

LOS ALAMOS NATIONAL LABORATORY **CURRENTS**



September 2008

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My View

Assessment results support safe, secure behaviors

In my almost 40 years of experience in operations of industrial and governmental facilities, I have found that the organizations committed to learning from their experiences and from each other are the most successful, judged from any frame of reference—profit, safety, product quality.

I believe if the Laboratory persists as a learning organization, we will continue improving our work products, as well as working more safely and securely. People are fallible; even the best will make mistakes. I have learned that error-likely situations are predictable, manageable, and preventable. Each of us is affected by the processes we are directed to use and the values our organizations establish that define those processes. We achieve high performance based upon encouragement from our leaders and our peers. I truly believe that accidents, reportable occurrences, and security events can be avoided if we regularly review our processes and results and learn the lessons we have right in front of us.

Earlier this summer, a Director's Institutional Assessment (DIR-08-136) was commissioned by Laboratory Director Michael Anastasio to "ensure we sustain balanced institutional priorities that support accomplishing our mission safely and securely." This Integrated Systems Management Assessment (ISMA) is intended to do just that. ISMA addresses the Lab's implementation of the required *Integrated Safety Management* (IP-300SD1), *Integrated Safeguards and Security Management* (SD200) principles, and core functions to manage our work (*Integrated Work Management*, IMP 300 and ISD 312-2). I have the privilege of leading this assessment. I thank every one of the approximately 300 employees who have participated in interviews or work observations.

The assessment results were reported to Anastasio last month. I believe we will have a comprehensive, accurate snapshot of the status of Laboratory safety and security system processes supporting integrated work management. In promoting our Laboratory goal to "Make safety and security integral to every activity we do," this assessment is a critical tool in the Laboratory's Human Performance Improvement initiative—focusing and improving processes at all phases of work that reduce error, prevent occurrences or events, and reinforce safe and secure behaviors.

—**Beverly Ramsey, Performance Feedback Team (CAO-PF)**



Dixon Wolf

About the cover: Laboratory computer scientist Sami Ayyorgun and his students deploy an array of wireless sensor network monitors on a pipeline near the Lab. See page 4 for the story. Photo by Dixon Wolf



WDWG recognizes outstanding mentors

Eight individuals who promoted the career development of women at the Laboratory via exemplary formal or informal mentoring are recipients of outstanding mentor awards from the Women's Diversity Working Group.

The recipients are Richard Dyer of Physical Chemistry and Applied Spectroscopy, Seth Gleiman of Materials Science and Technology Division, Philip Hypes of Safeguards and Security Systems, Marcelo Jaime of the National High Magnetic Field Laboratory, Kathleen Leckbee of Deployed Training Services, Quanxi Jia of the Superconductivity Technology Center, John Tseng of Stockpile Manufacturing and Support, and Piotr Zelenay of Materials Physics and Applications.

The individuals will be recognized at a ceremony September 18.

American Inhouse Design Awards

AnnMarie Cutler and Allen Hopkins, both of Communications, Arts, and Services, won American Inhouse Design Awards in the 2008 competition.

The American Inhouse Design Awards, sponsored by Graphic Design USA, is an opportunity for inhouse design, marketing, and communications departments within corporations, publishing houses, nonprofits, universities, and government agencies to be recognized for their creativity.

Cutler won for her design of the R&D 100 cover "Camera on a Chip." Hopkins won awards for seven entries:

an ESH&Q Mission Statement poster, Environmental Seasons display, a Radiation Protection Division display graphic, Wellness Center Nutrition posters, an ESH&Q booklet, Respect the Wildlife posters, and an Every Day is Earth Day poster.

Math and Science Academy recognized by DOE

The Laboratory's Northern New Mexico Math and Science Academy recently earned the 2007 Secretary of Energy EEO & Diversity Best Practices Award for its impact on enhancing the kindergarten through 12th grade math and science and teaching skills of teachers in five rural Northern New Mexico school districts.

Carol Brown, Lorenzo Gonzales, and Zach Leonard are MSA master teachers and coordinators of the program. Cathy Berryhill was a master teacher in the program before being named dean of the College of Education at Northern New Mexico College.

More than 200 teachers have completed MSA's intensive three-year professional development program designed to improve their teaching skills and their knowledge of math and science.

Students and mentors honored as distinguished performers

The Student Programs Advisory Committee recognized outstanding students and mentors at the 2008 Student Symposium awards ceremony.

