10,000: Annular Core Research Reactor hits milestone

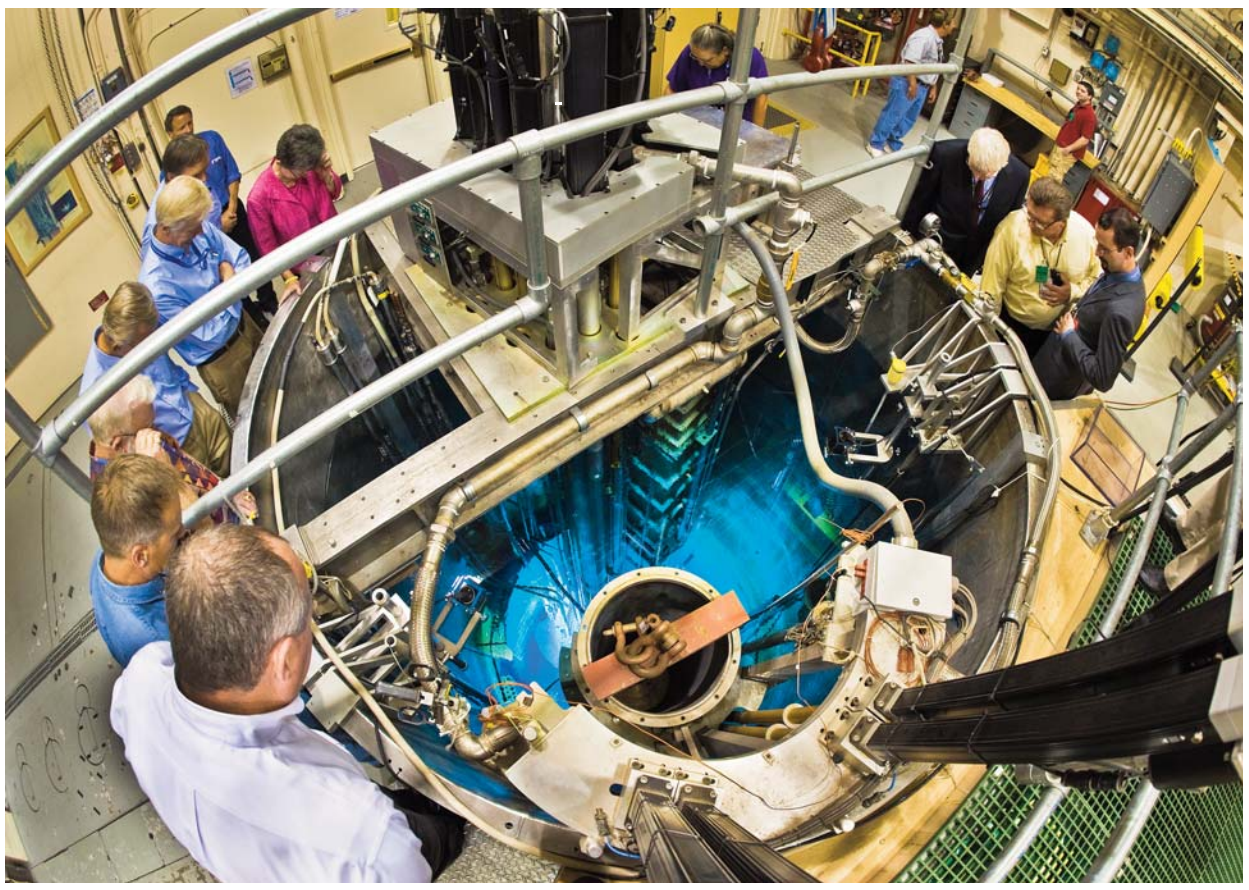
By Stephanie Hobby

An abrupt bang, a bright blue flash, and a loud cheer marked the 10,000th operation of Sandia's Annular Core Research Reactor (ACRR). About 150 people gathered in Tech Area V on Sept. 8 to celebrate the milestone for Sandia's research reactor.

In its 32 year history, the ACRR has been a valuable resource for an incredibly wide variety of experiments. With a dry, nine-inch diameter cavity in the core's center, and a 20-inch diameter external cavity, the ACRR's primary missions are to subject electronics to high-intensity neutron irradiation environments and conduct reactor-safety research. The ACRR has also provided testing support to organizations as varied as semiconductor manufacturers, NASA, and recently, the Large Hadron Collider in Switzerland.

"The ACRR has been a real workhorse for Sandia. ACRR supports stockpile stewardship activities concerning terminal-phase, hostile, and fratricide effects. Lab leadership relies on these and other weapons-component testing done at Sandia to support certification of the nuclear weapon stockpile," says Lonnie Martin (1381), an ACRR operator. ACRR is a water-moderated,

(Continued on page 6)



BIG SHOT — A group of spectators gathers at the ACRR for its 10,000th operation. The shot was videostreamed live to a nearby auditorium to accommodate more than 150 onlookers. The ACRR has been in operation for more than 32 years at Sandia. (Photo by Randy Montoya)

Sandia LabNews

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Sandia National Laboratories

US Coast Guard Academy cadets spend summer at Sandia

This past summer six USCGA cadets spent six weeks at Sandia doing hands-on, real-world research. See **page 7** to read about their experiences and their thoughts about working at a world-class engineering lab.

New VPs named to head HR, IT divisions

PAMELA HANSEN HARGAN

MICHAEL VAHLE

Sandia has two new vice presidents. Pamela Hansen Hargan is the new VP of Human Resources and Communications Div. 3000. She assumed her duties in late August. Mike Vahle is the VP of Information Technology Services Div. 9000, which was formerly called Enterprise Transformation. In his new role, Mike will also serve as Sandia's chief information officer.

Executive VP and Deputy Labs Director for Mission Support Kim Sawyer announced Pam's

(Continued on page 4)

Sandia's five-year *Strategic Plan* sets out path to meet national security mission

By Heather Clark

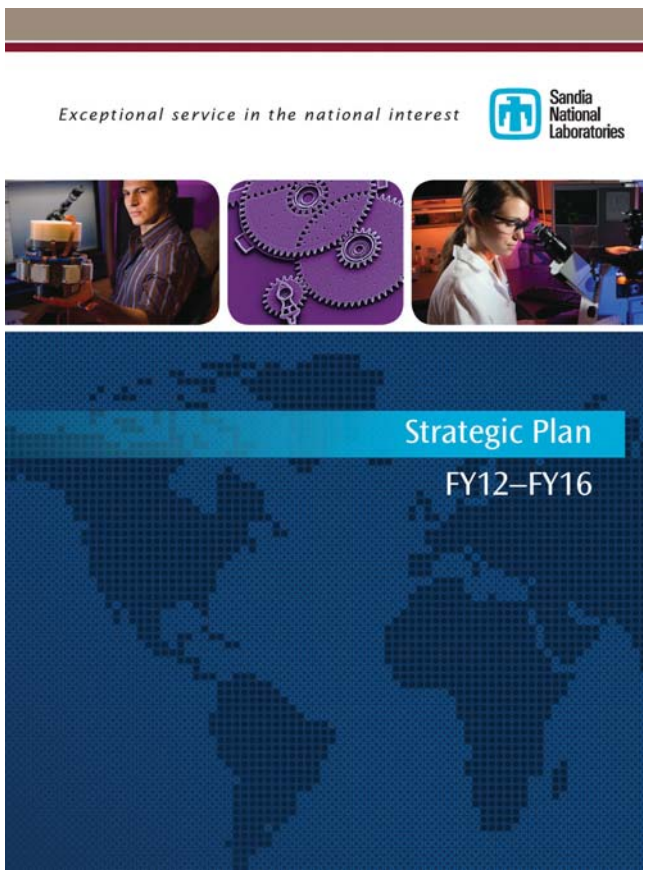
Read all about it! Sandia's *Strategic Plan FY12-FY16* is now available to employees to provide direction and focus for Sandia's leaders and set out goals that will help the Labs achieve its national security mission.

"For me, a plan is much more than a document or a set of specific actions: It inspires a conversation throughout the Laboratories, a conversation that brings us together."

Sandia President and Labs Director Paul Hommert

The link to the website containing the Strategic Plan was sent to all Labs employees Sept. 12. The document is available at the strategic planning web-

(Continued on page 5)



Three Lab directors mark 10th anniversary of 9/11 attacks

The three Sandia lab directors of the post-9/11 era — C. Paul Robinson, Tom Hunter, and Paul Hommert — shared the stage at the Steve Schiff Auditorium on Sept. 12 to share their thoughts about the impact of the 9/11 attacks on Sandia and its role as a national security laboratory. More on **page 6.**

Inside . . .

That's that

The photos were alarming. A day or so after Steve Jobs announced he was stepping down from a day-to-day leadership role at Apple because of health concerns, a photo started circulating around the web showing a startlingly frail-looking and emaciated Jobs standing in a doorway with someone, presumably a medical attendant. Subsequently, several debunkers made the case — pretty convincingly — that the photo was fake, a not-so-great Photoshop mashup. Still, Jobs' serial health challenges over the past decade have been no secret and this latest turn seems very much a turn for the worse. Let's hope that he recovers his health soon and picks up his remarkable career where he left off, leading the most successful and innovative technology company in the world for another 20 or 30 years.

As it happens, and why I bring up Steve Jobs in the *Lab News*, is that he once posed a hypothetical question to a job prospect that seems to me to be very relevant for Sandians. John Sculley, who served as Apple's CEO from 1983 to 1993, tells the story in his book Odyssey: In the early 1980s, Apple — started by Steve Jobs and Steve Wozniak in a garage just a few years before — was growing so fast that its board of directors felt it was time to bring in a serious business executive as CEO. The top prospect was John Sculley, then the head honcho at PepsiCo, one of the biggest and most recognizable companies in the world. Sculley was a marketing guy, very much at home in the world of soft-drinks and fast food restaurants. He had a good thing going at PepsiCo, where, with his hip and savvy ideas, he had become its youngest-ever marketing VP and then its youngest-ever president. Steve Jobs, always uncompromising in his quest for the best, had decided that Sculley was the man for Apple, and he went after him like a suitor. Sculley was ambivalent: Was this PC phenomenon for real? Was it a fad that would soon blow over, the electronic version of the hula hoop or pet rock? Was this something to hitch a career to? Sensing his reluctance, Jobs put it to Sculley in blunt terms, as was his way: "Do you want to sell sugar water for the rest of your life or do you want to come with me and change the world?" As Sculley tells it, when Jobs laid out the options so starkly, Sculley was convinced; he joined Apple and led the company (with mixed success) for almost a decade.

