Succession of major projects will ensure viability of nation's nuclear weapons stockpile, Jerry McDowell says in all-hands

By Bill Murphy

Sandia is about to embark upon a 25-year effort in its nuclear weapons program that is unlike anything the Labs has undertaken in scope or scale since the 1980s. That was the message Deputy Labs Director and Executive VP for National Security Programs Jerry McDowell conveyed during a Nuclear Weapons Strategic Management Unit (NWSMU) all-hands meeting earlier this month.

JF NAGEL honored as NNSA/DP Employee of the Quarter for his role in standing up Sandia's B61 LEP. Story on **page 6**.

Almost every weapon type in the US nuclear weapon stockpile today is planned to undergo either a life extension — which is a large investment of effort — or certain alterations or modifications over the next two-and-a-half decades, Jerry told an audience in the Bldg. 810 auditorium and watching via video from California and streamed live to desktops throughout the Labs.

A little background: Since the late 1980s, the nation has not developed any new nuclear weapons; the most current weapons in the US nuclear deterrent stockpile date from that era, and many weapons are a decade or more older than that. In lieu of adding new weapons to the inventory, the US for the past two decades has pur-

(Continued on page 7)

DEPUTY LABS DIRECTOR and Executive VP for National Security Programs Jerry McDowell emphasizes a point during a Nuclear Weapons Strategic Management Unit all-hands meeting in early March. In his remarks, Jerry challenged and inspired, saying, "It's time to light a fire under Sandia as we step up to this at least 25-year period of extraordinary effort that's going to be underway in the nuclear weapons program." (Photo by Randy Montoya)

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Sandia National Laboratories

Sandia supports DOE, NNSA earthquake response efforts

LATE IN THE AFTERNOON on Monday, March 14, DOE and NNSA deployed 33 people and more than 17,200 pounds of equipment — including Consequence Management Response Teams and NNSA Aerial Measuring Systems — to Japan in response to the March 11 earthquake and tsunami. Since that deployment, Sandians have been providing technical expertise and analyzing information sent by the DOE/NNSA teams. In a news conference last week, Deputy Energy Secretary Daniel Poneman affirmed the department's ongoing support for Japan during the crisis. "We have continued working very hard in consultation with our great friends and strong allies in Japan. . . We're going to continue to work very closely . . . in support of Japanese-led efforts to come to terms with this very dangerous situation." As a powerful tsunami crossed the Pacific in the hours following the 9.0 earthquake off the coast of Japan, personnel at Sandia's Kauai Test Facility braced for a possible impact. Forty-five Sandians and 86 additional program workers were in Kaua'i at the time, preparing for a missile test. Read about their experiences in a story on **page 10**. (Photo courtesy of NNSA)

SOLDIER, MEET CHEMIST

SANDIA OFFERS top-rate training for bomb experts heading to Afghanistan. Story and photos on **pages 8-9**.

World's smallest atomic clock hits marketplace

'VCSEL Wizard' Darwin Serkland lowers laser input power by factor of 1,000

By Neal Singer

You could have bought a Rolex, but now you learn about a new, matchbook-sized atomic clock. It's portable, only about 1.5 inches on a side and less than a half-inch in depth and heck, it costs less, only about $1,500.

Created in a joint effort by the Massachusetts division of Symmetricom Inc., MIT's Draper Lab, and researchers at Sandia's MESA center, the new "Chip Scale Atomic Clock" (CSAC) is 100 times smaller than its commercial predecessors and requires a hundred times less power: instead of 10 watts, it uses only 100 millliwatts.

"It's the difference between lugging around a device powered by a car battery and one powered by two AA batteries," says Sandia lead investigator Darwin Serkland (1742).

(Continued on page 5)

Becky Hunter's Sandia

No one who knew Becky Hunter when she joined the Labs as a secretary 32 years ago is surprised that she is a manager today. Now, Becky has reached a point in her career where she is happy to "encourage and help others live and tell their story." Read *her* story on **page 16**.

Inside . . .

Sandia, LLNL showcase hydrogen buses 3
Federal lab consortium honors Sandia's technologies . . 4
Site office, Sandia sign modifications to prime contract . . . 5
Refining computer models that track sea ice movement . . 11
Three Sandians named "Women on the Move" 12
Ethics Office: New faces, decades of experience 13
Changes to voluntary life, accident insurance plans . . 14

Early cancer detection

Sandia and research partner Senior Scientific LLC are developing a novel magnetic mechanism for early cancer detection. The approach uses CINT's nanotechnology tools to grow nanoscopic iron oxide particles that are part of the process. See **page 10**.

That's that

Looking at the photographs and watching the video feeds streaming daily out of Japan since the epochal earthquake and subsequent tsunami stuck the island nation on March 11 has been, for me, like contemplating the cosmos: The scale is so huge that the mind strains to comprehend. The images coming back from Japan in the wake of what may be the fourth-biggest earthquake in recorded history are, at once, heartbreaking, mind-bending, awe-inspiring, and terrifying. They remind us that our entire built-up, 21st century, advanced society exists on a razor's edge, that an unforeseen or inadequately prepared-for event can set us reeling back to the conditions of a pre-industrial society in a heartbeat.

A final reckoning for the cost this disaster will be a long time coming; in material terms alone, it appears that the scope of the devastation may not be fully clear for months. In human terms, the costs are — and I expect always will be — incalculable.

* * *

What this event will also show, ultimately, is that Japan's intangible capital will help the stricken country find its way to recovery much more quickly than current conditions might suggest. A few years ago, a study conducted by the World Bank described intangible capital as encompassing the sum of the knowledge, skills, and know-how possessed by a people, as well as the level of trust in a society and the quality of its formal and informal social institutions. By that definition, Japan is a wealthy nation; even as many of its tangible assets lie in crumpled heaps, its remarkable people will endure and prevail.

* * *

The Japanese nuclear crisis will surely inform US debate about how to proceed with nuclear energy in this country. Critics will seize on the Fukushima Dai-ichi failures as a warning shot across the bow: If even the Japanese — the super-competent and sophisticated Japanese — can be caught so unprepared to deal with a reactor crisis, who in the world can offer guarantees about safety with a straight face? Advocates will have to concede that there are no ironclad guarantees, that there are risks involved in using nuclear energy, as there are with any base load-capable energy source. The risks can be managed, though, they'll argue, and events like the one in Japan will offer lessons learned that the American nuclear industry and the Nuclear Regulatory Commission, like their Japanese counterparts, will put to good use.

Advocates, too, will point to a new generation of reactors that will be intrinsically safer and argue that the sooner we bring more of these Gen-III plants on line the safer we will be.

I've been an advocate of nuclear energy for a long time, but I'm no expert; my support has always been based on what strikes me as the very compelling benefits nuclear offers over any viable alternatives.

I hope we as a nation don't make any snap decisions about nuclear power while we're in the midst of a crisis whose dimensions are not at all clear. I'm not at all sure that the picture of the situation being portrayed in the global media accurately reflects what's going on. Not saying it doesn't, just that I'm skeptical. We need to fully understand what occurred in Japan, how the situation might have been mitigated, and what steps we might take to avoid a similar crisis.

* * *

While much of the post-earthquake/tsunami focus in the US has been, understandably, on the status of the impacted nuclear reactors, this catastrophe is, first and foremost, a human tragedy. More to the point, while this has been a devastating blow for Japan as a nation, the pain and woe take their toll one life at a time. Even as I write this, someone like you or me is without a home. Someone has lost everything. A family has been shattered. A parent has survived and lost a child, a child has lost her parents, a hometown has ceased to exist. That is the true meaning of this disaster.

* * *

See you next time, under happier circumstances.

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

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Sandia contributions in ECP campaign surpass $4.3 million

By Iris Aboytes

Sandia was once again announced as the No. 1 giver to the United Way of Central New Mexico with a total donation by Sandia employees and retirees of $4.3 Million.

"Our tradition of giving continues to provide the most vulnerable members of our community with opportunities for better lives," says President and Laboratories Director Paul Hommert. "Thank you for your generosity and for keeping Sandia a leader in community giving."

"The outpouring of caring from Sandians has changed countless lives," says Ed Rivera, president and chief executive officer for the United Way of Central New Mexico. "Sandians have helped change the culture of philanthropy through their generous donations and excited volunteerism. This level of caring for those in need is an exciting example of the outstanding community spirit within Sandians."

SANDIA DIV. 11000 VP Becky Krauss and Div. 10000 VP Matt O'Brien, right, and former Executive VP Al Romig, second from right, pause for a moment with United Way of Central New Mexico President and CEO Ed Rivera, left, during a breakfast event honoring United Way supporters. (Photo by Randy Montoya)

Sandia began its giving ways in 1956 when Public Relations Manager Ted Sherwin designated himself the architect. He felt that year-round giving by payroll deduction would be the key, and it was. Participation was 91 percent and Sandia's tradition of giving took roots, there was no going back. Sandia's contributions topped $1 million in 1986 and continue to rise.

