

LOS ALAMOS NATIONAL LABORATORY **CURRENTS**

Michael C. Meigs Center
For Teaching & Research

April 2008

***A supercomputing throw down
Artifacts, structures, and sites ... oh my!
Problem-solving ace
Linking up to stop jaywalking***

My View

Actinide Center concept pushes science to next frontier

As part of the complexwide preferred alternative announced by the National Nuclear Security Administration in December, Los Alamos National Laboratory will take a leading role in actinide research. Actually, it may be more accurate to say Los Alamos will continue in its leading role as actinide center of the complex.

Since the days of the Manhattan Project, actinide science has been central to the Laboratory's mission. The research span of actinide science goes from materials science to fundamental physics and chemistry to advanced modeling and simulation on the world's most powerful supercomputers, like the new Roadrunner petaflop platform.

There has been lots of discussion on what it means to be the "plutonium center" and whether this means strictly pit manufacturing. Frankly, the center of excellence is about actinide research and development, including manufacturing. The research will include everything from nonproliferation applications to next-generation nuclear power and methods for effectively reducing and containing the waste products that come with it.

Despite the Laboratory's 60-year relationship with the actinides, there still are many facets that we do not understand. For example, uranium and plutonium are relatively reactive materials; we still do not have a good understanding of corrosion in uranium. The actinides, this set of elements at the end of the Periodic Table, is a fascinating science opportunity. The electron structure of materials like plutonium gives us a great place to explore the next breakthroughs in superconductivity. John Sarrao (Science Program Office) has shown that plutonium-based superconductors provide exciting possibilities, and David Pines (Materials Physics and Applications) and his colleagues recently opined in *Nature* that actinides might allow superconductors to work at room temperature—the "Holy Grail" of lossless energy transfer and storage.

We are going to be looking at actinide materials on a broad range of scales (both time and distance). In particular, we are interested in bridging "the micron gap." The micron gap is the next frontier of science here and bridges material understanding from the atomic to the bulk scale.

To that end, the Laboratory will create a signature facility called MaRIE (Matter-Radiation Interactions in Extremes) at the Los Alamos Neutron Science Center for use by researchers from around the world. In this facility, materials, including actinides, will be probed and characterized at the micron scale.

The Laboratory's future is one in which world-class scientists will gather in world-class facilities like MaRIE to collaborate on problems of international importance. Like we have seen during the past 60 years, the Laboratory's mission will continue to enable fascinating, relevant, cutting-edge science for the benefit of humanity.

—Terry Wallace, principal associate director for Science, Technology, and Engineering



About the cover: David Kratzer of High Performance Computer Systems talks with students who are participating in the 2008 Supercomputing Challenge outside the Nicholas C. Metropolis Center for Modeling and Simulation. From left to right are Los Alamos Middle School students Steven McCrory, Rachel Robey, and Nadine Sanchez. See Page 4 for story. Photo by Dixon Wolf

Belangia named IST Division leader

David Belangia is the new Information Systems and Technology (IST) Division leader. Belangia has more than 30 years of experience as an information technology professional. Before joining the Laboratory, he was the chief information officer at the Nevada Test Site. He has been serving as the acting IST Division leader and previously was the deputy division leader.

Gray to serve on NMA board

George T. "Rusty" Gray of Structure/Property Relations has been selected to serve on the National Materials Advisory Board, an organization of the National Academies. The National Materials Advisory Board is the pre-eminent source of independent materials assessments for the nation. Gray is a Laboratory Fellow and a fellow of the American Physical Society and ASM International.

Choi receives young scientist award

Sukgeun Choi received a 2008 Young Scientist Award at the 35th Physics and Chemistry of Semiconductor Interfaces Conference held recently in Santa Fe. The awards are given to junior scientists, including graduate students and postdoctoral researchers to encourage their continuing studies on surface and interface of solid-state materials.

Choi is a postdoctoral researcher in the Center for Integrated Nanotechnologies and received his bachelor's

and master's degrees in physics in 1995 and 1997, respectively, from Kyung Hee University, Seoul, South Korea. In 2006, he received his doctorate in materials science and engineering from the University of Minnesota, where he explored the unique growth mechanism of rare-earth group-V compounds on III-V semiconductors in molecular beam epitaxy. He joined the Laboratory in April 2006 and is working on synthesis of semiconductor nanowires under Tom Picraux's supervision.

Before coming to the United States, Choi also worked at the Korea Institute of Science and Technology in Seoul as a research associate.

