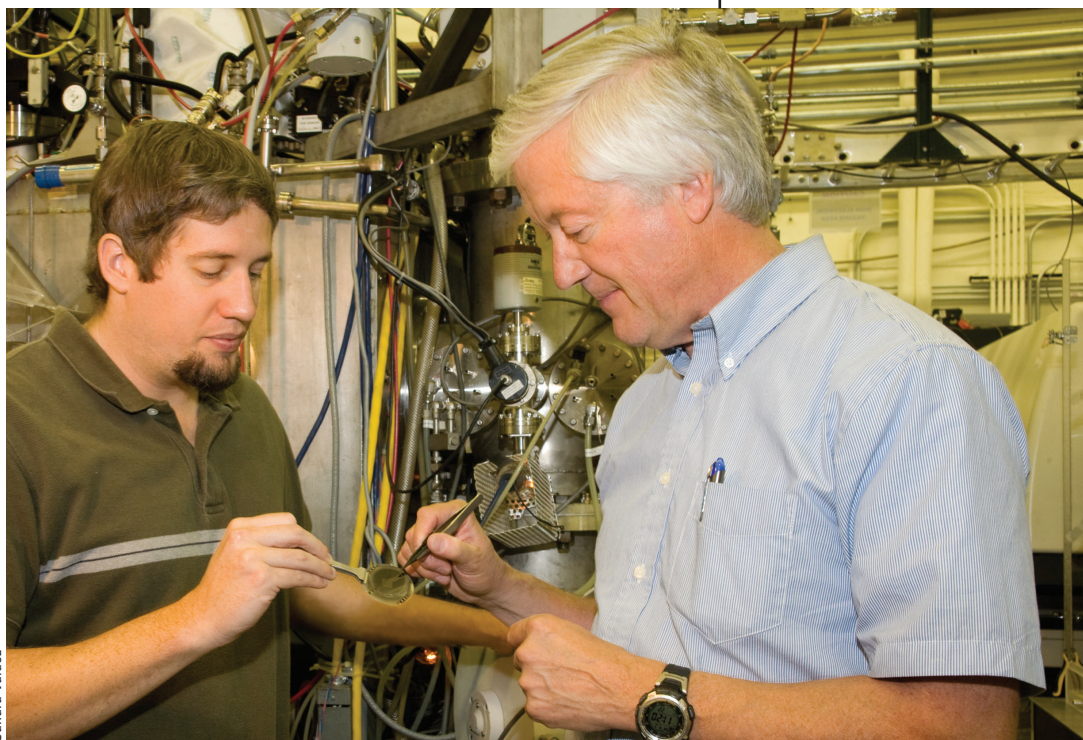
"This technology can create high-quality semiconducting Indium Gallium Nitride alloys that no one else has been able to produce, Williamson added. "These materials have the potential to revolutionize both the photovoltaics and solid-state lighting industries."

Hoffbauer estimates that commercially available products are three to five years out and that the average person can expect to benefit from the technology by way of both energy production and use.

"The Laboratory has so much to contribute to the nation in the area of energy," Hoffbauer said. "It's an exciting time, and I believe the materials we are working on will play a major role in ensuring our energy security in the future."

—Mig Owens

Todd Williamson and Mark Hoffbauer examine a thin film semiconductor wafer in front of the ENABLE instrument at the Laboratory.



Sandra Valdez



Laboratory celebrates Earth Day with activities

A litter cleanup around the Laboratory, the Pollution Prevention awards ceremony, a Take-the-Bus contest to encourage the use of mass transit, and an Energy Town Hall meeting are some of the Laboratory activities planned in April to celebrate Earth Day.

The 39th Earth Day is April 22 and the Lab's Earth Day theme this year is "Global Environment, LANL Commitment: A Natural Partnership." A Take-the-Bus contest the week of April 20-24 encourages employees to ride Los Alamos County's Atomic City Transit bus system.

The sixth annual Great Garbage Grab is April 13-24. Employee teams can pick up litter in areas around their workspace and in visible common areas. The team that picks up the largest amount of litter can win the 2009 Traveling Trash trophy. Laboratory Director Michael Anastasio is scheduled to lead "Mike's Green Team" in this year's litter cleanup.

An Energy Town Hall meeting is April 21 at Fuller Lodge, and the Laboratory will recognize Pollution Prevention award winners April 22 at the Physics Building Auditorium. The Laboratory is partnering with Los Alamos County to celebrate Earth Day with a community event April 25.

Learn more about these and other scheduled Earth Day activities at <http://www.lanl.gov/environment/earthday/>

Call 911 on Laboratory Property, Los Alamos County

Call 911 to request emergency fire, police, and ambulance responders on Laboratory property and within Los Alamos County. Provide your name, the nature of the incident, and the location. When calling from a cell phone, provide the city and state from which you are calling. Call 662-8222 for nonemergency fire or police service.

Bottled water safety

The Laboratory's bottled water contractor provides water that meets New Mexico drinking water regulations. There are several steps employees can take to ensure the continued safety of drinking water. For more information, go to http://int.lanl.gov/safety/bio-safety/docs/bottled_water_safety.pdf.

