Sandia LabNews

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Sandia National Laboratories

Brilliant!

Sandian Greg Nielson named to *Popular Science* magazines's Brilliant 10 list, recognized for his work on solar glitter. See story on **page 5**.

Labs director says Sandia strong, playing vital role in nation's security

By Sue Major Holmes

President and Laboratories Director Paul Hommert says Sandia is very strong and will weather the current budget uncertainties and continue to grow. Paul addressed a full house of members of the workforce who came to hear his 2012 State of the Labs speech in person at the Steve Schiff Auditorium in Albuquerque and via videostream at Sandia/California.

Backed by slides showing the breadth of work at the Labs and achievements by some of the 9,000 Sandians and 12,000 total members of the workforce, Paul said he had "great confidence in our tomorrow" because of the talent, commitment to national security, and exceptional achievements of the staff despite the many challenges the Laboratories faces.

In addition, leaders throughout the Labs "have an obligation to inform the debate in Washington, to bring honest, independent, scientifically based information to the policy decisions" made in the nation's capital, he said. That largely comes through testimony to Congress and interactions with the secretary of energy, the head of the NNSA, and other national leaders, he said.

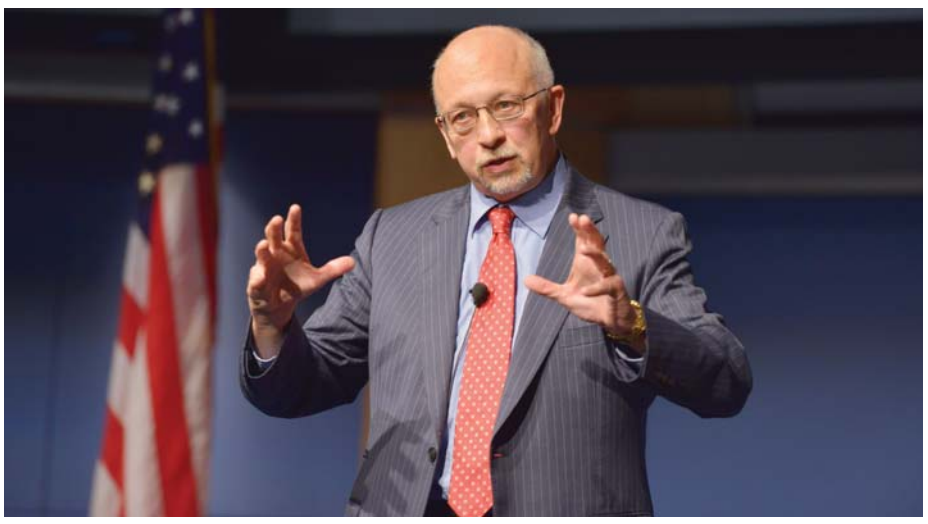
While Sandia has the unique responsibility for the nation's nuclear weapons, it also has a responsibility to a broader suite of national security issues, Paul said.

"The mission of this laboratory . . . is national security," he said.

There's a natural interplay between Sandia's nuclear weapons mission and the broader national security mission that includes defense, nonproliferation, counterterrorism, energy security, and homeland security. "It's a tremendous synergy," Paul said.

How Sandia is able to respond to its national security work "rests on the strength of our people, the strength of our science, technology, and engineering environment, and the unique facilities that we bring to it," he said.

Paul said it's easy to forget the breadth of the Labs' work, but "as you look around the world, there are Sandians pretty much everywhere," working on everything from homeland security in the international arena and partnerships in nuclear weapons to securing against bioterrorist materials.



THE STATE OF THE LABS is strong, Paul Hommert told an audience of Sandians during a recent all-hands meeting that was videolinked to Sandia/California. (Photo by Randy Montoya)

He ran down a list of recent Sandia accomplishments:

• Meeting a requirement to produce a concrete cost estimate for the B61 life

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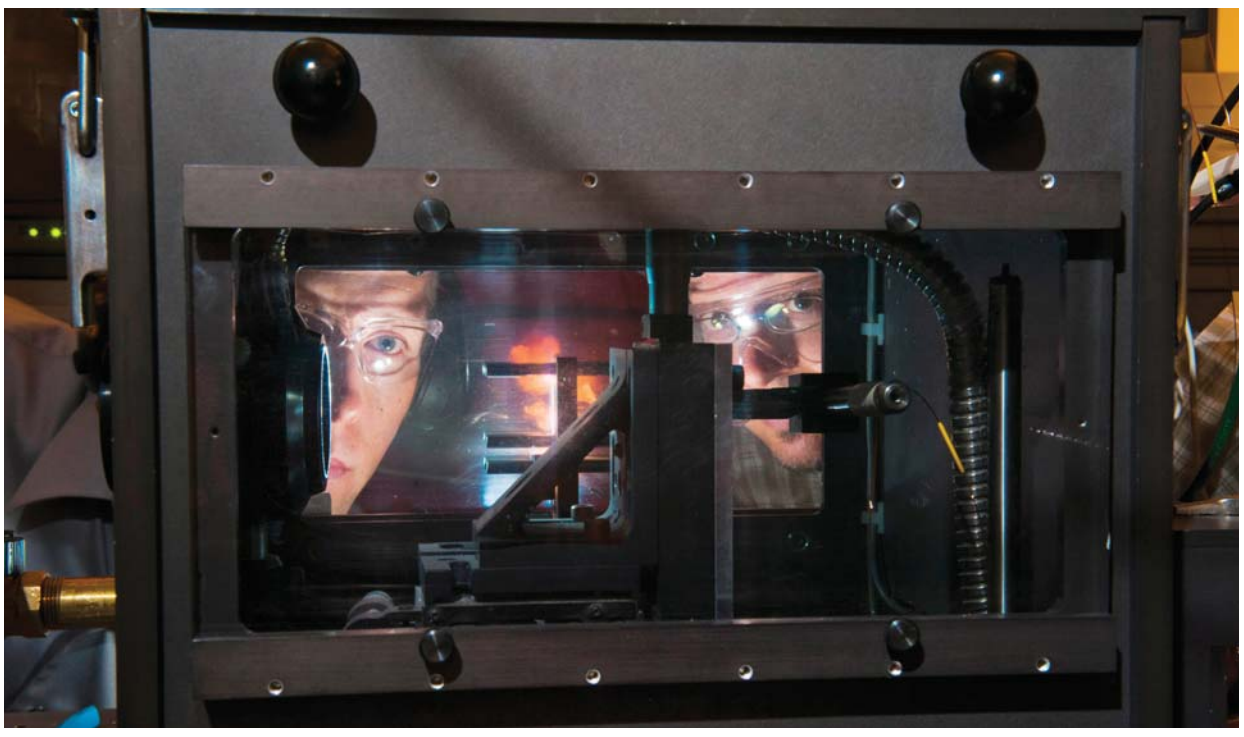
Sandia's Explosives Technology Group discovers key detonation behavior in common explosive



NOT SO BIG BANG — Alex Tappan (left) and Rob Knepper (both 2554) watch the detonation of a Sandia critical thickness experiment. The experiment typically uses less explosive material than the size of one-tenth of an aspirin tablet to determine small-scale detonation properties. The bench-top experiment is so small, researchers can stand next to the firing chamber with eye and ear protection. (Photo by Randy Montoya)

By Sue Major Holmes

The explosive PETN (pentaerythritol tetranitrate) has been around for a century and is used by everyone from miners to the military, but it took new research by Sandia to begin to discover key mechanisms behind what causes it to fail at very small scales.

"Despite the fact explosives are in widespread use, there's still a lot to learn about how detonation begins, and what properties of the explosive define the key detonation phenomena," says Alex Tappan (2554), who has been with Sandia for 14 years, all of it in the Explosives Technology Group.

Explosives are typically studied by pressing powders into pellets; tests are then done to determine bulk properties. To create precise samples to characterize PETN at the mesoscale, the researchers developed a novel technique based on physical vapor deposition to create samples with varying thicknesses. That allowed them to study detonation behavior at the sub-millimeter scale and to determine that PETN detonation fails at a thickness roughly the width of a human hair. This provided a clue into what physical processes at the sub-millimeter

(Continued on page 9)

Lab News *reader survey*

The 2012 *Sandia Lab News/Daily News* readership survey is still open and awaiting your contributions if you haven't already provided them.This year's survey will remain open to readers of these core communications tools through at least the end of September. It can be completed online — in as little as five minutes — at http://www.surveymonkey.com/s/XYT5B9J.

A *Lab News* readership survey targeted to retirees also is under way. Its web link is http://www.surveymonkey.com/s/XWLCSBV.

Questions about the survey should be emailed to labnewssurvey@sandia.gov.

HENAAC 2012 Engineer of the Year

Steve Castillo has been named the HENAAC 2012 Engineer of the Year, the highest accolade presented by HENAAC, the Hispanic Engineering National Achievement Awards Conference. Read the story on **page 12**.

BE A BETTER HEALTHCARE CONSUMER

Exceptional Care for Women

See story on **page 8.**

and . . .

That's that

I guess it was inevitable, although that doesn't make it any easier to accept.

We've all watched over the years as various professional functions — engineering, legal, accounting, admin — have been outsourced or automated. Why? Because businesses have discovered they can get these services cheaper through more sophisticated use of expert systems or by outsourcing the functions to professionals in the developing world.

Even as I cluck-clucked at these trends, with maybe just a touch — I am not proud to admit this, but we're all human — of Schadenfreude. I always figured that my particular line of work — writing — was sort of bulletproof. My skill, my unique, my special, my highly refined art and craft made me as job-secure as a plumber. When you need one, nothing else will do. When you need the words to flow, call a wordsmith.

It turns out I may have been grinning in smug self-satisfaction a bit too soon.

It so happens that there's at least one company out there (and there may be more) that is providing computer-generated news stories that are, by all accounts, every bit as readable as the stories produced by us trained professionals. The company, Narrative Sciences, has developed a set of algorithms that can take a collection of data — corporate earnings reports, sports scores, election poll numbers — and generate a credible, journalistically sound news story.

And the algorithms aren't limited to writing dry, lifeless prose. Narrative Sciences can turn up the heat at will; you want a punchy style? We can do that, says the company. Want sedate or stately? Or just-the-facts, ma'am? Done and done.

Upon first reading about Narrative Science, I had a sinking feeling (of course), yielding to a selfish thought: I'm glad I'm nearer the end of my career than the beginning. While we liberal arts majors — my degree is in journalism — partied our way through college, the computer science students were toiling away quietly, learning to master the skills that define the 21st century. Now, they're the ones who are partying, while we're looking for new lines of work. As the implications of the Narrative Science breakthrough sank in, I began practicing in front of the mirror: "Would you like some fries with that?"

But then it struck me: There is a way to keep my job security for a bit longer. Since Narrative Science's approach is based on converting facts into fables, I ought to be safe so long as I stay clear of facts altogether. The new paradigm for me? No hard data, please. As long as I can crank out sincere, heartfelt, fact-free stories (like this column), I should be fine.

