LOS ALAMOS NATIONAL LABORATORY

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November 2008

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Los Alamos NATIONAL LABORATORY EST. 1943

My View

Emergency operations at Los Alamos

Sandra Valdez

Recent events throughout the country—especially those triggered by severe weather and wildland fire conditions—have demonstrated the importance of emergency management. Here at Los Alamos, the Emergency Operations (EO) Division is a critical part of the Laboratory's emergency management program and represents the linkage between Laboratory employees and our first responders, including emergency managers and incident commanders, the Hazardous Devices Team, Hazmat, emergency medical services, and fire, police, security, and safety personnel.

Managing the program is challenging, because emergency response at the Laboratory is complicated by the size, scope, and diversity of its nuclear, chemical, biological, and hazardous material holdings. Critical to emergency management is the development and implementation of protective actions that would have to be performed during an actual emergency.

A sound emergency-management program consists of trained and experienced personnel capable of preparing for a disaster before it happens and providing disaster response and recovery. Laboratory emergency responders and other emergency personnel must be skilled in all areas of fire protection, handling hazardous materials, emergency response, and event mitigation. When not responding to actual emergencies, EO personnel are proactively involved in pre-emergency planning and nonemergency consultation to help reduce the potential for or severity of future emergencies.

This last fiscal year has been a very busy and successful one for our organization with a great deal of program development, which included completing the Department of Energy Corrective Action Plan; ensuring that our EO Program was compliant with the DOE order; identifying and mitigating risk through hazards surveys and emergency-planning hazards assessments; improving staffing levels, training, and qualifications; enhancing the Wildland Fire Program; implementing formality of operations that encompasses accurate and controlled policies, procedures, and implementation plans; and integrating emergency management into Lab facilities using the LANL deployed model.

Emergency management is a continuous process that requires hazards analysis, training, coordination, and practice. Our recent full-scale, full-participation exercise was a case in point. It involved a simulated terrorist attack and included members from SOC-Los Alamos, the Lab's protective force; the Security and Safeguards Directorate; the Los Alamos Police Department; and the FBI. The Laboratory received positive comments from the DOE evaluation team on the exercise planning package, complexity, and response capability.

Being prepared for an emergency or a disaster allows the Laboratory to respond more effectively and recover faster, but the Laboratory's emergency management program is not only for Laboratory employees. It also is intended to protect our facilities, our community, and the environment.

—Tony Stanford, Emergency Operations Division leader

About the cover: Joseph Palmer, a student at the Laboratory and doctoral candidate at Brigham Young University, looks at the cube sat on which he and team members in Space Data Systems are working. See page 4 for story. Photo by Richard Robinson

Koller appointed Journal of Geoscientific Model Development editor

Josef Koller of Space Science and Applications has been appointed topical editor of solar-terrestrial sciences for the *Journal of Geoscientific Model Development*. This international scientific journal, published by the European Geosciences Union, is dedicated to the description, development, and benchmarking of numerical models of the Earth system and its components.

The journal follows an innovative two-phase publication process. In phase one, papers are rapidly peer reviewed, published on the journal Web site, and subjected to a public discussion by members of the scientific community. In phase two, the peer review process is completed, and if accepted, the final revised papers are published in the main journal. For more information on the journal, go to *http://www.geoscientific-model-development.net*.

James E. Rickman

LANSCE's Hurd receives ESGR Patriot Award

Ralph Damiani, right, publisher of the *Los Alamos Monitor* newspaper and chairman of the Los Alamos Chapter of Employer Support of the Guard and Reserve, presents the ESGR Patriot Award to Alan Hurd of the Lujan Neutron Scattering Center for support of Laboratory employee Melvin Borrego's recent tour of military duty in Iraq. The ESGR is a Department of Defense organization that strives to develop and promote a culture in which all American employers support and value the military service of their employees.

"It is appropriate for the Lab to look after its employees who are citizen-soldiers who have served their country," Deputy Laboratory Director Jan Van Prooyen told Los Alamos Neutron Science Center employees.