Steinhaus named CPO director

Kurt Steinhaus is the new Community Programs Office (CPO) director. As director, Steinhaus will lead CPO as it supports the Laboratory's investment in regional education, economic development, and community giving. Steinhaus brings extensive experience in education to the Laboratory, having recently served as Education Policy advisor for Governor Bill Richardson and deputy cabinet secretary of education. Before that, he served as the Laboratory's program manager for the Education and Postdoc Office in the Science and Technology Base Programs Office.



Tonya Grace

Richard Robinson

Grace certified as Lab's first LSS Black Belt

Tonya Grace of Process Management and Continuous Improvement became the first Black Belt to certify under the new Los Alamos National Security, LLC Lean Six Sigma program. To become certified, she went through months of intensive training and successfully completed performance improvement projects.



David Kratzer at a Supercomputing Challenge poster session with then Albuquerque Bosque School students Kelly Dickey, Tristan Wright, James Scantlen, and Chloe Williams.

A supercomputing throw down *students step up to challenge*

When you love what you do, sometimes you just can't help wanting others to share your passion.

David Kratzer of High Performance Computer Systems knows firsthand how true this is. He has combined his affinity for computers and love of teaching to motivate and inspire thousands of New Mexico students to turn on to computing, science, and math.

Kratzer is the Laboratory's Supercomputing Challenge coordinator, and it's a role he relishes. Started in 1990, the Challenge is a yearlong immersion into the world of high-performance computing that pairs scientists with teams of middle- and high-school age student teams. Over the years, it has become quite the success story.

"When the Challenge was created, I was right there," said Kratzer, who had a long-time involvement with teaching math and computer science at the college level before joining the Lab in 1984. "It was natural for me to step in. I really enjoy helping people.

Part of my job at Los Alamos is helping the scientists who use the Laboratory's supercomputers.

"I also see my role through the Challenge as helping students reach their potential as future scientists," explained Kratzer. "I want to see the students succeed. There's potential in everybody, and we want to give them a positive outlet for that potential."

Kratzer recalled two especially promising Challenge students. One was Agbeli Ameko of Albuquerque Academy, who won the competition's top prize in 1993. Today, Ameko is CEO of a technology company in Colorado. Ameko would likely have won the following year too, according to Kratzer, but he asked that his project not be judged competitively. "He felt he had enough honors," said Kratzer. "He said he didn't need any more recognition."

The other memorable participant was a Springer High School student with a reading disability who entered the Challenge

in 1997 with a project about the roadrunner, New Mexico's state bird. The student's mother helped him prepare his reports, while also encouraging him to see his project through. "The progress the student made throughout the year was dramatic. He went from a student who couldn't read because of a learning disability to a student who prepared and was confident in presenting his report, which included *PowerPoint* slides," Kratzer said.

Fast forward nearly 20 years, and Kratzer is excited that this year there are fifth-grade students in the competition. The Challenge also is working with a program that began in Santa Fe last summer called GUTS (Growing Up Thinking Scientifically), which is targeted at middle-school students. GUTS will have an expo in conjunction with the Supercomputing Challenge Expo on April 21 at the Laboratory. "We hope to have it feed into the Challenge," said Kratzer.

No rest for the weary

Even in the summer, Kratzer and his Challenge assistants are busy working with related projects, such as the two-week Summer Teacher Institute at one of the universities that supports the program. Teachers go through a mini-Challenge project that helps them develop the confidence needed to lead a team during the following school year.

Kratzer also maintains the Supercomputing Challenge Web site (<http://www.challenge.nm.org>). Students help with the site, which frees up Kratzer for other Challenge tasks. Volunteers always are welcome to participate in activities throughout the year.

In fact, Kratzer said many Laboratory employees are repeat volunteers. "We even have past Challenge participants return as team mentors and judges while they are still in college," he said. "We have done a few follow-up surveys and found that between 70 and 100 past Challenge participants have been Lab employees."

Many heart-warming success stories have come out of the Challenge, Kratzer added. "It is encouraging to read the scholarship applications and learn about the students. The quality of the winning projects is on par with college graduate-level work. They really are impressive."

Reflecting on the Challenge participants, Kratzer said, "One of my favorite quotes is 'Teenagers are like airplanes. You only hear about the ones that crash.' Well, the Challenge is trying to change that. There are many great kids in New Mexico."

—Steve Sandoval



Photos by LeRoy N. Sanchez

It takes teamwork! Andrew Yazzie, left, Martha Hughes, and Polito Walters of Shiprock High School participated in the 2006 Supercomputing Challenge. Their research project investigated how Russian olive trees are invading native plant species in the Four Corners area.