How did this year's giving all magically happen? Sandia gained 12 new Tocqueville members for a total of 88. These members each contributed at least $10,000.

Employees in 67 departments had 100 percent participation. Was your department one of them?

More than 1,000 Sandians contributed $1,000 or more, making the average gift $657 per donor.

Lockheed Martin Corporation contributed $100,000 to United Way's Corporate Cornerstones, which helps pay for UW's administrative costs. Contributing to Corporate Cornerstone enables all other donations go directly where they are needed.

Retirees contributed $567,642; an increase of $40,000 over 2010. Former VP Francisco Figueroa used to say that retirees were Sandia's secret weapon. They have proven again they are a silent minority, but a powerful force.

Pam Catanach (3652), program manager for ECP the last few years, says she is in awe of Sandia employees and retirees. "I am so proud to be a part of the giving that takes place. Sandians are such special people with a wonderful spirit of generosity and caring for others.

"Sandians don't just donate and go away. Fifty-five Sandians serve on community panels making sure Sandia monies are distributed to those in the most need."

Former Executive VP Al Romig and Div. 3000 VP John Slipke serve on the board of directors. John also serves on the financial committee. Pam Catanach (3652) serves on the Family Advocacy Board; Kelley Burns is the AFL-CIO Community Services Chair; Susan Pickering, Pam Catanach, and Jacqueline Kerby Moore belong to the Campaign Cabinet, VP Matt O'Brien sits on the Corporate Cornerstone Council, Kim Archuleta, Kristin Dion, Mike Gomez, Nancy Marsh, and Dorothy Stermer chair Community Impact Council panels; Jim Novak and Jody Maheras serve on the Community Impact Council, Darline Polonis serves on the ECM Council, and the list goes on and on.

Local college receives a piece of Sandia/California history

LENS machine to assist future generations of welders being trained at Las Positas College

By Mike Janes

A nearby community college, located just a few short miles away from the Sandia/California campus, might be a close partner with Sandia in the near future as the Labs continues to pursue academic and industry collaborations on its open campus. But even with an eye to the future, this same college now possesses a piece of Sandia's history.

Sandia's original LENS® machine has been successfully transferred to Las Positas College for use in its welding department. LENS, or Laser Engineered Net Shaping, is a modern technique that can fabricate three-dimensional, prototype metallic parts out of virtually any metal alloy.

John Smugeresky (8222), a co-developer of the device along with former Sandian David Keicher, calls the machine "a kind of a precursor to the replicator from *Star Trek* lore," a 3-D copy machine of sorts popularized on the long-running film and television series.

The serial number of the transferred unit is 001, thus signifying that it was the first one ever manufactured (in 1994). The equipment was moved to Las Positas through DOE's Energy-Related Laboratory Equipment (ERLE) program, which grants available excess or used energy-related laboratory equipment to educational facilities for use in energy-oriented education programs.

Far from being an outdated technology, however, the inaugural LENS machine uses the same technology as present machines deployed commercially around the world.

"The technology is not antiquated at all and continues to be used in metallurgy and microstructure evaluation, as a metal-joining technique, and as a research tool," says John.

For years, John says, the LENS machine was used in the Labs' nuclear weapons (NW) mission, specifically in helping designers create prototype parts for safety and security upgrades, and for manufacturing replacement parts for existing NW systems. NNSA's Office of Stockpile Technology sponsored the LENS machine's official process qualification in 2006 through a project titled "Qualification of LENS for the Repair and Modification of NWC Metal Components." Process qualification gives Labs engineers and other LENS users the needed confidence to specify LENS as the primary path process for fabrication, repair, or modification of their components.

CONTRACTORS AT SANDIA/CALIFORNIA prepare the LENS machine for transfer to nearby Las Positas College. The school's welding department plans to use the historic piece of equipment to introduce students to metal joining techniques.

(Photo by Randy Wong)

The LENS machine features a glove box (to control contamination of materials), a high-powered laser, mirrors, and powder feeders. The process fabricates metal parts directly from computer-aided design (CAD) solid models using metal powder particles injected into a molten pool created by the focused, high-powered laser beam. The technology was licensed years ago by the Albuquerque-based company Optomec (where Keicher now serves as vice president and chief technology officer).

Las Positas welding instructor Scott Minor plans to use the LENS machine to introduce students to metal joining techniques.

"We look forward to seeing the equipment being used to inspire future welders, technicians, and engineers for the careers of tomorrow," says Minor. "It is partnerships like Las Positas College and Sandia that make our educational experience more meaningful to the student and forward-looking to careers, materials, and processes that will be part of tomorrow's industry." He says the LENS machine should help in the college's efforts to change the traditional image of welding from "grimy leather, hard hats, steel shoes, and a dirty environment" to one of sophistication and cutting-edge technology.

Sandia hopes to add value to the equipment transfer by developing opportunities for its technical staff to work directly with Las Positas students.

"The transfer provides a specific focus for interaction between volunteer technical staff at Sandia and the dedicated educators at Las Positas," says Tom Felter (8222), manager of the hydrogen and metallurgy science group.

Sandia continues to explore other partnerships with Las Positas, particularly as the Livermore Valley Open Campus (LVOC) initiative unfolds.

Sandia CaliforniaNews

Sandia, LLNL showcase hydrogen buses

By Patti Koning

The arrival of two hydrogen gas-powered Ford E-450 passenger vans has sent hydrogen research at Sandia and Lawrence Livermore National Laboratory (LLNL) from the laboratory to the road. With the vehicles already in use shuttling workers around the two sites and an operational hydrogen fueling station at LLNL, the two labs will serve as a testbed for hydrogen-powered transport.

On Tuesday, Feb. 22, the buses made their formal debut at a public event in downtown Livermore attended by community members, representatives of elected officials, and local media. Also on display were a Toyota Prius car equipped with a cryogenic tank and a hydrogen fuel-cell powered mobile lighting system.

"These buses will travel hundreds of miles each week, making this the most mileage-intensive project in the federal complex," said Ron Cochran, executive officer of LLNL. "Data on the performance of vehicles and the refueling station will be extremely important to our corporate partners. The goal here is to demonstrate the safety of hydrogen fuel and its environmental advantages."

Transportation Energy Center 8300 Director Bob Carling spoke about Sandia's historic involvement in hydrogen research, in keeping with the Lab's national security mission.

BOB CARLING describes Sandia's hydrogen research to members of the community at an event to showcase hydrogen buses now in service at LLNL and Sandia. One of those two buses is in the background here. (All photos by Randy Wong.)

"The buses you see here today are taking advantage of the talent and resources of the respective laboratories in a new and different way, using hydrogen for energy applications as we move forward," he said.

He also pointed out the hydrogen-powered mobile lighting system, which was used at the Golden Globe Awards, Academy Awards, and Grammys. "That hydrogen fuel cell is powering these microphones," Bob said. "Diesel-powered electrical generators are noisy and polluting, but the only byproduct of this hydrogen fuel cell is water and you can see how quiet it is. Consider how we might use hydrogen in other ways than to power vehicles, ways that could make a big impact on our way of life and the way some folks do their jobs."

John Garbak, technology development manager of DOE's Fuel Cell Technology Program, Energy Efficiency and Renewable Energy (EERE), thanked Sandia and LLNL along with business partners Ford Motor Co. and Air Products and Chemicals Inc.

"This project shows the firm commitment of LLNL, Sandia, Air Products, and Ford to the advancement of clean energy technologies in their community. You are truly leaders in launching this green economy," he said.

Garbak noted that hydrogen and fuel cells can play a unique role in addressing energy challenges by providing power for different applications such as forklifts and backup power for cell phone towers. "They can be used in stationary applications, auxiliary power applications, portable electronic equipment, as well as in buses and cars," he said. "To date, more than 3,000 forklifts have been deployed and are operational at diverse companies like FedEx, Kimberly Clark, Coca Cola, and Whole Foods."

THE COMMUNITY EVENT showcased other hydrogen projects in addition to the buses. Lennie Klebanoff discusses with a journalist the hydrogen fuel-cell mobile lighting system used at the Academy Awards, Golden Globes, and Grammys.

Livermore vice mayor John Marchand spoke of the city's pride in being home to two national laboratories that are global leaders in innovation and development.

"Sandia and LLNL have joined forces to harness the fuel of the stars to power these hydrogen shuttles. This technology can reduce our dependence on fossil fuel and has the potential to be a game changer," he said. "The future is here today and it is here in Livermore."

Also in attendance were Alice Williams of the DOE Livermore Site Office; Livermore Chamber of Commerce CEO Dale Kaye; and representatives for US Reps. John Garamendi, D-Calif., and Jerry McNerney, D-Calif., State Sen. Loni Hancock, and State Assemblymember Joan Buchanan.