So what does this have to do with Sandia? Well, I think we can all pose the Jobs question to ourselves, particularly those of us doing the hard mission work that protects this nation's security. For many of our best people, there are lots of options out there away from the national laboratory setting. But I don't think there are many places where, day-in, day-out, what you do at work is so consequential. That was true during the years of the Cold War, and it's been true since. As we documented in our 9/11 10th anniversary issue of the *Lab News* two weeks ago, Sandians have made profoundly important contributions in the war on terror and in keeping America safe in a complex and dangerous world. Jobs, with his vision and the force of his personality, certainly changed our world. But we at Sandia have, too. And we'll continue to do so. I'd rather be here than selling sugar water somewhere, that's for sure.

* * *

Speaking of Jobs, I read a note about his success that struck a chord with me: Jobs — and Apple — have been wildly successful not because they give consumers what they want, but because they deliver products that consumers didn't know they wanted and then make them wonder how they ever lived without them. So let me repeat what I said above: I hope Jobs recovers his health and returns to Apple; I can't wait to see what he'll come up with next.

* * *

Do you eat your lunch at your desk? If so, you may be damaging your health, your relationships, and even your career. Or, at least that's the assertion in a new study that says we all need to get up from our desks in the middle of the workday and seek out a total change of scenery. Move around a bit. Engage with our fellow workers in a different, stress-free setting. Sounds like good advice to me. Now excuse me, my sandwich is calling.

See you next time.

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

Sandia LabNews

Sandia National Laboratories

http://www.sandia.gov/LabNews

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LOCKHEED MARTIN

For the record

The Laboratories' first Strategic Objective was misstated in a boxed list on page 7 of the Sept. 9, 2011, edition of the *Lab News*. The first Strategic Objective is "Deliver with excellence on our commitments to the unique nuclear weapons mission." The objective was stated correctly in the text of the article on the same page.

Lab News Reader Service

The *Sandia Lab News* is distributed in-house to all Sandia employees and on-site contractors and mailed to all Sandia retirees. It is also mailed to individuals in industry, government, academia, nonprofit organizations, media, and private life who request it.

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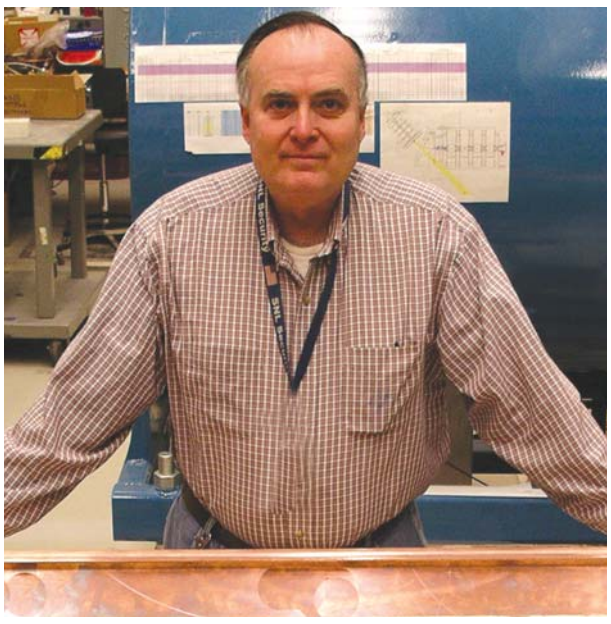
Employee death

Kim Reed is 'somewhere in heaven, where he belongs'

Kim Reed (1654) died on Sept. 9. He was 58 years old and had been at Sandia more than 22 years.

"Kim was an extraordinary and exceptionally creative individual who thrived on the unexplored," says his manager, Larry Schneider (1650). "Kim's contributions to magnetic switching and repetitive pulsed power led the way to the world's highest average power pulsed accelerator that enabled years of research with Fortune 500 companies in areas we could have never envisioned. His work on state-changing dielectrics and solid-state opening switches was truly groundbreaking. Kim's dedication and love of science and engineering was an inspiration to those who truly knew him."



KIM REED

Jim was kind was kind of heart, too. "His extreme generosity to St. Jude Children's Research Hospital and Christmas charity drives lifted the spirits of children," Larry adds.

"I worked with Kim for about 10 years," says Steven Tullar (1654). "He was one of the most intelligent people I have ever met. He could talk about almost any subject — he had read about or experienced it. Kim loved his job and came up with some of the most ingenious solutions. He was one who came to work early and left late."

"We had a yearly tradition of purchasing Christmas gifts for children in need via the Salvation Army, Giving Tree, etc.," says Gary Pena (1654). "These organizations had listed the needs of each child but Kim could not bear to deliver only the needed/requested items. That was not his style. He always included something fun for the child because, after all, what was Christmas to a child without a toy to open on Christmas morning? He loved children and children loved him."

"Kim is the only guy I've known who could out-pun me (and that is saying quite a bit)," says Ron Lipinski (6223). "He was a very sharp plasma physicist, hard-working, dedicated, and always made his project work. He insisted on understanding the deeper questions about the technology involved, and never hesitated from asking probing questions. He told stories about riding horses around Arizona and by the Grand Canyon in his youth. I think he took up riding motorcycles as an urban alternative to that past adventure."

For Joe Rudys (1654) Kim was his organization's sense of humor. "Kim always had something funny to say," Joe says. "They weren't jokes heard elsewhere. They were his — original and funny, like: 'I think I will go down the Australia and start a software company and name the company, Down Underwear. Kim loved Harley Davidson motorcycles; he had five fully decked-out bikes. More than his love of motorcycles was his love for children."

"Kim's childhood was as interesting and notable as his adult life," adds Gary. "Our weekly dinner engagements were often spent rehashing his childhood stories that always precipitated laughter. Often his stories were about the prankster acts he and his older brother, Greg, pulled on their younger brother, Brent, or their neighbor, Mr. Yule. A favorite story was about spying on their older sister, Kris, when she came home with her boyfriend and the mischievous things they did to both of them. He never really lost the element of mischief.

"Kim was proud of his personal accomplishments but got more excited about the accomplishment of others."

Christina Acosta (1659) says Kim was a special person. "He would make you laugh like no one could, but also bring tears to your eyes. He was such a character! It was a joy to work with him. I know he is somewhere in heaven, where he belongs, because he was so giving. He was such a blessing." *— Iris Aboytes*

SHARE is off to a flying start with a day at the races

WE ARE THE CHAMPIONS — Div. 8000 VP Rick Stulen, left, and Jim Lund (8130), right, savor a moment at the end of the SHARE Campaign tricycle race. With them is Dave Rice, president of the Tri Valley Community Foundation, Sandia's partner in the SHARE campaign for the past 18 years. (Photo by Randy Wong)

By Patti Koning

Sandia/California kicked off its annual SHARE — Sandia Helps and Reaches Everyone — campaign on Tuesday, Sept. 13, with a day at the races. The tricycle races.

Center directors and senior managers rode their hearts out on red tricycles, all in the name of sharing, caring, and personal glory. Competing in the center directors' race were Jim Lund (8130), Russ Miller (8200), Bob Carling (8300), Linda Houston (8500), Blake Simmons (8630), and Len Napolitano (8900). Jim and Len won their heats and rode against Div. 8000 VP Rick Stulen in the final race, with Jim finishing in first followed closely by Rick.

Jim and Blake also rode in the senior managers' race, along with Art Pontau (8360), Tim Shepodd (8223), John Garcia (8510), and Jim Costa (8950). Proving that experience matters, Jim and Blake won their heats and rode against Rick in the final race. After a photo finish, Jim and Rick were both declared winners and will share ownership of the golden tricycle trophy.

"Next year I'm going to wear a lycra suit to reduce the drag coefficient," says Rick.

The grand prize is $100 for both Div. 8000 and Center 8100, directed to the charity of each center's senior management associate's choice. Ann Stayton (8000) chose Canine Companions for Independence and Michelle Clark (8100) chose the Wounded Warrior Project.

Along with the fun, there were some serious words about SHARE and the growing needs of the community. Rick announced the site's goal to raise $255,000 this year for nonprofit agencies of employees' choosing.

"The funds you raise do amazing things," said Dave Rice, president of the Tri Valley Community Foundation (TVCF), Sandia's partner in the SHARE campaign for the past 18 years.

He noted that in the last eight years, donations made by Sandia employees have helped 600 students who had been high school dropouts earn their General Education Diploma. Even more impressive, more than 250 of those students have now earned their four-year college degree.

Attendees bid on silent auction baskets, donated by TVCF, with themes like gardening, wine, cats, dogs, family fun, and movie night. The baskets raised more than $2,600, which will be distributed to nonprofits supported by SHARE.

Chair Cathy Branda (8623) also honored recipients of the Presidential Award, for Sandians who self-reported at least 100 hours of volunteer work, and the Community Service Award, for Sandians who volunteered at least 100 hours for a single organization. Recipients of the Community Service Award also earn for their organization a Lockheed Martin contribution of between $100 and $500, depending on the number of hours volunteered.

The Community Service Award winners are: Teresa Antolak (8521), Will Bolton (8123), Toff Garcia (8517), Dan Golling (8123), Maria Matos (8243), Steve Paradise (8226), Diane Pereira (8531), Bill Rorke (8244), Tim Shepodd, Emily Soares (8944-1), and Hugh Tran (8634),

The Presidential Award winners are: Melissa Betz (8529), John Gillen (8135), Dan Golling, Hope Niblick (8947), Steve Paradise, Jacquie Reardon (8131), Howard Royer (8512), Tim Shepodd, Emily Soares, Tracy Walker (8940), and Kim Whitaker (8531).