Students honored were Pawan Rastogi of the Center for Integrated Nanotechnologies, Cheryl Gleasner of the Biosciences Division, Marcie Lombardi of Advanced Nuclear Technology, Wendy Patterson of Chemical Diagnostics and Engineering, Hillary Smith of the Los Alamos Neutron Science Center

(LANSCE), and Adrienne Sena of the Chief Financial Officer Division.

Mentors recognized were Aaron Anderson of Physical Chemistry and Applied Spectroscopy, Svetlana Kilina of Theoretical Chemistry and Molecular Physics, Deniece Korzerkwa of Materials Technology, Jaroslaw Majewski of LANSCE, Nathan McDowell of Earth and Environmental Sciences, and Steve Sandoval of the Communications Office.



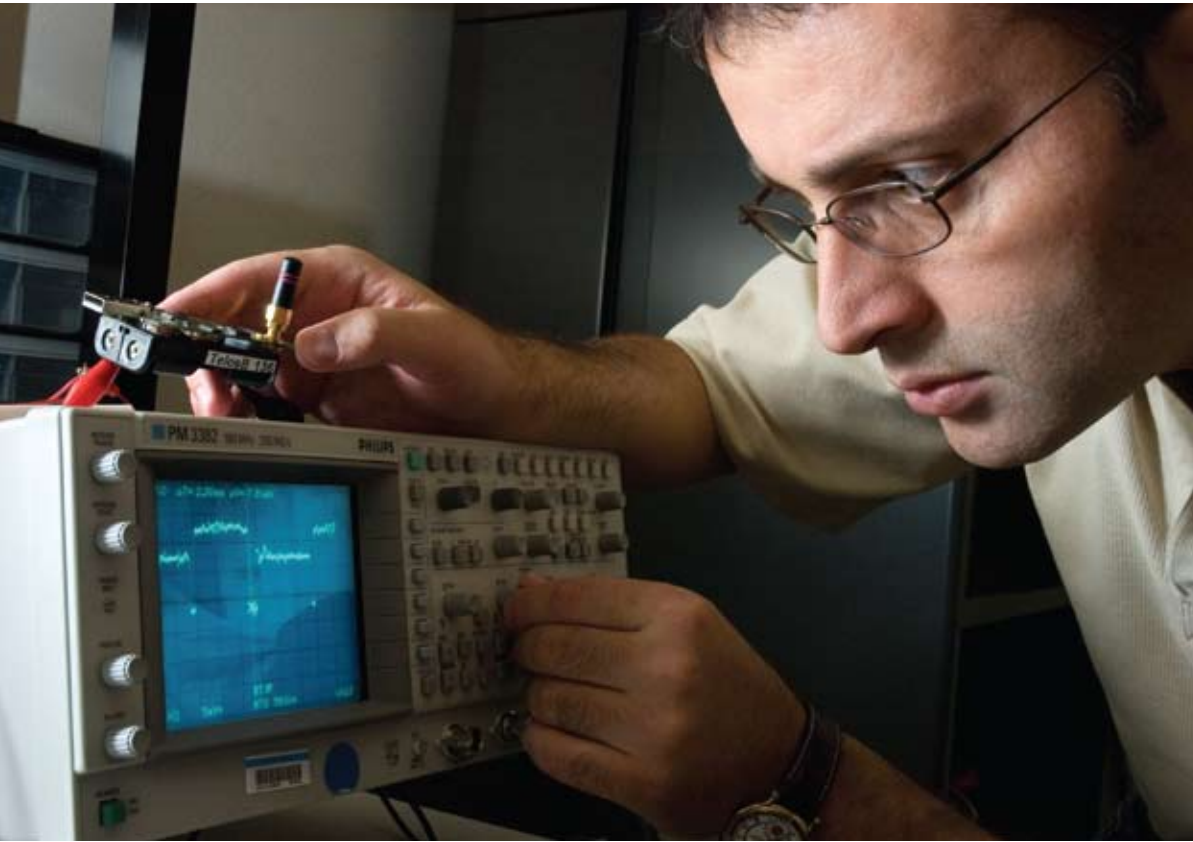
The High Bay Building, located at V-Site (TA-16), is where the plutonium-based bomb was assembled during the Manhattan Project.

V-Site preservation among DOE honors

The Laboratory's V-Site, where the Trinity device was assembled, is one of six historic locations mentioned in an award the Department of Energy recently received for historic preservation at Signature Facilities used during the Manhattan Project.

The Advisory Council on Historic Preservation gave the Chairman's Award for Federal Achievement in Historic Preservation to DOE for its preservation work.