After the formal remarks, attendees were invited to take a ride on one of the hydrogen buses, chat with scientists, and view displays offered by both laboratories. Joseph Pratt (8365) discussed his research on the use of fuel cells on commercial aircraft; Vitalie Stavila (8367) shared work on hydrogen storage for hydrogen fuel cell vehicles; and Lennie Klebanoff (8367) explained the fuel cell mobile lighting system.

Sandia wins 3 national technology transfer awards for bringing ideas, research to market

By Heather Clark

A water blade that is disabling improvised explosive devices (IEDs) in Afghanistan, software that detects water contamination or evidence of terrorists poisoning municipal water systems, and a program that provides free technical assistance to New Mexico's small businesses all have earned national awards for Sandia.

Sandia will receive three 2011 Federal Laboratory Consortium (FLC) awards at a ceremony in May at the FLC national meeting in Nashville, Tenn. The annual awards go to federal laboratories that transfer valuable technologies to those who need them.

"Sandia won awards for a partnership with a small business, for our work with a federal agency, and for collaborating with another federal laboratory and the state of New Mexico. These awards show Sandia's excellence in technology transfer plus the depth and breadth of our efforts," says Jackie Kerby Moore, manager of Technology & Economic Development (1933).

The three awards are for:

• **Water-based explosives disruptor** — The licensing of Sandia's water-based explosives disruptor to TEAM Technologies Inc. won the FLC Award for Excellence in Technology Transfer. The patent-pending technology — TEAM licensed it as "Stingray" — was invented by Steve Todd (5437) and Juan Carlos Jakaboski (5944), both Sandia employees, and Chance Hughs, a former Sandia employee. The water-filled device, which is capable of penetrating steel, is placed near a suspected bomb or package and shreds or punches a hole in it before it detonates. The device is small enough to be carried in a soldier's backpack and rugged enough to be placed by a robot. The licensing agreement between Sandia and TEAM, which is located in the Sandia Science & Technology Park in Albuquerque, allows the small, minority-owned business to improve the device's design and bring it to market. TEAM has produced 7,000 water disruptors, shipping nearly 5,000 to Afghanistan and 2,000 to US government and law enforcement agencies.

LONELY JOB — An Explosive, Ordnance and Disposal (EOD) technician places a water disruptor on the side of a car to disable a simulated improvised explosive device (IED) in the passenger seat during a recent test of the device at Thunder Range. (Photo by Randy Montoya)

• **CANARY Event Detection Software** — Sandia and the US Environmental Protection Agency won the 2011 FLC Interagency Partnership Award for their collaboration to develop the CANARY Event Detection Software, which protects public drinking water systems by enhancing the detection of contaminants or a terrorist attack. Sandia researchers, led by Sean McKenna (6911), worked with the EPA's National Homeland Security Research Center on the project. Using a network of sensors located strategically throughout a water distribution system, the CANARY software continuously analyzes signals and sorts through the noise of changing environmental conditions to detect significant variations that indicate water quality degradation. CANARY enables utility administrators to quickly notify consumers of a threat or risk to public health and start remediation and recovery efforts. CANARY is available to drinking water utilities of all sizes worldwide. The open-source software enables a utility to customize it to meet its needs. CANARY has been installed at several water utilities across the United States, including Cincinnati and Philadelphia, as part of the EPA's Water Security Initiative and has been running on the national drinking water system in Singapore since July 2009.

CANARY — Sean McKenna (6911) led a team of Sandia researchers to develop the CANARY Event Detection Software to protect public drinking water by enhancing the detection of contaminants or a terrorist attack on a water utility.

• **The New Mexico Small Business Assistance Program (NMSBA)**, a public-private partnership between Sandia and Los Alamos national laboratories and the state of New Mexico, won the FLC's State and Local Economic Development Award for bringing cutting-edge technical assistance to small businesses across New Mexico. Since it was created a decade ago, NMSBA has provided 1,736 small businesses with $25.1 million worth of research hours and materials. NMSBA has helped create and retain more than 1,500 jobs at an average salary of about $38,000, increase small companies' revenues by $82 million and decrease their operating costs by $45 million. These companies, many of which are located in rural areas without easy access to the Labs' expertise, have gone on to invest $19 million in other New Mexico goods and services.

The FLC is a nationwide network of federal laboratories that provides a forum to develop strategies and opportunities to link the laboratories' missions and expertise with the marketplace. The FLC was organized in 1974 and formally chartered by the Federal Technology Transfer Act of 1986 to promote and strengthen technology transfer nationwide. More than 250 federal laboratories and centers and their parent departments and agencies are FLC members.

Lockheed Martin Academic Scholarship Deadline

Children of Lockheed Martin/Sandia employees who are in their junior year of high school and who took the PSAT/NMSQT test in Oct. 2010 need to be sure to finish the National Merit Lockheed Martin Academic Scholarship Program entry process by submitting their online application by April 4.

To finish the entry process, students must submit an online application at https://programentry.nationalmerit.org/QHRMPGFQ by Monday, April 4, to be considered for the scholarship. For more information contact Dianne Koval Butler (dianne.k.butler@lmco.com) Lockheed Martin's manager of Corporate Education Outreach and Partnerships, or call the National Merit Scholarship Corporation at (847) 866-5100.

LOCKHEED MARTIN

Heinrich discusses new law's benefits to research parks at Sandia Science & Technology Park

By Heather Clark

Rep. Martin Heinrich, D-N.M., met with executives from companies located in the Sandia Science & Technology Park (SS&TP) and other local business leaders recently to discuss how a new federal law will benefit research and technology parks.

MARTIN HEINRICH

Part of the America COMPETES Reauthorization Act of 2010 establishes a regional innovation program under the US Commerce Department to support the development of regional innovation strategies at research parks, says Jackie Kerby Moore (1933), executive director of the SS&TP. COMPETES stands for Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science.

The support includes grants of up to $750,000 for feasibility studies and construction plans for new parks or the expansion of existing research parks, Jackie says.

It also provides loan guarantees of up to 80 percent of the loan amount for the construction or expansion of science park infrastructure for loans up to $50 million per project or $300 million in all, she says.

Heinrich amended the COMPETES Act to enable science parks and national laboratories to participate in the new grant program and to create an online database of unclassified technologies and capabilities available to the public at the national laboratories for the purpose of stimulating technology transfer to small businesses.

Heinrich says technology and research parks like SS&TP have shown they can create high-paying jobs and drive innovation.

"These loan guarantees are a very efficient way for the government to put out a small amount of money that can be leveraged many times over to expand and renovate these parks and make sure that our science and tech parks can compete," Heinrich said.

The SS&TP, which is adjacent to the Labs near the Eubank Gate, has 30 tenants, more than 2,000 employees, and has seen nearly $337 million worth of investment since it was established in May 1998.

Atomic clock

(Continued from page 1)

Despite common implications of the word "atomic," the watch does not use radioactivity as an energy source. Instead, where an ordinary watch uses a spring-powered series of gears to tick off seconds, a CSAC counts the frequency of electromagnetic waves emitted by cesium atoms struck by a tiny laser beam to determine the passage of time. (There's a more complete description of this process below.)

Still, given that the CSAC does not actually display the time of day — measured in millionths of a second, its passage would defy our ability to read it — why would anyone want this atomic clock?

Its uses are, indeed, specialized. Miners far underground or divers engaged in deep-sea explorations, blocked by natural barriers from GPS signals, could still plan precise operations with remotely placed comrades who also had atomic clocks, because their timing would deviate from each other less than one millionth of a second in a day.

Functions during GPS outages

If you were in the land of improvised explosive devices — IEDs — that could be detonated by a telephone signal, and your military deliberately set up electromagnetic interference to block those signals, even though GPS signals would also be blocked, your CSAC watch would still function.

If you were in charge of relay stations for cross-country phone and computer lines, which routinely break up messages into packets of information sent by a variety of routes but which must be reconstituted correctly at the end of their voyages, you might sleep better knowing that atomic clocks continue functioning during GPS outages.

The clock's many uses, both military and commercial, are why the work was funded by the Defense Advanced Research Projects Agency (DARPA) from 2001 until its market arrival in January 2011.

"Because few DARPA technologies make it to full industrial commercialization for dual-use applications, this is a very big deal," says Gil Herrera (1700), director of Sandia's MESA center. "CSAC now has a data sheet and a price."

Cesium atoms are housed in a thimble-sized container developed by Draper Lab. The cesium atoms are interrogated by a light beam from a laser called a VCSEL (vertical-cavity surface-emitting laser), contributed by Sandia. And Symmetricom, a leading atomic clock manufacturer, designed the electronic circuits and assembled the components into a complete functioning clock.

"The work between the three organizations was never 'thrown over the wall,'" says Sandia manager Charles Sullivan (1742), using an expression that has come to mean complete separation of effort. "There was tight integration."

A completely new architecture

Nevertheless, reduced power consumption was key to creating the smaller unit, says Darwin. That required, in addition to a completely new architecture, a VCSEL rather than the previous tool of choice, an atomic vapor lamp.