For more information about SHARE and to set up contributions, visit https://share.sandia.gov/share/.

YOU GO, GUY — Rick Stulen, California site VP, dashes for the finish line in the great Livermore tricycle race. (Photo by Randy Wong)

JAMIE GOODALE (8130), Michele Clark (8100), and Wen Hsu (8128) show their support for Captain America, AKA Jim Lund, who represented Center 8100 in the SHARE Campaign tricycle race. (Photo by Randy Wong)

Sandia CaliforniaNews

Nearly $1 billion in economic activity in California generated by Sandia in 2010, according to new report

By Mike Janes

Sandia generated nearly $1 billion in both direct and indirect economic output in the state of California in 2010 with nearly half coming from the San Francisco Bay Area, according to a new report prepared by the Center for Economic Development (CED) at California State University-Chico.

This economic output — defined in the report as revenue to all private businesses and public organizations — included $163 million in purchases and contracts to California businesses, $155 million in employee compensation and benefits, and $1.4 million in state corporate tax. Combined, those three components amount to $319 million, the total direct injection into the California economy.

Indirectly, impacts of Sandia's spending are responsible for an additional $24 million in revenue to California's state government and $612 million in additional revenue to other businesses and organizations in the state. In sum, the total output impact is $955 million.

About half Sandia's economic impact in California occurs in the San Francisco Bay Area, home of Sandia's campus in Livermore. The Bay Area's share of the total economic impact of Sandia is $474 million in output, $304 million in household income, and more than 2,500 jobs.

"This report demonstrates that Sandia is a significant economic engine for the state of California," says Denise Koker (8520), senior manager of human resources and business operations at Sandia/California. "And because the state — especially the Bay Area — is recognized as a global leader in energy innovation and a center of high-tech R&D and industry, we believe California and Sandia are natural partners. Those two entities should continue to strengthen their bond and seek out ways to jointly support both the state's and the country's missions through technology and innovation."

> *"This report demonstrates that Sandia is a significant economic engine for the state of California."*
>
> **— Denise Koker (8520), senior manager**

California households, according to the report, saw $497 million in financial benefits, including direct employee compensation plus $342 million in payroll, self-employment, and other household income paid by other California businesses and organizations. The household income benefit supports more than 4,800 California jobs.

At the end of 2010, Sandia employed 1,072 regular and temporary employees and approximately 130 staff augmentation (contract) employees in the state of California, primarily at its Livermore site and at the Joint BioEnergy Institute (JBEI) in Emeryville, just outside San Francisco.

Also in 2010, out of 726 new hires at Sandia's New Mexico and California locations, 71 obtained their highest degree from a California university. About 106 students from around the country held internships at Sandia's California site. Sandia researchers regularly team with professors and students at California universities such as the University of California (at Berkeley, Davis, Los Angeles, and San Francisco), Stanford, Caltech, Harvey Mudd, and the University of Southern California. In 2010, Sandia funded more than $2.1 million to California-based universities for work that supports Sandia programs.

Cal State-Chico's CED utilized the IMPLAN economic impact analysis system (version 3.0) to estimate the overall impact of Sandia's spending on all California businesses, organizations and households.

Sandia's internally-produced 2010 Economic Impact on the State of California report can be found at http://www.sandia.gov/bus-ops/scm/EI_Brochure_2010_CA_R&A-Sand-2011-3634P.pdf.

SEC2011 training gets good reviews from participants

Feedback will be used to help shape security environment

By Stephanie Lynn Anderson

The recent Security Learning and Feedback Activity (SEC2011) discussions offered members of the workforce an opportunity to let Labs leadership hear exactly what they had to say about security, and to engage managers directly in discussion, says Mike Schaller (4200), senior manager for Security Operations.

One of the best initial results of the five weeks of SEC2011 was that many organizations decided to start engaging in regular dialogues on security. Managers have asked for additional scenarios to use in upcoming department meetings, Mike says. In addition, Security Operations already plans to provide the workforce with additional information about security trends.

"Ultimately, Security Operations and Labs management recognized that, as a national laboratory, we are missing something if we see the same types of incidents repeated over and over again," Mike says.

Security Operations intends to take all the feedback and review it carefully, he adds. Some of the information will go to Labs management, best practices will be shared with the workforce, and some questions will be answered individually.

"We have full appreciation of the commitment that the Labs leadership has toward initiating changes to improve Sandia security performance," one manager commented in the feedback.

Mike says the internal dialogues and the feedback that emerged from SEC2011 were the most valuable part of the exercise. The other important aspect of the large volume of feedback was that members of the workforce weren't aware of the quantity and severity of security incidents and wanted additional context to understand the nature and scope of the problem.

"Ultimately, Security Operations and Labs management recognized that, as a national laboratory, we are missing something if we see the same types of incidents repeated over and over again."

— Mike Schaller

Some asked what Labs management and Sandia's security professionals see as the major factors contributing to recent security incidents. Although most contributing factors were incorporated into the training, Mike agrees that his team needs to re-emphasize the that following factors can lead to security incidents:

- Being in a rush
- Changing routines
- Not asking for help/not understanding what to do
- Not using a buddy system or speaking up when something seems amiss
- Delayed reporting

* * *

Managers generally liked the interactive format of the learning activity and said in their feedback that members of the workforce seemed to get much more out of the dialogues than a standard classroom or online training session. As a result, Mike says he and his team are discussing the notion of making security training interactive every year, similar to the annual ethics training.

Mike says he and his team will work on improvements. Managers asked for video scenarios and more interactive tools, either to use on their own or for future manager-led sessions. "We had a couple of weeks to design and launch the activity and we're very happy with it," he adds. "We are committed to keeping the momentum and developing the most effective tools possible for the future."

"We had a couple of weeks to design and launch the activity and we're very happy with it. We are committed to keeping the momentum and developing the most effective tools possible for the future."

— Mike Schaller, senior manager for Security operations

Overall, the feedback received was "better than we expected," Mike says. The security team especially appreciated some of the best practices that groups sent in as a result of the training activity. Among those were the following:

- "Our department has a policy not to forward anything with an attachment that you didn't originate yourself. In other words, if an email has an attachment you want to share, you must save the attachment and begin a fresh email. This forces us to think about what we're attaching and prevents assimilation issues."
- "Many security issues have a common thread of being rushed. Our department discussed that when we are doing classified work, it has priority, period."
- "Our department agreed to re-examine our monitoring procedures for completeness, with special attention to our Friday monitoring procedures and classified workstations."

New VPs named

(Continued from page 1)

selection in late August and announced Mike's appointment just last week.

Pamela Hansen Hargan

Pam replaces John Slipke, who retired from Sandia at the beginning of this month. Pam has worked for Lockheed Martin since 1991. Most recently, she served as director of Workforce Strategy, Planning & Programs for Lockheed Martin. She also served as VP of Human Resources and Security Operations for several Lockheed Martin business units and as the deputy VP for Human Resources for Lockheed Martin's Information Systems & Global Services.

Prior to joining Lockheed Martin, Pam held increasingly responsible human resources positions with major corporations, including Chrysler, General Dynamics, and Systems Research & Applications International. Her experience covers a full range of human resources functions including staffing, compensation, training, organizational effectiveness and organizational design, and human resources information systems.

Pam obtained a bachelor's degree in business administration from the State University of New York. Additionally, she holds a master's degree in executive management human resources leadership from Rutgers University in New Jersey.

Pam most recently served on the board of directors for Virtua Health and Junior Achievement of New Jersey. She is a member of the Society for Human Resources Management, Human Capital Institute, University of Pennsylvania Wharton Human Resources Advisory Group, and the American Society for Training & Development.

Div. 3000 centers include Health, Benefits and Employee Services (Center 3300), Human Resources (Center 3500), and Public Relations and Communications (Center 3600). The Labs' Corporate Diversity and Inclusion and Employee and Labor Relations functions also reside in Div. 3000.

Michael Vahle

Mike's role as VP of Information Technology Services is a new one at Sandia. In her message to members of the workforce announcing Mike's appointment, Kim noted that as part of the recent Mission Support restructure process, the position of VP for Enterprise Transformation (Division 9000) has been replaced with the position that Mike will fill. The change was made, Kim noted, to place greater emphasis and focus on Sandia's growing information technology.

As CIO, Mike will be responsible for the vision and leadership of Sandia's information technology, information management, and cybersecurity strategy. Mike will collaborate with Mission Delivery and Mission Support organizations to deliver technology services in support of Sandia's operational and research functions. Additionally, Mike will work in close collaboration with Sandia leaders to create and maintain a balance between information technology and information management solutions and distinct customer/programmatic requirements.

Before being named Div. 9000 VP, Mike was director of Defense Systems & Assessments (DSA) Strategic Management Unit Operations, Plans and Strategy Center 5200. He also recently served as acting VP of DSA. Mike has served as director for both the Systems Mission Engineering center and the Computing and Network center, as well as program director for the Space Mission and Nuclear Weapons programs.

Before joining Sandia, Mike was an officer in the US Air Force, where he developed and programmed command and control systems for the Strategic Air Command. He received both his bachelor and master's degrees in mathematics from the University of Missouri-Rolla.

In conjunction with her announcement of Mike's new position, Kim noted that as part of the Mission Support restructure, Management Systems & Support Center 9700 has been eliminated and its functions merged with the new Mission Support & Corporate Governance Center 700. The new center's mission is to elevate assurance improvement and to drive implementation across the Laboratories.