But that will only get me so far; eventually reality — and Narrative Science 2.0 — will catch up with me. What they say in politics is probably equally true for newspaper columnists: Sincerity is everything. Once you can fake that, you've got it made.

* * *

In early August, our building was part of a multi-facility test to allow the temperature in offices and public spaces to climb up to a maximum of 82 degrees over the course of four hours. This so-called "demand response test" requires voluntary actions by customers to reduce electric power use in response to requests from grid operators at times of high wholesale market prices or when electric system reliability is jeopardized. A similar test conducted in the summer of 2011 resulted in a 7.1 percent reduction in kilowatt-hour demand from the buildings involved.

Anyhow, at the appointed hour this year, the temperature in Bldg. 811 inexorably climbed toward 82 degrees. Now, there is 82 and there is 82. On a nice summer day, 82 degrees can be downright pleasant. But sitting in an office, that same temperature makes you clammy and uncomfortable.

As we were all loosening our collars (so to speak) and commiserating with each other about the horrible sacrifice of working under such conditions, *Lab News* photographer Randy Montoya, who can toss around a pun with the best of them, said to me, "They should have called this a 'swelter in place' exercise." Wish I'd thought of that.

See you next time.

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

Sandia Lab News

Sandia National Laboratories

http://www.sandia.gov/LabNews

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The *Lab News* is on the external web at www.sandia.gov/LabNews. *Lab News Interactive*, accessible on the internal web, is at: www-irn.sandia.gov/newscenter/interactive.

Retiree deaths

Enid Morton (age 88) . . . . . April 7
Norine Zuchowski (73) . . . . . April 19
James Gruver (90) . . . . . May 22
Joseph Newton (85) . . . . . May 27
Henry Sisneros (84) . . . . . June 3
Arthur Wickham (89) . . . . . June 3
Samuel Price (77) . . . . . June 5
Clarence Esquibel (59) . . . . . June 19
Kenneth Sarason (91) . . . . . June 20
James L. Jorgensen (69) . . . . . June 23
Helen Spriggs (90) . . . . . June 25
Frederick Stixrud (89) . . . . . June 25
Robert J. Buxton (91) . . . . . June 27
David L. Poli (82) . . . . . June 28
O. Marie Blakey (94) . . . . . July 5
Royce Bewley (88) . . . . . July 7
Gertrude B. Stephens (90) . . . . . July 8
Robert E. Barton (78) . . . . . July 9
Pat D. Brinkley (88) . . . . . July 11
Lovella Montoya (86) . . . . . July 16
Williard Irwin, Jr. (88) . . . . . July 20
Ralph Troy Miller (93) . . . . . July 20
James J. Lang (82) . . . . . July 21
Walter R. Eden (86) . . . . . July 23
Gabriel Garcia (76) . . . . . July 25
Thomas Covert (71) . . . . . July 31
H. Timothy Cooley (62) . . . . . August 2
Estelle D. MacKenzie (79) . . . . . August 3
Ronald Woodfin (73) . . . . . August 4
John P. Ford, Jr. (88) . . . . . August 5
Walter L. Henderson (91) . . . . . August 6
Jose S. Dominguez (89) . . . . . August 10
Melvin L. Merritt (90) . . . . . August 10
Robert G. Meier (79) . . . . . August 11
Joe William Wistor (87) . . . . . August 13
Ruth Bontrager (87) . . . . . August 15
Ann Hogan (87) . . . . . August 18
Jon A. Reuscher (75) . . . . . August 18
Donald Scranton (83) . . . . . August 18
Lugarda D. Abeyta (92) . . . . . August 19
Clarence Sandy (91) . . . . . August 22
Richard L. Schwoebel (80) . . . . . August 22
Roy Robert Boyd (90) . . . . . August 23
Robert C. Ezell (83) . . . . . August 23
Herman Levine (90) . . . . . August 31
James Reed (88) . . . . . August 31
Robert J. Blount (86) . . . . . September 1
Clyde Cano (74) . . . . . September 1
Jack Rex (88) . . . . . September 2
Carl Frantz (92) . . . . . September 4
William C. Myre (83) . . . . . September 6

Recent Patents

Note: Patents listed here include the names of active and retired Sandians only; former Sandians and non-Sandia inventors are not included. Following the listing for each patent is a patent number, which is searchable at the US Patent and Trademark Office website (www.uspto.gov).

* * *

Thomas Stewart (6915): Optimized Alumina Coagulants for Water Treatment. Patent No. 8,119,011.

Peter Schwindt and Cort Johnson (both 1725): Atomic Magnetometer. Patent No. 8,212,556.

Justin Garretson, T. Scott Gladwell (both 6532), Eric Parker (6114), J. Brian Rigdon and Fred Oppel III (both 6134): Apparatus and Method for Modifying the Operation of a Robotic Vehicle in a Real Environment, To Emulate the Operation of the Robotic Vehicle Operating in a Mixed Reality Environment. Patent No. 8,190,295.

Roger Moore, Michael Hutchinson, and Thomas Spindle (all 2718): Method of Making and Ceramic Articles with Multiple Regions of Distinct Density. Patent No. 8,212,456.

Mark Grubelich (6916): Reduced-Impact Sliding Pressure control Valve for Pneumatic Hammer Drill. Patent No. 8,176,995.

Alexander Roesler (8112): Microelectromechanical Safe Arm Device. Patent No. 8,191,477.

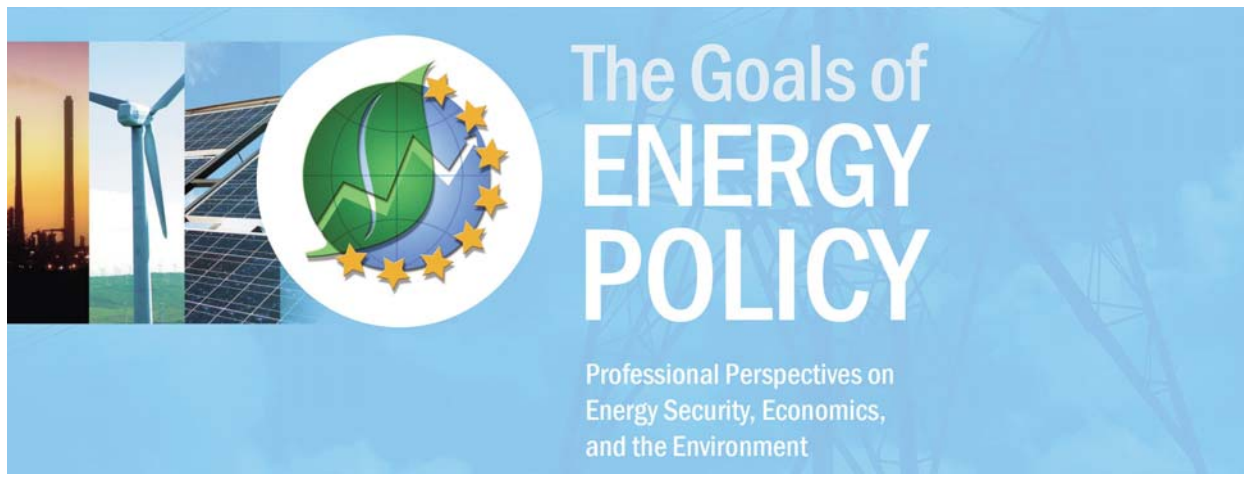
Jason Wilke (6634): Vehicle Barrier with Access Delay. Patent No. 8,210,767.

Murat Okandan and Gregory Nielson (both 1719): Microelectromechanical Inertial Sensor. Patent No. 8,205,497.

Jonathan Salton (6533), Barry Spletzer (6530), and James Lee, Jr. (ret.): Apparatus for Inspecting a Group of Containers and Method of Using Same. Patent No. 8,126,596.

Sandia and OurEnergyPolicy.org release 'Goals of Energy Policy' poll results

By Mike Janes



US energy policy should simultaneously pursue security of its energy supply, economic stability, and reduced environmental impacts, says a national poll of energy professionals jointly prepared by Sandia and OurEnergyPolicy.org.

The findings of the national poll, "The Goals of Energy Policy," show that the vast majority — more than 85 percent — of the 884 energy professionals surveyed prefer policymaking that pursues all three goals at once.

The poll asked the experts to allocate 100 points, representing a 100 percent policymaking effort, across three commonly accepted energy policy goals: the environment, economics, and energy supply security. Participating respondents included representatives of public utilities, oil and gas organizations, energy engineering groups, and other professional energy associations. Participating organizations were made up primarily of energy professionals and had no overt political or policy agendas related to the three policy goals.

"Creating and implementing energy policy is challenging on many fronts. We hope these results can serve as a useful starting point for those interested in building consensus for an effective energy policy," says Dawn Manley (8350), deputy director of chemical sciences.

Matthew Jordan, program director of OurEnergyPolicy.org, says, "Many surveys tend to simplify, rather than clarify, public opinion on energy policy by asking either-or questions. Thinking about energy policy this way is just not leading to results. It may be that the way we talk about energy policy is limiting our ability to develop viable policy options. Our country can and should pursue multiple energy-related goals simultaneously."

Dawn adds, "There is a growing recognition of the requirement to balance our nation's need for plentiful, low-cost energy with an inherent responsibility to steward the natural environment and to help grow our economy. Surveys like this can help provide strategic direction, guidance, and focus for the energy community."

The Sandia-OurEnergyPolicy.org survey asked the following questions:

- How should the US allocate its efforts across the following three energy policy priorities?
  - Energy supply security: Assure a supply of energy for the US that protects our national security interests.
  - Economics and job creation: Assure a cost for energy that sustains US economic stability and growth.
  - Environment and climate: Minimize the environmental impacts of energy supply, distribution, and use.
- Is another energy policy priority needed?
- If yes, how would you allocate 100 points across the three original priorities and the fourth, self-selected priority?

The results:

- On average, respondents allocated 36.9 points to energy supply security, 32.3 points to economics and job creation, and 30.7 points to environment and climate.
  - Single-issue advocates were rare, with just 3.1 percent of respondents allocating all of their effort toward one goal.
  - Single-issue adversaries were also few, with less than 15 percent of respondents completely devaluing any one goal.
  - Male respondents tended to emphasize energy supply security more heavily with increasing age and to de-emphasize the environment with age.
  - Female respondents prioritized the environment most highly, regardless of age.
  - Energy supply security rated highest among respondents from Arkansas, Louisiana, Oklahoma, and Texas; environment and climate was given the highest priority in the Pacific and New England regions; and compared with other regions, economics and job creation was a higher priority in the Midwest.
- Forty-two percent of respondents offered another energy policy goal. Of these, the three most commonly identified were reducing consumption, fostering technological innovation, and improving energy efficiency.

Results are presented in a report by Sandia National Laboratories and OurEnergyPolicy.org, which is available on both organizations' websites. Sandia and OurEnergyPolicy.org plan to continue their work on the national energy policy discourse with follow-up surveys and studies on related topics.

Sandia CaliforniaNews

Congressman Dan Lungren visits Sandia/California

By Patti Koning

On Sept. 5, US Rep. Dan Lungren (CA-3rd) visited Sandia/California to see how the Department of Homeland Security is leveraging Sandia's capabilities, specifically in cyber, critical infrastructure, and biodefense.