"It took a few watts to excite the rubidium lamp into a plasma-like state," Darwin says. "Use of the VCSEL reduced that power consumption over a thousand times to 2 milliwatts." (For obvious reasons, Darwin's success in attaining this huge power reduction caused some in the clock business to refer to him as "the VCSEL wizard.")

The way the clock keeps time may best be imagined by considering two tuning forks. If the forks vary only slightly in size, a series of regular beats are produced at the difference frequency when both forks vibrate. The same principle works in the new clock.

The VCSEL — in addition to being efficient, inexpensive, stable, and low-power — is able to produce a very fine, single-frequency beam. The beam, at 335 terahertz (894.6 nanometers), is midway between two hyperfine emission levels of the cesium atom, separated in terms of energy like the two differently sized tuning forks. One level is 4.6 gigahertz above and the other 4.6 gigahertz below the laser frequency. (Hyperfine lines are the energy signatures of atoms.) A tiny microwave generator sends an oscillating frequency that adds and then subtracts energy from the incoming laser carrier frequency. Thus, the laser's single beam produces two waves at both hyperfine emission energies. The emitted waves, interacting, produce (like two tuning forks of different sizes) a series of 'beats' through a process known as interference.

One of three DARPA Phase IV projects

A photodiode monitors the slight increase in light transmission through the cesium vapor cell when the microwave oscillator is tuned to resonance. According to the international definition of the second (since 1967) the clock indicates that one second has elapsed after counting exactly 4,596,315,885 cycles (about 4.6 gigacycles) of the microwave oscillator signal.

Because magnetism has an influence on cesium atoms, atomic clocks are shielded from Earth's magnetic field by a thin steel sheath.

While this sounds cumbersome, atomic clocks "beat" the difficulties that existed a century ago, when a pendulum clock in Paris was the source of the world's exact time. Kept in a room that was temperature- and humidity-controlled, not only would a change of one degree affect the pendulum's swing but the difficulty of bringing accurate time to the US was extreme: one synchronized a portable clock in Paris and then had to transport it across the ocean by ship, during which time the mechanical clock would inevitably drift from the frequency of the Paris pendulum.

The CSAC project is one of three DARPA Phase IV projects in the history of Sandia, says Gil. "The other two are the Micro Gas Analyzer (led by Sandia in Phase IV) and the Navigation Grade Integrated Microgyro led by Northrop Grumman with no present Sandia Phase IV participation."

A follow-on technology MESA is working for DARPA is a trapped-ion-based clock. It will improve timing accuracy at similar size/weight/power to the CSAC. It was just approved for Phase II development, with the goal to produce the first compact prototype unit.

At this rapid rate of development, the sales outlook may darken for high-status watches that don't evolve over time.

ABOUT TIME — Labs researcher Darwin Serkland in his lab at Sandia's MESA center. Darwin is part of a Sandia research team that is working with researchers from the Massachusetts division of Symmetricom Inc. and MIT's Draper Lab to create the new Chip Scale Atomic Clock, which is 100 times smaller than its commercial predecessors and requires a hundred times less power: instead of 10 watts, it uses only 100 millliwatts. (Photo by Randy Montoya)

Sandia, NNSA Sandia Site Office sign another round of contract mods

(Photo by Randy Montoya)

NNSA/Sandia Site Office Manager Patty Wagner and Sandia President and Labs Director Paul Hommert on Feb. 11 signed a modification to Sandia's Prime Contract removing 11 DOE directives. This marks the third in a series of modifications effected over the past year and a half as part of NNSA's Governance Reform Initiative and is in response to NNSA Administrator Tom D'Agostino's direction to remove duplicative and overly burdensome directives from both Sandia's and the Nevada National Security Site's contracts.

The contract modifications are intended to improve the effectiveness and efficiency of Sandia's operations by eliminating requirements that are redundant with applicable state and federal requirements, as well as where there are consensus standards available that foster best practices. This, in turn, facilitates Sandia's flexibility to exercise prudent technical, operational, and business judgment, adopt proven private sector business practices, and redirect its focus from process compliance to the timely, responsive, and effective resolution of national needs.

This modification was made possible by the collective efforts of Sandia, the Nevada National Security Site, the respective NNSA Site Offices, and governance reform champions in NNSA headquarters.

Launching the B61 Life Extension Program

JF Nagel wins NNSA/DP recognition for leading stand-up of largest weapon program at Sandia in 30 years

By Bill Murphy

When JF Nagel was honored recently as Sandia's NNSA Defense Programs Employee of the Quarter, the award was all his, certainly. For JF, though, it was more than a personal accolade. It represented formal recognition by NNSA that Sandia's B61 Life Extension Program, or LEP, the largest weapons-related project at the Labs in more than three decades, is up and running on solid footing to carry out the work required to ensure the B61 can remain a viable part of the stockpile for another generation.

The Employee of the Quarter awards recognize individuals who have gone beyond the call of duty in supporting the mission of NNSA's Defense Programs.

JF, now senior manager in Surety Assessment & Analysis Group 410, was recognized by NNSA for his work as manager of B61 LEP System Design Dept. 2127, where he was honored "for guiding the Sandia B61 Life Extension team through completion of multiple deliverables that are foundational for success of the LEP." JF moved to his current position in December.

JF recounts how he came to be involved in the B61 program. In May 2009, he was working on an advanced Navy Systems Development effort when his senior manager, Mary Gonzales, and acting director, Mark Rosenthal, called JF into their office and handed him the keys to the B61 LEP, which was just then gearing up. "It wasn't really presented as a choice" JF says, "but given the opportunity to have a key leadership role on such a cool project, I agreed and we started down the path to execute the LEP."

LIFE EXTENSION — JF Nagel, seen here with a B61 weapon on display at the National Museum of Nuclear Science and History, is Sandia's NNSA Defense Programs Employee of the Quarter, honored for his role in leading the stand-up of the B61 Life Extension Program (LEP) effort at the Labs. JF says engineering design work on the first-generation B61 began before he was born, entering the stockpile in the late 1960s. The B61 LEP aims to ensure the weapon can remain part of the nation's strategic deterrent for another 30 years. (Photo by Randy Montoya)

Staff, funding continue to grow

To get some sense of the scope of JF's accomplishment in standing up the B61 LEP over the previous 18 months — and to gain an appreciation for how big the project is for Sandia — consider: Funding in support of the LEP tripled between FY2009 and FY2010, and then tripled again between FY2010 and FY2011, to a level on the order of 5 percent of the total Labs budget. Between the time JF took the helm and the time he handed it off in December to what is now a group with two departments led by Vic Johnson (2120), the effort grew from six people to 40 on the systems engineering and program management team alone, and it's still growing to meet the needs of a profoundly demanding program.

In NNSA parlance, a weapon program is accomplished in phases: Phase 6.1 is a conceptual assessment, a determination of whether a proposed weapon project is doable, technically viable, and justifiable. Phase 6.2 is largely the conceptual engineering design stage: "This is how we'll do it." Phase 6.2A is the cost assessment stage: Based on the design developed in 6.2, this is what it will cost and how long it will take.

In his leadership role, JF oversaw the B61 LEP through most of the Phase 6.2 effort. The program is now about to enter Phase 6.2A, and if funds are approved — the administration and Congress seem to be in agreement on the merits of moving forward with the LEP — the project will enter Phase 6.3, full-scale engineering development.

Three functions

In heading up the early B61 effort, JF, who has spent his Sandia career (which started in 1984) in weapons work, didn't have time to get too involved in the technical issues; he left that to the technical lead and his team. His time, rather, was taken up with other demands.

"I described my job as having three functions," JF says: "Hiring, begging for money, and briefing people about the program.

"I did a lot of PR [public relations] with senior officials from DoD, NNSA, and all levels of Sandia management and a lot of team-building. I think we built an outstanding core of systems leadership and started to bring in the technical team members who'll accomplish the detailed system engineering work. And, I have to say, we also assembled a crack program management team that keeps the program on track."

To keep up with a fast-moving program, JF developed a "rolling briefing," one that evolved right along with the LEP itself. He had the one-slide, five-slide, and 20-slide version, but in every case, made the same high-level points:

- The B61, which entered the stockpile in the 1960s, includes a number of components reaching the end of their life.
- In addition to end-of-life issues, several modifications to the weapon are required to conform to new US Air Force equipment and aircraft; the B61 was designed to interface with equipment that itself is either retired or nearing retirement.
- The need to update components (for the reasons noted above) presents an opportunity to improve operational usefulness (that is, make the weapon easier to handle in the field and easier to maintain), and improve weapons surety (that is, safety, security and reliability) in line with 21st-century standards. The end-of-life component issues, JF says, "presented us an opportunity to work some changes into the system that significantly improve surety while enabling it to remain in the stockpile another 30 years or more."