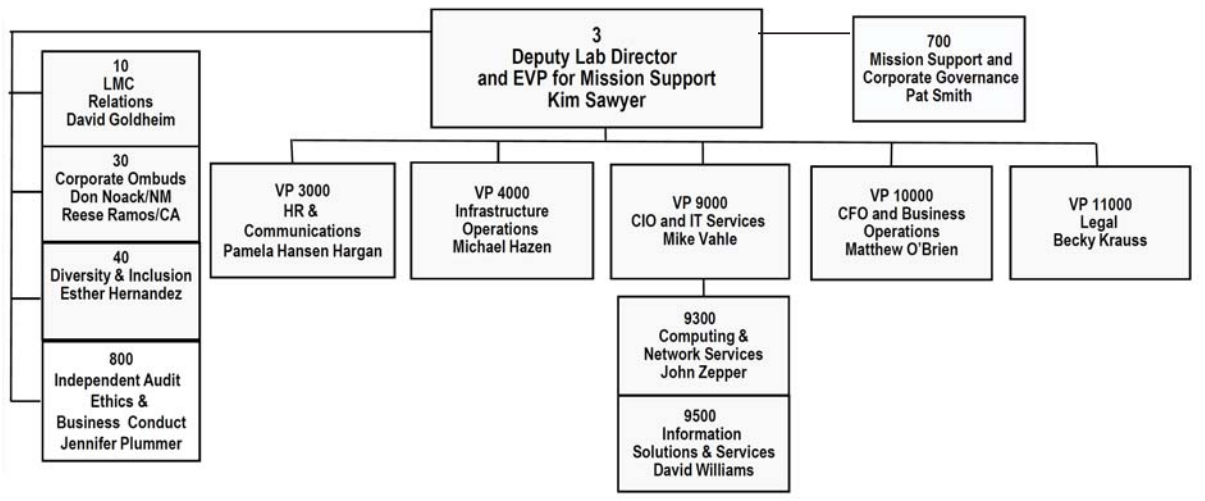
Kim announced that Pat Smith, who had served as acting VP in Div. 9000, has been selected as the director of Center 700. In this position, Pat also will serve in the new role of corporate risk officer.

Kim offered her appreciation to Pat for her role as acting VP in Div. 9000 since late February. "When Pat came on board," Kim said in her message to members of the workforce, "I gave her three objectives: 1) ensure a smooth transition; 2) close out the HS-64 audit; and 3) achieve clarity on assurance. Pat delivered on all three objectives and has become an integral leader in our assurance journey."

Kim also thanked Art Hale for serving as Sandia's chief information officer for the past four-and-a-half years, and for serving as acting director of Management Systems & Support (Center 9700) since last fall.

"Art's commitment and service as CIO strategically positioned Sandia to be a leader in effective and efficient information management," Kim wrote.

Mission support restructure



Introducing Sandia's FY2012-2016 Strategic Plan

(Continued from page 1)

site at http://strategicplan.sandia.gov/.

"For me a plan is much more than a document or a set of specific actions: It inspires a conversation throughout the Laboratories, a conversation that brings us together," President and Laboratories Director Paul Hommert writes in the introduction. "I encourage our Labs employees to talk with co-workers, question leadership, attend Labs-wide events involving a dialog on the plan, and provide their feedback."

The 20-page document provides more details on the Labs' five strategic objectives:

1) Deliver with excellence on our commitments to the unique nuclear weapons mission;

2) Amplify our national security impact;

3) Lead the Complex as a model 21st-century Government-Owned Contractor-Operated national laboratory;

4) Excel in the practice of engineering; and

5) Commit to a learning, inclusive, and engaging environment for our people.

The Strategic Plan also shows how Sandia's plans align with NNSA's and DOE's goals.

Paul writes in the introduction that for the plan to be truly meaningful, the objectives must translate into concrete actions that will move Sandia forward.

"While the objectives build from Sandia's more than 60 years of exceptional service, they also respond to our dynamic and challenging external environment, which demands the highest level of performance for all institutions that support our nation's security."

Paul Hommert, writing in the introduction to the FY2012-2016 Strategic Plan

Center directors developed more specific goals for each objective. For example, under the fourth strategic objective — excel in the practice of engineering — one of the four goals is to implement a common engineering environment that enables technically creative work and promotes a disciplined approach to assure quality.

The Labs' leaders will establish milestones that spell out specific actions against which they will measure the progress toward meeting these goals.

Managers will host meetings for their staffs to better understand how individual work groups can help meet Sandia's goals.

The plan is a living document that will be reviewed and modified to match the goals for current customers and future national security needs. Each summer, Sandia will establish multiyear goals and milestones for the upcoming fiscal year. Sandia's leaders will review these milestones quarterly and report annually to Lockheed Martin Corp., DOE, and NNSA on the Labs' progress.

From the 2012-2016 Strategic Plan

Who we are, what we do . . .

Core Purpose

Rendering "exceptional service in the national interest" has been Sandia's core purpose since 1949. The Labs' original mission, to provide engineering design, systems engineering, and integration for the nonnuclear components of the nation's nuclear weapons, continues today. The nuclear weapons mission is our reason for being; it is what makes us unique and it creates a foundation from which we leverage our capabilities and provide support to address other national security challenges.

Vision

On behalf of our nation, we anticipate and solve the most challenging problems that threaten security in the 21st century.

When we achieve this vision, we are widely recognized as a national leader in preventing technological surprise, anticipating threats, and providing innovative, science-based system engineering solutions to our nation's most challenging national security problems.

The excitement and importance of our work, our exemplary work environment, our partnerships with academia, industry, government, and other partners, and our record of historic contributions help us attract exceptional staff. Our employees are recognized by their professional peers for their outstanding contributions, and our laboratories are managed in a way that inspires confidence.

Mission

Our unique mission responsibilities in the nuclear weapons (NW) program create a foundation from which we leverage capabilities enabling us to solve complex national security problems.

As a multidisciplinary national laboratory and Federally Funded Research and Development Center (FFRDC), Sandia accomplishes tasks that are integral to the mission and operation of our sponsoring agencies by:

- anticipating and resolving emerging national security challenges;
- innovating and discovering new technologies to strengthen the nation's technological superiority;
- creating value through products and services that solve important national security challenges; and
- informing the national debate where technology policy is critical to preserving security and freedom throughout our world.

As an FFRDC for the National Nuclear Security Administration (NNSA), we have a long-term relationship with our sponsor. This creates an environment that supports maintenance of our fields of expertise, enables us to maintain our objectivity and independence, and allows us to have a familiarity with our sponsor's mission.

We bring the FFRDC culture to all our federal sponsors to provide long-term support, solutions to existing problems and emerging threats, and quick-response capabilities. As an objective, independent, and trusted advisor, we draw from our deep science and engineering bases to anticipate, innovate, create, and inform the policy debate for decision-makers.

Values

Sandia has five core values, which are used to inform our daily decisions, shape our performance, and enable us to achieve success as one lab with one national security mission.

We serve the nation by responding to the requests of our customers and by anticipating our country's future needs. We complete our mission even in the face of challenges and ambiguity, and seize every opportunity to "render exceptional service in the national interest."

We deliver with excellence by meeting our commitments, hiring the best, working collaboratively, and committing ourselves to continuous improvement to advance the frontiers of science, engineering, and technology.

We respect each other by cherishing the intellect, skills, diversity, flexibility, and passion of our coworkers. We cultivate the development of all members of our workforce and commend their world-class accomplishments, which enable Sandia's mission.

We act with integrity by living consistently within our principles, by telling the truth, and complying with the law.

We team for great results by sharing a common vision and by fostering an attitude of mutual respect with all our partners. We combine our talents to benefit each other and our customers, working to ensure that everyone gains from our collective achievements.

'Green Fire' film: Sandia partners with the city of Albuquerque, Rio Grande Nature Center

By Susan Clair

Sandia's Partnerships & Planning Dept. 4853 worked with representatives from the Rio Grande Nature Center State Park and the city of Albuquerque to offer a screening of the film *Green Fire* at the RGNC. More than 120 people attended this August event, including several members of the Sandia workforce. The film was shown in the nature center's new, solar-powered education building.

Sandia purchased a screening license of *Green Fire* from the Aldo Leopold Foundation in April to show the film during the Labs' 2011 Earth Day event. The screening license allows Sandia to show the film at other venues, in an effort to further disseminate the film's message of land-use sustainability.

Aldo Leopold is perhaps best known as the author of *The Sand County Almanac*. The book, written as a collection of journal entries and essays, describes his "land ethic," which he presents as the basis of a healthy relationship between people and the community of wildlife and vegetation living on the land.

Leopold's experiences in New Mexico were instrumental in inspiring his land ethic philosophy. After graduating from the Yale Forest School in 1909, he accepted a short-term position with the US Forest Service as a ranger in the Apache National Forest in the Arizona Territory. He later transferred to the Carson National Forest in northern New Mexico, where he developed a greater understanding of caring for the land community. He worked with ranchers, teaching them about the importance of maintaining a balance of wildlife, including protecting and monitoring predators such as the wolf. Leopold was instrumental in securing official wilderness status to the Gila Wilderness in southwest New Mexico in June 1924. The Gila was the first officially designated wilderness area in the world.

Green Fire was produced through a partnership of the Aldo Leopold Foundation, the Center for Humans and Nature, and the US Forest Service. The film describes the evolution of Leopold's idea of the land ethic, how it changed him, and how the idea has had a permanent impact on contemporary conservation projects around the world.

10,000 ops

(Continued from page 1)

pool-type research reactor capable of steady state, pulsed, and tailored transient operations and, in the past, has been configured for medical isotope production. Some of the other experimental areas include: reactor-driven laser experiments; space reactor fuels development; pulse reactor kinetics; reactor heat transfer and fluid flow; electronic component hardening; and explosive component testing. It is also routinely used for education and training programs.

At peak power in its steady state mode, the ACRR produces 4 megawatts of power. But during a maximum pulse, it generates a whopping 35,000 megawatts of power in 7 milliseconds. Nuclear engineer Ron Knief (1382) smiles when comparing its power output to that of the Palo Verde Nuclear Generating Station. "For that very short time, we produce three times more power than the nation's largest nuclear site. They have three big reactors, and yet, for a fraction of a second, we produce three times more power than they do."