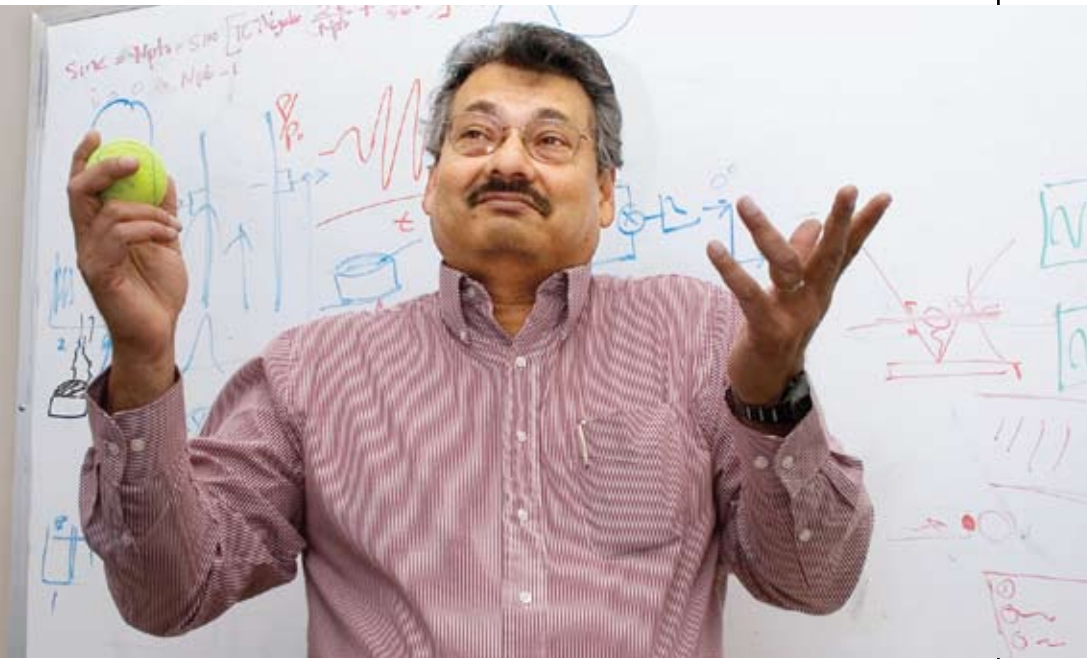
Supercomputing Challenge Expo

The 18th annual Supercomputing Challenge awards expo is April 21-22 at the Laboratory and culminates a year of intense research and project development for 80 student teams.

The goal of the Challenge is to increase knowledge of science and computing; expose students and teachers to computers and applied mathematics; and instill enthusiasm for science in students, their families, and communities. Students also learn time-management skills, how to research a problem, presentations and technical writing skills, graphic and Web page design, and how to work together on a team for eight months.

Any New Mexico high-school or middle-school student is eligible to join the Supercomputing Challenge. For more information, contact Kratzer at 667-2864 or dhk@lanl.gov.

'I want to see the students succeed. There's potential in everybody, and we want to give them a positive outlet for that potential.'



Dipen Sinha of Sensors and Electromechanical Devices

Problem-solving ace *finding solutions is researcher's joy*

The position of “problem solver” is not officially listed on Dipen Sinha’s curriculum vitae, but a quick look at his credentials leaves no doubt that it’s an apt description.

The recipient of numerous awards for his sensor work, Sinha of Sensors and Electromechanical Devices (MP-11) is the principal investigator in two crucial national energy security projects between Chevron Corporation and the Laboratory: noninvasive multiphase flow metering and acoustic reservoir imaging.

“Anyone in any field can come up to me with a technical problem, and if it is challenging enough and fun enough, I want to learn about that new field and solve that problem,” said Sinha. “And I believe every problem has a solution. It may be a difficult solution, but there is a solution.”

This attitude has drawn a diverse set of patrons—from medical doctors to geologists—to Sinha’s door, a situation he finds invigorating. “When they give me a problem to solve, they don’t realize they’ve done me a favor,” he explained.

Some of Sinha’s inventions for industry—Chevron in particular—include a solids flow sensor, which noninvasively detects sand in an oil bore; a device for ultrasonic imaging of particulate matter, which may revolutionize the detection of debris in oil pipelines; and an acoustic flashlight that uses sound waves like a light beam to create images underground (developed in collaboration with Cristian Pantea of MP-11).

