MY FAVORITE SUNS — *Lab News* photographer Randy Montoya captured this image of the May 20 annular solar eclipse reflected in some of the 212 computer-controlled heliostats at Sandia's National Solar Thermal Test Facility. Albuquerque was ground-zero for the eclipse, one of the best places in the world from which to see the eclipse as a glowing ring of fire. In the photo here, Ernie Trujillo, one of several solar facility personnel who helped Randy with the logistics for the shoot, watches the eclipse through protective glasses. Immediately after the eclipse, members of Sandia's media relations team provided the photo to The Associated Press, which in turn made it available to its subscriber base worldwide. The photo, with its prominent mention of Sandia, was subsequently featured on websites from around the world. Mashable, the popular social media news aggregator, cited the photo as one of the most inventive depictions of the eclipse.

NNSA's Sandia Site Office gets new manager

Geoff Beausoleil, recently appointed as manager of the Sandia Site Office (SSO), has more than 30 years of experience in the nuclear industry with DOE and Newport News Shipbuilding. His most recent assignment has been deputy manager for NNSA's Pantex Site Office, to which he was appointed in November 2008, with responsibilities for the day-to-day administration of the Pantex Site Office and oversight of plant operations.

GEOFF BEAUSOLEIL

"I'm excited to be the new manager at the Sandia Site Office," Geoff says. "I'm looking forward to working closely with Sandia and continuing to build on the strong relationship that has been established between the NNSA and Sandia. I'm confident that together we can ensure that the mission of the Labs is accomplished safely, securely, efficiently, and effectively."

Prior to his Pantex assignment, Geoff served as the assistant manager, Office of Operational Support at the DOE Idaho Operations Office (DOE-ID), and as the DOE-ID Integrated Safety Management Champion. In that position, Geoff was responsible for all of the Idaho National Laboratory Site environment, quality, safety, health, worker protection, safeguards/security, emergency management, and information technology programs. Previous experience with DOE included responsibilities in transuranic and mixed waste management and in quality and safety-related functions. Prior to arriving at DOE, Geoff held various engineering positions at Newport News Shipbuilding, finishing his career there as the chief refueling engineer for the USS *Enterprise*.

Sandia LabNews

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Sandia National Laboratories

Small worlds come into focus with new Sandia instrument

By Sue Major Holmes

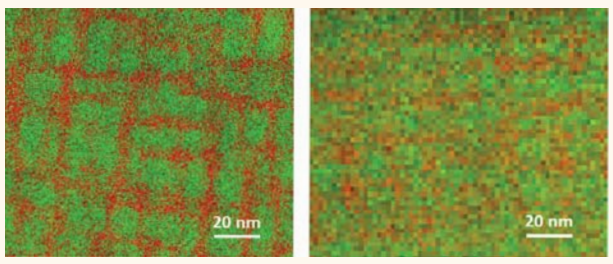
Paul Kotula recently told a colleague at another laboratory that Sandia's new aberration-corrected scanning transmission electron microscope (AC-STEM) was like a Lamborghini with James Bond features.

The $3.2 million FEI Titan G2 8200 Sandia accepted in February is 50 to 100 times better than what went before in terms of resolution and the time it takes to analyze a sample, say Paul and Ping Lu (both 1822), principal investigators.

Its unique combination of X-ray detectors and very high resolution offers magnification that Paul compares to a telescope powerful enough to show two peas side by side on the moon. Slides of microstructures analyzed with the AC-STEM and Sandia's older analytical microscope highlight the new capabilities, with a clear image from the AC-STEM and a fuzzy one from its predecessor. An analysis that took seven minutes on the AC-STEM took two hours on the previous instrument, he says.

Ping and Paul operate the microscope from a basement lab adjacent to the environment-controlled room that houses it. They're not in the same room because the instrument is so sensitive even clicking a

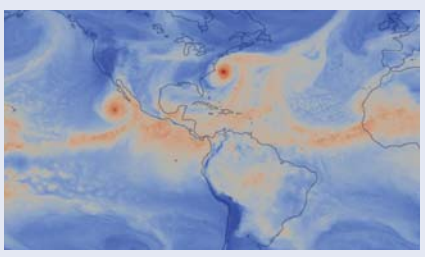
(Continued on page 5)



SHARPER IMAGE — The image on the left was captured in 7 minutes at 0.5nm/pixel with Sandia's new AC-STEM; the image on the right was captured in 120 minutes at 2nm/pixel with the old microscope. The analytical power of the AC-STEM is at least 70 times better than the older analytical microscope at Sandia. These high-resolution chemical images, seen here for the first time, are confirming predictions from the 1970s regarding the atomic-scale characteristics of electrical contact materials.

Image courtesy of Paul Kotula (1822), Don Susan, and Zahra Ghanbari (both 1831)

Care packages to overseas troops. **Page 3**



Global warming real, speaker says. **Page 4**

Sandia Health Partner Network. **Page 10**

All about Learning Expo 2012. **Page 12**

Red Storm stands down after years of super work

Legendary supercomputer's incredible feats recalled at retirement party. See pages 6-7

That's that

Don't you love it when some event, activity, or natural wonder lives up to and exceeds its advance billing? Remember, for example, the first time you ever went to the Grand Canyon? Remember how folks who'd been there before tried to tell you that there was no way to really, truly describe it, you just had to see it for yourself? So you went with pretty high expectations, even unrealistically high expectations, but when you got there, the experience was everything you'd been promised and then some.

Well, for my book, the annular solar eclipse on May 20 was one of those occasions. With Albuquerque right at ground zero for optimal viewing, the advance billing was huge. Thousands of people from around the world converged on the city and every organization in town seemed to have some sort of activity planned around the event. The excitement level was sky-high. In short, it was going to take something pretty darned spectacular to live up to the hype. Only the "hype" wasn't hype. The eclipse was everything we all hoped it would be, and more, magnificent and awesome — awesome in its truest sense of inspiring awe.

And this was special, too: All along the track of the eclipse, the world paused, and everyone looked. We were all, for that glorious few minutes when the annularity was at its peak, taken out of ourselves, reminded that we are part of something immense, and timeless, and deep.

At this point, I was about to say that these grand cosmic events make us ponder and try to understand our place in the universe, but let me check myself before I get too metaphysical here. The fact is, the eclipse was just plain cool. And I'm cool with that.

* * *

Speaking of the eclipse, isn't that a great photo on page 1 by Randy Montoya? He planned the shoot for a couple of weeks and with above-and-beyond the call of duty help from the folks at the Solar Tower and a couple of our team members here, Darrick Hurst and Stephanie Hobby, Randy was able to capture an iconic image that we provided to the Associated Press practically before the sun had set. AP put it out on its wire and the photo was picked up by news organizations around the world, garnering some terrific visibility for Randy's work and — more to the point — for Sandia.

* * *

Where were you when the lights went out? That was the title of a fluffy 1968 Doris Day movie about the Great Northeastern Blackout of 1965. It's also a question that Sandians asked themselves last week after a PNM power outage abruptly knocked out lights and shut down computers and everything else that plugs into the wall at most of Sandia/New Mexico and Kirtland Air Force Base. I haven't heard any horror stories about experiments ruined or important papers or letters lost irretrievably due to the power failure, but it was at the very least a nuisance for most and something more than that for the unlucky few who really did lose important work.

What with our collective reliance on the web for research and email for communications, the power outage left most of us looking at each other and wondering what to do next. Happily, the Great Sandia Blackout of 2012 didn't last long; after a couple of on-again, off-again false starts, the power came back for good after just a few minutes, a half-hour at most.

Unlike in the movie, where the power failure resulted in a laff riot of zany hijinx, at Sandia folks took the episode mostly in stride. (At least I didn't hear the groans and screams from my desk). Not that there weren't a couple of laughs, though. Randy Montoya, who's pretty quick with a pun as well as a camera shutter, observed that, with the cooling system down, if an emergency arose, we might have to swelter in place. Now, that's good. That's one of those things I wish I'd said.

See you next time.

— Bill Murphy (505-845-0845, MS0165, wtmurph@sandia.gov)

Sandia LabNews

Sandia National Laboratories

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Three engine combustion researchers honored at SAE World Congress

Three Sandians from the Engine Combustion group (8362) were honored at the 2012 Society of Automotive Engineers (SAE) World Congress Awards Ceremony on April 24 in Detroit. Chuck Mueller was honored as an SAE Fellow, Lyle Pickett was presented with the 2011 SAE John Johnson Award for Outstanding Research in Diesel Engines, and Ben Peterson received the Russell S. Springer Award.

2012 SAE PRESIDENT Frank Klegon and John Johnson, Michigan Technological University, with SAE award winners Lyle Pickett, Cherian Idicheria, Caroline Genzale, and Dennis Siebers.

Last fall, Chuck was named an SAE Fellow, an exceptional professional distinction (see the Nov. 4, 2011, issue of *Sandia Lab News*). Established in 1975, the Fellow grade honors and recognizes important engineering, scientific, and leadership achievements to enhance the status of SAE's contributions to the profession and to society. Only about 20 Fellows are named each year. Sandia has four additional SAE Fellows: John Dec (8300), Dennis Siebers, and Pete Witze, all named in 1998, and Paul Miles (8362), named in 2006.