Chalmers recognized for local business support

Acquisition Services Management Division Leader Kevin Chalmers recently was recognized for his contributions to minority entrepreneurs, corporations, and advocates in Northern New Mexico by the U.S. Department of Commerce's Minority Business Development Agency.

Chalmers was named the regional award winner in the Business Advocate Award category.

Herrera gets top coach honor at Santa Fe High

A.J. Herrera of the Chief Financial Officer Division recently was named coach of the year at Santa Fe High School. Herrera is a financial business analyst in CFO Division. He also is the boy's soccer coach at Santa Fe High, a position he has held since 2007.

Herrera came to the Laboratory as a graduate research assistant in 2004, becoming a staff member in 2006 after earning a master's degree in business administration from the College of Santa Fe. Herrera previously coached junior varsity soccer at Los Alamos High School.

Sandra Valdez

David Bracken

Bracken elected deputy chair for DOE technical support group

David Bracken of Safeguards Science and Technology has been named deputy chair of the newly formed Department of Energy Nondestructive Assay Technical Support Group. The group will provide operational and technical advice to the DOE's chief of nuclear safety and help the department meet the Defense Nuclear Facilities Safety Board's Recommendation 2007-1 for Safety-Related In Situ Nondestructive Assay of Radioactive Materials. It also will provide programmatic advice on the development of nondestructive assay holdup measurement programs at National Nuclear Security Administration and emergency management sites and assess NDA holdup technology ("holdup" refers to the nuclear material deposited in the equipment, transfer lines, and ventilation systems of processing facilities). It also will identify major issues and act as a forum to share ideas and ensure that NDA advances are implemented.

Joseph Palmer, left, and Michael Caffrey of Space Data Systems discuss a cube sat constellation.

Thinking inside the box

Cube sats revolutionize space science

When computers were first developed, they took up entire rooms, cost millions, and offered limited access. Sixty years later, ultra-portable notebook computers are reasonably priced and slip neatly into a backpack.

Satellites are undergoing a similar transformation. Infinitely smaller, the newest space orbiters, called cube sats, measure just 10 x 10 x 10 centimeters—about 5 inches per side—and weigh about 1 kilogram, or 2.2 pounds.

Cube sats are tiny powerhouses crammed with off-the-shelf electronic components. Although they won't put traditional satellites with their larger capabilities out of business anytime soon, and, in fact, rely on larger orbiters to boost them into space, cube sats are big enough to deploy small-scale science missions into space faster and more cheaply than anyone ever imagined.

"Cube sats are the laptops of satellites," said Michael Caffrey of Space Data Systems (ISR-3), whose group, together with two students from Brigham Young University, is preparing the Laboratory's first cube sat for launch in 2009.

The collaboration between the Laboratory and the academic world is a win-win situation for everyone, added Dan Holden of Nuclear Nonproliferation. "The students gain valuable experience designing payloads, setting up ground stations, launching and 'talking' to the satellite, and collecting data," he said. "And the Lab helps bright young people, who may later come to work here, to do innovative space science." Collaborations with the University of New Mexico, New Mexico State University, and the University of Michigan are planned, he said.

Tiny satellites were first conceptualized about five years ago by researchers at California Polytechnic State University and Stanford University, who realized how much space—about 30,000 kilograms of launch capacity—was going unused on U.S. satellites and military rockets every year, Caffrey said. Thrilled by the prospect of using that space to beam up hundreds of little science projects, universities and private companies began custom-building tiny satellites by filling standardized cube-shaped frames with electronic components from digital cameras, microprocessors, cell phones, and Global Positioning System (GPS) units. "The students really got excited, wanted to throw a ground station on the roof of every university," Holden said.

Students at ISR-3 are testing components for compatibility and capability, Caffrey said. And findings from such tests are often shared. "This is a very open architecture," Holden said, noting that researchers are blogging about their experiences, which improves product quality and makes prices more competitive. "Outfitting traditional satellites with a scientific payload often costs billions of dollars," he said. "Now we can have something up in space and 'talk' to it for around $100,000."