The ACRR is a descendent of the Sandia Annular Core Pulse Reactor (ACPR) — itself unique among a large family of TRIGA (Training, Research Isotope Production, General Atomics) reactors. The TRIGA concept is credited to Edward Teller, and its realization to him and a group of distinguished scientists who assembled in a "Little Red Schoolhouse" in San Diego in 1956. Their goal was to "design a reactor so safe… that if it was started from its shut-down condition and all its control rods instantaneously removed, it would settle down to a steady level of operation without melting any of its fuel." Essentially, even if all of the engineered safety mechanisms failed, safety is still guaranteed based on the laws of nature. In 1978, the original ACPR TRIGA fuel was switched out with a ground-breaking ACRR ceramic-metal, UO_2/BeO fuel, which is designed to allow steady state and pulsed operation at fuel temperatures up to 1,400 degrees C.

And for all its impressive technical achievements, the celebration Sept. 8 was as much about the team that has faithfully operated it for more than three decades.

"It's a small group of operators through time; the one overriding characteristic of the operations group is their

ACRR: A long history of accomplishment

- Annular Core Pulse Reactor: 1967-1977
- Initial criticality of the new Annular Core Research Reactor — April 1978
- First full-power (2 megawatts) 'steady-state' operation — July 1978
- First maximum power (29,000 megawatts) 'pulse' operation — August 1978
- First programmatic operations (nuclear fuels testing) — April 1979
- First university research experiment (UNM followed by New Mexico Tech in the same month) — May 1979
- First real-time neutron imaging experiment — June 1981
- Increase in maximum power (45,000 megawatts) 'pulse' operation — October 1981
- High Flux Neutron Radiography Facility — March 1991
- Testing of MIT reactor controller — June 1991
- First fiber-optics testing — December 1991
- Development of diamond radiation detectors — June 1993
- Large computer wafers testing — July 1993
- Flowing laser experiment — October 1994
- First medical isotope experiment — December 1995
- Reconfigured for medical isotope production (molybdenum-99) — 1996-97
- Medical isotope activation production — March 2000
- Remote storage neutron monitoring system testing — July 2002
- Complete renovation of controls systems — February 2003
- First Department of Homeland Security experiment — April 2004
- Experiment plan No. 1,000 issued — June 2005
- Satellite flight module testing — October 2006
- 10,000th operation — September 2011

THE ANNULAR CORE Research Reactor is readied for another test by Dave Clovis (1381). This photo originally appeared in the May 22, 2009, issue of the *Lab News* as part of the "Day in the Life" photo essay by Randy Montoya.

Remembering 9/11

Three Labs directors of post-9/11 era share thoughts at commemorative event

The three Sandia lab directors of the post-9/11 era shared the stage at the Steve Schiff Auditorium on Sept. 12 as part of a formal Labs observance of the 10th anniversary of the terrorist attacks that changed the nation's ideas about national security. C. Paul Robinson, Tom Hunter, and Paul Hommert discussed 9/11, its impact on Sandia, and how the Labs can continue to serve the nation in the years ahead. Here are brief excerpts from their comments (presented in the order in which they spoke):

C. Paul Robinson . . .

"We were really able to show that our talents could apply to much broader missions than we had done before. Truly, we became a national asset as viewed by even more people at that time. . . . We had decided, with a conscious decision of strategic planning, that we had wanted to work on the development of counterterrorism tools. We had seen the rest of the world experience terrorism and we kept saying, 'Okay, it's going to come to our shores and we had better be ready for it.' We had made a highest goal, which we had articulated in our strategic planning just a few years earlier, to become the laboratory the nation turns to first for solutions to the most challenging problems that threaten our nation and the globe. Quite an undertaking, but we felt we needed to mature from being just a nuclear weapons lab to being a total national security laboratory. And I know for sure that in the aftermath of Sept. 11, we found we were already showing signs of fulfilling that goal. [The lesson is that] strategic planning is even more important than simply meeting your obligations to put together such a plan; you've got to anticipate in science and technology to come up with solutions in advance of the need appearing."

Tom Hunter . . .

"[In Sandia's immediate response to the 9/11 attacks] what was really striking was the commitment and the unparalleled competence of the people. The staff and managers worked night and day to deliver what we promised we'd deliver. I recall very vividly the need to restrict base access to only those who worked on the immediate problems. That was a challenge because everybody — I think virtually every Sandian — insisted they had to be here working on the problems. No one wanted to be home . . . managing keeping people home turns out to be quite a big job. But let me put here a question: Why? Why here at Sandia did we see this competence and this commitment of our people? . . . The weapons program — and other programs over time — gave us people who shared two critical characteristics: competence and commitment. Commitment to the nation's service. But facilities, infrastructure, sometimes even people, are not in and of themselves sufficient to cause the nation to turn to us after 9/11. [What we offered was] an environment of objective truth-telling; a selfless dedication to identify and deliver what's really important to the nation. An environment where integrity is never exchanged for personal or corporate gain. . . . It's because of who we are that the nation turned to us after 9/11. A whole new arena of customers sought us out, not because of what we could deliver — that was certainly true — but because they could count on us to tell it like it is."

Paul Hommert . . .

"I believe with passion that [Sandia's new strategic plan] recognizes the true national security laboratory we have become over the past several decades. . . . It calls to us in every aspect — our core mission in nuclear weapons, in our broader missions, which we must look to amplify, our excellence in the way we do engineering based on the strength of our science, the way we operate as a laboratory, and most importantly, you, our people, and our continued need to invest in you. Because without you, we can't anticipate, we can't deliver, we can't do the kinds of things the nation demands of us, often implicitly, but which we hold sacred. . . . Over the course of our history, we have never done easy; we do hard. We should be very proud of that. We should also recognize that when you do hard, you train every day; you demand of yourself a standard of excellence that sometimes can wear you down a bit. But time and time again, the way we deliver is just remarkable."

'An experience I'll never forget . . .'

US Coast Guard Academy interns reflect on a summer of immersive work at Sandia

It may seem an unlikely collaboration: a desert-bound national laboratory hosting cadets from the United States Coast Guard Academy (USCGA). But look a little deeper and a common theme emerges: The US Coast Guard is the world's oldest life-saving organization; it has a long and proud tradition of keeping America safe. And so does Sandia. Along with similar goals of service to the nation, the institutions share a common engineering foundation: The USCGA curriculum is largely engineering-centric and Sandia is the nation's largest engineering laboratory.

With these common interests in mind, in 2005 Sandia launched a summer internship program to bring USCGA cadets to the Labs to work on science and engineering projects. This past summer, six USCGA cadets participated in the program at Sandia, including one cadet who worked at Sandia/California, a first in the history of the six-year partnership. The projects are anything but make-work; they are challenging, relevant, real-world, hands-on projects designed to stretch the skills and increase the knowledge of the USCGA cadets. The program, matching the students with Sandia researchers, encourages a mentoring relationship that enhances the cadets' technical and professional growth.

The NNSA-sponsored Military Academies Collaboration (MAC) program, coordinated by Staci Dorsey (0215) and Sarah Low (8529), has been such a success with the USCGA that plans are now in the works to partner with the nation's other military academies. Coordination efforts are currently underway with NNSA, Lawrence Livermore National Laboratory and Los Alamos National Laboratory to bring in cadets from all the military academies to the three laboratories for internship positions in the summer of 2012. A *Sandia Daily News* notice will be issued in December to solicit projects for the summer 2012 MAC Internship Program.

This year's summer interns were cadets Andrew Breen, Christopher Monacelli, Thomas Kane, Wryan Webb, Brian Gracey, and Alexander Lloyd (Sandia/California). The cadets, selected for the internship by the USCGA based on their academic performance and leadership skills, spent the first half of the summer on a Coast Guard boat assignment and the remaining six weeks at Sandia.

This year, the six interns worked on six different projects across multiple strategic management units and divisions, including:

- The DARPA Autonomous Robotic Manipulation Hardware program — Curt Salisbury (6533), mentor
- Study in New Materials for High-Capacity Batteries — Timothy Lambert (6124), mentor
- Alaska Red Team Threat Assessment —Tim Tooman (8123), mentor
- Non-Destructive Inspection Testing — Dennis Roach and Mike Bode (6620), mentors
- StrongLinks Project, Melissa Martinez (2616), mentor
- Hexacopter UAV Project — Dan Small and Dave Novick (6533), mentors

Shortly before heading back to New London, Conn., to resume their academy life, the six cadet interns shared their thoughts with the Lab News *about their summer experience at Sandia. Here are their comments:*

Andrew Breen

I really enjoyed my time at Sandia. I had the pleasure of working with Curt Salisbury (6533) on the DARPA Autonomous Robotic Manipulation project. My task was to design a data glove to control a robotic hand, a task that had its challenges, but has been rewarding. During the six weeks I spent at the Labs, I was very grateful to Sandia for the opportunity to work with and around so many smart people, not only giving me hands-on experience in engineering and design, but also an appreciation for how different government agencies, like the Coast Guard and Sandia, can interact to benefit mission readiness. My time at Sandia is something I certainly will not forget, and I am excited to take the experience and knowledge I have gained here into my Coast Guard career.

Alexander Lloyd

In the short six weeks I spent working at Sandia, I was presented with an incredible opportunity to learn about the history of Sandia as well as its current role in national security and technological development. I had the privilege of taking tours of most of the on-site facilities showcasing current projects and was able to attend seminars and talk to experts about current issues facing the United States. As a future Coast Guard officer, the project assigned to me in the field of homeland security hit close to home, serving as an eye-opener of the real threats that face our country. Preparing for a career in the military, I hope to look back on this experience as a positive one, knowing that some of the brightest minds in America here at Sandia and the other labs are constantly working on new technologies to keep our nation ahead.

Chris Monacelli

The six weeks I spent working at Sandia were an experience like no other. This was a time for me to really expand my knowledge in numerous fields of study. I think I have learned just as much in six weeks here as I have in three years at the academy. I don't think I will ever get the chance to work with and learn from so many bright minds in a single place anytime soon. Professionally, I think this internship has prepared me for a career outside the Coast Guard. It also has helped me get one step further in my Coast Guard career because I have worked with the personnel who train Coast Guard aircraft inspectors. Overall, the experience I got at Sandia is one that I will never forget.