Lyle was recognized for his paper: "Relationship Between Diesel Fuel Spray Vapor Penetration/Dispersion and Local Fuel Mixture Fraction." Co-authors on the paper are Dennis L. Siebers and Mark P.B. Musculus and collaborators Julien Manin (all 8362), who was at the Universidad Politecnica de Valencia and has returned to Sandia as a post-doctoral researcher, Caroline L. Genzale, a former Sandia post-doctoral research now at the Georgia Institute of Technology, and Cherian A. Idicheria, a former Sandia post-doctoral researcher now at the General Motors R&D Center.

The SAE John Johnson Award recognizes the lead author of an original and outstanding technical paper presented at an SAE meeting on the subject of diesel engines in the on- or off-road industries. The paper must be published in an SAE journal and address research advancements in diesel engines regarding efficiency and low emissions achieved by innovative experimental and modeling research of the engine, fuel, and/or aftertreatment systems. Chuck Mueller received the John Johnson Award in 2009 (see the April 23, 2010, issue of *Sandia Lab News)*.

Ben Petersen received the 2010 SAE Russell S. Springer Award for his paper "High Resolution Scalar Dissipation and Turbulence Length Scale Measurements in an Internal Combustion Engine." This award is for the author of an original and outstanding technical paper presented at an SAE meeting that is published in SAE literature in the year for which the recipient is selected. To encourage younger member achievement, the recipient must be an SAE member who is 36 years of age or younger at the time of the presentation and whose paper is a distinct contribution to the literature of the professions of engineering.

Lyle received the Russell S. Springer Award in 2003. Magnus Sjoberg (8362) received the award in 2005.

For more information, visit www.sae.org.

— Vanitha Sankaran

Retiree Deaths

Pablo C. Maes (age 80) . . . . . March 5
Edward W. Shepherd (85) . . . . . March 8
Ronald K. Bump (82) . . . . . March 8
Louis Kent Stam (92) . . . . . March 9
Leslie H. Minnear (93) . . . . . March 13
Myron S. Pilat (88) . . . . . March 17
John H. Temple (80) . . . . . March 17
Paul Peter Gallegos (74) . . . . . March 25
Miloslav Joseph Navratil (81) . . . . . April 5
Alphonse Julius Machac (77) . . . . . April 11

Sandia/California sends 100 care packages to overseas troops

By Patti Koning

When Carrie Burchard (8539), Michele Clark (8005), and Stephanie Beasly (8521) put out the call for help filling care packages for overseas troops, the California site answered loud and clear. Over the month of April, the site packed bin after bin with small food items, toiletries, games, books, and other comfort items — enough for 100 care packages that are on their way to deployed troops in Afghanistan and elsewhere.

The local Blue Star Moms organization, based in Danville, Calif., helped coordinate the effort. Through the Lockheed Martin Gifts and Grants program, Sandia made a donation of $5,000 to Blue Star Moms. These funds paid for shipping and additional items to round out the donation drive.

PACKED WITH LOVE — Luisa Oriti of Blue Star Moms packs boxes with Carrie Burchard.

Once the items were collected, several Sandia volunteers sorted and packaged the donations for boxing. Then on May 9th, a small team of volunteers — Shirley Kocourek, Luisa Oritia, Sandy Sperling, Chris Furlong, and Paul Furlong from Blue Star Moms and Carrie, Stephanie, Jim Berry (retired Sandian), Mark Cordes (8511), Adrienne Philips (8539), Joyce Prescott (8005), and Melissa Simpson (8539) — made quick work of packing the boxes. They addressed all 100 hundred boxes, completed customs forms, and loaded them for the trip to the post office.

"Thanks to all of the Sandians, both current and retired, who helped us to send these care packages. Most of the recipients are either from our area or individuals who haven't received any mail at all. It's heartwarming to see pictures of these brave service men and women as they open these boxes full of items from home. They really appreciate it," says Carrie.

The Blue Star Moms, a California/East Bay Chapter of Blue Star Mothers of America, supports the military through care packages, operation postcard, veterans outreach, wounded warriors programs, and comfort for families of fallen warriors. Membership in Blue Star Moms is open to any woman in the country whose child is in or has been in the United States Armed Forces. Many devoted fathers, other family members, friends, and community members also support the efforts of the Blue Star Moms.

Blue Star Moms sends shipments of care packages to troops overseas three times a year: Christmas, Valentine's Day, and July 4. These packages are sent to young men and women who aren't receiving much mail from home; they also are referred to the Blue Star Moms by commanding officers, chaplains, and soldiers in the field.

This was the site's third Blue Star Moms care package drive in recent years. Center 8200 has held a drive in conjunction with their annual holiday party for the last two years. Carrie hopes to hold another site-wide drive, possibly as a holiday project later this year.

BLUE STAR MOMS VOLUNTEERS, from left to right, Shirley Kocourek, Carrie Burchard (sitting in truck); front row: Jim Berry, Luisa Oritia, Chris Furlong, Mark Cordres, Melissa Simpson, Stephanie Beasly, Sandy Sperling, and Paul Furlong, take a break from putting together care packages for overseas troops.

Blue Star Moms will hold a volunteer packaging event for the July 4 shipment on Saturday, June 16, from 10 a.m.-3 p.m. at Camp Parks in Dublin. For more information, contact Chris Mahoney at crmahoney2 @ yahoo.com.

Blue Star Moms accepts donations of goods or cash year-round. For a list of suggested donations and to learn more about the organization, visit www.bluestarmoms.org.

Sandia CaliforniaNews

Cinco de Mayo, Sandia style

NEARLY 100 PEOPLE from both Sandia and LLNL, including a few friends and family members, set out for the one-mile walk.

Photos by Dino Vournas

On May 4, nearly 150 people from Sandia/California and Lawrence Livermore National Laboratory turned out for the Life Design Center's second 5k run, this time paired with a 1-mile walk. Even more people came to the Livermore Valley Open Campus to enjoy the Hispanic Leadership Council's Cinco de Mayo Street Fair, Classic Car Show, and Zumba Class.

The Hispanic Leadership Committee transformed the Livermore Valley Open Campus into a vibrant street fair commemorating Cinco de Mayo, the celebration of Mexican heritage and pride. There was delicious food, lively music, vendors featuring fresh produce, spices, gifts, and other speciality items, and informational booths on salsa, piñatas, aguas, and chiles.

In the 5k race, Gulheim Lacaze (8351) finished first in the men's division, ahead of Francois Leonard (8656) by one hundredth of a second, followed by Jeremiah Wilke (8953) in third place. In the women's division, Elena Starodub (8656) finished first, followed by Julie Fruetel (8114) and Michelle Hekmaty (8656).

The official times in the 5k race were:

Guilhem: 18:09.02	**Elena: 25:27**
Francois: 18:09.03	**Julie: 25:59**
Jeremiah: 20:45	**Michelle: 26:22**

WHO SAYS EXERCISE IS BORING? Alice Johnson (8248) leads a lively Zumba class during the HLC Cinco de Mayo Street Fair.

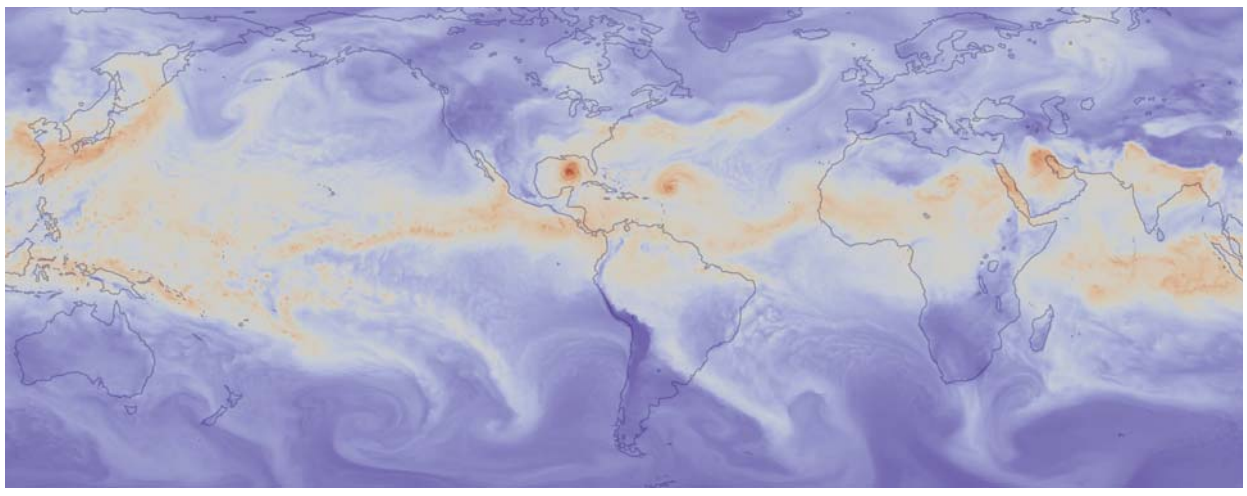
Dawn Manley supports Senatorial trip to China

SENIOR Manager Dawn Manley (8350) and Senior Senator Jeff Bingaman, D-N.M.