First, Lungren learned about several of Sandia's cyber programs. Casey Deccio (8966) explained his visualization tool DNSViz, which helps networking administrators in the federal government and global IT community better understand and troubleshoot Domain Name System Security (DNSSEC). Robert Hutchinson (8960), program manager for cyber infrastructure security, explained how cyber researchers create virtual environments to study malicious computer networks in the Internet Environment Test Facility.

Pablo Garcia (6920) gave a briefing on how Sandia uses science and technology for disaster response, including the National Infrastructure Simulation and Analysis Center (NISAC) and Sandia's Standard Unified Modeling, Mapping and Integration Toolkit (SUMMIT), which FEMA has used for several National-Level Exercises.

At the Applied Biosciences Laboratory, Cathy Branda (8623) gave an overview of Sandia's biodefense work. Lungren also saw prototypes of the Rapid Threat Organism Recognition (RapTOR) tool and SpinDx, a lab-on-a-disk platform with potential applications in radiation biodosimetery and toxin diagnostics.

Lungren represents the Sacramento area, chairs the Committee on House Administration, and sits on the House Committee on Homeland Security and the House Committee on the Judiciary. He has served in the US House of Representatives for 18 years, first representing a Southern California District from 1979-1989 and then being elected to represent California's 3rd District, the seat he now holds, in 2004. He served as California Attorney General from 1991 to 1999.

DUANE LINDNER (8120), at left in photo above, discusses Sandia's work in chemical and biological security with Rep. Dan Lungren, center. On Lungren's right is Peter Davies, director of Homeland Security and Defense Systems Center 8100. In top and bottom right photos, Robert Hutchinson (8960), program manager for cyber infrastructure security, explains how cyber researchers create virtual environments to study malicious computer networks in the Internet Environment Test Facility.

In photo below left, Lungren listens intently as Pablo Garcia (6920) explains how Sandia uses science and technology for disaster response, including the National Infrastructure Simulation and Analysis Center (NISAC) and Sandia's Standard Unified Modeling, Mapping and Integration Toolkit (SUMMIT), which FEMA has used for several National-Level Exercises.

(Photos by Dino Vournas)

Halon cylinder mishap offers opportunities for safety process improvements

By Jim Danneskiold

Sandia has a lot of equipment and materials spread across its five technical areas.

More often than you'd expect, storage areas fill up, organizations that need elbow room move, and materials may be moved repeatedly.

On June 20, workers were cleaning up the storage yard in Tech Area 2. In this process, several high-pressure fire-suppression cylinders were moved and staged horizontally in direct sunlight. Later that day, a worker in a nearby storage building heard a hissing noise.

One of about a dozen cylinders that had been laid out on a pallet in the sun that morning heated up, and the pressure of the gas inside increased until it leaked across the seat of the cylinder's solenoid valve. The resulting pressure imbalance led the gas to discharge, propelling the 30-by-10-inch, 94-pound cylinder 515 feet "where it caused minor damage to asphalt, landscaping, and an unattended vehicle," according to an official incident report.

What was seen at the time as one fairly typical equipment move potentially could have injured a member of Sandia's workforce, and there's a lot to learn from this incident, says Mike Schaller, Senior Manager for Security.

Immediately following the event, Mike Hazen, VP of Infrastructure Operations Div. 4000, commissioned a team to conduct a voluntary, timely, and comprehensive review to determine the direct and contributing causes in an effort to ensure the event isn't repeated and to develop lessons learned.

Recommendations in several areas

Mike was assigned to oversee cross-divisional technical and investigative aspects of the review, which included representation from the Sandia Site Office. The investigative arm of the review team, headed by Michael Gutierrez (4021), completed a comprehensive analysis of what is termed the Halon 1301 fire-suppression cylinder overpressure discharge and offered recommendations in several areas, including lifecycle management of materials, storage, work planning and control, and self-assessment.

"We think about moving materials and finding somewhere to store them as completely routine but potential hazards may be overlooked," Mike points out. "In this case, the hazard is as commonplace as the sun above us, and the consequences of failing to recognize it could have been much worse.

"There's a great deal to be learned: for work planners, pressure safety engineers, facilities managers, supply chain and inventory personnel, fire protection engineers, and others across the Labs," Mike says.

HALON cylinder detail

The origins of this event wind back 25 years, and include a major international treaty, the penchant of some Sandians for hoarding equipment that might be needed later, and a series of small failures that gradually built up, like pressurized Halon gas on a summer day.

Root causes and contributing factors

Sandia documents show that the cylinder was installed in 1987 at the Centrifuge Facility (Bldg. 6526). The following year, the US Senate ratified the Montreal Protocol on Substances that Deplete the Ozone Layer and in 1990, DOE told its contractors to phase out Halon and other chlorofluorocarbons and store the Halon onsite in the original cylinders. Then, in April of this year, a Sandia subcontractor moved the fire suppression cylinder from the Centrifuge Facility to the Facilities Laydown Yard, near Sandia's recycling center in Tech Area 2.

THE 93.92 LB. HALON CYLINDER came to rest in a Tech Area 2 parking lot after its 515-foot flight. The cylinder left a dent in an unoccupied truck just in front of the right rear bumper, and also gouged a small hole in the parking lot's asphalt at lower left (see circled areas).

After the pallet on which the cylinders rested was moved outdoors on the morning of June 20, pressure built up in the cylinder as the day grew hotter (It was 98 F at 2:15 p.m.). At around 2 p.m., the cylinder vented, made contact with a shelving unit, became airborne, and landed 515 feet away in the parking lot east of MO308, the Safeguards and Security Building. There it came to rest after bouncing off of the pavement and striking the rear of an unoccupied vehicle, denting it and the asphalt.

There were several root causes of the accident, the investigation revealed. They included the following:

- Inappropriate staging of decommissioned fixed pressurized fire-suppression system cylinders;
- Indications that the cylinder did not have a vented safety cap/plug;
- Poorly defined materials management of the decommissioned cylinders;
- Poorly defined ownership of the cylinders; and
- A lack of prescriptive directions and rigor in planning, controlling, and categorizing the hazards of the yard-cleaning work.

"We also found some contributing causes," Mike says. Those included insufficient oversight of the original subcontractor who moved the cylinders in April, failure to recognize the hazards, independent actions taken during the cleanup, and assumptions about ownership and disposition of the cylinders, he adds.

Through extent-of-condition discussions, Mike says, Sandia has identified additional cylinders and expects to complete disposal of the excess material by November. Fire protection engineering personnel also are developing requirements for storing, handling, and decommissioning pressurized fire suppression systems. In addition, work scope and controls are under examination, with a goal of making sure work orders are prescriptive and all hazards are identified. Pre-job walkdowns for even some low-rigor jobs are now the rule, he adds.

Take-away lessons

The voluntary investigation, which included active involvement with the NNSA Sandia Site Office, subject matter experts, Emergency Management, Facilities, Fire Protection, and executive management, resulted in the development of root cause/corrective actions that will help move Sandia's safety forward in an effort to enhance mission support, Mike says.

A lesson that each member of the workforce can take away from this event, he says, is the value in routinely looking at work spaces with a critical eye. If you see equipment or materials in your areas that don't seem to be in use, Mike says, discuss this with your manager and be sure it is stored safely and securely. If the items are no longer needed, he adds, your center and division ES&H coordinators, property coordinators, and environmental compliance coordinators can help. For more disposal options, refer to the Sandia Get Rid of It website at http://info.sandia.gov/getridofit/.

State of the Labs is strong, says Paul Hommert

(Continued from page 1)

extension program, "a seminal point in helping stabilize the future of the laboratory";

- Synthetic aperture radar, which means that "when we have modernized the US stockpile by 2030, every radar in the US stockpile will have been designed at this laboratory";
- The launch of the Advanced Hypersonic Weapon last November that accomplished a long lists of firsts and provides a technical groundwork for policy decisions;
- Nuclear waste management, with a 30-year-plus tradition of leadership in nuclear waste repositories, pioneering the concept of deep borehole disposal of spent nuclear fuel and demonstrating "deeply thought-through" technical options and new approaches for the country;
- Leadership in quantum computing with groundbreaking science, including new material systems;
- And the Laboratory Directed Research and Development Grand Challenges, including microgrid work to look at the challenge of large-scale integration of renewable energy, the RapTOR project that marries DNA sequencing technology with Sandia's expertise in microfluidic technology in recognizing emerging pathogenic threats, and exascale computing, which Paul said will represent a revolutionary rather than evolutionary jump.

He also outlined ways Sandia is meeting its various strategic objectives. He said, for example, it is amplifying its national security impact by investing in high-performance computing to establish and fund an institutional computing strategy that benefits researchers throughout the Labs. Sandia is meeting its objective of leading the national laboratory complex by developing a five-year facilities strategy that sets priorities on short-term investments, such as replacing the outdated and hard-to-maintain Bldg. 892, he said.

Paul also said Sandia is positioned to get through an era of constricting budgets that faces the entire nation. He cited the Labs' hiring of more than 2,000 people in the last three years who have worked with longer-term Sandians to achieve goals, the continuing integration of work across Sandia's mission areas, and the Labs' strategy to deal with the current budget uncertainty and manage costs into the future regardless of what Congress might do in the next year.

"You continue to deliver," he told the staff. "You have built our future with your execution. I think it is a strong future."

Brilliant!

Greg Nielson named to *Popular Science* Brilliant 10 list

By Neal Singer

Greg Nielson (1719) has been selected by *Popular Science* magazine for one of its 2012 "Brilliant 10" awards — "a roundup of the 10 most promising young scientists working today [in North America]." Winners of this designation have gone on to win the Fields Medal (considered the Nobel prize of mathematics) and MacArthur 'genius' awards, according to a congratulatory note from the magazine's editor.

Greg, a former Truman Fellow, was selected for helping lead the Sandia effort to create solar cells the size of glitter.

Said Sandia Labs Director Paul Hommert, "This recognition of Greg's groundbreaking contributions is testimony to his innovative spirit. It also reflects our broader Laboratory commitment to nurturing outstanding scientific achievement."

Said Steve Rottler, Science and Technology VP 1000 and Chief Technology Officer, "This award confirms what those of us who work with Greg already know — he is an incredibly gifted engineer who is developing an innovative solution to a complex challenge facing society. We are very proud of Greg and the accomplishments of his team."

The Sandia application sent in support of Greg and his team pulled no punches: "Greg Nielson and his team have created a new class of photovoltaic technology. The tiny pieces, each the size of a piece of glitter, sharply contrast with the so-called 'bricks' used by the photovoltaic industry. The microscale nature of the solar cells — each about the width of a human hair, and easily formed in the hundreds of thousands by widely used computer-chip fabrication techniques — offer significant benefits not available with traditional large-scale solar cells. The unique approach converts sunlight to electricity more efficiently. It increases the total power output available per unit area. It significantly lowers the cost for solar power. Most remarkably, the cells can be built into flexible products like tents, bags, or clothing, or embedded directly into more sturdy structures to become the outer shell of cell phones, tablets, or laptops. This is because the tiny units can be formed into three-dimensional structures with very sharp curves and corners, yet still be made of high-efficiency photovoltaic cells. No other PV technology possesses this capability."