Cube sats are revolutionizing accepted paradigms in space science, Holden said. "Traditionally, scientists began by designing the payload and then worrying about how to get it into space," he said. "Often, mission problems got solved the lazy way—with more power." Cube sats' space constraints challenge researchers to think "inside the box," he said.

Launch times are getting faster, too. "Before, getting a payload on a rocket would take years, making it a nonstarter for students whose time is limited," he said. "But now, you can jump on a rocket in a matter of months."

While individual cube sats have lower capabilities than larger orbiters, as wide-array constellations they can collect and combine data to better understand large-scale phenomena like space weather, Holden said. And if one satellite does not function, the reliability of the entire system is not compromised, he noted.

"Cube sats are useful for national security because they're more difficult for the enemy to detect and destroy," said Joseph Palmer, a BYU doctoral candidate in ISR-3. "They're also great for prototyping new systems, and there's less financial risk for backers, so more innovations get funded."

While cube sats are new, scientists have been doing space satellite research for decades, Palmer said. "There's world-class expertise at the Lab. And there's a lot of support for students—you don't often see that in the industry," he said.

—Tatjana K. Rosev

"Cube sats are the laptops of satellites."

Photos by Richard Robinson

A cube sat is being prepared for launch.

Laboratory honors two with prestigious Los Alamos Medal

Editor's note: Laboratory Fellow Robert Cowan and former Laboratory Director Sig Hecker are recipients of the 2008 Los Alamos Medal, the institution's most prestigious award.

Established in 2001, the Los Alamos Medal is the highest honor the Laboratory can bestow upon an individual or small group. Laboratory Director Michael Anastasio will present the medals to Cowan and Hecker during a formal awards ceremony and reception.

Illuminating a new path to atomic physics

Laboratory Fellow and 2008 Los Alamos Medal recipient Robert D. Cowan has had an illuminating career. Literally.

Cowan is known internationally and respected as the father of atomic structure calculations. During his nearly 35-year association with the Laboratory, Cowan developed methods for determining the spectra of different atomic species. His book, *The Theory of Atomic Structure and Spectra*, published in 1981, still is in use today.

Robert Cowan

In the mid 1960s, Cowan became the first person to use a computer to calculate atomic spectra—the unique photon wavelengths associated with particular ionization states of atoms. At that time, a British scientist approached him about interpreting spectrographic images of the sun that had been obtained by rockets traveling outside Earth's atmosphere.

Because the atmosphere absorbs light in the ultraviolet region, this portion of the solar spectrum had never been observed before. Scientists were interested in determining what elements were responsible for the part of sunlight blocked by the atmosphere. The spectrographic images revealed several previously unseen bands of light. Cowan raced a team of British experimentalists to determine which atoms were responsible for the lines. His calculations led him to assign the spectral lines to three different ionization states of iron. But the British team published its results first.

Nevertheless, "the field of atomic spectroscopy certainly had changed with these calculations," Cowan said.

After his achievement, Cowan's renown prompted researchers from around the world to query him about spectrographic problems of all kinds.

"Those were days before e-mail, so our dialogues were done by letters, sometimes many of them," he said.

His willingness to provide his computer codes and assist researchers gave Cowan the reputation as an invaluable mentor and allowed him to travel to England, the Netherlands, Sweden, China, and the former Soviet Union to collaborate with researchers.

Outside the Lab, Cowan sought to see the light a different way: through mountain climbing. He has climbed every 14,000-foot peak in Colorado and once took a three-week trek through the Himalayas. That expedition allowed him to reach an altitude of 16,500 feet within 15 miles of Mt. Everest. Probably few on that expedition realized that the soft-spoken physicist had used a computer to see something in sunlight they would never see with their own eyes, even at such a breathtaking height.

Plutonium, actinides—a life-long passion

Many Laboratory employees have a deep respect and admiration for former Director Siegfried "Sig" Hecker. And not surprisingly, the feeling is mutual.