In April, senior manager Dawn Manley (8350) accompanied senior New Mexico Senator Jeff Bingaman on his recent trip to Hong Kong and China to discuss their clean energy landscape. The US delegation sought to learn more about the policies and incentives that Hong Kong and China have put in place to advance clean-energy technologies. The delegation included the senator, staff members from the Senate Energy & Natural Resources Committee, Duncan McBranch from Los Alamos National Laboratory, Dawn, and a US Navy Senate liaison officer. After meeting with finance and technology leaders in both Hong Kong and Shenzhen, the delegation moved on to Beijing where their discussions included government officials and power producers. The Chinese government sees carbon emissions and air pollution as serious issues that it needs to address. Many local governments also are interested in supporting clean-energy research and power generation. China has set ambitious goals for reducing the intensity of their energy consumption and their overall emissions, but progress is challenged by continuing urbanization and manufacturing growth. *— Patti Koning*

Speaker envisions climate change-related national security stresses

By Neal Singer



SANDIA SCIENTIST MARK TAYLOR (1442) came in for special praise from speaker Warren Washington for a significant climate simulation run on the Argonne National Laboratory supercomputer Blue Gene/P that resolved down to 12 kilometers. "Sandia has played a major part in getting the climate community a brand new tool to study climate change," said Washington. Later, he said, "Scientists like Mark Taylor and others have turned to techniques like using a cubed sphere grid to make calculations parallel, and therefore solvable, on modern systems." Old-fashioned maps showing latitude and longitude converged at the poles, making them hard to work with. In the image above, from one of Mark's simulations run on Blue Gene/P, a Katrina-like hurricane slams into the Gulf Coast, while a tropical storm forms in the mid-Atlantic.

Global warming is unequivocal in its advance and will lead to more record-setting temperatures, said plain-spoken Warren M. Washington, a senior scientist at the National Center for Atmospheric Research, in his talk on May 10 in the seventh of Sandia's Climate Change and National Security lecture series, held in Bldg. 810.

Washington, a pioneer in atmospheric computer modeling, served as science advisor to five presidents — Carter, Reagan, Clinton, and both Bushes. He received a lifetime achievement award from then-DOE Under-Secretary for Science Raymond Orbach in 2007 and was awarded the National Medal of Science by President Obama in 2010.

Washington presented graph after graph that showed how various atmospheric components have combined to create stronger rainfall near the equator and more intense droughts in the subtropics, as well as sea level rises and storm surges. He said more tropical diseases would move northward as the tropics in effect spread "poleward." He also envisioned national security stresses that will appear when some island states disappear in rising waters and their populations "need transport, or transport themselves, elsewhere, causing immigration issues."

Putting advice in the most basic terms, he said, "People shouldn't be building houses on the seacoast or putting houses in flood plains."

With a nod to climate-change skeptics, he specifically cited noted University of California, Berkeley professor Richard Muller as once skeptical of the general scientific belief that "we've warmed the planet by almost a degree C from 1880 to 2010 in land temperature average." Washington said Muller therefore used a different technique to compute Earth's temperature, "but his graph [only] reproduced what others have found."

In several instances, Washington challenged climate-change skepticism without personifying those who might hold those opinions.

"Climate skeptics often mention that solar radiation has changed and that is what is causing the climate change," he said as he presented a graph charting the intensity of solar irradiance at the top of Earth's atmosphere. "You can see 11-year cycles from 1975 on, and you can see there is no significant trend on radiation coming into the atmosphere. So this argument by skeptics isn't valid to the climate change community."

Meanwhile, he said, extremes in temperature have grown since the 1960s, methane and nitrous oxide concentrations are increasing, ozone depletion is increasing, the usually ice-locked Northwest Passage should be open for shipping this fall if accompanied by an ice-breaker, and 2010 was "a record year for glacier melting in Greenland, as observed by satellite."

With some exceptions, he said, glaciers are melting substantially around the globe. "Since the 1960s," he said, "ocean heat content, humidity, temperature near sea surfaces, and the temperatures over land and oceans have increased substantially. Meanwhile, snow cover, glaciers, and sea ice have decreased."

As for what is causing the problems shown in his graphs, he said, "Natural variations [used in models] do not explain climatic change. Climate models with natural 'forcing,' including volcanic and solar, do not reproduce warming. However, when the increase in greenhouse gases is included, models do reproduce warming. We consider this a smoking gun."

Adding the effects of aerosols to climate models further improves their agreement with the temperature rises of the last decades, his graphs indicated.

Initially, experiments to simulate climate change were handicapped by the slowness of computing, which made it necessary to use unrealistically few factors, he said. Much faster computing speeds have led to more accurate models.

Still, Washington said candidly, meetings with politicians through climate meetings in Copenhagen, Cancun, and South Africa "haven't gotten very far. Basically, there's a lot of inertia in making big changes in our energy profile."

He postulated several reasons for this.

One, "Many skeptics claim that climate change is a hoax and we have some sort of secret agenda to fool the public. Obviously, I believe there's no conspiracy, that climate change is not a hoax, and that the advice we give the policy makers is honest and good science."

Later in his talk, he said, "We're faced by a lot of people whose business interests are affected by climate change mitigation." He found the situation similar to the way, "20 years ago, people said that smoking does not cause cancer, even though the scientific evidence shows otherwise."

Washington's simulations showed that cutting back on carbon in the atmosphere would have good results in restraining temperature rises. He listed other measures he seemed to find speculative at best. These included space mirrors to reflect light away from earth and seeding stratocumulus clouds to brighten them. Other possible methods included sequestration of carbon, and, for short-term benefit, reducing the amount of airborne methane and Freon.

"Climate system models are far from being perfect," he said, "but are the best indicator of our science knowledge of how the climate system works."

Questions from Sandians were of course technical rather than political. They concerned the representations of several basic physics equations presented by Washington in his talk, and why mollusks could not be expected to survive in an altered ocean if they had done so millennia ago. The physics challenge was only a difference in notation; as for mollusks, Washington was unfamiliar with the proposed example.

The talks were hosted by Rob Leland, director of Computing Research (1400) and of Sandia's Climate Security Program. The program sponsored the talk.

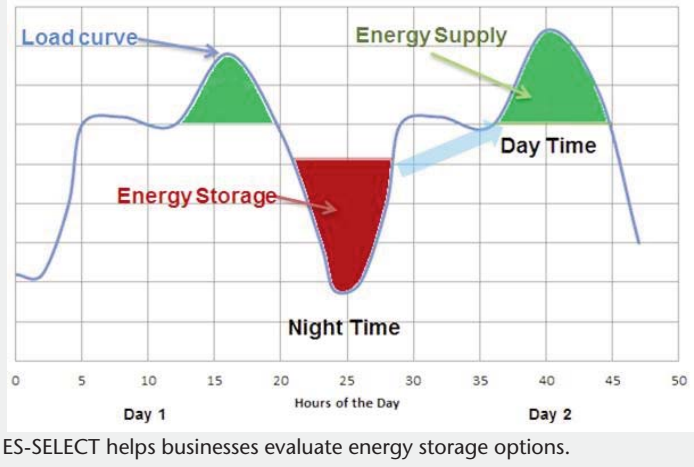
Sandia's web tool identifies best energy storage options

By Stephanie Hobby

Sandia and DOE have released a new tool to help utilities, developers, and regulators identify the energy storage options that best meet their needs.

Partnering with DNV-KEMA, a global testing and consulting firm, Sandia is releasing Energy Storage Select, or ES-Select, software under a public license to the company. The tool makes it easier to conduct a quick, basic analysis of energy storage options and determine the value of energy storage technologies for a specified application. This, developers say, will increase the adoption of energy storage technologies.

"ES-Select is the first of a suite of easily accessible web tools to help potential users and regulators make decisions on energy storage options in specific applications," says Imre Gyuk, program manager of DOE's Energy Storage program.



ES-SELECT helps businesses evaluate energy storage options.

The application is available for free download on Sandia's energy storage website at www.sandia.gov/ess.

"This tool is designed to help users understand at a basic level what storage can do. If it looks beneficial from a cost standpoint, they can explore the options further," says Sandia project manager Dhruv Bhatnagar (6113).

Utilities and developers who want to use energy storage have many technologies to consider, including flywheels, compressed air, pumped hydro and thermal storage, and six types of electric batteries. All have different costs, and estimating revenue from using various applications is difficult. Researching all relevant cost factors independently previously took days or weeks, but ES-Select aggregates all relevant factors into a single decision-support tool that runs in a few minutes. If the results are favorable for a particular technology, users can determine whether to run detailed, site-specific analysis using other tools.

"ES-Select is an educational and decision-support tool for deployment of energy storage on the power grid," says Ali Nourai, executive consultant for DNV-KEMA, and co-developer of ES-Select. "It has been created for public use to promote the understanding of storage technologies and the benefits they offer when applied on the electric grid."

The tool aids decisions about what storage technologies would work best in a given situation. For example, if a business pays more for electricity during the day than at night, the owner could use the tool to quickly evaluate several energy storage options to determine the cost-benefit of buying lower-cost electricity at night and storing it for use during the day.

Users can input the application they are interested in, as well as such parameters as energy costs and discount rates. The program produces a list of storage technologies and their predicted benefits and associated costs. ES-Select aggregates all of the inputs and assumptions — monetary value for an application, technology costs, performance characteristics, and operation and maintenance costs — and quickly spits out recommended options.

Rather than basing decisions on a single factor such as capital cost, ES-Select assesses how an energy storage technology performs while addressing uncertainties in application value, storage cost, cycle life, efficiency, discharge duration, and other parameters.

"With funding from DOE's Energy Storage Program, Sandia has worked with KEMA to develop a user-friendly, freely accessible tool to evaluate potential applications of energy storage," says Gyuk. "We hope that this tool will contribute to the widespread adoption of storage on the grid."

ES-Select should benefit utilities, independent power producers, industrial and commercial enterprises, regulators, lawmakers, and the public, including those doing research on energy storage. "We've already had a lot of people asking about this program, and we know many are eager to use it," says Dhruv. "I think this will encourage those who might not have considered energy storage before to think more seriously about it and evaluate its potential as a viable option."