Much larger effort than W76

Just how big is the B61 project? It's "been estimated between three times and three factorial the scale of the W76 LEP," JF says, adding that the W76 was itself, the most ambitious weapon-related effort at the Labs in more than two decades. "The B61 dwarfs that effort," JF says. "It's the largest effort in more than 30 years, the largest, probably, since the original development of the B61-3,4," a full-up weapon development effort that began in the late 1970s and entered the stockpile in 1979. The B61 LEP effort, JF estimates, will require 400 to 500 people directly involved through the First Production Unit — or FPU — with hundreds of others from organizations across the Labs participating in specific aspects of the effort.

The B61 LEP schedule, says JF, is ambitious, with an FPU date of 2017, "which is not that far away. From a design perspective, that means the detailed design has to basically be done within the next year," he says.

In the weapon business, the FPU is like a talisman. JF recalls that during the W76 LEP, "The mantra from the program manager, Mark Rosenthal, was 'What have you done today to get us to FPU?' Our whole lives were geared around that date.

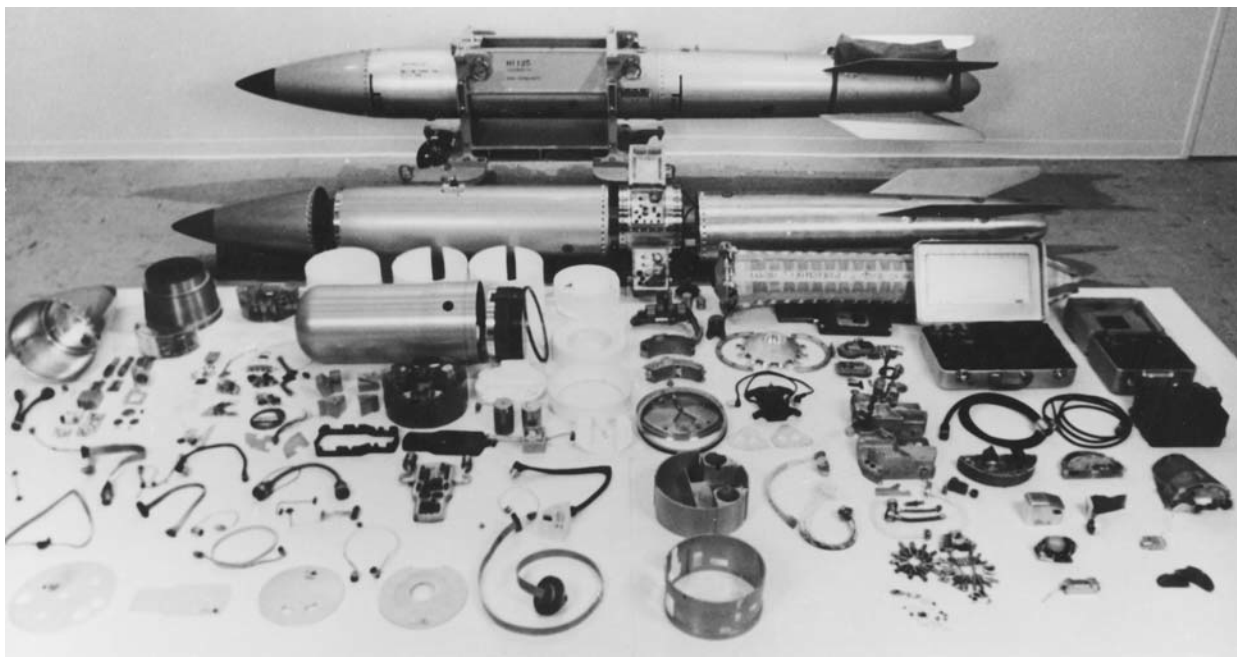
"We are benefitting enormously from the experience we gained with the W76," JF says. "If we hadn't done that project, I think we'd be very hard pressed to pull off this much bigger effort." The W76 effort, he says, provided invaluable hands-on experience for a core group of people who will lead the B61 program.

Everyone pulling toward same goal

JF says he loves the energy and motivation a major life extension program can inspire. "One of the best things in the weapons world," he says," "is to work on an LEP. Everybody's pulling toward this single goal that is way out in the distance but just keeps coming closer and closer and you can't afford to lose a single day."

JF was understandably torn in deciding to move on and leave the LEP program, but says he considers himself fortunate that he is one of those people whose favorite job is the one they're currently in. Leading the B61 launch, though, was something special.

"It was a real privilege for me to lead that team — a real privilege. My goal is always to do cool stuff with cool people. I've had that at Sandia since the day I walked in the door. What more could I ask for."



SANDIA'S ROLE in the B61 Life Extension Program is to refurbish and replace aging or technologically obsolescent components in the B61 nuclear weapon with the aim of ensuring it will remain a vital part of the nation's strategic nuclear deterrent for another 20 to 30 years. The B61design dates to the 1960s and a number of components in the weapon are reaching the end of their useful life.

Jerry McDowell's NWSMU all hands

'It deeply matters what you do here'

(Continued from page 1)

sued a policy of periodic refurbishment of its existing weapons to address issues of aging and technology obsolescence of components. In some cases, alterations (alts) or modifications (mods) address specific issues identified in a weapon system. A full-scale updating of a weapon and its systems is called a life extension program, or LEP, a major effort that aims to ensure the weapon can remain in the stockpile for another 20 to 30 years.

Forward with the B61 LEP

After shepherding the W76, a US Navy-deployed weapon, through an LEP over the past decade, Sandia is now moving forward with the B61 LEP, Jerry said, noting that, "We are in the middle of what's called the 6.2/6.2A study period right now for the B61 LEP. [That study focuses on] What are we going to do? What do we think it will cost?"

Based on the results of the 6.2/6.2A study, Jerry said, "The Nuclear Weapons Council, [a joint DoD/DOE/ NNSA organization that seeks consensus on stockpile related issues] has to say, 'OK, we approve it. Proceed to full-scale engineering development.' We're hoping that starts on Oct. 1 of this year, at the beginning of FY12."

The B61 LEP, Jerry said, is "a considerably more complicated effort than W76" and will place much larger demands on the Labs' resources and capabilities. The B61 LEP, it has been estimated, will likely be three times or more the scale of the W76, an effort itself that involved several hundred Sandians over more than a decade.

"Next up," Jerry said, "is the W78, an air force reentry system. We are hoping any day to be authorized to start what's called a 6.1 study, which is a conceptual study, and there are a lot of aspects of that that could lead to a 6.2 and from a 6.2 further on to, eventually, a life extension program. And the navy has asked that we do an alteration to the W88 system.

"The take-away from the picture is that there is a body of work that will test this laboratory's ability to step up . . . like no other time we've had since the 1980s."

Budget considerations

A bipartisan consensus — emerging in part in the course of congressional debate on the New START Treaty and in part in the wake of the 2010 Nuclear Posture Review — has helped clarify the nation's nuclear weapons policy for the coming decades, Jerry said. The consensus includes an agreement in principle that investments need to be made in NNSA's infrastructure and in extending the working life of weapons in the stockpile.

Photo by Randy Montoya

"The take-away from the picture is that there is a body of work that will test this laboratory's ability to step up . . . like no other time we've had since the 1980s."

— Sandia Executive VP Jerry McDowell

Reflecting that consensus, the administration's budget request for FY11 and beyond shows a steady increase in NNSA weapon activities over the next five years, Jerry noted. However, he added, "It's controversial. Why is it controversial? It's going up. It's going up when the mood of the country is we should go down [in all federal spending]. We have budget deficits; we have a big debt. So the ability to articulate why it's important [that the NNSA budget be increased at this time] will tax the political skills of the [NNSA] administrator, the secretary of energy, the president, the vice president, all the folks in the executive branch side who will have to convince Congress that we should follow this path."

Regarding spending, Jerry displayed a chart indicating that spending across the nuclear weapons program at Sandia is actually a little behind the curve during this fiscal year. That is, the programs are not spending at projected levels for FY11. That's the case, Jerry suggested, because managers have held back on hiring and other commitments due to uncertainties about the budget process in Washington. That hesitancy is perhaps understandable but is also unwarranted, Jerry said. Citing the fact that the March 4 bipartisan continuing budget resolution in Congress specifically authorized NNSA to spend at the administration's proposed FY11 levels, Jerry encouraged his leadership team to ramp up investment in the program.

"This is not the time for us to falter in the face of ambiguity," Jerry said. "Whatever the Congress will decide — and they will decide because that's the law of the land — right now, the direction we have [from Congress] is to spend at the president's FY11 budget request level. All of us with knowledge of the intricacies of what's going on in our weapon programs know there is a compelling need to get on with it, to get on with doing the work associated with making sure we deliver on our mission requirements.

"I encourage you: Go ahead and proceed with the plans that we have laid out. Step up. Engage. Let's get on with doing the important work that we are a part of. If we do not do our part, the larger enterprise — the B-2s, the B-52s, the Minuteman IIIs, the Trident IIs — will not have what they will need to create the deterrent posture that remains the policy of our country."