Brian Gracey

My time at Sandia went by way too fast. The six weeks at the laboratory were the most exciting, rewarding, and creative weeks of my engineering career. Under the guidance of David Novick and Dan Small (both 6533), I worked on the Hexacopter, a remote-controlled, six-rotor copter with surveillance and autonomous capabilities. Through this work, I expanded my knowledge of SolidWorks and learned a lot about rapid prototyping and concept development, skills that will certainly help me in my future. Sandians are a truly unique breed and I am proud to say I worked alongside so many intelligent and truly awesome people. The amount of respect and teamwork displayed on a daily basis was inspiring. I look forward to working with Sandia in my future as a Coast Guard officer. My only regret about my summer experience at Sandia is that it had to come to an end. However, my engineering experiences at Sandia have me excited about my career and ready to return to the Coast Guard Academy for my senior year. Thank you to all those at Sandia for providing me with a unforgettable summer experience.

Thomas John Kane

My time at Sandia has been an experience that helped me grow as a person and as an engineer. Being accustomed to the military environment of the Coast Guard, seeing how an elite research facility operates has helped me learn about how true scientific research is being done. I worked with a research group on finding new materials for high-capacity batteries. I learned a ton about batteries and battery science, a subject in which I had little prior knowledge. I think there are few places in America where you can find as many smart, dedicated people as you do at Sandia. Being in that environment alone was a very rewarding experience. I know that the resources I gained both personally and professionally during my time at Sandia will give me a tremendous advantage as my peers and I move into our senior year at the academy.

Wryan Webb

Working at Sandia this summer was a very rewarding six weeks. I was attached to Center 2600, working with Sandians in their efforts to monitor and evaluate the integrity of Stronglinks. The experience was somewhat challenging, as the world of Stronglinks is an intensive one. Gaining the general level of competence to even participate in an intelligent conversation took some time. However, since then, I had the opportunity to work with and learn from many incredible people, which has been beneficial, both in terms of professional development and in the personal relationships I've established with many impressive Sandians. This short-term internship program has been one of the most worthwhile uses of summer I've ever had and I will definitely be recommending it to other cadets back at the US Coast Guard Academy.

US COAST GUARD cadet interns with mentors and program coordinators at Sandia.

Power *forward*

Electric Power Fellowship students and faculty work on solutions to our future energy challenges

By Stephanie Holinka

It's been an electric summer at Sandia.

A flurry of projects related to renewable energy adoption and power grid modernization have been going on at Sandia and on the campus of Sandia's partner, the University of Vermont (UVM).

Nine UVM students and eight faculty members spent the summer at Sandia through a DOE-sponsored Electric Power Fellowship Program. The students worked with Sandia researchers on a variety of projects related to the challenges of integrating plug-in hybrid electric vehicles (PHEV). Their projects ranged from deeply technical work about hardware robustness to complex cultural and behavioral analysis.

UNIVERSITY OF VERMONT students spent the summer at Sandia as part of the Electric Power Fellowship program. (Photo by Randy Montoya)

"To modernize our grid and prepare it to meet our future energy needs, we need to understand the technical, human behavior, and policy implications related to any changes proposed to the grid," says energy surety engineering and analysis manager Juan Torres (6111).

The students' projects included analysis of thermal impacts on electrical cables from vehicle charging, cascading electrical failure analysis, communication system constraints via wireless communication and power line carrier, how opinions spread about PHEVs via online social networks, and understanding consumer preference about PHEVs.

"The power grid is a complex system and we need to make sure the technical and nontechnical aspects are aligned to maximize benefit from the future power grid. The best technology does us no good if consumers don't like it or if policy limits its use," says Juan.

As part of the program, eight UVM faculty visited Sandia throughout the summer, giving talks and collaborating with the students and Sandia researchers on projects related to fluid mechanics, neural nets, cognitive modeling, and energy policy.

The students view their time at Sandia as useful and important, and think they will have valuable insights to contribute to their state's renewable energy efforts and initiatives.

"I'm happy that our country's laboratories are doing so much in renewable energy technologies," says UVM student Brad Lanute. "The challenges facing the development and implementation of a smart grid are in no way solvable in one summer, so I hope the collaboration between the state of Vermont, UVM, and Sandia continues into the future."

The students and faculty have all returned to UVM, ready for fall classes and ready to assist their state in an important project, the statewide implementation of smart-grid technology. This will be the first statewide implementation project of smart grid, to date.

Vermont received a $69.3 million e-Energy American Recovery & Reinvestment Act (ARRA) grant in 2009 to fund the smart meter implementation program. Vermont's utility companies are matching the grant, for a total investment of $139 million. UVM is working with utility companies and state regulators to assist in the implementation and to assess its success.

The project will serve as a model for the transformation of the entire US electric power grid.

"That task is huge," says Juan. "We're looking to modernize the largest machine in the world. We must understand not only the technical complexities of intelligent communications systems, dynamic load management, and renewables integration, but also recognize and prepare for the larger social, regulatory, and economic implications of these systems."

The students' summer work and that of the visiting UVM professors was funded by a nearly $1 million DOE Electric Power Fellowship grant received by Sandia.

In addition to the student and faculty visits, the grant funded the creation of three short courses on Smart Grid Technology, offered in spring, summer, and fall of this year at UVM. The courses feature Sandia researchers from a variety of disciplines and highlight the challenges and opportunities arising from the efforts to modernize the US power grid.

Sandia researchers have also held technical talks at UVM on such topics as the smart grid, solar energy, climate change technology, and cybersecurity. The exchanges are ongoing. More energy-related UVM short courses will take place at the end of the summer on cybersecurity, grid integration of renewable energy, and global smart grids.

Student projects

Below is a brief summary of the Electric Power Fellowship final projects. The students presented their work both at a technical talk at Sandia/New Mexico and at a special presentation for VP Rick Stulen at Sandia/California.

- **Eduardo Cotilla-Sanchez**, a doctoral student in electrical engineering and electromagnetics, and his partner, **Chris Parmer**, helped develop a power grid model that will allow researchers to better understand how cascading failures propagate through a grid, and how grid stability breaks down during blackouts.
- Graduate student **David Zhang** and his research partner, undergraduate engineering student **Francesca Minervini**, examined some possible effects of increased evening PHEV charging in residential neighborhoods. Zhang and Minervini's model demonstrates the increased transient heat dissipation from underground cables into the soil that will result from the new peak loads.
- Recent graduate **Andrew Seier** worked with Tony Lentine (1727) and UVM professor Jeff Frolik, examining possible communications requirements for smart grids, considering them as a system of scalable microgrids.
- Electrical engineering doctoral candidate **Chris Palombini** analyzed power line communications for microgrid stability and PHEV balancing. His work supports the LDRD Grand Challenge on Secure, Scalable Microgrids and the LDRD for plug-in hybrid electric vehicles.
- Mechanical engineering undergraduates **Melissa Faletra** and **Nate Palmer** worked on a behavioral model that displays how social influence through online networks can cause opinions and knowledge about PHEV implementation to propagate. Their work looked at ways that social influence through online social networks could be used to aid in sharing information about PHEVs.
- **Brad Lanute**, a graduate student beginning his second year of a master's in economics and modeling, worked with Kiran Lakkaraju (1462) on a cognitive modeling project evaluating whether Amazon's Mechanical Turk (AMT) crowd-sourcing web service could be used by researchers to get complex data on consumer preferences related to car purchases.

Garage biology buff brings global perspective to bio-challenge

By Renee Deger

It's counterintuitive, especially for a Sandia audience primed to worry about protecting public health and well-being, but the growing practice of hobby biologists heading out to the garage to tinker unmonitored with the basic building blocks of life is a good thing.

That the proliferation of biological knowledge and pursuits will benefit us all was a key message biologist, author, and consultant Rob Carlson brought to Sandia last month while delivering his presentation, "Biology is Technology," a much abbreviated argument he outlines in a recently published book of the same title.

That's not to suggest Carlson came to Sandia to undermine the security posture of bioscientists contributing to Sandia's Countering Biological Threats (CBT) programs, a growing element of the International, Homeland, and Nuclear Security strategic management unit. These are scientists researching fundamental biological and chemical processes to develop appropriate diagnostics, treatments, forensic frameworks, and other countermeasures.

Carlson, a principal of Biodesic LLC, an engineering, design, and consulting firm, instead painted a world picture of demands driving biotechnology, like growing populations depending on genetically modified crops or, contrarily, the flat-lining of productivity available from fossil fuels. Innovation from any place, garage or secured lab, is both welcome and needed.

Bio is big business

Some of the numbers Carlson shared to illustrate how much formal biological activities were spreading were sobering. Biotechnology represented 2 percent of China's gross domestic product in 2010 — roughly the same as in the US, Carlson said. He added that China was investing heavily in biotechnology, aiming for biotech to comprise 5 to 8 percent of its GDP by 2020.

ROB CARLSON in his garage-based bio-lab in 2006. (Photo courtesy of Rob Carlson)

Carlson's message echoed some of the same points senior manager Ren Salerno (6820) raised recently in both internal and external presentations that outlined how dual-use biological materials, equipment, and expertise were proliferating worldwide, creating a more complex threat environment. Ren's premise is that countering biological threats, both man-made and naturally occurring, now calls for engaging scientists in professional collaborations. Ren is leading the rollout of the strategic vision driving greater recognition for Sandia's CBT programs.

"The reality is that the US no longer controls the biotechnology industry and we're seeing a growing prevalence of biologically based businesses and educational programs in all corners of the world," Ren says. "This has real implications and we need to reach out to scientists as individual communities of professionals if we hope to have a positive influence on how these activities expand and how these individuals view safety, security, and preparedness."