Currently codirector of the Center for International Security and Cooperation at Stanford University, Hecker recently was awarded the 2008 Los Alamos Medal, the Laboratory's most prestigious award.

"I am delighted and honored to receive the Los Alamos Medal," said Hecker, who headed the Laboratory from 1986 to 1997 and is now director emeritus. "My thanks go to all the terrific people with whom I had the pleasure of working during my 34 years at Los Alamos. The Lab and its people continue to hold a special place in my heart."

Hecker said he came to the Lab three times—as a student, a postdoc, and a staff member. "I spent my honeymoon at Los Alamos as a summer graduate student in 1965," he said. "I had not expected to return, because my lifelong ambition was to be a university professor. However, the Lab was such a fantastic place to work that I wound up postponing the professorship for 37 years until I joined Stanford University in 2005."

His research years at Los Alamos were stimulating, Hecker said. "I came to work on typical metals but became fascinated by plutonium and the actinides," he recalled. "It turned into a life-long passion."

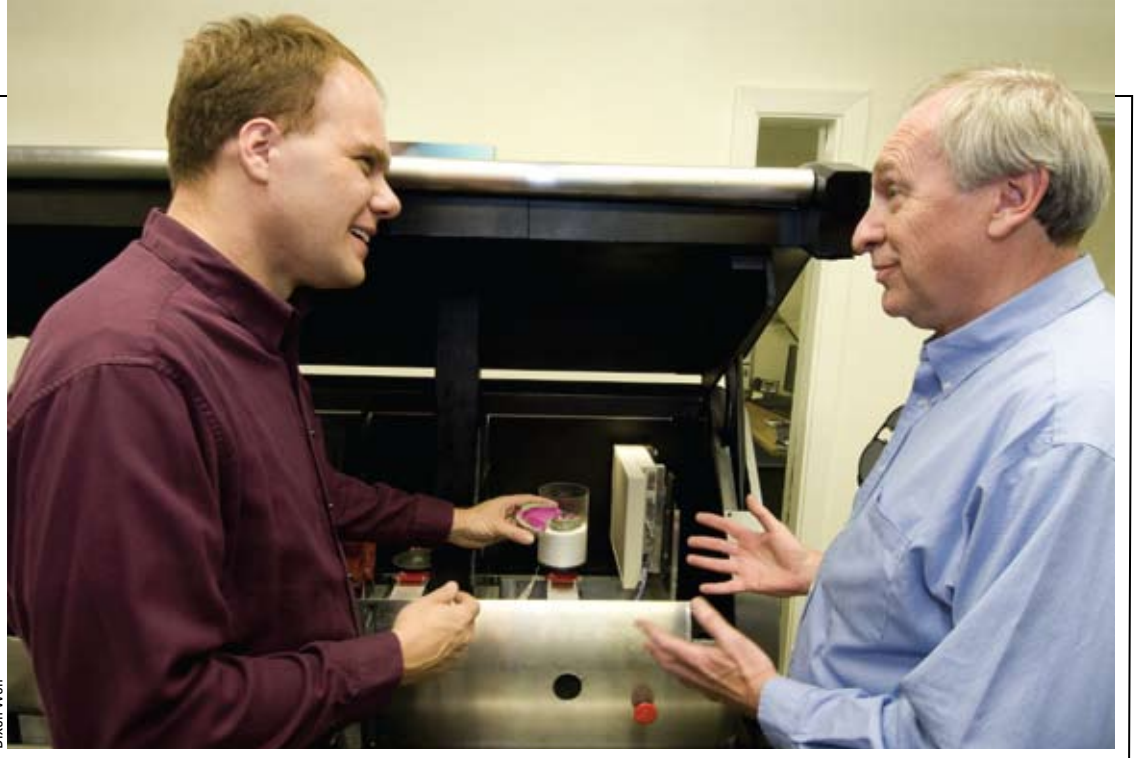
Hecker led the Laboratory at an exciting time in history. "I had a front-row seat on a rapidly changing world," he said. "When I took over in January 1986, we were at the tail end of the Reagan defense buildup to hold back what he termed the 'evil empire.' " The collapse of the Soviet Union changed the nature of the nuclear threat and the Laboratory's role dramatically. "We had the job of redefining the role of the weapons laboratories in the post-Cold War world," said Hecker.