Lighting a fire

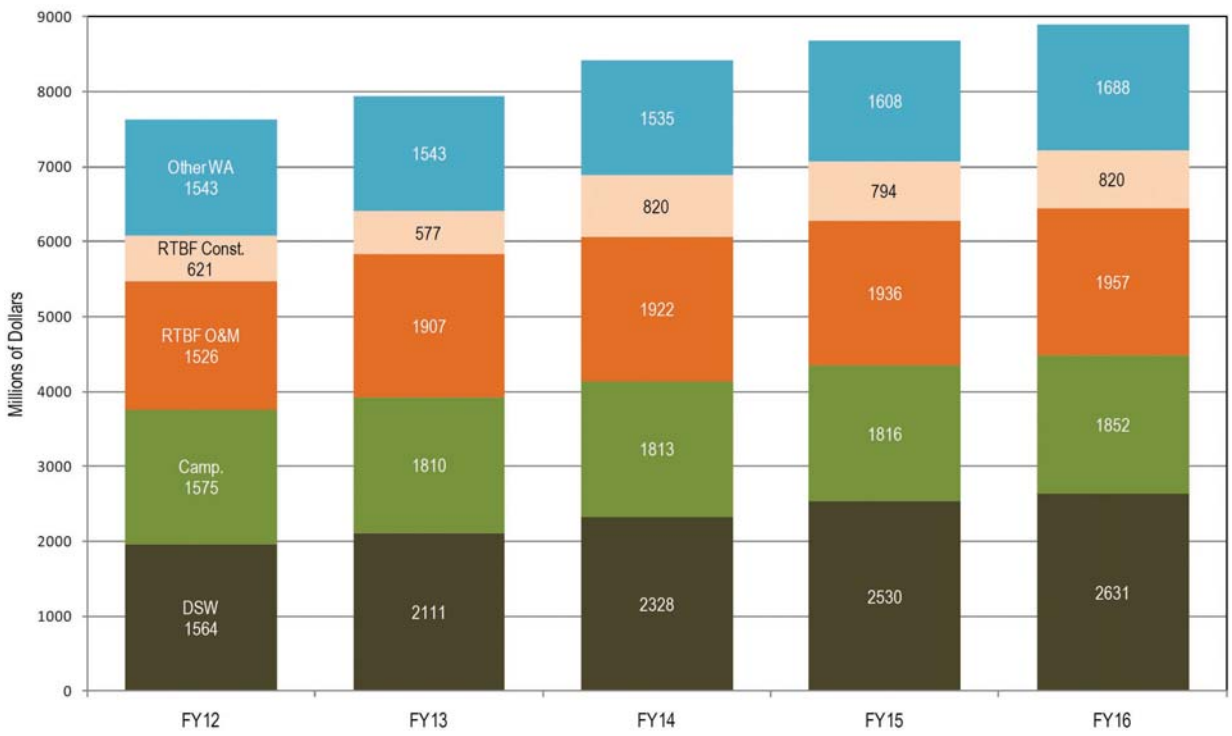
Jerry used the opportunity of the all-hands meeting to introduce himself to the Labs' nuclear weapons community, having just assumed a leadership role last summer. He spent most of the past 25 years working in increasingly responsible positions supporting work for other federal agencies, notably DoD and other national security organizations that come to Sandia looking for help.

As its new leader, Jerry said he hoped to infuse a renewed sense of passion, of mission, into the Labs' weapons work. To emphasize the important role Sandians play in protecting the nation's security, Jerry placed the Labs at the very heart of America's strategic deterrent capability.

"It deeply matters what you do here," he said. "You are an extraordinarily important part of the nation's deterrence policy. That's what Gen. Kehler [Gen. Robert Kehler, Commander of US STRATCOM who visited Sandia recently] said and I know he meant it. He speaks from a position where his everyday life is spent watching airmen and sailors do the kinds of things you're likely to see on TV. You're not likely to have a documentary — forgive me — of you sitting at your desk designing something on your CAD/CAM system . . . that's too bad, but please don't underestimate how important you are.

"And as we evolve out workforce, as new employees come to Sandia, I'd like for all of you, to the degree that you can, in whatever way that you can, particularly if you're later in your career and you've had these experiences [working on other major weapon projects], share them with your colleagues. It's time to light a fire under Sandia as we step up to this at least 25-year period of extraordinary effort that's going to be underway in the nuclear weapons program. I'm happy to be a part of your team. I see a lot of faces, people that I recognize, people that I depend on, and we are going to rise to this challenge together."

The president's FY12 budget request:



THE OBAMA ADMINISTRATION'S budget request for NNSA's weapons activities shows a steady increase in funding over the next five years. These budget requests have not been acted on by Congress, but do suggest the administration's policy goals to support key NNSA initiatives, including substantive investments in infrastructure.

SOLDIER, MEET CHEMIST:

Sandia offers top-rate training for bomb experts heading to Afghanistan

Story by Heather Clark
Photos by Randy Montoya

The classroom chatter fell silent as 17 bomb technicians remembered four soldiers killed in Afghanistan while doing the same job they were being trained for during a weeklong training course at Sandia on how to spot, safely remove, and disable improvised explosive devices, or IEDs.

"Be safe out there," said Pete Terrill (5436), a retired Navy warrant officer, who knows first-hand the perils these Explosive, Ordnance & Disposal (EOD) technicians will face in the field. He served as a Navy bomb expert during the first Gulf War.

Pete oversees the training program at Sandia that aims to teach these young soldiers not only how to survive, but how to dispose of the chemicals and bombs that are the biggest threat to soldiers overseas and have killed thousands of civilians in Afghanistan and Iraq. The program is executed by centers 5400, 5900, 6600, and 4200 for the International Homeland and Nuclear Security Strategic Management Unit.

"I know what they're going through because I did it," Pete says. "But we never went to the national labs to train. I wish I had this kind of first-rate, top-of-the-line training available to me when I was on active duty."

Others see the value of hiring scientists to help soldiers navigate the hazards they will face in Afghanistan. Since 2007, interest in the training program has grown from about 40 students to more than 400 students annually, says Dave Minster, manager of Energetic Threats and Training Dept. 5436 and a retired Air Force colonel. Funding has grown from about $2 million in fiscal year 2007 to about $7 million for fiscal year 2011.

The soldiers learn through hands-on chemistry courses and by winding their way through a Middle Eastern-style adobe complex, a four-story tower that simulates an office building and a simulated underground clandestine explosives laboratory similar to what they might find in a warzone.

Most of those taking the courses are EOD techs from all four military branches — soldiers portrayed in the Oscar award-winning 2008 film *The Hurt Locker*. Increasingly, local law enforcement and security personnel want the courses, which can be customized for a wide variety of personnel, Dave says.

'Fire in the Hole!'

In a recent training session for EOD techs, shouts of "Fire in the hole!" rang out across a firing range as fatigue-clad soldiers disabled simulated IEDs with PAN disruptors, tools developed at Sandia and used to disable bombs before they detonate. Sandia scientists monitor the activity from a nearby trailer containing a 46-inch computer screen that shows the soldiers colorful graphs indicating exactly what happened inside the explosive during the shot. The display tells them whether the IED was effectively disabled, whether it would have detonated, and how much time they had to spare.

During the firing, Pete moved among the EOD techs — a tight-knit community who train together — joining in their jokes and building rapport between them and Sandia.

Chemistry Chefs

Two days later, in a course that was designed after 9/11 and is taught by two Sandia researchers, the soldiers explored material chemistry to learn what substances are used in homemade explosives.

As the IED threat grew in Iraq and Afghanistan, the military sought out information about how these weapons and improvised explosives were made. Sandia, along with other national laboratories and companies, responded by developing its coursework, says Brian Melof (5434), one of the teachers and a national expert in homemade explosives.

Brian says the goal of the class is to help the soldiers recognize certain chemicals, processes, and equipment used to make explosives.

"It's to get them to realize that a laboratory or a truck full of materials may have explosives implications. By going through the classroom and doing the hands-on processing, they now say, 'Hey, if I see these chemicals in a certain context, I need to raise my awareness because an explosives operation either is in progress or could be in progress," Brian says.

Another goal is to make the soldiers aware of the hazards of explosive materials and precursor chemicals, which are the chemicals and compounds typically used to make homemade explosives, so that they can safely handle them overseas, Brian says.

The Sandia instructors have the soldiers mix chemicals to teach them what ingredients insurgents might use to foil bomb sniffer dogs or what seemingly innocuous household devices may be used to process ingredients to make bombs.

PRACTICE MAKES PERFECT — Two Explosive Ordnance & Disposal technicians use a Sandia-developed PAN disruptor to disable simulated improved explosive devices during a weeklong course at Sandia.