Small world

(Continued from page 1)

computer mouse against a desk would cause an image to jump, Ping says.

"At the atomic scale, it doesn't take too much," he says.

Operating unit from 1,000 miles away

The remote operation affords another advantage: Sandia/California researchers can run it from 1,000 miles away, which they demonstrated in March. Paul jokes the only thing they can't do from California is load the sample and fill the liquid nitrogen that cools the machine.

The AC-STEM delivers electron beams accelerated at voltages from 80 kV to 200 kV, allowing researchers to study properties of structures at the nanoscale — very important for materials science in everything from microelectronics to nuclear weapons.

The physics of nanomaterials are different, Paul and Ping say.

"They have different optical properties than bulk material — gold nanoparticles versus gold foil, they're totally different," Paul says.

Any impurities or structural defects hurt performance in super thin microelectronics layers, for example, he says. In the same way, interfaces in a weapon are critical because that's where any impurities tend to be, "where you might get some sort of separation or corrosion or reaction happening that's the basis of aging of these materials," he says. "Being sensitive to that lets us help others predict lifetimes, replacement intervals, or failure modes so we know what to look for."

It takes powerful instruments to do those studies.

"You need this kind of tool to quantify it," says Ping as he sits in front of a computer screen showing an image of a 50-nanometer-thick specimen inside the AC-STEM — a sample 2,000 times thinner than the thickness of a human hair.

What looks like a close-up of mesh or lattice on the screen is really an image of 3-angstrom atomic spacing between titanium and strontium. An angstrom equals one 10th of a billionth of a meter.

The microscope uses a unique in-lens design in which four X-ray detectors surround a sample placed in the center, increasing collection efficiency, Ping says.

Older instruments were limited by lens aberrations, particularly spherical aberration that prevents sharp focus because electrons off of the optical axis are focused more strongly than ones near the optical axis, Paul says. The AC-STEM's additional lenses and computational elements negate that, he says.

"With the aberration-correction technology, you can open the aperture up and keep all those electrons focused to a nice point on your sample," he says.

Atomic resolution requires a tiny probe and scanning the sample at very high magnification.

Preventing damage to samples

The AC-STEM can put the probe on a sample for tens of microseconds or even milliseconds and gather enough information for researchers to tell what elements are present at atomic resolutions, Paul says. The probe returns to the same spot repeatedly with a drift correction that prevents a blurred image, collecting a stream of X-ray photons while minimizing damage since short duration equals a smaller dose rate.

High electron beam currents can damage some samples. However, "you can easily back off on the intensity" of the AC-STEM's beam because it has so many adjustable parameters, Paul says.

A dark spot that looks like a hole in Ping's sample indicates damage, but it's deliberate as he sputters atoms from the sample with a 200kV electron beam, knocking atoms out of the lattice to measure how removing part of the sample affects the X-ray signal.

The AC-STEM also studies material in the micron world. Although a hundred microns is about the smallest size a human eye can see, it's a huge scale for a transmission electron microscope.

PRINCIPAL INVESTIGATORS Paul Kotula, left, and Ping Lu (both 1822) show off Sandia's new aberration-corrected scanning transmission electron microscope, which has a unique combination of X-ray detectors and very high resolution and is capable of doing analyses in far less time than the Labs' older analytic microscope. (Photo by Randy Montoya)

At the micron level, "we're not making such a fine beam anymore but we're using the collection efficiency and the bright electron source to be able to be sensitive to small concentrations," Paul says. "That's very important for a lot of our customers who are looking for impurities in some of these materials."

First commercial unit fielded

The room that houses the microscope has to remain stable in terms of vibration, acoustics, temperature, and electromagnetic fields. Acoustic and chilled water panels line the walls, and the room's 65-degree temperature varies less than a tenth of a degree Celsius over half an hour. The instrument's accelerator, capable of producing 200,000 volts, is stowed behind acoustic drapes in a corner to isolate vibrations from the 9.5-foot-tall column containing various types of lenses and the instrument's in-lens X-ray detectors.

Sandia's AC-STEM is the first commercial unit fielded, based in part on development funded by a DOE Basic Energy Sciences project aimed at developing advanced electron microscopes built around aberration-correcting optics. The Transmission Electron Aberration-corrected Microscope, or TEAM project, was a collaboration involving the Argonne, Brookhaven, Lawrence Berkeley, and Oak Ridge national laboratories and Frederick Seitz Materials Research Laboratory.

The concept was theorized in the 1950s but computers were in their infancy and no one could manually adjust microscopes requiring multiple alignments and mechanical and power stability, Paul says.

"This new transmission electron microscope is now the flagship of our departmental capabilities that include professionally maintained, state-of-the-art equipment in all types of bulk material analysis — gas, liquid, solid — and microstructural characterization, including electron optics, diffraction, and spectroscopy," says manager Jim Aubert (1822).

The AC-STEM offers endless potential for collaboration with colleagues in the Labs and at other national laboratories, companies, and universities since they don't have to be on site to participate, the researchers say.

"Other colleagues can go online and look over your shoulder virtually," Paul says.

NASA Chief Technologist visits Sandia

CHRIS ORENDORFF (2546) leads NASA's Chief Technologist Mason Peck, at right, and a delegation of NASA officials, on a tour of the Battery Abuse Testing Facility on May 21. Peck was visiting to explore collaborative efforts in technology development between NASA and Sandia. The group also met with Sandians working in aerospace technology, power sources, nuclear and solar propulsion technology, and satellite technology. In addition to the Battery Abuse Testing Facility, they also toured MESA and CINT. During Peck's lecture, "Space innovation: the importance of investing in technology and NASA's space technology programs," he discussed potential collaborations and outlined ways that NASA finds new solutions to challenging problems. (Photo by Randy Montoya)

RED STORM stands down

By Neal Singer

A quietly exuberant celebration took place in Sandia's Computer Science Research Institute on May 15 to mark finis to Red Storm, the Sandia-designed and Cray Inc.-built supercomputer that became one of the most influential machines of its era, with 124 descendants at 70 sites around the world.

"It's over, but its influence is not," said Bill Camp, the retired Sandia director who moved heaven and earth to get support for the design first proposed by Sandia technical wizard Jim Tomkins (retired).

Cray Inc. President and Chief Executive Officer Peter Ungaro did not quibble in his praise. "Everything we have done at Cray was spawned by this project," he told the *Lab News*. He later told the assembled group, "Without Red Storm I wouldn't be here in front of you today. Virtually everything we do at Cray — each of our three business units — comes from Red Storm. It spawned a company around it — a historic company struggling as to where we would go next. Literally, this program saved Cray."

The supercomputer design and its descendants have logged more than a billion dollars in sales for the company, he said.

It was a big risk

"Cray bet the farm on us," said Camp, "and we bet the farm on Cray. It was a big risk." As for Cray engineers and technicians, Camp said, "no matter how much [their salaries], they weren't getting paid much by the hour because they were in there weekends and evenings." Camp currently serves as a no-fee consultant to Sandia.

Center 1400 Director Rob Leland, who hosted the celebration, was senior manager responsible for the project at the time. He recalled at one point in 2004 being on the verge of relocating his family to Seattle, Cray's home base, to help out. "Things were really tense. We couldn't keep flying back and forth to be in immediate touch with Cray management and technicians," he told the *Lab News*. "Imagine going to a company whose defining idea is one thing [a custom vectorized, or linear, processor] and telling them it's the wrong idea for the future and they needed to focus instead on building massively parallel systems out of commodity processors. It only worked because they were at risk of going to go out of business, so they were quite motivated to accommodate us. And it turned out really well for them — in four years, their market share of supercomputers jumped from 6 percent to 20 percent."

What Rob told the celebrating group was, "Sometimes the need and vision and the people and the resources all come together to make something extraordinary happen. In my view, that's what Red Storm represents. We had a vision crafted by Bill Camp, a technical architecture led by Jim Tomkins [now a Sandia consultant], and the Cray folks went through an incredible journey to create this machine and on the way, recreate their company."

Off-the-shelf parts

Among the machine's advances were that it used off-the-shelf parts, which made it cheaper to build, repair, and upgrade. It was air-cooled instead of water-cooled, so that replacement parts and upgrades could be changed out while the machine was running. The only custom component was the Interconnect chip that made it possible to pass information more directly from processor to processor while applications were running. High memory bandwidth kept the processors from being starved for data. And its architecture was intended (and proved) to be upgradeable, going from a theoretical peak in 2005 of 41.47 teraflops to 124.42 teraflops in 2006 to 284.16 teraflops in 2008, because (among other reasons) the machine was able to accommodate single, dual, and quad-core processors that reached 12,920 in number.

THIS PANEL depicting the Red Storm architecture was on display at the groundbreaking supercomputer's "retirement" party.