Sig Hecker

For the past 20 years, Hecker, a senior fellow at the Freeman Spogli Institute for International Studies at Stanford, has divided his time between the science of plutonium and its societal impact. He also is a member of the National Academy of Engineering, a Fellow of the American Academy of Arts and Sciences, and a foreign member of the Russian Academy of Sciences, among other professional accolades.

Photos by LeRoy N. Sanchez

Stories by James E. Rickman and Tatjana K. Rosev



Tony Davis, left, of Imtec-3M demonstrates to Thomas Claytor of Applied Engineering Technology-6 some features of the third-generation Flash CT scanner, such as the iPhone like interface and rapid 3D reconstruction.

Dixon Wolf

Straighten up and smile right!

Lab technology simplifies fitting braces

Custom-made nearly invisible teeth aligners are improving people's smiles thanks to Laboratory technology. To date, more than a million Invisalign® clear plastic braces have been produced, and 2,500 patients are scanned daily for fittings using FlashCT (computed tomography) technology.

Originally developed to provide high-resolution 3D images using nondestructive means, the R&D 100 Award-winning technology matured via a Cooperative Research and Development Agreement between the Laboratory and IMTEC (then HYTEC).

In January 2002, a company called Align began using FlashCT scanners as part of the production of Invisalign, which are designed to gradually move teeth using a series of aligners that address crowding, spacing, and bite issues.

"Invisalign cold called HYTEC to investigate the use of FlashCT for its product. Originally employees took impressions, cast these in plastic, and machined thin layers off the cast material while taking photographs to produce a 3D image of the impression. This time-consuming, wasteful process was replaced by a simple 3D CT scan using FlashCT," explained Tom Claytor of Applied Engineering Technology-6, principal investigator for the FlashCT project.

Tony Davis, initially a Laboratory technical staff member on the FlashCT project, is now IMTEC's vice president of radiographic imaging systems engineering. In addition to its use in the medical community, he said there is a demand for the technology in industry.

"We've built systems ranging from small tabletop designs to large, multimegavolt systems used in Department of Energy facilities," Davis said. "Many government and commercial organizations have standardized on FlashCT as their solution for computed tomography inspection."

The technology is used at the Laboratory as well to image everything from classified parts to rocket motors and rocks, according to Claytor.

"The installed base of FlashCT machines for industrial and scientific use now is approaching 400 units, making it the most successful industrial and scientific CT machine," he said.

Though acquired by 3M in July, 40 of IMTEC's 250 employees call Los Alamos home.

"The ability to stay in Los Alamos near the people and culture that create the innovations that drive our company's success is a rare privilege," Davis said. "The Laboratory remains an important center of technical excellence, and that culture bleeds out to companies fortunate enough to locate in this county."

—Mig Owens

LANL Star uses award as opportunity to mentor young staff members

For Evgenya Smirnova of High Power Electrodynamics, one of the most rewarding aspects of her work at the Laboratory is mentoring postdocs, and she draws upon her experience as a mentoree when relating to young researchers.

Smirnova came to Los Alamos five years ago as a graduate student in the former High Power Microwave, Advanced Accelerator, and Electrodynamic Applications group. Since then, she has made numerous contributions to the science world that culminated in her being named a LANL Star by the Women's Diversity Working Group.