The rapid expansion of garage bio-hobbyists in the US and the West, Ren adds, is a precursor to the kinds of unfettered exploration inevitable, perhaps already taking place, in other nations particularly vulnerable to terrorism activities.

Garages the new bio-frontier

Carlson came to Sandia earlier this month as part of the Bioscience/Material Science Education Program, which was created in 2002 to support those scientists and program specialists with strategic educational opportunities. A Princeton University-trained physicist, Carlson worked with noted biologist Sydney Brenner at the Molecular Sciences Institute in Berkeley, Calif. His experience there and his subsequent experiment setting up a microbiology lab in his own garage were chronicled in an October 2010 article in *Nature* called BioHackers.

That article explored how garage-based biology was taking shape and communities of hobbyists were forming in several major cities. Falling prices for some basic

(Continued on next page)

Cyber workshop addresses difficulties, responses to cyberattacks

By Neal Singer

CYBER DEFENDERS — Student interns in Sandia's Center for Cyber Defenders program tackle a cybersecurity challenge.

Among their other dubious achievements, hackers have stolen identities, broken into bank accounts, and breached computer systems of military contractors. They could conceivably interrupt water or electricity service to targeted populations. And worse.

As Rob Leland, director of computing research (1400), said in a talk at Sandia to a packed, two-day meeting on cybersecurity, "The dilemma is that even as we rely increasingly on computers to run our utilities, banks, and basic security measures, the possibility of an adversary seriously damaging the very complex systems that support these concerns has increased."

Why cyberattacks are difficult to defend against, and what to do to change that situation, was a major focus of the meeting, called the second University Partners Cyber Open House and Workshop. Led by Sandia researcher Ben Cook, manager of Cyber Research and Education (5624), it was held in late July in Sandia's Computer Science Research Institute.

"This workshop brought together over 50 leading academic, government, and Sandia experts to consider how we can build more secure systems by leveraging what we've already learned from several decades of security research," says Ben.

Attendees included 30 professors from across the US and cybersecurity program directors from the Department of Homeland Security and the National Science Foundation.

The meeting divided what seemed like overwhelming macro-security problems into small, more workable subpieces.

A realistic picture

A key to developing strong cyberdefenses is having a realistic picture of the threats, said Ann Campbell, senior manager for Cyber Research (1950). She remarked that people typically think of cyberdefense in terms of firewalls and antivirus software, but in reality, sophisticated adversaries are more devious. They may introduce malicious elements into the supply chain to help them later steal its information, whether personal or relating to national security. They may weaken an information system by degrading its performance or availability.

"The adversary certainly has the advantage," continued Campbell. "It chooses the time, place, and method of attacking a system, whereas the defender needs to be successful all the time."

To better the defender's odds, "The nation needs to be able to find ways to share threat information without compromising sensitive information," Ann told the attendees.

This will aid not only those developing cybersecurity systems but help advanced student training as well, she said. "What we don't want [for students] are toy problems with toy solutions. We want researchers to be inspired by real problems so they can develop real solutions."

A related security problem is that statistics show student enrollment in cyber courses has been stagnant.

One way to solve that problem, and at the same time come up with radical security innovations, suggested the NSF's Carl Landwehr, could be through the historically effective method of prize competitions.

"Evidence shows," he said, "that a well-framed public competition can trigger innovation."

Landwehr highlighted the limited progress to date in building appropriate cyberdefenses for large-scale computer systems. "I've been working on this problem for 40 years, and all I've seen are Band-Aids," he said. Then he provided a list of historical examples — one dating back to a 15th-century design competition for a cathedral dome in Florence, Italy — to show how public competitions have led to significant public involvement, accompanied by technological breakthroughs.

A cybersecurity design competition with a particular target, prize, and completion date, he said, could not only lead to radical technical solutions, but also help reinvigorate the research community and attract students to a field facing chronic talent shortages.

One reason for tepid student interest is that the biggest societal rewards lie in coming up with imaginative, money-making programs, rather than functioning as cybercops, participants pointed out.

Also, university professors may find teaching the dynamic ins and outs of immediate response to threat less appealing than extensive research investigations within their own area of specialization that might be turned into papers.

As professor Ravi Sandhu of the University of Texas – San Antonio put it, "Academic incentives may encourage inertia, and inertia will not solve this problem."

Cybersecurity curriculum

A cybersecurity curriculum may include, he said, computer science theory, principles and practice; security theory; STEM (science, technology, engineering, and mathematics) instruction, principle and practice; statistics, sociology, organizational theory, economics, game theory, laws, regulations, compliance, privacy, history, successes, and failures.

"In a world of overwhelming complexity, with incomprehensible advances happening in every branch of computing every month, how do we train a cadre of enough students with enough incentives to learn so much that they can actively contribute before their [computer] knowledge is dated?" he said.

Discussions of one possible prize competition — better security for "smart" electric meters — showed that conducting challenges for even simple systems would take thought.

According to Dan Thomsen (5637) and Lyndon Pierson (retired senior scientist), one reason the workshop chose to discuss smart meters is that they are tangible examples of a difficult-to-solve problem with high exposure.

"The adversary has access to as many units as needed to 'reverse engineer' the security measures," said Lyndon, "and, with access to the supply chain portion of the life cycle, can insert [malicious elements that can be] triggered [later] to cause a targeted denial of electrical service."

What to do?

The necessarily low per-unit cost for meters would limit contestants to inexpensive, possibly less effective security solutions. And even a superior solution would be hampered in its overall effect by the large number of meters already installed.

Other technologies could serve as a contest focus, but to predict which would have a significant future role was not trivial.

"The contest could take the form of a special LDRD category with the best idea winning funding to develop it further," said Lyndon.

In other sessions, researchers from a range of disciplines — including experimental criminal psychology, computational social science, and visual analytics — suggested that the Internet is best understood as a human system, not a technological one and that social science theory and methods can make important contributions to a science of cybersecurity.

Kevin Nauer (9312) introduced the Tracer FIRE cyberforensics network training environment, developed by Sandia and Los Alamos national laboratories with DOE support. Its purpose is to build a stronger virtual community of cyberdefenders through team-building competitive exercises.

Dan gave an overview of the new educational game "Space Sheep," which increases student understanding of basic principles for securing threatened systems. The game was developed by Dan and several Center for Cyber Defenders (CCD) students over the past year with Sandia support. It is expected to be externally released shortly in response to requests from several faculty at the workshop. The CCD is a hands-on internship program focused on cybersecurity research.

The effort presages a larger Sandia effort over the coming year to increase cybersecurity research by closer coordination with industry and universities, and through a new Cyber Engineering Research Institute (CERI), which will have a presence in both New Mexico and California.

"One of our overarching purposes for holding this workshop was to increase awareness of Sandia as a research and educational partner," says Ben. "There are few places in the country where a student can come and work on real cybersecurity projects that have national impact." In addition, the CCD offers students exposure to external research ideas and opportunities; the program hosts visiting faculty scholars to share their research, interact with Sandians, and present lectures.

Laura McNamara, who led a workshop session on the human dimension of cybersecurity will be the subject of a separate article in *Lab News*.

Personnel who played key roles in organizing the meeting include Kathryn Hanselmann and Cherri Porter (both 1932).

Garage biology

(Continued from page 8)

tools of the trade have made it possible for hobbyists to set up shop on their own and comparisons abound of the practice to the early days of the computer revolution. However, the bio trend carries significant concern for some authorities and it symbolizes how pervasive the technology has become.

Dr. Carlson acknowledged this and reminded the scientists and program specialists gathered to hear him lecture that the current administration supports the notion, quoting the second paragraph of the National Strategy for Countering Biological Threats. It reads: "From cutting-edge academic institutes, to industrial research centers, to private laboratories in basements and garages, progress is increasingly driven by innovation and open access to the insights and materials needed to advance individual initiatives."

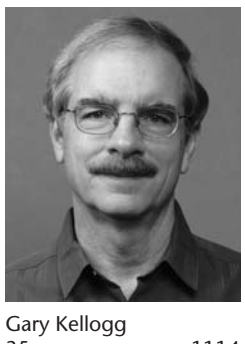
The concern, however, is something he's familiar with. He has consulted on bioterrorism with some of the partner agencies of the CBT programs, and he had a few hair-raising examples of hobbyists developing benevolent mechanisms by manipulating some pretty scary dual-use materials.

At the same time, he pointed out that the biological world was complex and scientists today had still only scratched the surface.

"There are a lot biological problems to solve and these systems are very complex," Dr. Carlson said. "We don't have the capability to understand all that we need to know about how cells work. Most of the biological developments that we have today are the result of simply inserting just one gene into a couple of cells. We're just barely beginning to understand some of these systems.