(Photo by Randy Montoya)

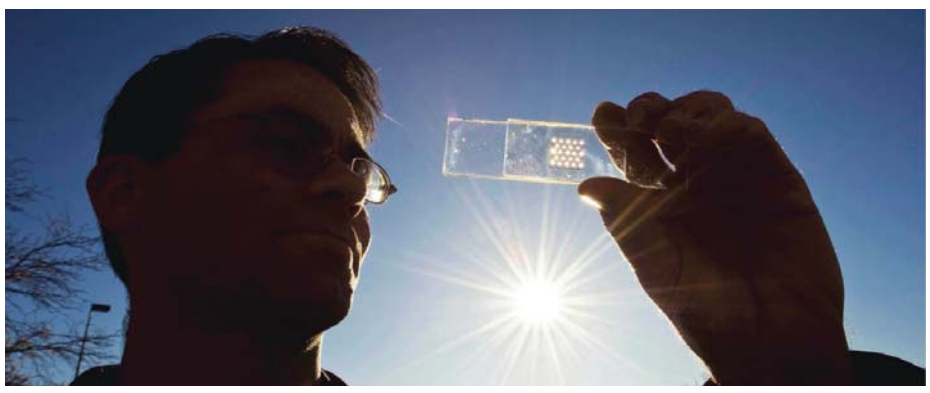
A paradigm-shifting success?

Support for Greg's nomination came from a variety of sources external to Sandia.

Joseph H. Simmons, professor of Optical Sciences and of Materials Science and Engineering at the University of Arizona, wrote, "I have seen many photovoltaic . . . technologies. Sandia's microscale photovoltaics are one with the most innovative approach and the best chance for a paradigm-shifting success."

Wrote Stephen J. Fonash, Kunkle Chair Professor of Engineering Sciences at Pennsylvania State University, "I have seen few truly new visions for improving solar cell costs and efficiency; Sandia's microscale photovoltaics is the most recent one I place into this special category."

Wrote Jeffrey H. Hunt, an American Physical Society and Boeing Technical Fellow, "[Solar] applications to mobile ground units, airborne platforms, and space assets continue to depend on engineering the power to fit the system, rather than logically fitting the power to the application requirements. . . . The glitter cells are the only technology capable of bridging this important technical gap."



BRILLIANT! — Greg Nielson, just named to *Popular Science's* annual Brilliant 10 list, holds a solar cell test prototype with a microscale lens array fastened above it. Together, the cell and lens help create a concentrated photovoltaic unit. (Photo by Randy Montoya)

Indications that Greg was a high achiever came early. At the age of 7, he had read all the children's books in the Bountiful, Utah, public library. His mother, a strong supporter of education, talked the librarian into granting Greg an adult card so he could get more information on the insects and birds he saw around him.

His dad, now retired and working five hours a week at the Ace Hardware in Bountiful, is so proud of his son's achievements that he relays news of them to store customers.

Supportive parents were supplemented by one of Greg's high school classes, taught by a millionaire physics teacher who had made his money by inventing a machine that heated pop bottles and stretched them at state fairs. "He taught for the fun of it," Greg says, "and every day or so he'd make up some experiment."

The experiments included blowing up a car battery, filling a 15-foot-diameter weather balloon with helium and letting it fly upward, and rolling bowling balls off the school roof in attempts to hit a target below.

"The experiments wouldn't have been OSHA-approved, but they influenced me significantly," says Greg.

'I love coming up with a solution'

Because of the influence of his physics teacher, Greg signed up for mechanical engineering when he went to college at Utah State. "I'm not that interested in discovering new scientific theory," he says. "It's when I hear of a problem that needs an engineering solution that my mind goes crazy. I love coming up with a solution."

At Utah State, a telecommuting Sandian suggested Greg apply to Sandia for a summer internship. He worked for two summers under Rob Leland in the CUBIT group, doing software for mesh generation. It didn't hurt his application that he was already — though still an undergraduate — working as a Utah State teaching assistant and also as a research assistant, testing rockets that combined solid fuel with liquid/gas oxidizers. The hybrid process enabled rocket propulsion mechanisms to be turned on and off, rather than burn without pause to the end of their solid-fuel lives.

"The college didn't have a lot of graduates, so they took advantage of undergraduates," Greg says modestly.

He travelled to the Massachusetts Institute of Technology for his master's and doctoral degrees. The degrees were in mechanical engineering, but because he was working under a thesis advisor interested in volume holography (creating a holographic lens to provide more information than could a physical lens under certain circumstances), he took courses in physics, mechanical and electrical engineering, and materials science, and ended by doing a thesis on optical micro- and nanostructures combined with MEMS (microelectromechanical systems). After completing a PhD, Greg was selected in the first crop of Sandia Truman Fellows.

"I had ideas about optical switching for MEMS devices I was excited about," he says. "Sandia's MEMS facilities seemed a fine site to work out the technology."

But an unexpected conversation with Vipin Gupta (6124) changed Greg's direction. Vipin had called Greg by mistake, looking for another Truman Fellow. "Vipin is willing to listen to people with crazy ideas," Greg said. "It was extraordinary luck that we crossed paths."

Greg at the time had envisioned a nonphotovoltaic way of converting sunlight into electricity through use of the piezoelectric effect. (When a piezoelectric material changes size, it creates a voltage.) Though he still thinks the premise could work, after many conversations with Vipin and others he settled on the more immediately practical idea that current solar photovoltaic generators "were using a lot of silicon they didn't need to. With my background in microsystems, I saw they could save by a factor of 10 in materials cost."

He credits his volunteer experience leading youth groups, Boy Scouts, and a church congregation for his ability to provide "steady pressure," as he puts it, to move his projects forward.

"Another help," he says, "is that many people feel strongly about solar and gravitate toward our project. They believe they are making a difference and I believe they are."

Among those he cites for their helping in the earliest stage of the project, in addition to Vipin, are Jeff Nelson (1131), Murat Okandan, and Jose Luis Cruz-Campa (both 1719). "But there are many more on the team today." *Popular Science* is expected to release its list of its 2012 selectees in its October issue, available in late September, along with sketches of the winners and their achievements.

Greg's photovoltaic work has been supported by DOE's Solar Energy Technology Program and Sandia's Laboratory Directed Research & Development program.

NNSA Defense Programs Awards

Four individuals and 10 teams were selected to receive NNSA Defense Programs Awards of Excellence at ceremonies this year in New Mexico and videolinked to Sandia/California. The special guest speaker was NNSA Deputy Administrator for Defense Programs Don Cook. The Defense Programs Awards of Excellence were created in the early 1980s to give special recognition to those at the laboratories and plants directly associated with the stockpile modernization program. Today, the awards honor exceptional contributions to the stewardship and management of the stockpile.

RENE BIERBAUM

Rene Bierbaum for her excellent technical and interpersonal team leadership, resulting in the development of surveillance metrics and sampling strategies.

Rene has been a leader and contributor to the technical bases of nuclear weapons, providing exceptional guidance, leadership, and extensive knowledge of weapon system performance, surveillance data, and analytical capabilities.

She has worked with others across the nuclear weapons community to develop a General Engineering Document defining the structure of the Sandia surveillance program which provides ongoing data and analysis for annual assessment. She also wrote a white paper about component base-lining, which is a methodology essential to supporting the development of predictive capability for stockpile components. Rene led the development of metrics for evaluating the impact of surveillance accomplishments and gaps on stockpile confidence.

DAVID CAMPBELL

David Campbell for his role in delivering a new W88 Pathlength Module design, or PLM, for the W88 ALT370. This design will replace the Force Balanced Integrating Accelerometer of the current W88 Mod 0. As the lead electrical designer, he led the team that delivered this extremely high-risk component. This effort is viewed as one of the most challenging design tasks for the W88 ALT. David's technical excellence and ability to capture the implications of design trades with respect to both component and system impacts make him an integral part of the W88 ALT team.

David also consulted and mentored system and component engineers as the "go to guy" for both historical context and leading-edge technology. His coaching and mentorship are producing the nation's future weapon designers.

JUSTINE JOHANNES

Justine Johannes for outstanding program management as the deputy program manager for the Advanced Simulation and Computing Program.

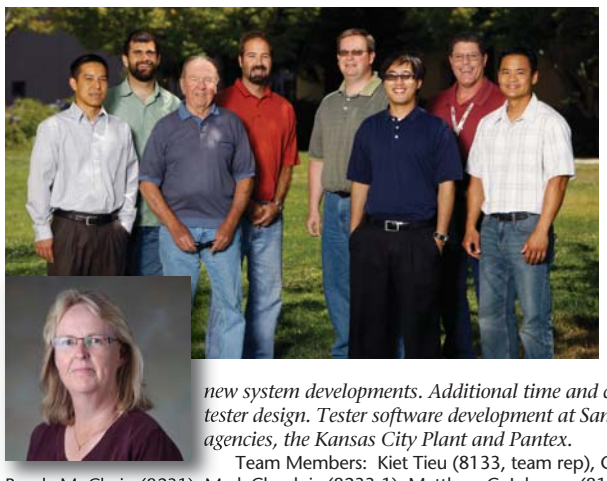
Justine's leadership was key to the program's ability to meet mission requirements for high-performance computing capabilities. Her work led to a technical basis for the Annual Stockpile Assessment that surpassed work done in previous years and that addressed several important questions about the viability and margin of particular designs.

Justine worked with Headquarters and the other NNSA laboratories to develop a high-performance computing platform strategy for the nuclear weapons program that is the foundation for Cielo and the upcoming deployments of Sequoia, Trinity, and exascale-class platforms.

Justine also worked to support the advanced computing needs of other customers, which allowed the Red Storm computer to be maintained and supported while several units of the second generation Trilab Computing Cluster were being procured.