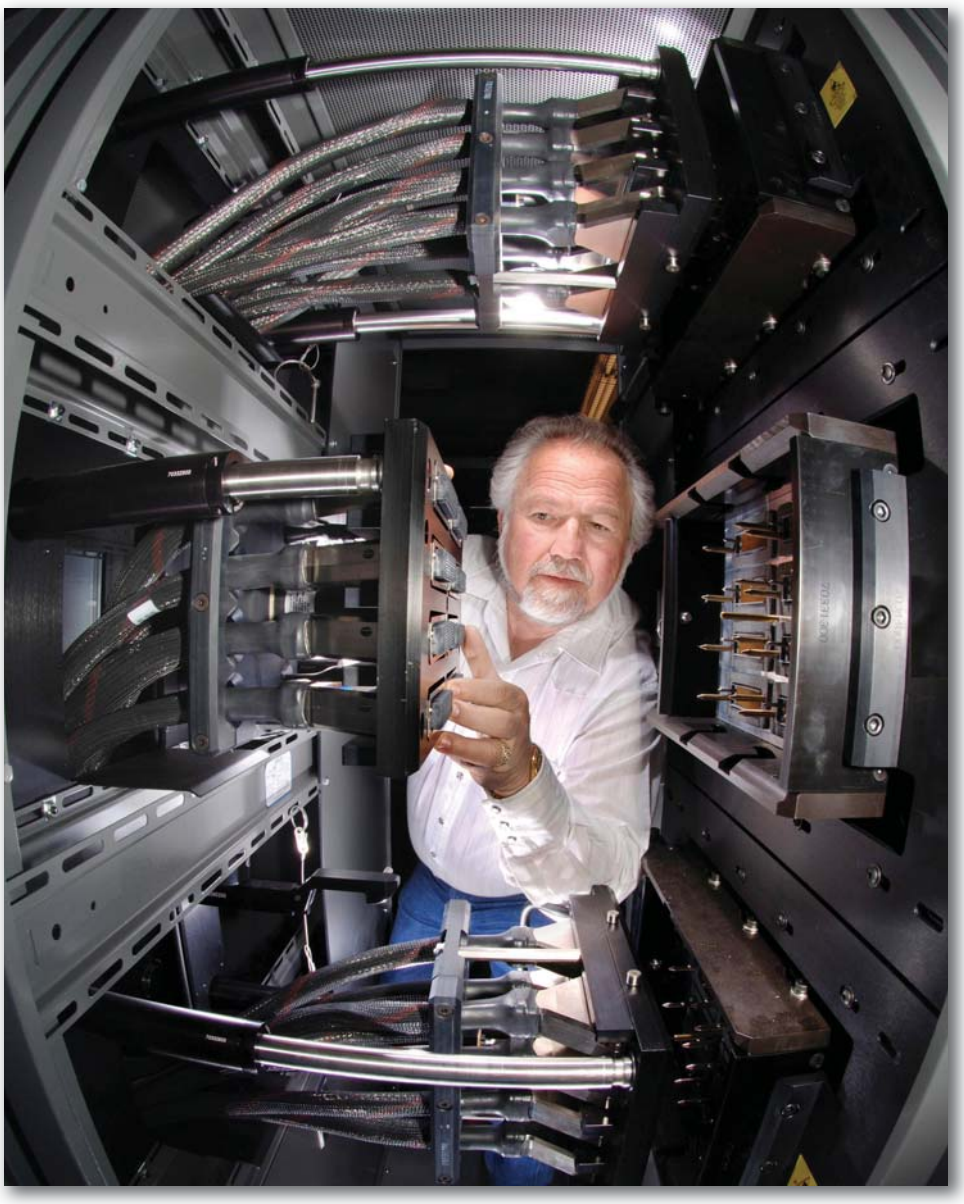
Among the machine's technical achievements was the operation known as Burnt Frost, which in 2008 programmed a rocket to shoot down an errant satellite traveling at 17,000 miles per hour, 153 miles above the earth.

For months, Red Storm ran calculations to fully examine a large number of shoot-down scenarios, until Sandians were ready to brief then-President George W. Bush on his options.

The result: After the successful take-down with no collateral damage, a military commander exulted, "We can hit a spot on a bullet with a bullet."

Red Storm's role, classified for several years, was made known when DoD eventually released the information.A Sandia video, using DoD images that showed the launch of the intercept missile and the impact, opened with the sentence: "This IS rocket science!"

Other operations of Red Storm, still classified, were described as having "a dramatic effect on the history of the country." The machine's boilerplate description says it was used to solve "pressing national security problems in areas such as cyber defense, vulnerability assessments, informatics (network discovery), space systems threats, and image processing." One nonclassified use for the machine and its more powerful descendant Jaguar at Oak Ridge, was to produce high-fidelity climate models that revealed, for the first time in simulations, vortices (swirls of water) in the Indian Ocean. That work was led by Mark Taylor (1442).



IN THIS 2005 PHOTO, ARCHIE GIBSON, a team leader on the Computer Operations Team, works inside the Red Storm supercomputer, the result of an award-winning partnership between Cray Inc. and Sandia. (Photo by Randy Montoya)

To a ripple of laughter at the improbable statement, the elegant Cray president thanked a slightly rumpled Bill Camp, a cross-trainer-shod Jim Tomkins, and Sandia in general "for your marketing expertise in selling the machine to the other DOE labs and to Europe."

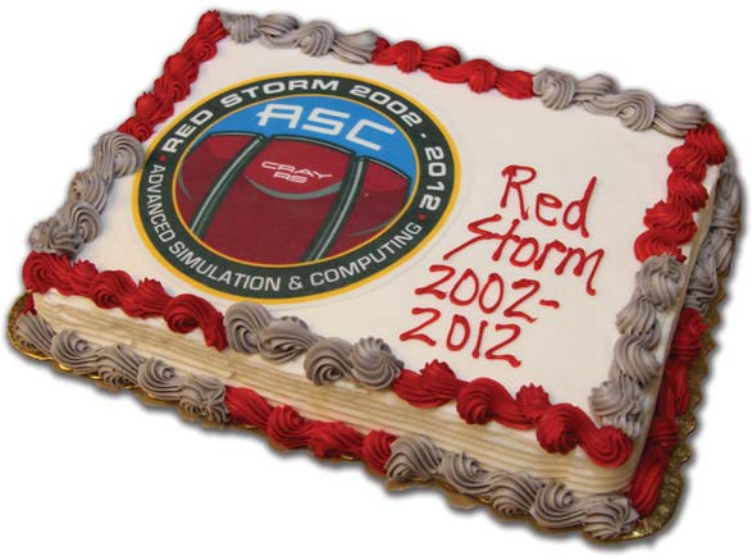
The selling, if that's what it was, actually started far earlier, in explaining the value of the still-unbuilt machine to Congress, DOE, and other Sandia executives before it could be built.

Then-VP Frank Figueroa was wary to let Camp embark on the project because, Figueroa protested, "The size of the project is bigger than the net worth of the company." To Camp, with Intel refusing to remain in the specialty supercomputer field and IBM already committed to another type of machine, Cray was, so to speak, the only US game in town, and it wasn't sure it wanted to play.

Journey to Washington

Camp convinced then-Sandia president Tom Hunter and current 9000 VP Mike Vahle to journey to Washington to reason with Congress and DOE to fund the new effort, which eventually reached a cost (depending on what is included) of approximately $72 million, a large sum but far less than comparable supercomputers available at the time, and for a far more all-purpose machine.

But that was just the start of the beginning. On the trip back to Albuquerque, remembers Mike, "Tom asked, 'Well, where are you going to house the thing? Where are you



going to get power?'"

A small task-group in Center 9300 saw to erecting a 22,000-square-foot building in a few months.

"The normal supercomputer development time for Cray was four to five years," says Rob. "We had in mind about 18 to 22 months."

"It was the fastest development cycle of any supercomputer," agreed Camp.

A great adventure

Things moved fast despite the perfectionism of the originator of the design, Jim Tomkins. "I had this nickname at Cray, 'the devil incarnate,' because I was something of a hard nose," he told the group. "I believed if we didn't pay attention to detail, we were going to fail. I wanted dotted i's and crossed t's. But it was the best team I ever worked with. There was no internal friction, and it was a great adventure."

Because of the speed with which Sandians pressed forward, when the machine arrived in Albuquerque, constructed from predominately off-the-shelf parts and with visions of shattering world records for speed, it had no management software to boot the system. So Jim Laros III (1422) wrote it. Then, because the communication software between each processor didn't work, Kevin Pedretti (1423) wrote that. "It is still in use today," says Sue Kelly (1423), credited with leading the effort to make the system usable once it was delivered. Bob Balance (9328) soothed stress between Sandia and Cray personnel during the ramp-up. John Noe (9328) warded off "administrivia" to speed progress.

Linda Bonnefoy-Lev (10694) was the purchasing agent who, according to several participants, "made things happen."

"We used AMD parts," said Constantine Pavlakos (9326). A side benefit, he said, was that "It encouraged Intel to ramp up and get back into the supercomputer business."

"It all goes back to [former Sandia computing director] Ed Barsis, who started all this," said Camp. "Ed realized something big was happening in massively parallel computing. We and Cal Tech were kind of 'it.' Red Storm grew out of the continuity of effort that grew out of that."

One of the biggest compliments to the machine, called one man from the rear of the room, is that "when a program doesn't work on another machine, they say, 'It works on Red Storm.'"

Horst Simon, deputy director at Lawrence Berkeley National Laboratory and prominent himself in computer science, emailed Camp, "I just want you to know what a wonderful thing you and Jim [Tomkins] have done for supercomputing."

"Jim Tomkins and me, we hung in there and made it happen," reminisced Camp.

About Camp, Leland said, "There were a handful of people in the country with the leadership skills for this job and a handful with the technical skills for this job, but I don't know anyone who had both, except for Bill."