At Los Alamos, the most well-known Manhattan Project preservation project is the restoration of V-Site. Other DOE Manhattan Project Signature Facilities are located in Oak Ridge, Tennessee, and Hanford Site in Washington.



Sami Ayyorgun tests a mote in an experiment aimed at increasing the capabilities of wireless networks across several metrics.

Networks of the future

extending our senses into the physical world

The picture of a future with wireless sensor networks—webs of sensory devices that function without a central infrastructure—is coming into sharper focus through the work of Laboratory computer scientist Sami Ayyorgun of Information Sciences.

Proponents of this new technology see a world with deployments to improve a wide range of operations. Engineers could wirelessly monitor miles of gas and oil pipelines stretching across arid land for ruptures, damage, and tampering. Rescue workers might detect signs of life under the rubble of a collapsed building after an earthquake, thanks to a network of sensors inside the structure. Armed forces could keep an eye on a combat zone or a vast international border via a sensor network that promptly could provide alerts of any intrusion or illicit trafficking.

“It’s not easy to envision the impacts that sensor networks will make, both socially and economically,” Ayyorgun said. “Like many other researchers, I think they are likely to rival the impact that the Internet has made in our life.” Even today, a few companies are beginning to market the technology.

Ayyorgun has developed a new communication scheme that brings the reality of these and other applications a step closer. He has shown for the first time that concurrent gains in many measures of performance are possible, including connectivity; energy; delay, or time it takes for data to be transported; throughput, or the amount of data the system can handle at once; system longevity; coverage; and security.

In recognition of the multifaceted improvements Ayyorgun’s research makes on state-of-the-art technology in this field, his recent

paper, “Towards a Self-organizing Stochastic-Communications Paradigm for Wireless Ad-hoc/Sensor Networks,” has been nominated for the Best-Paper Award from a pool of more than 250 manuscripts at the International Conference on Mobile Ad-hoc and Sensor Systems of the Institute of Electrical and Electronics Engineers.

Like cell phones, wireless sensor networks depend on small, independently powered devices, often called motes, to communicate. But unlike cell phones, which always relay their signal through a base station, such as a tower, sensor motes use each other to relay signals, transmitting communications through a series of “hops” from one mote to the next. Foregoing the need to build a mesh of base stations that must be wired or have a substantial supply of energy, creating information-bearing ad-hoc networks to suit each unique set of circumstances would significantly reduce costs.

“Wiring or ‘beefing up’ system resources is expensive and often is not feasible for many applications,” Ayyorgun said, calling that a “major impetus” for wireless network research.

But with nearly all motes dependent on a portable source of power like a battery, it is important that the devices be as energy efficient as possible. “Energy efficiency is a first-class design criterion,” he said.

And energy utilization isn’t the only consideration. Other performance aspects of concern include the system’s connectivity, the delay, the throughput, and network security.

Many solutions aimed at advancing wireless sensor networks have managed to improve performance over at most a few metrics at the expense of others. Ayyorgun analogizes the conundrum to a Rubik’s cube, the toy in which the aim is to match each of the six sides with one distinct color. Often, gains in one aspect of wireless sensor network performance, such as energy efficiency, have only been achieved with losses in another area, such as the “end-to-end delay.”

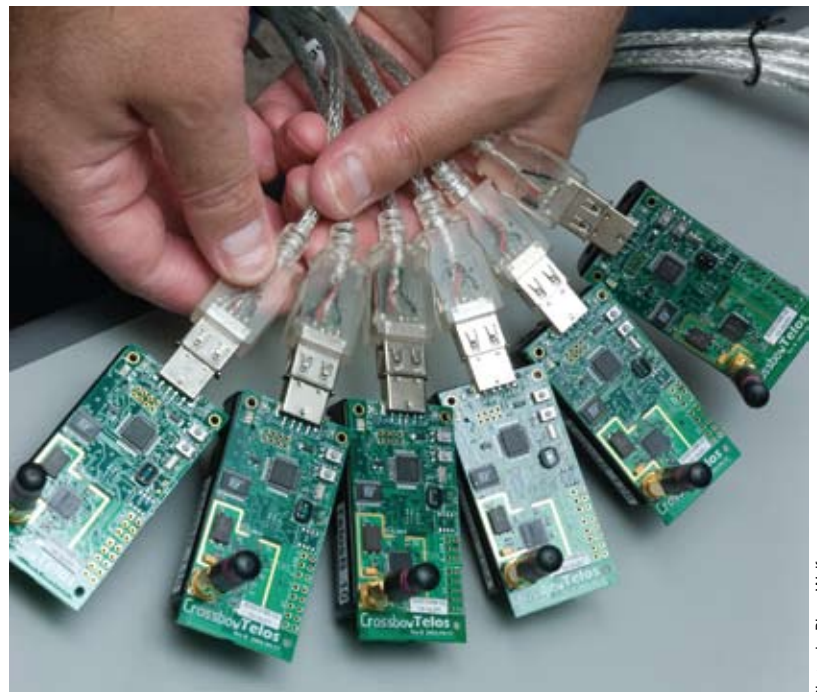
“Like many other researchers, I think [wireless sensor networks] are likely to rival the impact that the Internet has made in our life.”