The atmosphere at Los Alamos, unlike that at a university or a company, allows exposure to so many diverse research areas, noted Sinha. “It’s one of the joys of working here,” he said.

Always contemplating more challenges, Sinha said his new fascination is how to mimic nature’s functionality with modern or newly invented materials. “Real-life problems are so incredibly challenging and fun,” he said. “They are very, very hard, but they still must be solved, because people need solutions. If life depends on it, we will come up with a solution.”

—Karen Kippen

From simple vision to hot tech transfer

Lab tracking technology yields major commercial success

Who would have thought that the world's leading line of radio frequency identification (RFID) products would spring from the vision of five guys in the humble surroundings of a garage in White Rock, New Mexico. Yet, the technology that these former Laboratory scientists developed and transferred to the public sector is found today in identification tags on railroad cars, shipping containers, and fleets of buses, trucks, and taxis across America.

Gary Seawright, Jeremy Landt, Rand Brown, Al Koelle, and Paul Salazar developed the technology at the Laboratory from 1971 to 1980 for the Department of Energy and Department of Agriculture. The DOE application was to track vehicles and nuclear materials, and the DOA application was to track cattle and monitor their health.

With support from the Laboratory to transfer technology to the private sector in the form of borrowed equipment, permission to alter their work schedules, and assistance with obtaining patent waivers, the scientists founded Animal Management Technology (Amtech) Corporation in 1983.

The company targeted the cattle industry until investor David Cook, a Los Alamos native who founded Blockbuster Entertainment, suggested using the technology to track railroad cars instead. By 1995, Amtech employed about 500 workers and was engaged in a joint venture with Motorola. It subsequently moved its research, development, and manufacturing center to Albuquerque.

TransCore acquired the company in 2000, and today, TransCore's RFID tags are deployed in transportation applications in 39 countries, with wireless toll-collection

systems in use in Florida, Georgia, Texas, Oklahoma, and Hong Kong.

"Going from five guys and a vision to transportation applications in 39 countries is humbling," said Landt, who now serves as TransCore's chief scientist. "While this achievement was probably incomprehensible to us at the time, RFID's sustained commercial success in transportation built a foundation for RFID developments we see today."



Courtesy of TT Division

To date, TransCore has distributed more than 31 million RFID tags and 53,000 RFID readers worldwide.

"Amtech is a prime example of the positive impact technology transfer can have on industries and markets," said John Mott, acting division leader for Technology Transfer. "In this case, while the ultimate commercial value was serendipitous rather than by design, it demonstrates the importance of identifying dual uses for technology developed with federal investment."

—Mig Owens

Radio frequency identification (RFID) tags developed by scientists at the Laboratory were first used in the 1980s to monitor the movement of livestock to help control the spread of disease. Today, RFID tags on virtually every rail car in North America track rail assets, while the technology also is used for wireless payment of tolls in 17 countries.

Focal Point

Artifacts, structures, and sites . . . oh my!

employee helps protect local historic treasures



Ellen McGehee inspects a horno (a beehive-shaped outdoor oven) during a site survey of the Gomez homestead (circa 1899 to 1942), one of several on Lab property that were taken over by the federal government for the Manhattan Project.

For someone who only planned to be in Los Alamos for a couple of years, Ellen McGehee has stayed a long time—24 years. Yet, her stint at the Laboratory is barely a blink in time compared to the archaeological and historical sites and structures she tends as part of her job.

“I came to the Lab in 1984 to work on the excavation and relocation of the Romero Cabin, one of the homestead structures that was on Laboratory property,” said McGehee. “I was planning to spend a couple of years on that project and then go to graduate school. But two years and a few decades later, I am still here.”

Although, McGehee eventually went on to earn a master’s degree in history from the University of New Mexico while working at the Laboratory, she still considers herself an archaeologist. The Cultural Resources Team leader in Ecology and Air Quality, McGehee has spent much of her time on the job surveying, excavating, documenting, and cataloging the history, artifacts, and structures that can be found across the Laboratory. It is a history that spans more than 10,000 years.

“We have a diversity of sites on the Pajarito Plateau that we manage and by law have to protect,” said McGehee. “These include archaeological sites and historic buildings on Lab property dating from the Archaic and prehistoric periods to the Cold War, anything from 10,000 years ago to the early 1990s.”