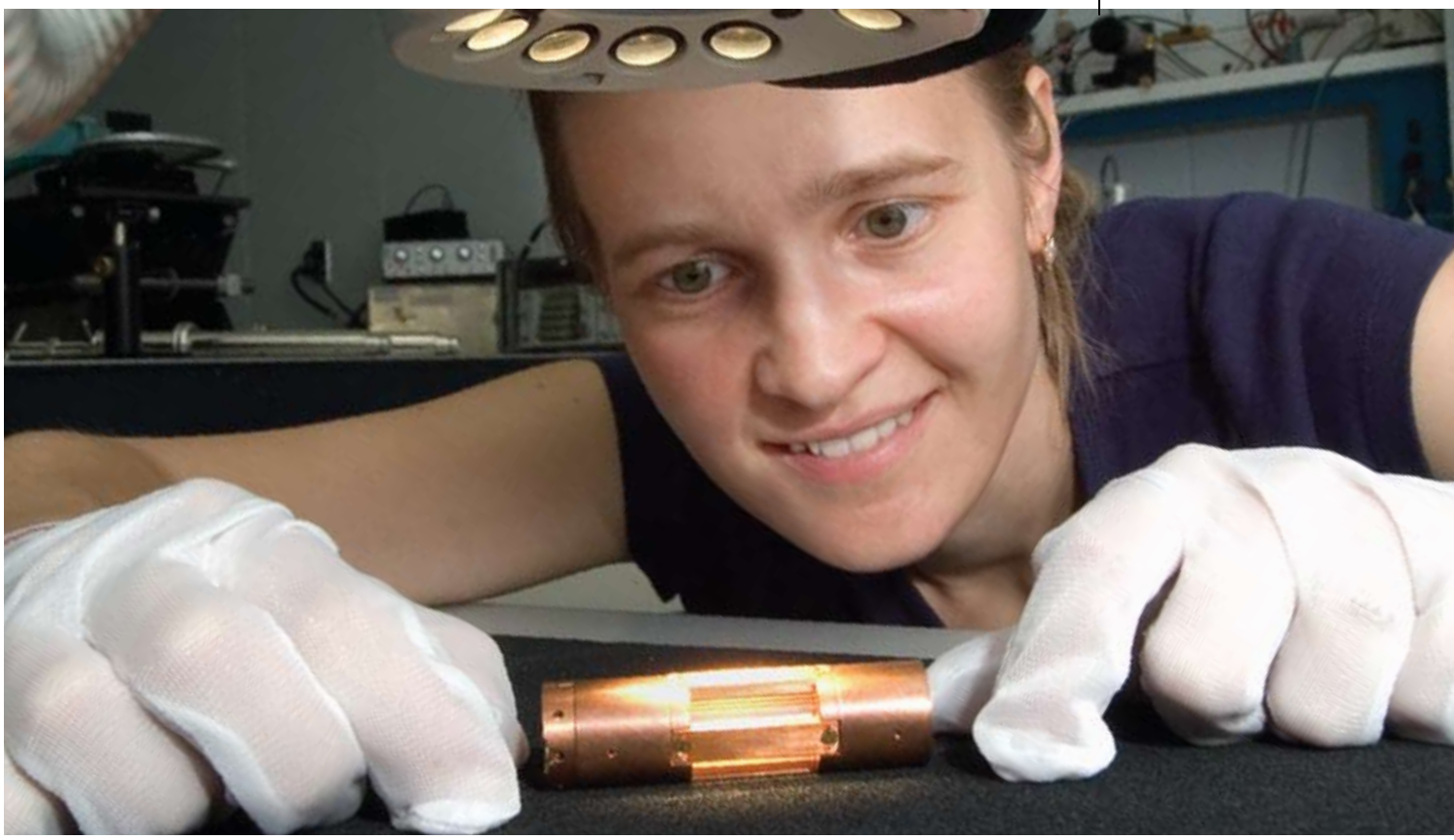
Smirnova feels that winning the award will help enhance her mentorship role. "It's wonderful to be recognized and supported by the Laboratory," she said. "Being named a LANL Star offers me greater opportunities to do good science and serve as a mentor to younger people. I think that it is a very important part of my job to teach younger people how to do good science."