By mixing the chemicals, soldiers can touch and smell the materials, the trainers say. Stimulating their olfactory senses in the lab might mean they'll remember what they learned when they smell the same substance in an Afghani village, just as the smell of pumpkin pie might bring up dormant memories of grandma's kitchen.

The soldiers also use various fluids to desensitize milligram quantities of explosive materials and then test them to see if they're less sensitive to impact.

Field tests

The last day of the training ties everything together. The EOD techs enter a simulated Middle Eastern-style village where their guide, Vicki Chavez (6633), tells them there are reports of a nearby clandestine laboratory. Their job is to find the mock hazardous materials, figure out what the adversary was up to, and make the location safe, Vicki says.

The labs are hidden in a labyrinth of two-story adobe buildings, connected by rooftop walkways. They contain furnished living quarters and various shops stocked with goods. The goal is authenticity. The trainers want the EOD techs to encounter here what they will likely see in Afghanistan. They want them to recognize that things may not be what they seem, such as sacks of fertilizer that are not being used to grow crops, Christmas tree light bulbs may be improvised detonators, and cooking pots and steel coils may be an acid manufacturing operation.

"You can make some stuff with that," one soldier, who asked not to be identified, says, looking at what appears to be an apartment, but has one room filled with laboratory equipment and substances in unmarked jars.

They discuss what's there, then Vicki prompts: "There's one thing you didn't get," and a soldier identifies another substance. Later, Vicki says the group was the only one among that week's trainees to identify the last substance.

The EOD techs also enter a simulated underground clandestine laboratory where burlap sacks containing powdered chemicals, marked "Made in Jihad," line the walls and jars of unidentified substances and equipment sit on a table next to a framed photograph of Osama bin Laden.

The EOD techs use a spectrometer to identify chemicals, while an instructor fires questions at them asking how sensitive certain powders are or how they would dispose of a caked material lying on black plastic garbage bags on the floor.

One soldier recalled the smells of the chemical labs two days before and instantly realized where the hazards lay.

Charles Price of Barksdale Air Force Base says Sandia's training program is just one nationwide that he's checking out to provide to the troops.

Price says Sandia's training is diversified, with soldiers learning about firing devices to disable bombs, learning about homemade explosives, and working in a simulated environment based on the experiences of those who have gone before them from all four services.

"Just the way it's designed, it's very fluid and they can change the curriculum," Price says. "We share information and this is a good avenue to get it out to all the guys doing this."

That exchange of information between scientists at Sandia and soldiers in the field helps Sandia's training provide EOD techs with the latest information from the field.

"As people told us about it, we incorporated it into the training. This is something you may see and then a few months from now when they're doing something different and we find out about it, we'll put that in the class," Brian says.

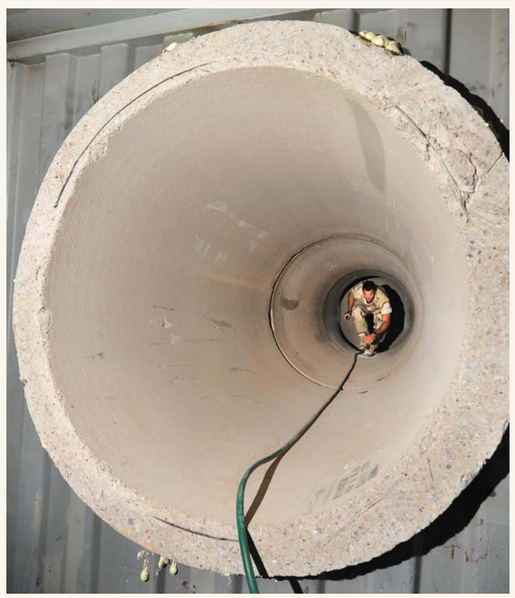
While it's impossible to prove the class is keeping soldiers safer, Dave says they occasionally get emails from soldiers thanking them for the course and explaining how it helped them deal with what they encountered overseas.

"There's no question in my mind that it's helped soldiers," Dave says. "We're not doing this to make a buck; we're doing it to save lives."

Pete says the training program is a team effort involving many organizations, including departments 5434, 5436, 5437, 5943, 5944, 6631, 6633, and 4218.

He sees Sandia as a resource for the EOD techs long after they leave New Mexico.

"We've got plenty of smart people at the Labs, so we'll get the answers for you," Pete says. "These are their national labs; they can call back and get the information they need to stay alive and save lives."



EOD TRAINING (Clockwise from opposite page, top) — EOD techs training at Sandia are shown how even seemingly innocuous chemicals can produce serious chemical reactions, even in small amounts; Charles Price (left) of Barksdale Air Force Base practices disabling a simulated IED on a PAN disruptor; An EOD tech finds his way through a tunnel into a simulated underground clandestine homemade explosives laboratory where he and other trainees uncover chemicals that could be used for IEDs and explain how they would safely dispose of them; Larry Henderson (5434-3), center, explains how well a shot fired from a PAN disruptor disabled a simulated IED; Two EOD techs make their own homemade explosives so they can learn what chemicals are used in IEDs and be able to recognize them once they're sent overseas.

Novel magnetic mechanism for early cancer detection under development at CINT

By Neal Singer

To materials chemist Dale Huber (1132), most people remain unaware they have cancer precisely when the knowledge could help them most: when the number of harmfully mutating cells are treatably small. But in a kind of catch-22, Dale says, when the number of mutant cells are still trivial, they fall below the detection threshold of current sensors. So when preventive action would be easiest, nothing is done.

"For example, mammography has a long history of not working well enough for early cancer detection," Dale says. "The tumor has to be big and obvious. The radiologist has to be able to read it in the image."

Improving early detection of cancerous cells is a particularly poignant problem when it comes to children, Dale says. "Leukemia is the number one childhood cancer. Even successfully treating it can knock as many as 20 IQ points off a developing child, according to some published studies."

'Left the comfort zone'

To help improve early detection capabilities, Dale has left his comfort zone of (as he puts it) "squishy soft polymers" and instead is working with iron oxide nanoparticles in the Sandia/Los Alamos national laboratories joint Center for Integrated Nanotechnologies, where he is a principal member of the technical staff. (CINT is sponsored by DOE's Basic Energy Sciences office.)

Providing technical backup in an approved "user" project to retired LANL researcher Ed Flynn and his company Senior Scientific LLC, Dale uses CINT technologies to help grow iron oxide nanoparticles 20 to 30 nanometers in diameter that ride antigens designed to home in on the cells of a particular cancer.

Antigens that locate cancerous cells bind to those cells' receptors, stabilizing their magnetic riders. Those antigens which locate no cancers go whirling off harmlessly, essentially lost in space (or rather, the bloodstream), iron oxide nanoparticles destabilized.

By subjecting the patient to a magnetic field that lasts three-tenths of a second, a clear signal is yielded by those nanoparticles attached to a stable base. Those unattached to a cancerous cell are rotated by random motion in a way that cancels any response. Thus, a signal is provided only from those iron oxide particles attached to cancerous cells.

IRON MAN — Dale Huber, working with retired Los Alamos National Laboratory researcher Ed Flynn and his company, Senior Scientific LLC, is using the tools of nanotechnology to grow nanoscopic iron oxide particles as part of an approach to provide early detection of cancer cells. The blue material here is a solution of cobalt chloride, a salt that can be used as a precursor to magnetic nanoparticles. (Photo by Lloyd Wilson)

The beauty of the system is that even cancer distributed throughout the body can be detected. The new system shows their location clearly.

"Death comes when the number of cancer cells in the body reach, roughly, 10 to the 12th power," Dale says. "At 10 to the 9th power, the cancer is palpable. X-rays can detect cancers in amounts 10 to the 8th power. Our method, with its unambiguous signal, can detect it at 10 to the 4th power, literally doubling the time to treat the cancer." Additional treatments, he says, should greatly improve survival rates from microtumors.

Could locate Alzheimers sites in brain

The interesting technique also could work to locate Alzheimers sites in the brain, he says. The antigen would be designed to attach to protein plaque called amyloids that haven't folded properly — a key indication of the presence of the disease. The same iron oxide particles in a similar magnetic field should reveal pools of disease, no matter how small.

"We haven't done it because we lack the patience to wait till laboratory mice get Alzheimer's," he gently jokes.

The ability to achieve iron nanoparticles of narrow size distribution, so that all particles have the same magnetic response, is one reason for the work's success to date, says Dale. "If the iron particles nucleate slowly and then grow, there's no catching up for the ones that nucleate later: they'll always be smaller than the ones that nucleated earlier. So we want, and have achieved in this system, rapid nucleation and slow growth."

The science is an interesting change for a polymer chemist used to working with materials that grow like microscopic snakes, forming slowly yet growing to the same size.

"I do a lot of different work I wouldn't have done without outside suggestion," says Dale. "Anyone can write a proposal to work with me; I welcome the chance to use CINT's capabilities to complete the technical cores of outside projects that matter deeply."

A formal process is available for interested researchers to apply to work with CINT personnel and available CINT equipment.