The work that McGehee and her team have been involved in includes managing numerous prehistoric Native American sites that dot the plateau, such as cave dwellings and ancient pueblo communities similar to those in Bandelier National Monument. The Laboratory team works



Photos by Kari Garcia

with various stakeholders, including area pueblos, government, and historical groups to make sure artifacts and structures on the sites are protected and respected.

“Fortunately, because the Lab has been here so long, the artifacts and sites have been well protected,” said McGehee.

Her team also has worked on stabilizing and restoring some significant sites that originally were part of the Manhattan Project effort to build the atomic bomb. One example would be the award-winning restoration of V Site, a cluster of wooden buildings built in 1944 and considered the birthplace of the “Gadget,” the atomic device detonated at Trinity Site in Alamogordo on July 16, 1945.

Summarizing her tenure at the Laboratory, McGehee said, “In all the years I’ve been working here, I’ve never been bored. Part of the excitement of my job is the knowledge that the cultural resources at the Lab hold tremendous significance, not only for area pueblos and other nearby communities, but for the American people and the world community at large.”

—Ed Vigil

McGehee surveys an old dump site as part of the post-fire documentation of archaeological sites on Laboratory property shortly after the Cerro Grande Fire in 2000.



Appropriate disposal of contaminated sharps

To avoid the improper disposal of sharps, specifically diabetic insulin syringe needles, Occupational Medicine provides Occupational Safety and Health Administration-approved sharp disposal containers. Once the containers are filled, simply close and return them to Occupational Medicine for proper disposal. Contact Michelle Eaton at mceaton@lanl.gov to obtain a sharps container for your facility.

Institutional Web templates updated

Web guidance on the LANL Identity site (<http://int.lanl.gov/commplan/web/>) has been updated by the Office of the Chief Information Officer with new templates featuring a simplified page structure, extra-wide page option, and consistent font display across platforms. In addition, employees now will be asked to use the Code Review Checklist at <http://enterprise.lanl.gov/forms/1969.pdf> before publishing a site to comply with Software Quality Management procedures.

Workstation ergonomic evaluations available

Employees who want an ergonomic evaluation of their workstations can request one by going online to http://int.lanl.gov/safety/ergonomics/eval_track.shtml. Laboratory ergonomic analysts who provide

workstation evaluations take into consideration all physical and engineering factors in order to fit the job to the worker and help alleviate physical stresses.

Experiencing physical discomfort at your workstation? Don't try to ignore it. Stop by the Occupational Medicine clinic at Technical Area 3, Building 1411. An appointment is not necessary Tuesday through Thursday between 2 and 4 p.m. Early reporting and intervention may reduce the severity of an injury or illness.

Ethics training for LANS employees

Web-based ethics training is now available to Laboratory employees, including students, postdocs, and affiliates. The approximately one-hour-long course is required and must be completed by June 30. To take the training, go to <http://int.lanl.gov/training/w-courses/44486/splash-in.asp> online.



Discounted airport parking for employees

The Laboratory has established a corporate account with Airport Fast Park in Albuquerque. Employee travelers may sign up to obtain a Frequent Parker Program card, which ensures a rate of \$3 per day. Card users are guaranteed parking availability and earn points toward

free parking. The card may be used for both personal and business trips. To sign up, go to http://cfo.lanl.gov/travel/reservations/transportation/airport_fastpark.shtml online.

Clearance usage changes

To strengthen and standardize its clearance policy throughout the complex, the Department of Energy now requires the Laboratory and other sites to terminate the clearance of any worker who does not use his or her clearance at least once every 90 working days. For more information, see the March 11 *Daily NewsBulletin* at http://int.lanl.gov/news/index.php/fuseaction/nb.story/story_id/12762/ online.

April service anniversaries

Find the April service anniversaries online at <http://www.lanl.gov/news/newsbulletin/anniversaries>.

In Memoriam

- Robert Keepin, 84, died December 31, 2007
- Manhattan Project Pioneer Theodore "Ted" Magel, 89, died January 3
- William Raies, 93, died January 26
- Warren Howard Adams, 83, died February 3
- Robert "Rogie" Tyson, 87, died February 15
- James W. Myers, 89, died February 21

 *Make safety and security integral to every activity we do*

Linking up to stop jaywalking

new fence will block unsafe road crossing

What started out as a seed of an idea to address an observed safety problem grew into a solution that may help save lives.

Randy Parks of Infrastructure Planning and a colleague were waiting for the Los Alamos Police to finish up their report on a fender bender along a stretch of Diamond Drive between Eniwetok and West Jemez roads in Technical Area 3, when they decided to pass the time counting jaywalkers (individuals crossing the street at locations other than crosswalks).