Smirnova's work plays a vital role in national security and entails developing new concepts for threat reduction applications. "I think all my projects are important," Smirnova said. "I am finding more and more real-life applications for the photonic band gap structures. These are new, artificially engineered materials made in the form of periodic structures—for example, a structure of dielectric rods. I have to admit that I did not trust in photonic band gap structures that much when I started at the Laboratory, but the help of my supervisors and the support of my peers in the group helped me realize the potential of my ideas."

Smirnova said she works with wonderful people in an exciting area of science. Collaborating with students and serving on new research teams every year keeps her on her toes, she said.

"I am a part of a very entrepreneurial group, and starting a new project every year that tests new concepts is so exciting," Smirnova said.

—Erika Martinez and Tatjana K. Rosev



Dixon Wolf

Evgenya Smirnova of High Power Electrodynamics studies a photonic band gap traveling-wave tube structure.

Notebook

Safety short: Traffic safety children's poster video

Twenty-one children from Laboratory families donated their talents and created traffic safety posters to help Lab employees take care of each other. These posters now are available on an animated video with narration. Go to *http://int.lanl.gov/safety/safetyshort/traffic/video.mpg* to view the video.

Charging-practices guidance

All employees must understand their responsibilities for charging for their time and other project costs. The Charging Guidance Web site offers information to assist employees in understanding the various policies that address specific charging situations. Go to *http://cfo.lanl.gov/Budget/ChargingGuidelines/definitions.shtml* to access the site.

Information required for badge pick up

Workers scheduled to pick up new security badges must bring a copy of the *HSPD12Admin@eds.com* e-mail (Subject: USAccess — Credential Ready for Pick Up). The e-mail contains an initialization personal identification number (PIN) to activate the new badge. It will take longer to activate the new badge without this PIN. For more information, go to *http://int.lanl.gov/security/newbadge/process.shtml*.

Political activities on Lab property prohibited

Distributing campaign brochures, putting up posters, and installing signs are prohibited on Laboratory property, which includes publicly accessible but DOE-owned roads (for example, the Truck Route or West Jemez Road). Those who violate this policy will be escorted off Laboratory property by Protective Force officers. For more information, go to *http://policies.lanl.gov/pods/policies.nsf/MainFrameset?ReadForm&DocNum=AM709&FileName=am709.pdf*.

Benefits Open Enrollment scheduled in November

Benefits Open Enrollment is scheduled for November 3 through 21. Medical premiums will remain at 2008 rates. Life and disability rates will decrease. Medical plans will remain the same for 2009. Employees who don't make any changes to their health and welfare benefits will maintain 2008 coverages in 2009. Re-enrolling in the Flexible Spending Account is required to continue the benefit. For more information, go to *http://lanl.gov/worklife/benefits/open/index.shtml*.

New Web page highlights Lab's education resources

The new Community Programs Office education Web site (*http://community.lanl.gov/source/orgs/cpo/education_programs/*) is now online with links and information for Laboratory staff, regional educators, and students.

The Web site provides information about the Laboratory's kindergarten through college education programs and partnerships in the areas of science, technology, engineering, and math.

The site includes links to information and resources in key education areas such as workforce development, student pipeline programs, teacher and faculty development, professional development, and lifelong learning. There are links to the Lab's education programs and partnerships, the Bradbury Science Museum, and Los Alamos National Security, LLC's education sponsorships.

There also is a link to the Laboratory's science education community service time page for employees interested in education outreach in the areas of math and science.

November service anniversaries

Find the November service anniversaries online at *http://int.lanl.gov/news/currents/2008/nov/anniversaries.shtml*.

In Memoriam

- Paul Morgan Dugan, 86, died August 10
- George Herbert Pimbley, 86, died August 14
- Carl W. Buckland Jr., 86, died August 16
- William Aaron Beyer, 83, died August 16
- Robert Emmett Kelly, 78, died August 25
- James Duffy, 76, died September 22

Deliver improved business processes, systems, and tools that meet the needs of our employees, reduce the cost of doing business, and improve the Laboratory's mission performance.