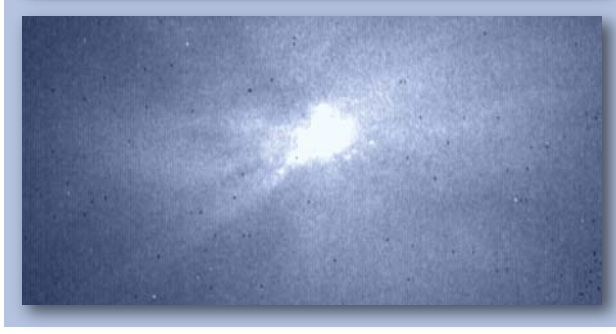
Among other people mentioned as having a positive impact on the project were Don Cook (now NNSA Deputy Administrator for Defense Programs), and Sandia 8000 VP Rick Stulen.

THE ARCHITECTS — Jim Tomkins, left, and Bill Camp stand before a screen displaying a Red Storm simulation. (Photo by Randy Montoya)

A SPECIAL 22,000-square-foot building was erected to house Red Storm. (Photo by Randy Montoya)

AND A GOOD TIME WAS HAD BY ALL at Red Storm's retirement party. In typical casual dress, Sandians celebrate with CEO Peter Ungaro of Cray Inc., made noticeable by his sports jacket (middle photo, far right). Among the folks standing with him are (right to left) Jim Tomkins, Bill Camp, Sue Kelly, Rob Leland, Linda Bonnefoy-Lev, Mike Vahle, and Bob Balance. At top, Sue Kelly and Dino Pavlakos; at bottom, Courtenay Vaughan, Mahesh Rajan, Dennis Dinge, and Dino Pavlakos.

SHOOTDOWN — Operation Burnt Frost was a US military operation to intercept and destroy a nonfunctioning US satellite before it could reenter the atmosphere and release its potentially toxic fuel supply. Red Storm was used to run simulations of the operation and played a key role in its ultimate success. The images here, released by DoD, show the launch of the intercept missile from the USS *Lake Erie* (top image) and the subsequent destruction of the errant satellite.



Let's twist again, like we did last summer

Photos by Randy Montoya

Annual Fitness Day event gets Sandians up and moving

Sandians from across the Labs converged on Hardin Field at lunchtime on May 16 to participate in Sandia's annual Fitness Day activities and earn extra Virgin HealthMiles for their efforts. Fitness activities included hula hooping, rope training, suspension training, jumping rope, and exercise band training. Thunderbird Cafe-prepared brown bag lunches, chock full of nutritious offerings, were available during the day's activities. For more information about Sandia's year-round fitness activities, go to the HBE website on Sandia's internal Techweb.

Sandia team honored for strong showing at SPOTC competition

Sandia's three-man handgun team claimed second place in its category in the 40th annual SPOTC competition, held this year at the Savannah River Site in Aiken, S.C.

SPOTC — The Security Protection Officer Team Competition — is an annual tactical, physical, and skills-oriented firearms competition open to teams of security protection officers from DOE and other agencies. SPOTC's goals are to foster interaction and camaraderie among a wider range of protective forces across the DOE complex, reflect the diversity of DOE, and showcase the abilities of protection officers at all levels.

Newly appointed NNSA Sandia Site Office Manager Geoff Beausoleil congratulated Sandia's shooters for their second-place overall finish in the handgun events.

"This team has done a great job representing the site and Sandia National Laboratories," Geoff says. "Without the Protective Force we couldn't do our jobs here. They are an integral part of our success."

Geoff, at left in photo, joins team members Orlando Griego (4238-3), Joseph Branch (4238-3), and Ruben Padilla (4238-8). Not pictured here, but key contributors to the team's success, are coaches Pat Stott (4238) and Andy Tabios (4238).

Sandia helping nation find best way to protect infrastructure, recover from disasters

By Sue Major Holmes

Sandia is trying to anticipate the unexpected to help the nation prepare for severe weather and figure out the best way to lessen the havoc hurricanes and other disasters leave on power grids, bridges, roads, and everything else in their path.

"I think our work in critical infrastructure protection is a really great thing to be working on. We can help provide the understanding and information to help policymakers make good decisions" that result in more resilient infrastructure — meaning it's better able to absorb impacts and recover quickly, says Marianne Walck, director of Geoscience Climate and Consequence Effects Center 6900.

Marianne was part of a panel in early May at the American Geophysical Union's inaugural Science Policy Conference aimed at highlighting geoscience insights for the economy, public safety, and national security. She discussed Sandia's work in developing ways to assess the resiliency of the nation's infrastructure and in providing the knowledge officials need to create more resilient systems.

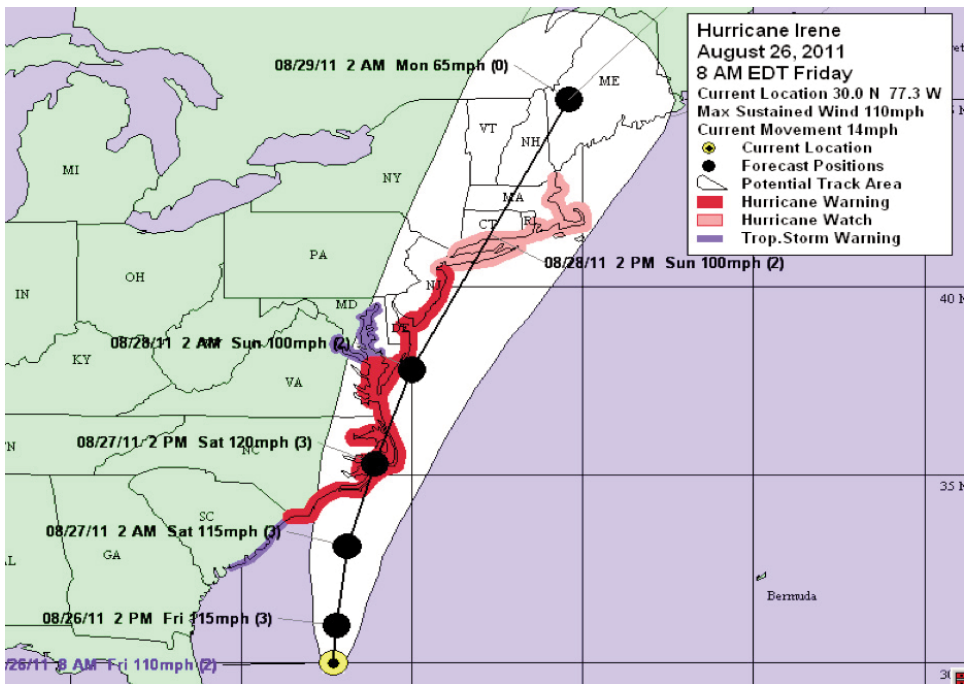
Sandia is trying to make the effort more quantitative by developing a mathematically rigorous approach to assess resilience objectively, says manager Lori Parrott (6924). As a part of critical infrastructure protection programs funded by DOE, the US Department of Homeland Security (DHS), Sandia's Laboratory Directed Research and Development program, and agencies such as the Federal Emergency Management Agency (FEMA), Sandia has developed capabilities ranging from high-fidelity models of individual infrastructure elements to generic network models and dynamic simulations.

Sandia's expertise in interdependencies and system modeling, economic and human consequences, asset and facility modeling, and integrating simulation architectures allows analysts to provide information on complex systems to decision-makers, Lori says.

"The analytic information can allow policymakers to be better informed to decide how to craft policies, how to promote incentives to create resilient infrastructure, or how to prioritize recovery and restoration," she says. "It's a true example of leveraging federal investments in Sandia capabilities to support multiple agencies' missions."

Researchers do a risk analysis and quantify uncertainties. They look at interdependencies among systems and supply chains, the resilience of various systems, how infrastructure systems fail, any cascading effects, and how results might differ if there are a series of disasters instead of just one.

Good models allow analysts to quantify consequences of disruptions in very complex systems. "If you don't have a good model to look at or to exercise in terms of running through these various scenarios, you may not understand what could really happen," Marianne says.



HURRICANE WATCH — The Department of Homeland Security's National Infrastructure Simulation and Analysis Center (NISAC), housed at Sandia and Los Alamos national laboratories, provided timely analysis of the potential infrastructure impacts of Hurricane Irene in August 2011. Officials asked NISAC to analyze Irene's likely impacts while the storm moved toward shore and to deliver an analysis in less than 12 hours. NISAC came through; its analysis was used to brief FEMA and first responders as well as the DHS and DOE.

A flood, for example, could damage roads, collapse bridges, and take down power lines, leaving officials to decide how best to rebuild and how much that will cost, Marianne says.

"This isn't just saying, 'Oh, I think that hurricane is going to knock out this particular chemical plant.' Then you have to think about what that means in terms of getting critical chemicals to industries. What societal or economic effects will result if this particular product isn't supplied? There are lots of different interactions that go on," she says. "It's just illuminating to understand what the impacts are if you've got particular types of infrastructure."

"This isn't just saying, 'Oh, I think that hurricane is going to knock out this particular chemical plant.' Then you have to think about what that means in terms of getting critical chemicals to industries. What societal or economic effects will result if this particular product isn't supplied? There are lots of different interactions that go on."

— Center 6900 Director Marianne Walck

Understanding impacts

Efforts to analyze natural disasters and other threats grew out of Sandia's strengths in systems engineering and complex systems analysis, she says. Some of the work is done through the National Infrastructure Simulation and Analysis Center (NISAC), a DHS program housed at Sandia and Los Alamos national laboratories. NISAC models and analyzes critical infrastructure, including how interdependent and vulnerable systems may be and the consequences of having them disrupted.