“We noticed there were several jaywalkers, even with the police present,” said Parks. “I brought it up as a safety share during one of our staff meetings, and it took off from there, with my directorate’s Infrastructure and Site Services saying we really needed to do something about it. They then brought it to the attention of their management.”

Parks and Michael Bodelson, a member of the Laboratory’s Worker Safety and Security Team, worked with their directorate to find a solution to the jaywalking issue.

One solution to the problem was to construct a chain-link fence 400 feet long by 3 feet tall along a stretch of Diamond Drive between Embudo and Eniwetok drives that will direct people to a safer approach to the small parking lot near the steam plant. It also will remove most of the motive for people to jaywalk along that stretch of Diamond Drive, employing one component (engineering) of what Bodelson and Parks call the Three E’s, or three elements, for enhancing traffic safety—engineering, education, and enforcement. As far as enforcement, the Infrastructure and Site Services Directorate has asked the Los Alamos Police Department to give more attention to the jaywalker issue.

The fence will be an addition to other existing pedestrian safety features along that stretch of Diamond Drive, which include a pedestrian tunnel a short distance from the corner of Diamond Drive and West Jemez Road and several crosswalks at the traffic lights along Diamond Drive between West Jemez and Pajarito roads, said Parks.

“We really would have felt bad if we hadn’t moved forward with this plan, and a month or two later someone gets injured or killed jaywalking in that area,” said Parks.

“Our hope is when we talk about safety in the workplace, it is not just about at our desk or in our lab, but everywhere. We hope it’s at home as well,” said Parks and Bodelson.

For information on the Laboratory’s Worker Safety Committee, go to <http://int.lanl.gov/orgs/adsms/wsc/> online.



Richard Robinson

Delfin Romero, right, and Randy Salazar of KSL Services install a section of fencing to prevent people from jaywalking across busy Diamond Drive.

—Ed Vigil



Joe Riedel

It's about taking care of each other

"We have family here. We want to make it safe for them." That's one of the driving forces behind safety-based observation, according to Maryrose Montalvo of Quality Performance.

For Montalvo, safety isn't just another job duty or box to check on a form, it's a way of life. Montalvo is one of the facilitators of the Stockpile Manufacturing and Support (SMS) Directorate's ATOMICS program. ATOMICS is an acronym for Allowing Timely Observations Measures Increased Commitment to Safety.

The key to the ATOMICS program and safety-based observation is simple: "It's a matter of workers taking care of workers," said Montalvo.

Montalvo learned about safety and taking care of others early on. Her late father, Percy Lujan, was a captain in the Los Alamos County Fire Department who routinely practiced safety while fighting fires. According to Montalvo, her father was one of only seven "crash and fire" experts in the nation, and he helped the Los Alamos County Airport obtain its crash and fire certification. Without this certification, the airport couldn't operate, she explained.

Technician Joel Montalvo of Nuclear Materials Science and Maryrose Montalvo, right, perform a hand-and-foot check on monitors before exiting a room in PF-4 at Technical Area 55.

Montalvo and her colleagues in the ATOMICS program are now working with the Lab's Environment, Safety, Health, and Quality Integration Office and Voluntary Protection Program Office to incorporate safety-observation into institutional safety programs. In February, safety experts from around the Department of Energy complex came to the Laboratory to talk about behavior-based safety and how it can be incorporated into existing safety programs. Likewise, several Lab employees traveled to Pantex last year to benchmark safety-observation processes.

Montalvo said as of mid-March, 765 employees in the SMS Directorate have completed the enhanced ATOMICS safety observation orientation, which was started in 2000 in the former Nuclear Materials Technology Division.

"At the end of the day, can you say you've done everything in your power to make it safe so that others can work here tomorrow?" asked Montalvo. She wants every employee to be able to answer "yes." That's how important safety is to her.

—Steve Sandoval

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CURRENTS

P.O. Box 1663
Mail Stop C177
Los Alamos, NM
87545

LALP-08-0013

CURRENTS is a monthly publication of the Communications Office, Los Alamos National Laboratory.

Editor, Jacqueline Paris-Chitanvis; Associate Editor, Steve Sandoval; Production Editor, Denise Bjarke; Graphic Design, Ed Vigil.
Art Director: Donald Montoya.

E-mail: currents@lanl.gov; Web address: www.lanl.gov/news/currents.

Los Alamos National Laboratory is operated by Los Alamos National Security, LLC for the Department of Energy's National Nuclear Security Administration.