2009 supplemental disability and life insurance premiums lower for majority of enrollees

The recent rebidding of the Laboratory's disability and life insurance contracts has paid off for employees. Benefits Design and Administration (HR-B), the key player behind the successful rebidding outcome, projects that some employees will save as much as 77 percent, depending on the exact coverage and the enrollee's age group.

For some disability and life insurance choices and age groups the savings will not be as great, and a few options and age brackets will experience rate increases. In the aggregate, enrolled employees will save a combined total of 32.22 percent in insurance premiums across the various supplemental options and age categories, as Laboratory Director Michael Anastasio suggested in the all-employee memo of September 10 (*http://int.lanl.gov/memos/2008/09/LANL_EMP182.pdf*).

The lower disability and life insurance premiums for most enrollees are just part of other positive financial news for employees. Despite rising medical insurance premiums nationwide, participants in the Laboratory's medical plan will pay the same medical rates in calendar year 2009 as in 2008, thanks to effective contract negotiations between HR-B and the Lab's medical insurance carrier, United Healthcare. By comparison, enrolled Laboratory employees experienced an average medical premium increase of 8.3 percent in 2008 and 10.9 percent in 2007. The life, disability, and medical premium good news is further complemented by the fact that individuals qualified to receive fiscal year 2008 merit increases will benefit from the largest salary increase authorization awarded by the National Nuclear Security Administration in several years.

"In a time of never-ending inflation, from health-care costs to fuel prices, it pleases me that the Benefits Administration group has been diligent and successful in its ability to avert any increase of health-care premiums paid by our employees," said Doris Heim, associate director for Business Services. "Not only that, Benefits has secured rate reductions in the employee premiums for both disability and life. This is a huge win for the employees of the Lab," said Heim.

To review the 2008 medical insurance rates, which will apply to 2009, employees can access the online premium chart at *http://int.lanl.gov/worklife/benefits/health/premiums_08.shtml*.

Enabling Lab innovation into the marketplace

Sandra Valdez

Vlad Matias of the Superconductivity Technology Center shows Steve Girrens, right, the ion-beam-assisted deposition system for continuous processing of long-length tape used in the deposition of high temperature superconducting films.

A self-described "innovation ambassador," Steve Girrens heads the Laboratory's primary portal for partnering with industry—reaching out to corporations and reaching in to Laboratory personnel to match and leverage industry needs with Lab capabilities.

He recently returned to the Lab as Technology Transfer (TT) Division leader after two and a half years at ARES Corporation. His return, he said, was motivated by "the opportunity to work with a group of very talented people who are passionate about their success for a noble cause; namely, trusted partnership catalysts."

Before ARES, Girrens was at the Lab from 1979 to 2006, joining Los Alamos as a staff member in the energy-focused Q Division and eventually leading the Engineering Sciences and Applications Division. During that time, he acquired diverse experience as an engineering analyst and manager developing and applying engineering technologies to solve problems in energy and defense.

"Steve has a unique combination of experience as a technical leader in the weapons program and in business development in the private sector. He also has demonstrated a sustained commitment to community service and economic development," said Duncan McBranch, Science, Technology, and Engineering Directorate deputy principal associate director.

One of the first staff members to work to understand, explain, and promote Cooperative Research and Development Agreements (CRADAs), Girrens aims to increase CRADAs in his new role.

"CRADAs are the sweet spot for accomplishing open innovation with industry," he said. "TT has been assisting the Laboratory achieve significant growth in CRADAs and nonfederal Work-for-Others, which combined doubled over the last two years. Both of these activities bring industry research dollars into the Lab totaling $36 million in fiscal year 2008."

Girrens, who holds bachelor's and master's of science degrees from Wichita State University and a doctorate from Colorado State through the Laboratory's Advanced Study Program, reports two successes since his return.

First, line management is being re-engaged in selecting and crafting the Lab's intellectual property portfolio. Second, TT has selected the Verge-ARCH team as partners on the Venture Acceleration Initiative aimed at spinning off new technology-based companies from the Laboratory in Northern New Mexico.

—Mig Owens

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