B61 Joint Test Assembly Modernization Firmware Verification Team. *"Joint Test Assembly" is also known as JTA. This team is being recognized for executing the first complete functional verification of a JTA telemetry system's digital hardware using state-of-the-art techniques employed in industry and academia. Significant accomplishments include evaluation of electronic design automation tools, the verification of subsystem components resulting in an improved firmware development process, and the use of high performance computing resources to identify low-probability critical errors using hardware fuzing. The team's improvements and standardization efforts allowed for easier firmware sharing and development by multiple designers. This effort measurably improved the quality and reliability of the B61 JTA Modernization telemetry system. The team's expertise collaborating on, reviewing, and improving the quality of subsequent firmware will be valuable to Sandia and the Nuclear Weapons program long into the future.*

Team members: Yalin Hu (8136, team rep) Daniel Kevin Anderson (8136), Brett Chavez (8135), Brian Joseph Gestner (8136), Grace Soh (8133), Craig D. Ulmer (8953)



B61 JTA Modernization Team. *This team developed and implemented the first JTA to incorporate Micro Modular Telemetry, or MMT, technology aimed specifically at reducing development time and costs across multiple programs and weapon systems. The mechanical architecture was designed for robustness. The team advanced the MMT technology to include MMT Cards, allowing for a more efficient, centralized design. The team was able to reduce the development cycle from seven to five years, and the MMT Cards are designed for reuse and adaptability to minimize the costs associated with current development, future design upgrades, and new system developments. Additional time and cost savings are realized by using a common tester design. Tester software development at Sandia is being shared with two production agencies, the Kansas City Plant and Pantex.*

Team Members: Kiet Tieu (8133, team rep), Gary Boccoleri (8233-1), Brett Chavez (8135), Randy M. Clarin (8231), Mark Claudnic (8233-1), Matthew C. Johnson (8136), Gary W. Kirchner (8135), Myles Young Lam (8133), Ryan Layton (8133), Paul Lowe (8135), Peter J. Royval (8133), Grace Soh (8133), Douglas P. Stark (8133), Marlene Elizabeth Uribe (2111)

Reentry Systems Transformation Ground Test Unit Team*, recognized for its systems engineering excellence in the design and fabrication of the Reentry Systems Transformation, or RST, Ground Test Unit. As part of the RST project, tasked with developing options for future reentry systems, the RST Ground Test Unit team developed a system architecture resulting in a high-surety reentry system design that is adaptable to three different aeroshells. The team designed, built, and tested a ground test unit. They performed detailed system engineering and integration, and demonstrated the performance of surety hardware never before deployed in a reentry system. The full-scale test unit was assembled and environmental testing was completed.*

Team members: Robert D. Monson (8244, team rep), Kurt W. Berger (8242), Edwin B. Bochenski (8244), Glenn

BARBARA RESER

Barbara Reser for exceptional administrative service for 14 years in support of Sandia's Weapons Intern Program, commonly known as WIP. The WIP curriculum continuously evolves to better address the future challenges of maintaining the nation's nuclear deterrent and Barbara is responsible for maintaining that curriculum.

Barbara is the engine to the vehicle called WIP. Each year she arranges for hundreds of nuclear weapons subject matter experts to visit Sandia and share their historical perspectives; she also coordinates more than 30 tours to significant locations for the WIP class. Barbara's contributions and untiring devotion significantly enable the WIP mission to shape the future stewards of the nuclear weapons stockpile.

# of Excellence

N.M. photos by Lloyd Wilson
Calif. photos by Randy Wong

National Nuclear Security Administration

Arthur Bohan (8244), Robert C. Brandt (8531), Arthur Brown (8259), Jennifer P. Chan (8244), Brett Chavez (8135), Jay J. Dike (8259), Shawn Allen English (8259), Joshua R. Greegor (8241), Robert G. Hillaire (8244), Alice Johnson (8248), Matthew C. Johnson (8136), Ryan A. Johnson (8244), Shelly M. Keith (8248), Bruce L. Kistler (8259), William Loo (8244), Bryn Miyahara (8248), Brian E. Owens (8244), Debra S. Post (8248), Simon Scheffel (8226), Jeffrey L. Tong (8233), Janson Wu (8112).

W87 JTA4 Noise Susceptibility Fire-down Team. *Over time, existing W87 neutron generators will be replaced with new small models of the device. This team completed a ground test that demonstrated the telemetry systems, and other JTA components, will continue to perform as required with these new neutron generators. This outcome results in a number of cost savings associated with the avoidance of a JTA redesign. In addition, the JTA4 hardware will be used by the W87 neutron generator qualification team for system-level qualification testing, which avoids the cost of a new tester. The team successfully managed a very complex set of interfaces and effectively used methods such as peer review and safety walkdowns in conducting this program.*

Team members: Robert Mark McConkie (8231, team rep), Marco Alvares (8231), Herman O. Armijo Jr. (8516), Siddhartha Bhowmik (0426), Randy M. Clarin (8231), Lee Druxman (8231), Toff B. Garcia (8516), Steve Grieco (421), Daniel J. Hardin (8231), Gary A. Hux (8537), Steven Ikebe (8247), Gary W. Kirchner (8135), Derek Koida (8231), James P. Lauffer (8231), Paul Lowe (8135), Quenton L. McKinnis (8231), James M. Morris (8531), Jessica Ann Rippee (8247), Kiet Tieu (8133), Roger S. Tilley (8231), Pamala Joann Vela (8231), Kit Schmitz (ret.), Dale Walker (ret.)

H1700 Product Realization Team, or PRT. *This PRT, part of a joint NNSA and Department of Defense team, played an integral role in the success of the H1700 shipping container, modifying it from a Department of Energy Environmental Management container into NNSA Military Certified Handling Gear. This container provides hermetically sealed protection for Limited Life Component Exchange shipments of weapon parts to the Department of Defense and for surveillance and dismantlement shipments within NNSA's Nuclear Security Enterprise for multiple programs. The team developed innovative approaches to cost effectively modify the container by integrating a qualification process across four National Laboratory sites and three additional government agencies. The team met the unique challenges posed by such an over-arching effort by establishing best practices to ensure that all agencies knew the exact contents of any H1700 assembled for shipment. They also developed cost saving measures for data sharing between agencies. Because of these initiatives, the handling gear design process was expedited and the quality of Technical Publications drawings and images needed for military training were improved.*

Team members: Frank Mark Cranfill (2111, team rep), William A. Beenau (2913), Thomas Clark Jr. (8133), Bruce D. Fishel (2548), Douglas F. Hodge (2996), Cynthia I. Kajder (2913), Cary Lynn Pratt (0427), Karen Townsend Scheffel (8231), Tri Quang Trinh (2547), Scott A. Whalen (2547), Frank Whiston (2111), Glenn Abramczyk (Savannah River), Peter Biggs (SNL Staff Augmentation, KCP), David Blake (NNSA Albuquerque Complex), Jackie Claycomb (NNSA Albuquerque Complex), Pete Corpeny (KCP), Bob Dearth (KCP), Tom Foster (KCP), Chelsea Fuchs (NNSA Albuquerque Complex), Bob Hoye (KCP), David Jordan (KCP), Keith Lacy (LANL), Bradley Loftin (Savannah River National Laboratory), Ronald Martinez (LANL), Brian Meisner (KCP), Jim Otto (Pantex), Ronald Roberts (SNL Staff Augmentation, KCP), Steven Smith (KCP), Robert Stevens (NNSA Albuquerque Complex)

Nuclear Security Enterprise International Traffic in Arms Regulations, or ITAR, Team *for their exceptional service in the national interest. The team worked with DOE and NNSA to utilize an ITAR exemption for international activity authorized under the Atomic Energy Act of 1954. They developed a three-tiered licensing system that could apply to items on both the US Munitions List and the Department of Commerce's Commerce Control List. They updated the Cold War Era ITAR List for nuclear weapons related items. A new NNSA policy document incorporating these changes will allow more efficient and cost effective operations while maintaining an appropriate level of security. The team's efforts provide a solid foundation for export reform and address US goals for being a prime player in the international marketplace without jeopardizing our national security efforts or undermining our international treaties and commitments.*

Team members: Alan George Rittel (4032, team rep), Winalee E. Carter (8511), Ian Cheng (10242), Madelynne J. Farber (11500), Tony D. Hernandez (2998), Robert A. Paulsen Jr. (2211), Luis A. Paz (0216), Tracy C. Peterson (1732), Susan Y. Pickering (6230), Patricia M. Sanchez (0233), Sally D. Uebelacker (4030), James P. Wilhelm (8511), Ernest Wilson (2613), John Maechaen (ret.), Michael Spence (ret.), Steve Sultemeier (ret.), D. Ron Baca (NNSA Service Center), Ian Brandt (KCP), Tony Carey (KCP), William Chappell (Y12), Tim Chasteen (KCP), Doug Clark (Pantex), Larry Collins (LANL), Greg Enserro (KCP), Robert Fong (NNSA), William Fritchie (LLNL), Don Gerber (Pantex), Steven Kyle (Y12), Therese Leblanc (KCP), Danny Lewis (KCP), Sarah Maynard (LANL), David McMindes (KCP), John Monahan (SRS), Lloyd Montoya (SNL-NTS), Nelson Beard (KCP), Michael Thress (Y12)

Radio Frequency Integrated Circuit, or RFIC, Based Radar Fuze Team. *In 2005, Sandia completed radar design activities for the W76-1 life extension program. The W76-1 radar fuze uses hundreds of commercial off-the-shelf, or COTS, components. Although a COTS-based design allows Sandia to access commercial technologies at low cost, there are also significant drawbacks to this approach. The level of integration requires many hundreds of discrete radio frequency components sourced from a wide variety of vendors. All these parts must individually go through a time-consuming qualification process. The quality and uniformity of future part lots is not guaranteed, and parts available now are often not available in the future. The sheer number of components is the limiting factor to overall fuzing reliability, and most importantly for our customers, the expensive seven-year full-scale development period for the W76-1 fuze is not feasible for future programs. This team has demonstrated a new design approach for future radar fuzing subsystems. The electronics can be integrated onto RFICs, in order to greatly reduce part count, simplify the qualification process, increase reliability, reduce physical size, and allow the radar to have additional capabilities as desired. This approach allows Sandia to deal with fewer but more-trusted suppliers who have basic commercial interests in maintaining the stability and uniformity of their Integrated Circuit manufacturing processes. What's more, the RFIC approach allows us to create a radar technology infrastructure, which is a generic chipset that can be reused or modified as needed among multiple future Life Extension Programs.*

Team members: Christopher T. Rodenbeck (5352, team rep), Keith Burton Albers (5353), Keith Richard Barkley (1751), Thomas G. Brown (5353), Emily R. Crespin (1751), Gilbert G. Delaplain (5344), Michael Matthew Elsbury (5352), Isaac Garcia (1751), Christopher L. Gibson (5352), Terry Hardin (1751), Clinton Lloyd Haslett (5352), Lung-Hwa Hsieh (5353), Nicola Jean Kinzie (5352), Richard T. Knudson (5352), Garth Kraus (5353), Johnson Liu (5353), Glenn Omdahl (1751), Jeffrey Pankonin (5353), Kenneth A. Peterson (01832), Kenneth D. Reaves (2992), Charles E. Sandoval (1751), Troy Satterthwait (5345), Gayle Schwartz (1832), Matthew Samuel Starosta (5352), Keith J. Tracey (5352), Nathan Paul Young (1718), Jeffrey Dimsdle (KCP), John Dokos (KCP), Cristina Fadner (KCP), Sean Garrison (KCP), Michael Girardi (KCP), Stephen Goldammer (KCP), Randy Hamm (KCP), John Harder (KCP), David Jarrell (KCP), Daniel Krueger (KCP), Travis Mendenhall (KCP), Zachary Page (KCP), Pauline Pham (KCP), Barbara Reed (KCP), Leslie Rubottom (KCP), Ronald Schroeder (KCP), Frank Smith (KCP), J. Ambrose Wolf (KCP), Barbara Young (KCP)