Distinguished Performance Award nominations sought

Nominations are invited for the 2008 Distinguished Performance Awards, which recognize individual employees, small teams, and large teams. Peers or supervisors of outstanding employees may nominate for performance during calendar year 2008. The nomination deadline is April 30. For more information, see a memo from Laboratory Director Michael Anastasio at http://int.lanl.gov/memos/2009/03/LANL_ALL2277.PDF.

Call for Laboratory Fellow nominations

The Fellow appointment is an honor bestowed by the Laboratory director in recognition of outstanding achievement by research and development scientists and engineers. Any employee may sponsor a Laboratory Fellow nomination, and the submission deadline is May 13. For more

information, see a memo at http://int.lanl.gov/memos/2009/02/MM2281_ADS2424.PDF.

Price Anderson Amendment training offered

The Price Anderson Amendment Act Office offers an online training class to help employees understand the Laboratory's process for identifying, screening, and reporting noncompliance. Course #47656 provides an overview of the Laboratory's program that addresses DOE Office of Enforcement expectations.

April service anniversaries

Find the April service anniversaries online at <http://www.lanl.gov/news/currents/2009/april/anniversaries.shtml>.

In Memoriam

- William (Bill) Hughes Yeamans, 92, died February 25
- Matthew L. Porter, 42, died March 9
- Randal N. Rupert, 42, died March 9
- Maxwell G. Witte, 82, died January 9
- John McDowell Walsh, 86, died March 9
- Margaret Nelson, 87, died March 15

 *Implement an information security system that reduces risk while providing exemplary service and productivity*

Emergency exercise tests Lab's IT security

Business Systems Contingency drill leads to valuable insights

It's any organization's worst nightmare: a malicious insider infects its operational systems with a worm that diverts funds to a bogus bank account, leaks confidential employee information to outsiders, and then causes a total system shutdown. Far fetched? Not really.

Worms that corrupt databases, exploit default accounts and passwords, create false accounts with far-reaching privileges, and communicate with off-site servers are more common than we'd like to believe, said the Lab's Information Technology Contingency Planning Coordinator Dale Leschnitzer.

Leschnitzer, whose nickname is "Master of Disaster," recently led a desktop emergency exercise to safeguard the Lab's information security and protect the integrity and functionality of its business systems. The National Nuclear Safety Administration requires the exercise annually.

"The Contingency Planning for Business Systems Drill is vital, not just for compliance purposes, but to ensure continuity of business operations in the event of a disaster," said the Lab's chief information officer, Thomas Harper.

The exercise allowed participants to build emergency response skills by playing out a fictitious scenario wherein a malicious insider had corrupted the Lab's Oracle system. Critical services and activities, such as employee payroll, security badging, staff information systems, and accounts payable, were jeopardized.

Monique Sanchez of Emergency Planning and Preparedness coordinated the drill at the Laboratory's Emergency Operations Center. "We discussed how emergency operations would operate without these important systems," she said.

The scenario was based on real events, Leschnitzer added. "New Mexico Tech recently had funds diverted to false but legitimate-sounding bank accounts," he said. "And the City of San Francisco's network was hijacked for months by a malicious insider."

About 70 participants and observers from the Associate Directorate for Business Services, Associate Directorate of Engineering, Chief Financial Officer, Information Resource Management, Cyber Security Incident Response Team, Communications and Government Affairs, Emergency Response, Security, Desktop Support, Los Alamos Site Office, National Nuclear Security Administration, and Sandia National Laboratories attended the event.

— Tatjana K. Rosev

Monique Sanchez and Dale Leschnitzer prepare an emergency exercise.



Richard C. Robinson

Spotlight



Sandra Valdez

One of Elisa Enriquez' favorite relaxation techniques is yoga.

degree in social work from the University of North Carolina, Chapel Hill and a bachelor's degree in psychology from the University of Central Florida.

Enriquez has extensive experience in cognitive-behavioral therapy and in interpersonal skill building, such as assertiveness and anger-management training. Working at the EAP allows her and the other counselors to provide Lab employees with a plethora of free and confidential counseling services, she said. "Some people have the perception that EAP counselors help primarily with mental and behavioral conditions, but that's not so," Enriquez said. "A big part of the counseling we do is helping people build skills to enhance their work experience, nurture relationships in the workplace and at home, and manage stress."

Stress-relieving techniques include biofeedback, taught by James Barber, and classes, such as "Dealing with Stress During Uncertain Times," taught by Amy Anderson.

While experienced in longer-term therapy, Enriquez said she particularly enjoys conducting solution-focused and brief therapies that enable clients to identify problems and come up with practical solutions in 10 sessions or less.

Prior to joining the Lab, Enriquez worked as a psychotherapist with Los Alamos Family Council and as a behavior therapist in Santa Fe. She relaxes by doing yoga, hiking, singing, and listening to the sound of water.

Contact Enriquez at 7-9676 or elisae@lanl.gov by e-mail.

— Tatjana K. Rosev

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