Mileposts

New Mexico *photos by Michelle Fleming*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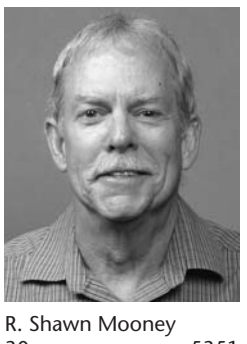
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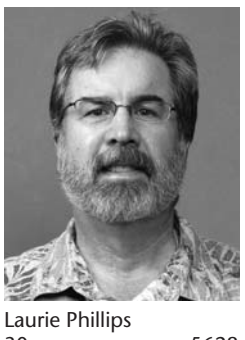
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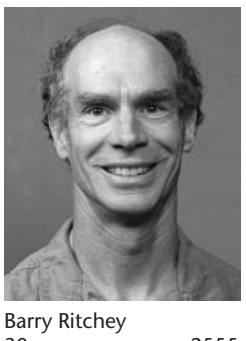
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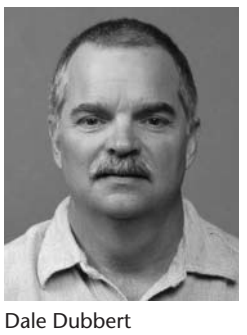
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Linda Hall
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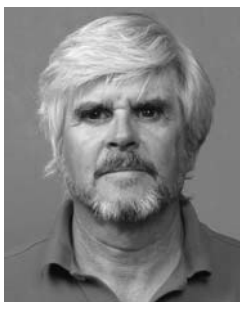
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Sheryl Hingorani
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Kent Meeks
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Lorraine Mendoza
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Marion Scott
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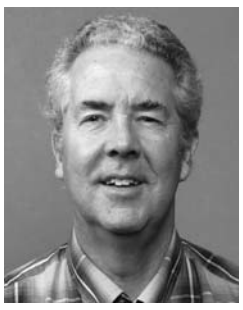

John Myre
15 6614

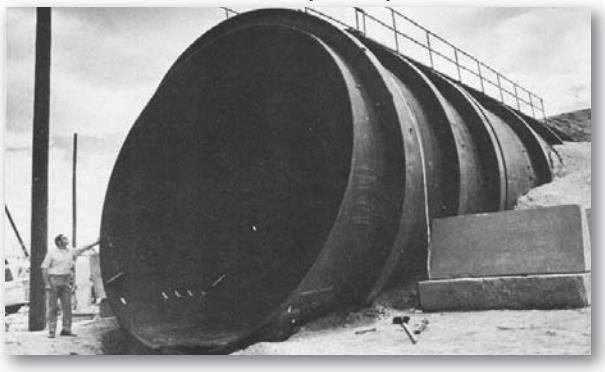

Anthony Salazar
15 9513


Daniel Savignon
15 1732

50 years ago . . . A striking similarity between aluminum "honeycomb" and sea water has led to an economical and time-saving technique for testing nuclear weapon instrumentation systems at Livermore Laboratory. Until recently it was almost impossible to guarantee that instruments recording flight tests would survive when a missile hit water. Now, however, it is possible to test the instruments in advance by attaching them to the rear of a block of pre-shaped honeycomb and firing a projectile at it. The honeycomb acts as a shock absorber, soaking up the blow and relaying it to the instruments in the same way water would. Early tests revealed that honeycomb crushes at a constant rate when struck by the air gun projectile, regardless of the speed at which the projectile was fired. Further tests show that an object attached to the rear of the honeycomb would receive a smooth transfer of energy, much the same as that experienced by a missile hitting water.


TARGET for air gun water entry tests is missile warhead instrumentation attached behind a block of aluminum honeycomb. (Inset shows comb after test.)

40 years ago . . . First-flow calibration tests were successfully conducted recently to check out Sandia's new 305-foot-long shock tunnel in Coyote Test Field. The shock tunnel is the largest explosive-driven blast facility in this country capable of generating supersonic flow mach numbers at the muzzle end. It will be used to subject instrumented full-size test units suspended in the test section to shocks and overpressures created by the detonation of explosive charges in the driver section at the other end. The new tunnel is Sandia's fourth explosive–driven shock tube facility in Coyote Test Field.


TEST SECTION of Sandia's new shock tunnel is checked by Manuel Vigil (9322), project engineer for the facility.

30 years ago . . . In recent tests of the Navy's Tomahawk cruise missile, performance has been remarkably successful — and so has the performance of Sandians and instrumentation systems at Tonopah Test Range where the tests terminated at a dry lake bed target area on the range. "Elated" is the way Ron Bentley, TTR supervisor of Div. 1172, describes the Navy's reaction to test data supplied by the range. "The cruise missile tests stretch the capabilities of our instrumentation to its fullest," Ron says, "but the systems are performing without a glitch. "The test marked the first time that a Tomahawk was launched from undersea by a submarine to hit a land target. It was successful on the first try. The missile carried a simulated conventional HE warhead. Additional tests of the Navy's submarine-launched Tomahawk are planned to take place at TTR before the end of the year. These tests will take the missile from development to operational status. **Tuff formations at the Nevada Test Site may be suitable for a commercial high-level radioactive waste repository**, studies conducted during the past several years indicate. Tuff — compact volcanic ash millions of years old — is one of the rock types being studied as part of the Department of Energy's Nevada Nuclear Waste Storage Investigations (NNWSI) program, which is expected to continue during the next several years. Long-range federal plans call for identification, by the late 1980s, of US sites that could accommodate disposal facilities for heat-producing, solidified commercial nuclear waste. Sandia, as technical overview manager of NNWSI, is charged with assuring that all research, development, and exploration data support Nuclear Regulatory Commission licensing requirements. The Labs also is conducting safety assessment studies. Sandia, Los Alamos, Lawrence Livermore, and the US Geological Survey also are conducting a variety of laboratory and field experiments at NTS.

LAUNCHED FROM A SUBMARINE, the Navy's Tomahawk cruise missile flies at low level at 550 mph. After undersea launch and flying a 500-mile zig-zag course, the Tomahawk impacted on a target at TTR's dry lake bed target area.


DATA INSTRUMENTATION package is placed in an instrumentation hole drilled in tuff (consolidated volcanic ash) at Nevada Test Site.

Sandians profiled in *Diversity Journal*

By Iris Aboytes

Bonnie Apodaca, director of Business Management Operations Center 10600, and Becky Krauss, Div. 11000 VP and General Counsel, are profiled in the current issues of *Profiles in Diversity Journal*. Becky is profiled in the *10th Annual Women Worth Watching* special issue and Bonnie is profiled in the Hispanic Heritage Month issue.

BONNIE APODACA

Profiles in Diversity Journal is a bimonthly magazine focusing on diversity and inclusion in business, government, nonprofits, higher education and military settings. The focus of the journal is on senior leadership, best practices, workforce diversity strategies, and recognition of employee contributions. The journal also includes special features including: CEO leadership issue; annual women's leadership issue; Black History Month feature; window on the future feature; national Hispanic heritage feature; recruitment/retention feature; supplier diversity feature; and a diversity education feature.

Bonnie says one of her most rewarding accomplishments is leading a team of business professionals in a research and development environment. "We have realigned our business support into one organization," she says. "This was not a popular idea. In this role, I am a change agent in an environment where change was not well-accepted.

"You grow as a leader by finding the right approach for each situation."

— Bonnie Apodaca

"It's been rewarding because it has required communicating with many people and building trust, relying more on leadership and teaming than on any specific technical knowledge or skills."

Becky says staying flexible and being open to new challenges have been key characteristics to her success. "I have never remained tied to one vision of success," says Becky. "I started my career as a corporate and securities lawyer. Soon I realized I needed to make a mark in the law firm distinct from other associates. While I had no background in science and shied away from such courses in law school, when a new and different opportunity presented itself — to practice environmental law — I jumped. Taking this leap allowed me to stand out and provided the springboard for my next enticing prospect, an environmental law position at Sandia."

BECKY KRAUSS

Bonnie's philosophy is that for every situation there is a right leader. "You grow as a leader by finding the right approach for each situation," says Bonnie. I'm on a continual journey to understand what approach to take for various situations. You can learn something from every person you come in contact with. Leadership is not a one-person act."

Becky believes in calling attention to yourself in a respectful way. "Make your mark in a positive way that distinguishes you from your co-workers and fits within your culture. I watched, listened, and learned a different communication style that allowed my voice to be heard and my impact recognized."

"Make your mark in a positive way that distinguishes you from your co-workers and fits within your culture."

— Becky Krauss

Bonnie believes that leadership is not a one-person act.

Becky believes in being open to new challenges.

Bonnie and Becky are both members of Sandia's Executive Diversity Council.

Remembering POWs and MIAs

DOZENS OF VOLUNTEERS participated in a 24-hour vigil run at Hardin Field on Kirtland Air Force Base Sept. 15-16 as part of National POW/MIA Recognition Day. The congressionally established recognition day is observed across the nation on the third Friday of September each year. On that day, many Americans honor those who were prisoners of war (POW) and those who are missing in action (MIA), as well as their families. (Photo by Randy Montoya)

Jessica Pascual receives personal achievement award

By Iris Aboytes

Jessica Pascual (3510) was selected as the 2011 Pamana awardee for Personal Achievement by the Filipino American National Historical Society – Rio Grande Chapter (FANHS-RG) at ceremonies held Sept. 3 at the MCM Elegante Hotel in Albuquerque during the Pamana Heritage Awards Night.

The FANHS-RG sponsors this event to recognize the achievements and contributions of Filipino Americans in the community. The Personal Achievement Award is given to a Filipino American who has attained success in his or her chosen profession, field, or specialty and has inspired others to overcome obstacles and make sacrifices to achieve their goals.

JESSICA PASCUAL

Jessica joined the Laboratories in July 2009 and is currently deputy director for Human Resources. She manages and oversees the Human Resource Operations (HR) function and leads the TotalComp project.

Before coming to Sandia, Jessica worked at Los Alamos National Laboratory (LANL) for more than six years. She also worked for McAfee Inc. as a global compensation and benefits manager.

Jessica's team was successful in designing and implementing a market-based job classification system at LANL, the Compensation Program Design project that allowed the laboratory to better meet a wide range of strategic recruitment and retentions needs. It provided its employees with visible career paths and a fair and consistent salary progression framework aligned to external market and internal equity.

Jessica received a bachelor's degree in business administration from Assumption College in Manila, Philippines. She is a member and is a certified compensation professional of WorldatWork, a not-for-profit organization providing education, conferences, and research focused on global human resources issues, including compensation, benefits, work-life, and integrated total rewards to attract, motivate, and retain a talented workforce.

Jessica was born in Manila. Her late father, Jesus Cabalza, had several businesses: taxicabs, restaurants, and movie production.

"I remember reading meters for each taxi and collecting money from the taxi drivers," says Jessica. Her mother, Araceli Nolasco, was a nurse and is now a retired businesswoman.

Jessica's first job was working in the production of the *Sesame Street* TV series. She was also a fashion model in Manila.

Jessica is married to Leonard Pascual and together they have two sons, Leland who attends New Mexico Tech, and Lorenzo, a junior at St. Michael's High School.

"You are the epitome of the modern professional whose relentless pursuit of excellence has crowned you with unending personal success," said Pearl King, president of FANSH-RG. "You serve as an inspiration to both the young and old in our community."