"Given how much of our national and economic security rests on the resiliency of our infrastructure, the rational choice for policy-makers is to experiment with models, not the system," Lori says.

Each year, NISAC undertakes projects to analyze various risks. Given a particular incident, how could people be evacuated given a particular road system? How much damage would hurricane-force winds cause to power lines, and would that cause governments to consider requiring underground lines in the future? There also are rebuilding considerations. Would it be better, for example, to focus on repairing rail transportation routes in a particular area rather than try to repair all routes simultaneously?

NISAC has developed expertise in analyzing subjects and developing models based on that analysis that cover everything from national transportation to interdependent supply chains. "Through our long-term analysis projects and our capability development, we work to keep our data, models, and analytic expertise current to be useful for crisis decision support," Lori says.

For example, NISAC has worked on a number of hurricanes, including Hurricane Irene, the only hurricane to threaten the US mainland last year. Although a small storm compared to other hurricanes, Irene was unusual. Rather than striking a concentrated area, Irene traveled up the East Coast, threatening a large swath of significant infrastructure.

Officials asked NISAC to analyze Irene's likely impacts while the storm moved toward shore and to deliver an analysis in less than 12 hours. NISAC came through, and Marianne says its analysis was used to brief FEMA and first responders as well as the DHS and DOE.

Japanese delegation celebrates smart grid launch

SMART GRID PARTNERS — A delegation from Japan's New Energy and Industrial Technology Development Organization (NEDO), including NEDO chairman Kazuo Furukawa and directors of the organization's smart grids/smart communities departments, visited Sandia in mid-May to discuss new opportunities for collaboration between NEDO and the Labs. Before visiting Sandia, the NEDO delegation, in collaboration with Mesa del Sol, PNM, Sandia, and the University of New Mexico School of Engineering, held a ribbon-cutting ceremony to unveil a state-of-the-art microgrid facility in the 78,000-square-foot Aperture Center at Mesa del Sol. NEDO plans an overall investment of $22 million in the Mesa del Sol microgrid project, which will use on-site solar, fuel cell, natural gas, and backup battery storage systems. Nine Japanese companies installed the systems and will test them for two years to learn about how a smart grid can function in a real-world setting. The system is a showcase for future smart-grid projects. In the photo above, Charlie Hanley (6112) briefs the NEDO delegation on Sandia's photovoltaic research, a key component of the microgrid concept. (Photo by Randy Montoya)

The Sandia Health Partner Network: More Choices, More Savings

The information here was provided by Sandia's Benefits organization.

The Sandia Health Partner Network is part of Sandia Total Health, the consumer-directed health plan (CDHP) available to active employees and Pre-Medicare retirees. Like most CDHPs, Sandia Total Health provides 100 percent coverage for preventive care services such as annual physicals, mammograms, and well-child care. And, Sandia Total Health encourages you to take an active role in health care decisions. When you enrolled in Sandia Total Health, you chose your plan administrator:

- Blue Cross and Blue Shield of New Mexico (BCBSNM);
- United Healthcare (UHC); or
- Kaiser Permanente (California only)

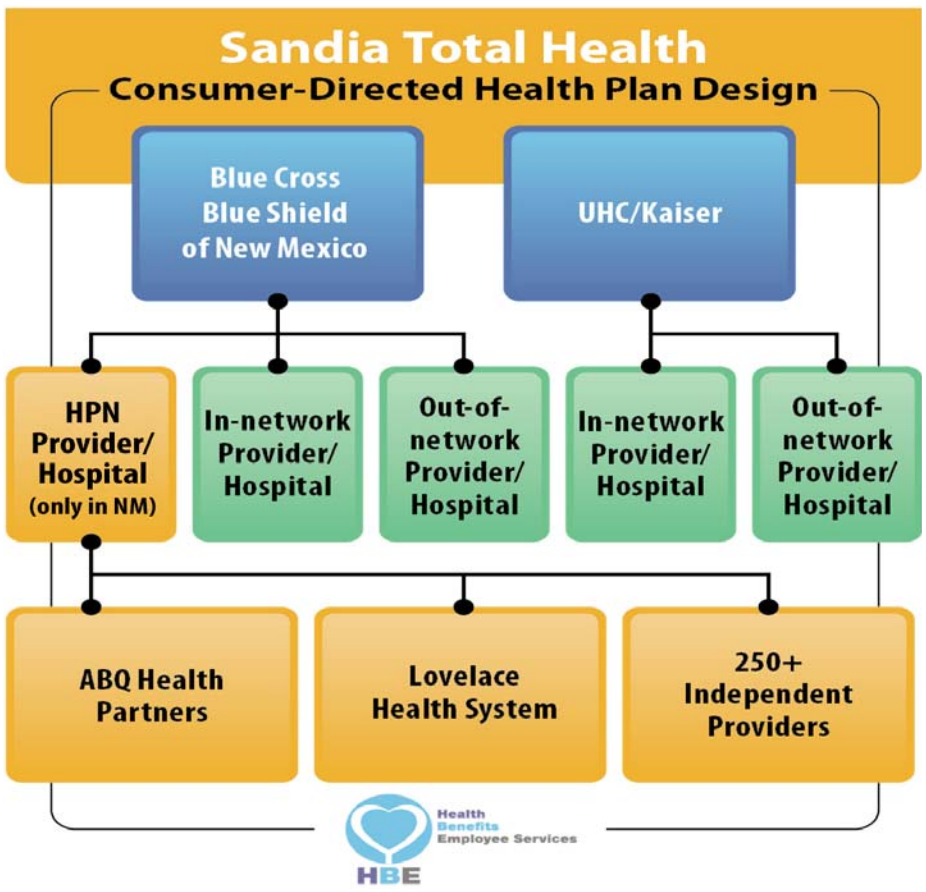
Many providers accept both BCBSNM and UHC, but in general, each administrator has its own network of doctors and hospitals that provide discounted services. All three administrators also let you get care at out-of-network doctors, but those visits are at a higher cost.

In New Mexico this year we introduced a new approach to health care: the Health Partner Network (HPN). This network has teamed with Sandia to focus on improving the quality, access, and cost of health care. If you are in Sandia Total Health with BCBSNM, you have access to Sandia HPN doctors and hospitals that will save you money.

What you get with the Sandia HPN

Those enrolled in BCBSNM can access the BCBS nationwide network of providers and the HPN for in-network care. The HPN includes:

- Lovelace Health System;
- ABQ Health Partners physician group;
- Heart Hospital; and
- More than 250 independent community physicians.

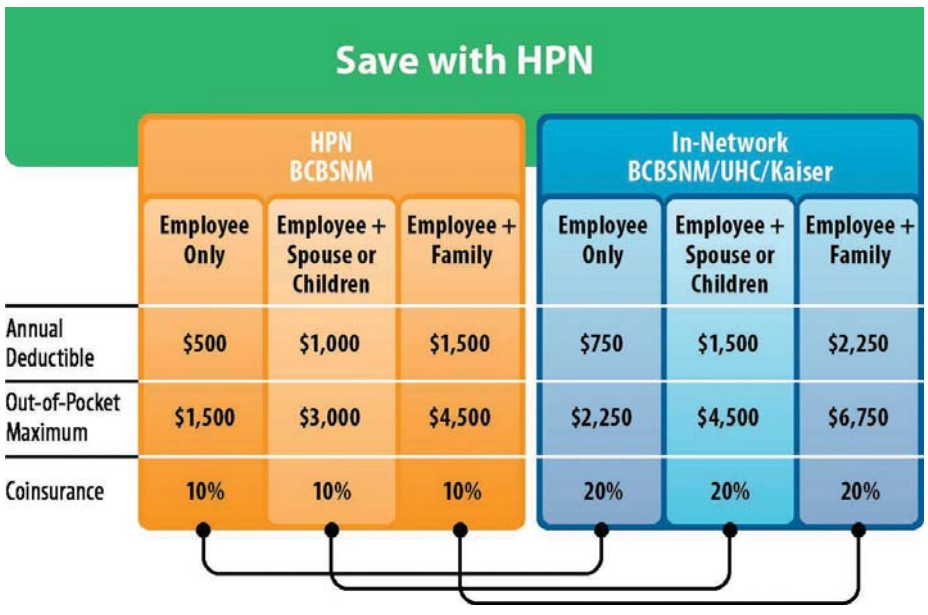


More in your pocket

When you visit HPN doctors and hospitals, you save money because your out-of-pocket costs (deductible, coinsurance, and out-of-pocket maximum) are lower. The premiums you pay for BCBSNM are lower, too.

And, anything you pay toward the HPN deductible and out-of-pocket maximum also applies to your in-network deductible and out-of-pocket maximum (see the scenarios in the column at right.)