With Ayyorgun’s scheme, however, “all of the colors have started to match,” he said. The sensor network was more energy efficient with shorter delay times, and the other performance considerations all have improved as well.

“The motes communicate randomly, but their random behavior—their genetic code, if you will—has collective intelligence by design,” he said. That collective intelligence results in the concurrent performance gains over many areas, he added.

“We have good colors on all sides, but it’s not perfect yet,” Ayyorgun said, emphasizing that wireless sensor networks still are in the development stage. Many issues remain to be addressed, just as the potential of these networks of the future is being realized.

—John C. Cannon



Sami Ayyorgun’s self-organizing communication scheme drives the tiny “motes” of a wireless network to new heights of performance, increasing their versatility in defense, disaster, environmental, and industrial applications.

Photos by Dixon Wolf

Focal Point

Why the clock works

educator makes the technical tangible

When it was time for the Bradbury Science Museum to unveil Science in Motion, the newest featured exhibit in the TechLab, Bradbury's science educators wanted something eye catching to encapsulate their message.

With Science in Motion's focus on gears and levers, pendulums and pulleys, they turned to one of their own, science educator Gordon McDonough, to help create a moving sculpture. The result: Gears attached to a giant pendulum, looking like a faceless, oversized clock—aptly named "Clockworks."

"It was a natural fit for me," said McDonough. "A lot of my art is science-based, so I felt well-prepared to tackle this challenge."

The design seemed a natural choice as well. "Clocks are ubiquitous, but very few people today know how clocks actually work," McDonough said. "They don't think about what makes a clock tick or a pendulum swing. Even I was somewhat mistaken when I was conceptualizing the clock. The way I had envisioned it would have made the clock run backwards! It was a learning experience for me, too."

McDonough also emphasized the importance of introducing a physical aspect to science education. "Clockworks, like the rest of the Science in Motion exhibit, helps make science tangible," said McDonough. "Some people learn well with museum displays and paragraphs of text, but kinesthetic learning tends to encourage a deeper kind of knowledge that involves both the muscles and the brain."

"This is a chance for us to make the lessons learned in the museum really stick," McDonough continued. "We hope the next time people look at a clock, they'll end up thinking a little more about what makes it work."

Clockworks is on display at the museum's TechLab through summer 2009. Museum hours are 10 a.m. to 5 p.m. Tuesday through Saturday and 1 to 5 p.m. Sunday and Monday.

—Laura Anderman



Science educator Gordon McDonough stands by "Clockworks," the moving sculpture that he helped create.

“Saint Pete” honored by Laboratory

senator to retire at end of term



New Mexico Senator Pete Domenici, left, told Laboratory employees last month that they and Los Alamos have been “special” to him during his many years of service. “We kind of hit it off,” Domenici said, drawing a chuckle from employees.

At the talk, the state’s longest-serving senator, who is retiring when his present term ends in January, was lauded for his many years of support for the Laboratory.

A short video tribute to the senator was shown. Laboratory Director Michael Anastasio then presented Domenici with a plaque and announced that the NSSB Auditorium is being renamed the Pete V. Domenici Auditorium.

The Pete V. Domenici Auditorium

Los Alamos National Laboratory dedicates this auditorium to Senator Pete V. Domenici in recognition of his steadfast belief that science and technology can improve our lives and make the world safer. The longest-serving senator in New Mexico’s history, Senator Domenici worked tirelessly for 36 years to strengthen the country’s national security and energy security, curb nuclear proliferation, and promote fiscal responsibility. His support for the Department of Energy’s national laboratories ensured that these world-class scientific facilities could carry out their nuclear deterrent and scientific missions.

Thank you, Senator Domenici, for relentlessly tackling the many important issues of our time.