Sandia Pulsed Reactor Facility Critical Experiments Project Team *for exceptional contributions in creating a new capability for the NNSA Nuclear Criticality Safety Program when they developed and piloted a hands-on criticality safety training course utilizing the water-moderated critical assembly, a small nuclear reactor, in Sandia's Technical Area Five. The course provides DOE nuclear criticality safety professionals with practical experience with the systems that can go critical. Hardware was designed and installed that allows experiments to safely approach critical by varying the amount of water in the assembly. This provides the capability to simulate a criticality accident caused by flooding, something that is at the heart of many safety analyses for the storage of nuclear material across the DOE complex. The hardware also allows the completion of an entire approach-to-critical sequence in less than half a day, which is very useful when incorporating a number of critical experiments into a five-day training course.*

Team members: Gary A. Harms (1384, team rep), Raymond D. Beets (0254), Steven Martin Bonadore (4128), Matthew J. Burger (1381), Rafe Campbell (1381), Nancy Collins (1387), James J. Dahl (1383), Kraig Paul Deike (1381), Paul Dixson (4128), Todd Erenstein (1386), Edward Allen Finley (4128), John T. Ford (1381), Emily J. Fuller (1384), Joseph David Gomez (4128), Paul H. Helmick (1385), George H. Hoskison (4128), Ronald Allen Knief (1382), Allison Delo Miller (1384), John Miller (1386), Mary Ellen Ratzer (1382), Kenneth O. Reil (1384), David Samuel (2998), Darren G. Talley (1344), Milton E. Vernon (1384), Del Wiedeman (1385), Kevin Gray (SSO), Jeff Petraglia (SSO), Sujita Pierpoint (NN-162), Jody Pugh (SSO), Bill Wechsler (SSO)

Uranium Experiments on Z Team *for completing the first uranium experiments at the refurbished Z facility. Before these experiments on the Z machine, the existing data for uranium contained large uncertainties. The team's 2011 Z experiments provided high-quality shock data at the highest pressures to date in above-ground experiments, and the first equation of state and strength data from the shockless compression of uranium. The Z machine is the only facility capable of obtaining accurate data for both shock and shockless compression. The uranium data obtained are already being incorporated into modern material models to assess the performance and safety of the stockpile. The data will directly impact the 2012 Predictive Capability Framework deliverable to improve and quantify the initial conditions for boost. The team fielded two radioactive uranium experiments within a five-workday window. This accomplishment allowed Sandia to provide extremely high value data in a cost-effective manner.*

Team members: Amy Renee Laspe (1679, team rep.), Seth Root (1646, team rep.), David Artery (1679), Lance Baldwin (1676), Eric Wayne Breden (1671), Matthew David Christison (1676), Joshua Bernard Cordova (1679), Lisa Cordova (4128), Todd A. Culp (4128), Devon Dalton (1646), Jean-Paul Davis (1646), Aaron Edens (1679), Dawn G. Flicker (1646), Jeffry Gluth (1646), Nibby Grelle (1679), Heath L. Hanshaw (1641), Steven Hellemann (4128), Peter Andrew Jones (1676), David Justus (1671), Mark L. Kiefer (1612), Raymond W. Lemke (1641), Mike R. Lopez (1679), John Lott (1342), Elaine T. Marshall (4128), Matthew Martin (1641), G. Randall McKee (1676), Charles Meyer (1646), James Moore (1671), Kathleen Moore (1612), Thomas D. Mulville (1671), Anthony Romero (1646), Dustin Heinz Romero (1646), Kelly Gene Seals (1671), Brian Stoltzfus (1671), William A. Stygar (1671), Michael Alex Sullivan (1671), Tim Wagoner (1342), Peter Eric Wakeland (1676), Donny Brady (SSO), Rick Martineau (LANL), Veronica Martinez (SSO), Paulo Rigg (LANL), Heather Trumble (SSO)

W87 JTA4 High Accuracy Separation Package Field Programmable Gate Array Qualification Team. *The team demonstrated dedication, innovation, technical excellence, and leadership in the successful qualification and delivery of the first Sandia-developed Field Programmable Gate Array, or FPGA, certified as Mark Quality. The process to certify the first FPGA for War Reserve use produced best practices, lessons learned, and a detailed submittal package for future FPGA and application-specific integrated circuit, or ASIC, code submittal efforts to follow. These guides will significantly reduce cost, development time, and qualification submittal uncertainties for programs that require Mark Quality FPGA or ASIC devices.*

Team members: Steven Rodriguez (5359, team rep.), Charles E. Brady (5339), Arthur Gariety (5357), Robert E. Hursig (5357), Keeven Hurtt (5359), Wesley J. Landaker (5339), Delia M. Madrid (10653), Marcus J. Martinez (5359), David E. Peercy (0421), Glenn C. Roubik (0423), Doretha Smith (10653), Janet Tucker (5359), Ian Zachary Wilcox (5337), Sharon Winings (0424)

NNSA Defense Programs AWARDS of EXCELLENCE

BE A BETTER HEALTHCARE CONSUMER

Lovelace Health System and the Sandia Health Partner Network (HPN) Offer Exceptional Care for Women

Women's health providers specialize in meeting the needs and concerns of women of all ages, from adolescent care to obstetrics, from gynecology through menopausal issues related to aging. Services such as family planning, prenatal care, and birthing centers are critical areas in this field. Regardless of your place in life, the Sandia Health Partner Network (HPN) has providers to meet your needs.

Sandians and their covered dependents enrolled in **Sandia Total Health Blue Cross Blue Shield of New Mexico (BCBSNM)** have access to the entire BCBSNM network of providers for in-network care. However, when you visit providers in the HPN (a smaller subset of the BCBSNM in-network providers in New Mexico), you'll save money through reduced deductibles, coinsurance, and out-of-pocket maximums. The table below explains the cost savings you can see from visiting HPN providers:

Are you enrolled in Sandia Total Health UHC?

Your provider may also be a part of the Sandia Health Partner Network. Visit www.SandiaHPN.com and click Provider Search. Switching to Sandia Total Health BCBSNM could potentially save you money in 2013.

Sandia Total Health BCBSNM						
	Employee Only		Employee + Spouse or Children		Employee + Family	
	HPN	In-Network	HPN	In-Network	HPN	In-Network
Annual Deductible	$500	$750	$1,000	$1,500	$1,500	$2,250
Coinsurance	10%	20%	10%	20%	10%	20%
Out-of-Pocket Maximum	$1,500	$2,250	$3,000	$4,500	$4,500	$6,750
Note: HPN and in-network deductible and out-of-pocket maximum will cross-apply.						

For more information about the Sandia Health Partner Network, please visit hbe.sandia.gov.

Lovelace Health Systems

Earlier this year, Lovelace Women's Hospital won the 2011 Zia Award for Performance Excellence "Best in Class" designation from the New Mexico Quality Awards program. This award is modeled after the Malcolm Baldrige National Quality Award. Lovelace Women's Hospital earned this honor by demonstrating through its practices and achievements the highest level of performance excellence.

Lovelace Women's Hospital is New Mexico's first and only hospital dedicated to women's health and features a 53-bed Level III Neonatal Intensive Care Unit, 24/7 emergency department, 16 labor and delivery rooms, 41-bed Mother-Baby unit, a Maternal-Fetal Medicine program for high-risk pregnancies, and a Pediatric Observation Unit supervised 24/7 by pediatricians. The hospital is also home to a Natural Birthing Center, where women who wish to have a more natural delivery or water birth can deliver in a safe environment.

Additional HPN Facilities

A quick Provider Lookup search of Sandia Health Partner Network providers at www.sandiahpn.com shows that there are 66 Obstetrics and Gynecology providers in the Sandia Health Partner Network. Those 66 providers work in the following facilities:

- Women's Specialists of New Mexico — www.wsnm.org
- Albuquerque Women's Health — www.abqwomenshealth.com
- Southwest Medical Associates — www.southwestmedicalassociates.com
- ABQ Health Partners — http://abqhealthpartners.com

Most of these providers offer the following women's health services, but please call the facility to verify that it meets your needs:

- Annual exams
- Birth control
- Breast and pelvic exams
- Family / prenatal planning
- Hormone replacement therapy
- Osteoporosis screening, prevention, diagnosis, and treatment

This month in the past

60 years ago . . . Movie actress Penny Singleton to help open Sandia Corporation's Community Chest Drive. In Los Angeles on official business, T.E. Shea, our vice president and general manager, assisted Community Chest Campaign chairman H.J. Wallis in arranging for Penny Singleton's visit to Sandia Oct. 6 to speak to our Red Feather rally. Penny Singleton was the youngest dancer ever to be featured on Broadway. After training in singing and dancing schools and also attending Columbia University, she became a singing-dancing star in Broadway hits such as "Good News," "Sweetheart Time," "Follow Through," and "Hey Nonny, Nonny." More recently she has been active as "Blondie" in the movies and also in the Penny Singleton radio show.

PENNY SINGLETON

40 years ago . . . A Sandia scientist has resolved the controversy over the electronic state of the hydrogen atom when metals take up hydrogen to become hydrides. This work, performed by Al Switendick, Supervisor of Solid State Theory Division 5151, will help to better provide a better understanding of all metal hydrides — including those purposely manufactured for their high hydrogen content and those inadvertently created during metals processing and in nuclear environments. In the past, theoretical predictions of how given metals will be converted to hydrides have been governed by two principal models, the proton and anion models, in which the hydrogen atom either loses its electron or gains an additional electron to form a bond with the host metal atoms. Al's energy band calculations of the electronic energy levels of metal hydrides give fundamental insight into the structural stability and electronic properties of hydrides and replace the proton and anion models with a unifying new model. **A Sandia-developed technique for improving the bondability of cured RTV (room temperature vulcanizing) silicone rubbers was announced** and is arousing interest in both scientific and medical fields. RTV rubbers are often used to give printed circuits and electronic components a protective resilient coating before they're permanently potted or encapsulated. Adhesives — epoxies and the like — don't stick well to the rubber coating. The theory that a liquid (such as an adhesive or encapsulant) can wet a solid (such as RTV rubber) only when the surface energy of the solid is greater than that of the liquid has been around for quite a while. The team exposed the rubber to an activated gas plasma (argon and helium work best) that consists of ionized gas particles. This process apparently causes disassociation of the polymer molecules which, on being quenched with air, results in oxidation of the surface and succeeds in improving rubber's wettability.

Water droplet on untreated RTV rubber disk. Following gas plasma exposure, water droplet will spread across surface of disk.

BE A BETTER HEALTHCARE CONSUMER

Sandia Summer Health Fair

Dr. BARRY RAMO shares ideas with attendees at the Sandia HBE Summer Health Fair about how to be a better healthcare consumer. Ramo was the keynote speaker at the event, which drew more than 350 Sandians and their guests.

On Saturday, Aug. 11, the Sandia Health, Benefits, and Employee Services (HBE) organization held a Summer Health Fair at the Embassy Suites Hotel in Albuquerque. About 350 people — Sandians and their spouses — showed up for this fun and informative event. Admission was free and people enrolled in Sandia Total Health received up to 1,500 Virgin HealthMiles for their participation.