For details on the Sandia HPN, visit hbe.sandia.gov



Let's see how you save money when using the HPN offered through BCBSNM:

Scenario 1:
You have Employee-Only coverage through BCBSNM and you visit *only* an HPN doctor

Services You Use	Cost Explanation	Total Cost
You make several visits to your *HPN* doctor.	You meet your HPN deductible of $500.	$500
Your doctor refers you to an *HPN* specialist who charges $1,000.	Since you've met the HPN deductible, you only owe coinsurance, which for HPN is 10% of the $1,000.	10% x $1,000 = $100
	Total out-of-pocket cost	$600
If you completed last year's Health Assessment and Virgin HealthMiles requirements, you have $500 in your HRA, reducing your cost to $100.		$600 – $500 = $100

GREATEST SAVINGS

Scenario 2:
You have Employee-Only coverage through BCBSNM and you visit HPN *and* In-Network doctors

Services You Use	Cost Explanation	Total Cost
You make several visits to your *HPN* doctor.	You meet your HPN deductible of $500.	$500
Your doctor refers you to an In-Network, *non-HPN* specialist who charges $1,000.	$250 of the $1,000 goes to meet the $750 In-Network deductible.	$250
	You then owe 20% of the remaining $750 as In-Network coinsurance.	20% x $750 = $150
	Total out-of-pocket cost	$900
If you completed last year's Health Assessment and Virgin HealthMiles requirements, you have $500 in your HRA, reducing your cost to $400.		$900 – $500 = $400

Scenario 3:
You have Employee-Only coverage through UHC, Kaiser or BCBSNM (but don't access the HPN)

Services You Use	Cost Explanation	Total Cost
You make several visits to your doctor.	You meet your in-network deductible of $750.	$750
Your doctor refers you to a specialist who charges $1,000.	Since you've met the deductible, you only owe coinsurance, which for UHC and Kaiser is 20% of the $1,000.	20% x $1,000 = $200
	Total out-of-pocket cost	$950
If you completed last year's Health Assessment and Virgin HealthMiles requirements, you have $500 in your HRA, reducing your cost to $450.		$950 – $500 = $450

Finding an HPN doctor or hospital

Sandia Total Health BCBSNM members who use Sandia HPN providers will see increased benefits through lowered out-of-pocket costs. Go to www.sandiahpn.com or download the SHPN iPhone app to find HPN providers.

If you're not enrolled in BCBSNM this year, then during Open Enrollment this fall you should check to see if providers you use are in the HPN or in the BCBSNM network and decide if switching to BCBSNM makes sense for you.

Remember, many doctors participate in multiple networks, so it's very likely your doctor is already in the BCBSNM network. If you want to switch to BCBSNM as your Sandia Total Health administrator, you can enroll in that plan this fall, with coverage starting Jan. 1, 2013.

Single phone number offered to resolve medical concerns

As mentioned in the accompanying article, the Sandia Health Partner network includes Lovelace Health System, along with a physician group called ABQ Health Partners, the Heart Hospital, and approximately 250 additional independent community physicians. ABQ Health Partners is the largest multispecialty independently owned medical group in New Mexico. It offer a comprehensive range of services that includes more than 40 medical specialties.

The HPN Ambassador Service is an exclusive program offered to employees, PreMedicare retirees, and their families who use the groups of physicians within the ABQ Health Partners organization. The HPN Ambassador Service provides Sandia Total Health BCBSNM members with a single phone number to call for all ABQ Health Partners services. The Sandia HPN Ambassador Dedicated Phone Line is 262-7100.

Use the Ambassador phone number for almost all ABQ Health Partners service-related issues. You can:

- Ask about clinical services or specific providers with ABQ Health Partners. The Ambassador agents are familiar with all ABQ Health Partner services, locations, specialties, physicians, and labs.
- Request an appointment with a primary care or specialty provider for preventive visits or an acute need. The Ambassador agents will do their best to make sure you get an appointment within 48-hours.
- Get assistance in navigating to the correct point of contact for billing or other concerns. The Ambassador agents will either resolve your issue right on the phone with you, or connect you directly to the individual who can.
- All questions regarding benefits and claims should be directed to Blue Cross and Blue Shield of New Mexico (BCBSNM) at customer service: 877-498-SNLB (7652).

The Ambassador Line is staffed with a small team of ABQ Health Partners professionals trained to provide help with Sandia HPN questions and concerns. They are prepared to help you with policy, appointments, or even help resolve complex issues. For Sandians enrolled in Sandia Total Health BCBSNM, the HPN Ambassador Service provides the only number you need to know to handle all of your ABQ Health Partners servicing needs.

Call the Ambassador Line today at 262-7100 to see first-hand what this exceptional service can do for you.

ABQ Health Partners

Gift that keeps on giving

Expo lays out an array of learning opportunities

By Nancy Salem

Curt Salisbury won a $1.6 million contract for Sandia not long after earning a PhD in mechanical engineering from Stanford University through the Labs' Doctoral Study Program.

"Sandia would not have gotten that contract if I didn't have the doctorate. We used to joke around that we couldn't understand why it made sense for Sandia to put us through school," Curt (6533) says. "Well, it makes sense."

Curt is among hundreds of Sandians who have taken advantage of educational opportunities offered by the Labs. The options range from university tuition assistance to special degree programs, such as Curt experienced, to a wide variety of internal training classes.

"The opportunities abound," says Charline Wells, senior manager of Corporate Learning & Professional Development Dept. 3520. "There really is something for everyone."

A commitment to continuing education supports Sandia's Strategic Objective No. 5, to provide a learning, inclusive, and engaging environment for employees. "Giving people the opportunity to expand their education always serves the Labs' best interest," Charline says. "By renewing and keeping the staff at the top of their game, we keep our mission at the top of its game. Education is the gift that keeps on giving."

Educational opportunities offered through Sandia will be highlighted at a three-day expo June 12-14. Previous education fairs, held every year or every other year since about 1997, typically have been one-day events focusing on university programs and internal training.

"We've made a concerted effort to expand our Education Fair to be inclusive by including other types of learning opportunities at Sandia, both formal and informal, that are available to employees to expand their development and education," Charline says. "People can come to the fair and sample classes or spend a little time talking with university representatives about available education programs."

IN THE NEXT ISSUE of the *Lab News*, we talk to members of the first class of Sandia's Technical Development Program, or TDP, one of the Labs' earliest continuing education efforts. The class recently celebrated the 50th anniversary of its graduation with master's degrees from the University of New Mexico School of Engineering.

ANTOINETTE ANGEL moved into a business management job at Sandia after earning bachelor's and master's degrees with Labs tuition assistance. "I am very grateful," she says.

A person to talk to

The first day of this year's expo, in Bldg. 858EL, showcases internal training courses and programs offered by about 15 universities. Most have relationships with Sandia through the Campus Executives Program. Among those participating are Stanford University, Carnegie Mellon University, University of New Haven, University of Arizona, University of Wisconsin at Madison, Missouri University of Science & Technology, Stevens Institute of Technology, University of New Mexico, New Mexico State University, New Mexico Tech, and Central New Mexico Community College.

NMSU, Stevens, and New Haven offer classes at Sandia. The other schools plan to showcase distance learning programs in such fields as business, accounting, computer science, information technology, engineering, math, and science. All the schools will set up booths and have representatives available to discuss their offerings — degree programs, certificates for academic credit, and individual courses.

"People can gather information and get their questions answered directly by the university representatives." Charline says. "Attendees can put a face with the name at a school. It makes the process less onerous. There will be a person to talk to."

The second day's activities, at the Steve Schiff Auditorium lobby, focus on informal learning opportunities. Tables include Procurement, Lean Six Sigma, Weapons Intern Program, Nuclear Product Quality Training Program, Community Involvement, HBE, Summer Camps for Children, Security Awareness, and National Training Center. Workshops are planned on inclusion, how to package yourself, emotional intelligence, and apprenticeships.

"This is the perfect opportunity for employees to focus on their own learning and skills development," says Bernadette Montano (3520), project lead for the expo. "It gives organizations an opportunity to demonstrate their commitment to employee learning and to emphasize the connection between a highly skilled workforce and organizational results."

Activities for Day 3, at Bldg. 856, focus on leadership and communication skills. Attendees can sample a new communications and storytelling curriculum and decide whether to sign up for a longer session.

At the end of the expo, employees who embody lifelong learning and leaders who support education will be recognized. About 50 people received awards in 2010 at a ceremony at the Thunderbird Cafeteria. This year's ceremony will be June 21 at 2 p.m. at the Thunderbird.

'Go for it'

In any given year, 350 to 400 Sandians participate in tuition assistance programs and about 40 in special degree programs. Assistance is offered for education relevant to Sandia and/or to a person's work at the Labs and taken at Sandia-recognized accredited schools or accredited programs.

Antoinette Angel (10653) was hired at Sandia in 2003 as an office administrative assistant. Going to school at night with Sandia tuition assistance, she earned a bachelor's degree in information technology in 2008 and a master's degree in business administration two years later.

"The programs are awesome," she says. "I had never thought about earning a master's degree, and I am very thankful to have been given the opportunity. My advice to people is 'Go for it.'"

Antoinette is now a business management professional providing financial and business support to four technical areas.

Troy Stevens (6925) earned a master's degree in business administration from the University of New Mexico with Sandia tuition assistance. He had been hired in 2001 as a computer systems analyst and moved into the technical staff as a program developer after getting the higher degree.

Troy was accepted into the Labs' Special Master's Program in 2010 and spent a year at Carnegie Mellon University in Pittsburgh earning a master's degree in information systems management. He returned to Sandia last May and a job in computer science research and development.

"I consider myself very lucky to have done not one but two of Sandia's educational programs," Troy says. "I have lots of friends who have done them as well, and you can see how it benefits them and how it benefits Sandia."

He says the Sandia programs are considered among the best in the country. "People from other companies tell me how lucky we are to have these programs in place and how much of an advantage it is," Troy says.

Charline says education "touches the entire Laboratory."

"It's not just a few people," she says. "Anyone and everyone can come out and learn more about their educational opportunities."

FOR MORE INFORMATION, contact Bernadette Montano, University Programs administrator, or see the website at http://learningexpo.sandia.gov/.