LeRoy N. Sanchez

Brenda Dingus shows four of the 1,000 recycled photomultiplier tubes that will be used for the High Altitude Water Cherenkov telescope in Mexico.

Richard Robinson



Pushing the limits

star says gamma rays may shed light on universe

Brenda Dingus of Neutron Science and Technology likes to live on the edge—in scientific theory, that is. “Gamma-ray astronomy allows us to look at the sky in a way that pushes our theories of physics to the limits,” she said.

Recognized for her involvement in large-scale projects such as the Laboratory’s Milagro Observatory at Fenton Hill and the High Altitude Water Cherenkov (HAWC) telescope at Volcàn Sierra Negra, Mexico; her collaboration with international physicists; and teaching astronomy at the Universities of Wisconsin and Utah, Dingus was named a 2008 LANL Star by the Women’s Diversity Working Group.

“It’s important to recognize the efforts and valuable contributions women make to the Lab,” Dingus said of her LANL Star recognition.

A 2007 American Physical Society Fellow, Dingus sees gamma-ray astronomy as an innovative and interdisciplinary field at the intersection of astronomy and particle physics. “Gamma rays can tell us many interesting

things about our universe,” she said. “We use novel detection technology to study extreme phenomena in space, such as neutron stars, supernova explosions, and black holes.”

Dingus said she enjoyed collaborating with students and faculty on the now-retired Milagro project. “It involved having many conversations to find creative solutions,” she said. Now, she’s looking forward to getting HAWC, a joint U.S.-Mexican project that incorporates recycled Milagro components, up and running.

A native of Los Alamos, Dingus obtained her doctorate in physics from the University of Maryland and later worked for NASA. Although her work allowed her to travel extensively, something always pulled her back to Los Alamos, she said. “I did research at the Los Alamos Neutron Science Center as a graduate student at Maryland and worked on Milagro when I was a faculty member at Utah and Wisconsin,” Dingus explained. “I’ve always loved it here.”

—Tatjana K. Rosev



Celebrating summer in a big, big way

lots of food, fun, and music

An estimated 4,000 Laboratory employees, family members, and friends made a stop at Sullivan Field to enjoy some food, fun, and entertainment at the second annual employee picnic on August 23.

On hand were Director Mike Anastasio, Deputy Director Jan Van Prooyen, and their wives. Other executive team members also were spotted greeting and visiting with attendees.

Participants dined on grilled burgers, hot dogs, barbecue chicken sandwiches, and cotton candy, while enjoying '50s rock and roll by The Continental Kids. Fun included games and hands-on science activities, along with inflatable slides, bounce, and climbing attractions for the little ones.

ARAMARK provided the food, and participants included several Lab organizations and the Los Alamos County Fire and Police departments. Los Alamos National Security, LLC and its board of governors provided funding and support for this year's event.



Photos by Richard Robinson





Infrared wireless devices

Infrared data communications (e.g., data transfer between portable electronic devices, printers, and computers) and the use of infrared keyboards are permitted only on unclassified systems in property protection areas that do not process sensitive unclassified information. Infrared communications are not allowed inside a Limited Area.

Do not delete e-mails from HSPD12Admin@eds.com

Personnel Security has begun submitting cleared Laboratory workers for the new HSPD-12 badge. As names are submitted, workers will receive e-mails from the address listed in the headline. These are not spam and should not be deleted. They contain important information regarding the new security badge enrollment and activation processes. For more information, go to <http://int.lanl.gov/security/newbadge/process.shtml>.

Discounted hotel programs to supplement government-rate hotels

Integration of travel programs with Lawrence Livermore National Laboratory and the University of California will offer both Los Alamos and Livermore employees an additional inven-

tory of approximately 9,000 hotel properties, with discounts between 15 and 20 percent off published rates, to supplement demand when government-rate hotels are not available. The new properties include Marriott, Starwood (e.g., Sheraton), and the Wyndham chains of hotels. For more information, go to <http://cfo.lanl.gov/travel/> online.

What causes car accidents?

Four factors contribute to the majority of car accidents: equipment failure, roadway design, poor roadway maintenance, and driver behavior. More than 95 percent of motor vehicle accidents involve some degree of driver behavior combined with one of the other three factors. To find out ways to avoid these accidents, go to <http://www.smartmotorist.com/traffic-and-safety-guideline/what-causes-car-accidents.html> online.



Benefits Open Enrollment scheduled in November

Benefits Open Enrollment is scheduled for November 3 through 21. A Benefits Fair for employees is scheduled for October 8 and 9. 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.