Dr. Barry Ramo, medical editor for KOAT-TV and medical columnist for the *Albuquerque Journal,* one of the keynote speakers, discussed how to be a better healthcare consumer. Also in attendance at the fair were many physicians from Lovelace Health Systems, ABQ Health Partners, the New Mexico Heart Institute, as well as many independent providers. They provided free services such as BMI testing, vascular ultrasound screening, heel scans, pulse oximetry, and chiropractic and acupuncture — totaling more than 800 free services provided.

PETN explosive

(Continued from page 1)

level might dominate the performance of PETN.

Years of work went into the process, says Alex.

The idea is that by understanding the fundamental physical behavior of an explosive and the detonation process, researchers will be able to improve predictive models of how explosives will behave under a variety of conditions.

Getting a handle on the variables

Right now, "if we want to model the performance of an explosive, it requires parameters determined from experiments under a particular set of test conditions. If you change any of the conditions, those models we have for predictions don't hold up any more," says Rob Knepper (2554).

Physical vapor deposition works like this: Researchers put PETN powder in a crucible inside a vacuum chamber and heat it so the PETN sublimes or evaporates. Above the crucible is a flat substrate of plastic, ceramic, or metal, and the PETN vapor deposits on that, producing explosive films.

Such pristine samples allow the team to study the initiation and detonation behavior of explosives, Alex says.

"By varying deposition conditions, we're starting to get a handle on how the deposition conditions affect the microstructure and how microstructure affects detonation behavior," Rob adds.

The tests use less explosive than what's inside a .22-caliber bullet, and researchers wearing safety glasses and ear protection can stand next to the experiment in a protective enclosure, Alex says.

"A typical experiment weighs about a tenth of an aspirin tablet," he says. "If that tablet is 325 milligrams, we're shooting about 32.5 milligrams. These are not huge."

The team did multiple shots to determine at what point detonation fails.

"As size [thickness] decreases further and further, at some point the detonation will slow down and eventually fail," Alex says.

His interest in the subject goes back to when he and his brother as kids fostered each other's interest in fireworks and explosives. Alex, a chemist, became involved in Sandia's projects through an interest in collaborations and because of a mentor, Anita Renlund, a senior scientist with the Explosives Technology Group who retired in 2008. Rob, whose background is in materials science, began working for Sandia in 2009 as a postdoctoral appointee working with Alex. Rob later moved to the Labs' regular staff, continuing on many of the same projects.

Alex, Rob, and co-authors Ryan R. Wixom, Jill C. Miller, Michael P. Marquez, and J. Patrick Ball presented a paper at the 14th International Detonation Symposium in Coeur d'Alene, Idaho, in 2010. They wrote in the paper, "Critical Thickness Measurements in Vapor-Deposited Pentaerythritol Tetranitrate Films," that the work represented the first highly resolved measurements of detonation failure in high-density PETN.

Work began as an LDRD project

It adds new information for a very old explosive.

"What we brought to the table is a new experiment that allowed samples to be made that are small enough to measure this critical thickness property," Alex says. "Other research has been done on PETN in a different form or when it had a binder added to it. This is the first time these data have been done on the critical detonation geometry for pure, high-density PETN."

In the past, diameter information was obtained through experiments using high-aspect-ratio cylinders of pressed pellets of differing diameters. But it's difficult to press pellets with diameters smaller than 1 to 2 mm with precise density.

The work began under a three-year Laboratory Directed Research and Development project that ended in 2001. It's now funded largely through a combination of internal and external programs.

PETN TEAM — James P. Ball, Jill Miller, Michael P. Marquez, Rob Knepper, and Alex Tappan (left to right, all 2554) pose in the reaction dynamics lab in Sandia's Explosive Components Facility. In the foreground is what's called a microboom box, where the group does its experiments on PETN (pentaerythritol tetranitrate). (Photo by Randy Montoya)

The research falls under the umbrella of Sandia's Microenergetics Program, which Alex says uses novel techniques to produce small-scale explosive samples to study ignition, combustion, and detonation phenomena. It began as a collaboration among researchers in the Explosives Technology Group 2550, Manufacturing Process Science and Technology Group 1830, Engineering Sciences Center 1500, and Microsystems Science and Technology and Components Center 1700.

Sandia Sci/Tech Park fuels economy with jobs, tax revenue, spending

By Nancy Salem

The $1.89 billion in economic activity generated by the Sandia Science & Technology Park (SS&TP) since it was established in 1998 has produced more than $73 million in tax revenue for the state of New Mexico and $10.4 million for the city of Albuquerque, according to a new report by the Mid-Region Council of Governments.

And direct and indirect jobs associated with the research park, which houses private companies and Sandia sites, have resulted in $3.06 billion in wages, giving the local economy a major boost, the report said.

Albuquerque Mayor Richard J. Berry and Bernalillo County Commissioner Maggie Hart Stebbins announced the report's findings Aug. 28 at Ted Hobbs Park in the 300-acre master-planned SS&TP. The report is available at http://www.sstp.org/about-sstp/economic-impact.

The mayor said the park is a major contributor to the city's economy. "It's been a home run," he said. "The city of Albuquerque is proud to have been an active partner in this important job-creation initiative since its inception."

Berry said the park is a great example of regional cooperation in economic development and what government's role can be.

"Institutions such as the Sandia Science & Technology Park are instrumental in creating economic stability within the region," Hart Stebbins said. "Despite the tough economy, the park continues to contribute to our nation through innovation and technology, and to our region through increased local investment, area revitalization, and spin-off jobs that provide opportunities to our residents. Bernalillo County is proud to be a partner in this effort."

MRCOG assessed the research park's economic impact on the local and state economy from its inception in May 1998 through the end of 2011. The report also measured the number of Albuquerque-area jobs created in the park, economic activity in the community, and wage and salary levels.

"Creative partnerships that represent public and private interests and multiple jurisdictions, like the Sandia Science & Technology Park, are critical to the health of the region," said Dewey Cave, MRCOG's executive director.

Sherman McCorkle, chairman of the board of the SS&TP Development Corp., said the park was founded in 1998 as a partnership to promote business growth and facilitate collaboration with Sandia and the Air Force Research Lab (AFRL). "Since then, the park has provided a remarkable economic boost to New Mexico," he said. "This public-private partnership is a true testament to the importance of technology commercialization and its important role in job creation."

The average salary for full-time employees in SS&TP was $74,949 in 2011, nearly 1.8 times higher than that of a full-time employee in the Albuquerque area, according to the report.

"Since park jobs are primarily high technology, mainly engineering and research and development jobs, a high wage rate is associated with them," McCorkle said.

ALBUQUERQUE MAYOR Richard J. Berry, flanked by Dewey Cave (left), executive director of the Mid-Region Council of Governments, and Bernalillo County Commissioner Maggie Hart Stebbins, said the Sandia Science & Technology Park has become a key place to do business. (Photo by Randy Montoya)

The park expanded by more than 500 jobs since the last economic impact report was issued in 2009. By the end of 2011, SS&TP was home to 2,470 jobs, including about 1,000 Sandia jobs. Growth in private sector employment within the park is due largely to expansion at Air Products and Emcore Corp. The park's activities have created an additional 4,123 indirect jobs throughout the regional economy for a total of 6,593 jobs in 2011, according to the report.

Sandia shifted jobs to park

Sandia also shifted a number of jobs to the park with the establishment of the Cyber Engineering Research Laboratory and the addition of staff to the Innovation Parkway Office Center. Other Sandia Labs facilities in the park include the Center for Integrated Nanotechnologies, the International Programs Building, and the Computer Science Research Institute.

Public investment since the park was established has been nearly $87 million, including DOE's contribution for the Master Development Plan, Sandia's management of the park, land from Albuquerque Public Schools and the New Mexico State Land Office, and landfill cleanup by Bernalillo County, the report said. Other federal, state, and local government entities also helped the park by providing grants or matching funds, the report said.

For example, the US Economic Development Administration provided significant grants for secure fiber-optic communications and security network infrastructure. The city of Albuquerque also contributed to infrastructure improvements in the park.

"As of December 2011, investment in the park has been more than $350 million, with 75 percent coming from private sources," said Jackie Kerby Moore, the park's executive director and manager of Sandia's Technology & Economic Development Dept. 1933.

"Fourteen years ago, this area was nothing but dirt and tumbleweeds, but since then the jobs and investments have led people to invest not just in the park, but in the surrounding area," she said. "The park has been a catalyst for economic revitalization in southeast Albuquerque."

The SS&TP is located next to Sandia and Kirtland Air Force Base, giving park companies access to scientists and engineers from Sandia and AFRL. Many park companies supply Sandia and AFRL with goods and services or technological products or have licensed and commercialized technologies that originated at the federal laboratories.

The park received the 2012 State and Local Economic Development Award from the Federal Laboratory Consortium.

The park is a partnership of Sandia, DOE, Lockheed Martin Corp., Technology Ventures Corp., the city of Albuquerque, Albuquerque Public Schools, Bernalillo County, the Mid-Region Council of Governments, BUILD New Mexico/Union Development Corp., the New Mexico State Land Office, the state of New Mexico, Public Service Company of New Mexico, and the US Economic Development Administration.

Mileposts

New Mexico photos by Michelle Fleming


Marcelino Armendariz
35 1751


Juanita Evans
35 731


Larry Stevenson
35 2951


Michael Vahle
35 9000

Recent Retiree


Jim Beals
27 4824


Frank Bouchier
30 6512


Mark Platzbecker
30 1732


Carol Jones Adkins
25 1800


Ed Cole, Jr.
25 1726


Rudy Sanchez
25 4844


Linda Wagner Barnett
20 4241


Donna Bauer
20 10501


Gary McGovney
20 2622


Jeanette Orona
20 10691


Pin Yang
20 1833


Beverly Eppinga
15 1100


Ron Manginell
15 1716


Martin Thompson
15 5348


Kevin Rolfe
15 1522

Sandia Emergency Response Team overcomes host of hazards, takes second at HAZMAT Challenge

By Chris Mullaney and Stephanie Hobby

Sandia's Emergency Response Team (ERT) proved once again that they are the guys you want on hand when calamity comes crashing in. Seven Sandians returned with honors after the week-long HAZMAT Challenge at Los Alamos National Laboratory. Team members demonstrated their outstanding skills when facing a variety of significant response challenges including a cramped mechanical room full of toxic and explosive vapors, dangerous chemicals leaking from a vandalized railroad car, a booby-trapped meth lab, and a hijacked city bus packed with frantic passengers, contaminated by a terrorist armed with chemical warfare agents.


THIS YEAR'S SANDIA HAZMAT CHALLENGE TEAM was (front row, kneeling, left to right) Rich Lovato, William Liebhard, Victor Marquez, John Ledet, (back row, standing, left to right) Chris Mullaney, Dale Larez, and Steve Saddoris.

Although the emergencies were all simulated, they represented very real possibilities in what emergency responders might face in the course of their work. The days were long, tense, and grueling. Every emergency was complex, physically demanding, and required team members to keep a level head through it all.

The annual challenge is hosted by LANL to enable emergency response teams from around the country to network, practice technical skills, and learn new HAZMAT techniques in a safe, yet realistic, environment.

"Sandia's Emergency Response Team has again proven their remarkable talents and skills against some of the best this country has to offer. Sandians should be proud of their efforts and rest assured in knowing that such an outstanding team is working on their behalf," says VP of Infrastructure Operations Div. 4000 Mike Hazen.

This was the 16th annual HAZMAT Challenge, and 12 teams from New Mexico, Oklahoma, and Missouri participated during the second week of August. LANL's Tech Area 49 was the setting, and the competition was intense. Teams are scored on a 500-point scale. The Sandia/New Mexico Emergency Response Team brought home the Second Place Overall HAZMAT Challenge Trophy after missing the first place by only two points. The team also earned a special Third Place Technical Trophy.


SANDIA'S EMERGENCY RESPONSE TEAM (ERT) respond to the challenge scenario of dangerous chemicals leaking from a vandalized railroad car. This was one of many significant response challenges presented during the week-long HAZMAT Challenge at Los Alamos National Laboratory.

"We did very well, and I'm really proud of our team," says Chris Mullaney (4263-1) of Sandia's Emergency Operations Department. "Most of the people we were competing against were the best of the best, selected from sometimes hundreds of people in their agency. Sandia's team is small; so for us to take second — and miss the first place trophy by only two points — was very rewarding. Sandians should be proud and know that they have a first-rate emergency response team."

One focus of this year's HAZMAT Challenge was mutual aid and a joint, unified command; that is, two agencies coming together and working in coordination and smartly during a crisis. "Comparatively, we have a lot of experience with unified command since we routinely team up with the Kirtland Air Force Base Fire Department. During the challenge, we had two incident commanders from other teams come up to us and thank us for helping them succeed in their own events. That's what it's all about. That meant a lot," says John Ledet (4236-1).

That experience came in handy more than once. "During the railroad car scenario, everything went wrong. Everything went south," says Dale Larez (4236-1). "Even though we practiced, there were lots of curves they gave us in that challenge event that were unexpected. But even when we were running out of air, and things weren't going just right, the Sandia team worked together as one, did not get excited, and just dealt with the situation. The Sandia team got all the available points and the fastest time of all teams on that event."

Despite demonstrating a high degree of capabilities, the Sandia team is committed to refining its skills and bringing the first-place trophy home next year. The team is already working with emergency managers Eugene McPeek (4236) and team leader Rick Romero (4236-1) to plan for next year. Besides being ready for the 2013 event, the ongoing training activities enhance the team's preparedness for any of the numerous events that can actually occur at Sandia.

Sandia National Laboratories

U.S. DEPARTMENT OF ENERGY

NNSA National Nuclear Security Administration

Diversity Awareness Event

"Hispanic Heritage Month"

2nd Place
Katherine Ortega

3rd Place
Jose Calzadillas

Honorable Mention
Raquel Madrigal

Time: 11:00 AM—1:00 PM

Date: Thursday
October 4, 2012

Location: Hardin Field, KAFB

Salsa/Chile/Cultural Dessert Tasting Contest

Cultural Music provided by The Abel Lucero Band

Youth Art Displayed

Food Provided By: Garcia's Kitchen - $8.00 per plate

Menu: Red Cheese & Green Chile Chicken Enchilada, Taco Bar, Refried Beans, Spanish Rice, Biscochitos, Tortillas and Passion Fruit Tea.

Advance Food Purchase Only

Contact SNL:: Erika Barraza, 505.844.4800, ebarraz@sandia.gov
SSO:: Jose Munoz, 505.844.5570, Jose.Munoz@nnsa.doe.gov
KAFB:: Jose Del Val, 505.853.9300, Jose.DelVal@kirtland.af.mil
NNSA:: Pablo Garibay, 505.845.6185, Pablo.Garibay@nnsa.doe.gov

Background artwork By: 2011 1st Place Winner Erick Ramirez South Valley Academy Charter High School

Our People, Our Legacy
Nuestra Gente, Nuestra Herencia

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

The Original Garcia's Kitchen tickets may be purchased from the SLFCU/Kirtland Branch by Friday, Sept. 28, for $8.

Steve Castillo named HENAAC's 2012 Engineer of the Year

Sandia manager touched thousands of students' lives during long career in academia

It wasn't inevitable that Steve Castillo would become an engineer. But it wasn't surprising, either, given his upbringing. It's not surprising, either, given his upbringing, that he has moved to the very top of his chosen profession. Steve has been named the HENAAC 2012 Engineer of the Year, the highest accolade presented by HENAAC, the Hispanic Engineering National Achievement Awards Conference.

Steve joined Sandia in 2011 as manager of ISR Systems Engineering & Decision Support Dept. 5346. His immediate previous job was as executive vice president of the Colorado School of Mines. Before signing on at the Labs, Steve spent most of his accomplished 24-year career in academia, in jobs of increasing responsibility. While Sandia has been a new and different professional environment for Steve, he has found he likes the change.

"I really enjoy the demanding, fast pace of the work in [Airborne ISR Systems Group] 5340, the high quality of the technical staff I get to work with, and the tremendous national security mission impact our systems have," he says.

Steve grew up in Belen, N.M., where the roots from both sides of his family reach back 300 years. For most of those centuries, his forebears made their living by farming and ranching the rich, well-watered soil of the Middle Rio Grande Valley.

Steve's grandfather, Alejandro Castillo, was the first in that long line to go to college, graduating with a degree in education, after which he spent 30 years as a teacher in the small community of Casa Colorada, south of Belen. Alejandro passed on his love of education to his own children; it was a lesson that stuck. Alejandro's son — and Steve's father — Philip, spent a long and successful career as a PhD electrical engineer in Los Angeles and Albuquerque. Philip's influence, anchored by the support of Steve's mother, clearly rubbed off on Steve and his five siblings, all of whom have gone on to successful professional careers.

College was not optional

In the Castillo household of Steve's youth, discipline was strict but fair and education was not just valued; it was revered. In his home, Steve recalls, "going to college was not an option; it was a requirement."

It was during his senior year in high school that Steve definitively resolved to become an engineer, a decision his parents very much supported. Steve knew the academic demands would be great but he was well-prepared; his family had moved back onto a farm in Belen and all the Castillo kids had chores to do, and not easy ones either. They all learned the meaning and value of hard work.

Steve credits his parents with being the biggest positive influence in his life, but there were other influential and inspirational adults in his life, too.

"In addition to my parents," Steve says, "there were a few teachers that inspired me — my 5th grade school teacher, Leona Brown, a 7th grade civics teacher, Steven Prentice, and my high school college algebra teacher, Mr. Zamora."

In his later career, Steve would remember — and act on — how important those positive role models were at a formative age.

After graduating from Belen High School in 1977 as a National Merit Scholar finalist and a member of the National Honor Society, Steve was accepted to several good engineering schools, but it was a personal letter from a college close to home that sealed the deal for him. The dean of the engineering school at New Mexico State University in Las Cruces, John Hernandez, heard about Steve and recruited him the way big time sport schools recruit top athletes.

(Photo by Randy Montoya)

Steve's decision to go to Las Cruces right out of high school was the beginning of a lifelong relationship with NMSU. After earning his Bachelor of Science degree in electrical engineering at the school, he spent a year and a half at the AT&T Bell Lab facility in Denver. He subsequently moved on to earn a Master of Science degree and doctorate in electrical engineering at the University of Illinois at Urbana.

A consequential phone call

With his PhD in hand, Steve had a wide-open field of options. He interviewed for research positions at several government and private sector laboratories, but again, it was a personal intervention — a phone call this time — from Las Cruces that settled the issue for him. Steve's NMSU undergraduate mentor, professor Gerry Flachs, suggested that he consider a teaching position at the university. It was something that had never really occurred to Steve, but he became intrigued by the idea and took a tenure-track position that set the direction of his career for the next 24 years.

First as a professor, then as an administrator, Steve became a major influence at NMSU's engineering school. He taught more than 3,000 students, and graduated eight PhD and 22 MS electrical engineers, all while remaining deeply involved in research. He was lead author or contributor on scores of technical papers, focusing on the areas of his technical interests, which include electromagnetic theory, electromagnetic interference problems, numerical solution of electromagnetic problems, high performance computing, and computational linear algebra.

After years in the classroom as professor and department head, Steve became dean of the NMSU College of Engineering in 2004. In that role, he was successful in helping shape the school's program direction and in raising more than $120 million in cash and in-kind gifts. Those resources helped establish several new endowed faculty positions and increased scholarship opportunities.

Steve is the recipient of many honors and awards for his professional accomplishments and his community service. His greatest reward, he says, is the opportunity he has had to work with and be a positive influence for his students.

"I am very proud of the many young people I touched throughout my career that have gone on to become outstanding professionals and citizens," Steve says. "Whether it was through a talk at a local high school, a student in a class or a student organization that I taught or mentored, or graduate students that I advised, I feel like I played at least some role in helping to shape their future. Even here at Sandia, I have run into many former students who are doing very well."

Although he has left the classroom, Steve has not left behind his desire to be a positive role model and mentor. When he meets with young people today through community service, he encourages them to consider careers in STEM — science, technology, engineering, and math.

Says Steve, "I tell any young person that a career in STEM will give them the opportunity to be involved in the creation of wealth and a better standard of living for our society or even provide for the security of our country, and at the same time, pay them well enough to enjoy a comfortable lifestyle.

"A STEM career has the potential for making their daily work lives enjoyable because of the many 'gee-whiz' moments that occur on the job in engineering and science professions. I would also tell them that the keys to a successful career in STEM are the mathematics, science, and communication skills they must obtain before they go on to college."

* * *

Steve will be presented HENAAC's Engineer of the Year award at the organization's annual conference in Orlando Oct. 11-13.

About HENAAC

From the HENAAC website: The first HENAAC conference was held in 1989 as a means of identifying, honoring, and documenting the contributions of outstanding Hispanic American science, engineering, technology, and math professionals. Over the past 23 years, the conference has evolved to encompass many additional activities including honoring students; providing opportunities for student leadership development; conducting a career fair where both students and professionals can look for employment; and a forum where top leaders of representing corporations, government agencies, academic institutions, the military, and the business community-at-large can discuss and implement change for the betterment of our country and the Hispanic community's involvement in STEM.

How HENAAC chooses the Engineer of the Year

From the HENAAC website: The Engineer of the Year and the Scientist of the Year Award is presented for overall leadership and technical or scientific achievement. An individual may not be nominated for the Engineer of the Year or Scientist of the Year Awards. These individuals are selected from among the top candidates submitted in all professional categories and can be leaders working in any area of science, engineering and technology, including research, technology development, or technology management. Technology leaders considered for this honor are meeting the demands of today's rapidly advancing technology and dynamic economic environment. They have mastered the art of managing multi-skilled teams to solve complex technical and business problems. The Selection Committee is searching for individuals who model the kind of technical or scientific excellence and executive leadership that significantly impact an industry, a field of science and/or engineering, our community, and our nation.