United Healthcare offers 24-hour nurse line

United Healthcare (UHC) members who have medical questions but are unsure whether they should see a doctor can use UHC's live Internet service (<https://www.myuhc.com/>) to chat with a registered nurse in real time. Alternatively, members may speak with a nurse by calling the toll-free, 24-hour nurse line at (866) 425-2157.

September service anniversaries

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

In Memoriam

- Frank William Reeves, 81, died July 3
- Harold "Gaby" Hays, 85, died July 4
- John Pirtle, 82, died July 8
- Roger Perkins, 72, died July 11
- Robert "Breck" Glascock, 75, died July 12
- James Robert Neergaard, 72, died July 16
- James F. Smith, 59, died July 16
- James H. Breen, 75, died July 17
- Bart J. Daly, 79, died July 18
- Robin Markham, 48, died August 4



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.

Efficiencies in hydrodynamic testing

Lean Six Sigma team uncovers big savings

For more than 50 years, the Laboratory has conducted tests, or “shots,” that simulate the detonation of nuclear weapons to enable scientists to measure the implosion of primaries.

Shot execution just became more affordable, thanks to a team lead by Lori Primas, acting deputy group leader in Hydrodynamics (HX-3). The team's work resulted in savings of nearly \$900,000 per shot, or hydrotest.

The team turned adversity, in the form of a \$12.5 million budget cut in fiscal year 2008, into opportunity, using Lean Six Sigma tools to identify ways to manage processes.

The tools helped the team analyze costs associated with the execution of hydrotests at the Dual Axis Radiographic Hydrotest Facility (DARHT). They also built a resource-loaded process model identifying the hundreds of associated activities supported by organizations across the Lab.

“Our biggest obstacle was identifying costs directly related to the hydrotest execution versus costs that are critical to operations but not unique to a particular experiment,” said Primas, a Lean Six Sigma Yellow Belt candidate. “Understanding the big picture gave us the ability to prioritize some of the targeted work to be done.”

The first efficiencies uncovered by the team were implemented in April, and additional measures will be phased in during the remainder of 2008 and 2009. The savings will be used to maintain the hydrotest program capability and make investments in the future of hydrotesting at DARHT.

Team members included Primas, Gary McMath, Kurt Anast, and Ray Flesner, all of HX-3, Tom Turner of Detonator Technology, Paul Leslie of Weapons Test Engineering, Carrie Apgar of Weapons Budgeting, Suzanne Maez of Physics, Chris Binns of Lean Six Sigma, Dave Bowman of DARHT, Tim Fife of Weapons Engineering Technology, Diann Bruhn of Dynamic and Energetic Materials, and Martha Zumbro of Hydrodynamic Experiments.

—Mig Owens





Tatjana Rosev

New student program brings environmental stewardship up close and personal

Global warming, wildlife conservation, and fossil-fuel depletion are but some of the issues that humans face as a result of choices and actions that negatively affect Earth. Awareness of environmental issues and getting involved to make a difference may be the keys to helping ensure the planet's long-term survival, or so believes Angelica Gurule and Katelyn Booth of the Risk Reduction Office (ENV-RRO).

To help get students at the Laboratory involved in environmental stewardship, ENV-RRO sponsored the Student Sustainability Challenge. The program encouraged students, through competition, to come up with a "green" concept that could be implemented across the Lab; it also introduced them to environmental issues outside the Lab. This year's challenge focused on the shark finning industry, highlighting its affect on the declining shark population and the delicate balance of the ecosystem.

"Providing a forum in which students could discuss the environmental problems we face today and inspiring them to think about how we can reduce our environmental impact at work and home were among the main reasons we created the Sustainability Challenge," said Gurule.

Valles Caldera National Preserve chief scientist Bob Parmenter, right, explains how a flume measures spring runoff and monitors water flow to students who participated in an all-day field trip to the Valles Caldera National Preserve as part of the Student Sustainability Challenge.

The program included seminars, movie screenings, and field trips "to inspire students to establish excellence in environmental stewardship in their own workplace," said Booth.

"Challenge participants developed innovative ideas about how the Laboratory could reduce its environmental impacts," said Gurule. "These ideas easily can be implemented, such as planting trees to offset carbon dioxide, providing shade for buildings, painting roof tops white to reduce heat absorption, and using solar panels to power parking lot lights."

"This challenge was extremely successful," added Booth. "It inspired students and mentors to create a more sustainable working environment."

More information on the Sustainability Challenge is at http://int.lanl.gov/environment/go_green/lanl_only/index.shtml online.

—Erika Martinez

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