Federal agency approval will be required before testing the magnetic sensing technique in humans.

Sandians in Kaua'i move to higher ground to avoid tsunami; no employees in Japan during March 11 earthquake

By Heather Clark

When Steven Yesner (5419-1) heard a tsunami was headed toward the Hawaiian Islands, the site operations program manager for the Kauai Test Facility (KTF) made the necessary phone calls — speaking to managers, activating the site's emergency phone tree, and coordinating with local emergency services personnel — and shut off generators at the site in case of flooding.

Steven's apartment is about 40 feet from the ocean in the town of Kekaha, so hours before the tsunami was to hit, he packed up his camper with some belongings and a futon and headed about 1,000 feet up to higher ground in the Koke'e hills above the US Navy's Pacific Missile Range Facility, which includes the Sandia site.

"It was a beautiful night, all the stars were out, and there was a fabulous meteor shower, so I took it as a good omen," Steven said the next day by telephone from Kaua'i.

Forty-five Sandians and 86 additional program workers were in Kaua'i preparing for an upcoming missile test at KTF or packing up equipment from a missile test the previous night when the tsunami warning came, Steven says.

Jeff Mortimer in Treasury & Travel Services (10507) says there were no Sandians in Japan on March 11 when the 9.0-magnitude earthquake hit. The last Sandian had flown out of Japan two days before the tragedy, he says.

"ALL IS NORMAL at KTF. Pads 1 & 15 are dry and in operating order." That was the situation report Steven Yesner (5419) sent to his managers letting them know that the tsunami generated by the magnitude 9.0 earthquake off the coast of Japan did not damage Sandia's Kauai Test Facility. The 6-foot waves reached Kaua'i about 3 a.m. local time but did little damage around the island.

In Honolulu, Sandians there were asked to move to higher floors in their hotels, but no evacuations were ordered, Jeff says. The situation in Kaua'i seemed slightly more serious, as people were asked to move to safety after the National Oceanic and Atmospheric Administration (NOAA) predicted a tsunami would hit the islands at 3:07 a.m.

Larry Young (5422) says sirens started wailing at about 9 p.m., but he waited to leave his hotel in Waimea until about 2 a.m. Larry spent the night in a car outside the historic Russian Fort Elizabeth near Waimea, listening to the radio news and text messaging co-workers to make sure they were safe.

Reports were that 6-foot waves started after 3 a.m., but Larry and Steven say they didn't see or hear much.

"You couldn't see anything because it was dark," Larry says. "They said there wasn't much damage anywhere around the whole island."

At about 7 a.m. the next morning, the authorities allowed Larry to return to his hotel.

Upon his return, Steven sent the following email to update his managers: "All is normal at KTF. Pads 1 & 15 are dry and in operating order."

Steven says no Sandians or contractors were injured during the evacuations.

His personal view is that the nearby reef structure of Ni'ihau and Lehua islands may have disrupted the surge flow around Kaua'i sufficiently to prevent flooding this time. The islands farther east with wider sea lanes between them reported flooding and damage.

Preparations for the next test, including a dry run, were delayed one day to give Sandians time to rest after a sleepless night.

KTF is conducting Aegis Readiness Assessment Vehicle (ARAV) tests that support tracking and intercept missions using the Aegis Combat System radar aboard the US Pacific fleet. ARAV targets launched from KTF include different combinations of motor and payload assemblies.

All employees worked through Saturday to ensure the mission stayed on schedule, Steven says.

Sandia applying a high-fidelity booster to sea ice modeling

By Nigel Hey

Sandia researchers are using a suite of new techniques to refine existing computer models that describe the behavior of sea ice, an important component of larger climate models.

Sea ice, which exists primarily in the Arctic Sea and in the waters surrounding Antarctica, is a key player in climate change because it reflects sunlight and acts as an insulator between the ocean and atmosphere. Its contraction may also increase the likelihood of international conflict because, as it recedes, the process will increase access to natural resources that were previously inaccessible.

According to NASA's National Snow and Ice Data Center, Arctic sea ice has declined dramatically over at least the past 30 years, and its extent at the seasonal minimum is now shrinking at a rate of 11.5 percent every 10 years.

Due to the scientific and geopolitical importance of the Arctic, sea ice simulations to support science-based policymaking are essential. But how good are current models, and how are they likely to change over coming years?

"Predictive mathematical models are extremely important for making accurate estimates of how sea ice will develop in the future," says Kara Peterson, a researcher in Numerical Analysis and Applications Dept. 1442. "However, the current generation of sea ice models in global climate models vary significantly in their prediction of the future state of Arctic sea ice, and have generally underestimated the rate of decline in minimum sea ice extent seen over the past 30 years."

To improve the understanding of the lifecycle and characteristics of Arctic sea ice, Sandia researchers are now analyzing existing ice simulation modeling systems as an aid to developing an improved, high-fidelity version that will work with massively parallel processing computers. The Sandia approach will use new techniques to better resolve the ice edge and to explicitly incorporate the formation and evolution of cracks in the ice where the bulk of new ice is formed.

The development and analysis of high-resolution sea ice models pose difficult modeling and simulation challenges, Kara says. Computer programs that predict the life history of sea ice now combine individual models for melting and growth. Those models include the differences between the incoming and outgoing solar radiation that reaches the ice (radiative forcing), and to the motion and deformation that result from ocean currents and wind.

However, Kara adds, conclusions drawn from these models can be affected by uncertainties in the data, errors due to simplifications in the physical models, and errors resulting from the numerical solution methods. Sandia researchers are addressing these sources of error by considering new physical models for the ice, developing improved numerical procedures for their solution, and numerically evaluating the correlation of the models to the input information.

Any predictive sea-ice model necessarily involves a large amount of data on material and environmental parameters that are uncertain by nature. As a first step toward reducing the problems caused by these uncertainties, Sandia is evaluating the agreement of models originated by Los Alamos National Laboratory (CICE, the Los Alamos sea ice model) and the University of New Mexico (which uses the material point method to model sea ice) with respect to the same input data. This will help researchers rank the relative importance of different factors that relate to developing uncertainties in a model, and provide a way to reduce the volume of the considerations that must be numerically described. These sensitivity analyses rely on Sandia's DAKOTA (Design Analysis Kit for Optimization) sampling tools and leverage the Labs' significant knowledge base in uncertainty quantification.

"Comparison of the sensitivities of the two sea ice models will help to increase confidence in their predictive capabilities and improve our understanding of the complex interactions between various parameters," says Pavel Bochev (1442). "And we know there will be considerable work to do. For example it is likely that running the same calculations with a fully coupled atmosphere and ocean model would produce different results due to feedback effects between the ice and atmosphere and ice and ocean."

Research is being carried out in conjunction with DOE's Office of Biological and Environmental Research Climate Research Project, with funding from Sandia's Laboratory Directed Research and Development organization.

Pin Yang receives Asian American Engineer of the Year Award

By Iris Aboytes

Pin Yang (1823) was honored as Asian American Engineer of the Year at ceremonies held during the annual Asian American Engineer Conference Feb. 25-26 in Seattle, Wash.

Held during National Engineers Week, the event aims to raise public awareness on the importance of science and engineering to future generations. It also honors and celebrates Asian Americans who work to change the world through invention, innovation, and leadership in their respective arenas.

PIN YANG

Pin came to Sandia in 1992 after receiving his doctorate in ceramic engineering from the University of Illinois at Urbana-Champaign.

During his 18 years at Sandia, Pin has worn several hats. He has been a principal investigator, project manager, product realization leader, and core team member. His research and expertise in electroceramics led to the development of a processing approach that resolved several technical challenges and doubled the yield for a mission-critical component production.

Pin is currently working with materials teams to develop advanced inorganic scintillators for homeland security applications and is the material point of contact for the B61 Direct Optical Initiation (DOI) program.

Pin grew up in Taiwan. As a child he lived with his grandparents in the mountains. He learned the value of hard work from his grandmother, who showed remarkable endurance against hardship throughout her life. While he was with his grandparents, his parents were busy working so that his father could start his own business. His father eventually ran a successful business in international trade and was able to send Pin to study in the US.

"My parents valued education," says Pin. "They always told me to study hard because only then would I have what I wanted, only then would I be able to live my dream."

Pin calls Michigan his second home because it was at the University of Michigan-Ann Arbor where he received his bachelor's and master's degrees. After finishing his graduate study, Pin found that there were more career opportunities in America and decided to make the US his home.

"My story is not unlike any other immigrant's story," says Pin.

When Pin is not at work, he volunteers his time at the Albuquerque Chinese Baptist Church. He has organized fundraising events for the disaster relief of earthquakes in Taiwan and China. He has been part of the Sandia volunteers building Habitat for Humanity houses.

Pin and his wife, Ann, a Bernalillo County systems analyst, are busy with their boys Andrew and Daniel.

"I love working at Sandia," says Pin. "I have had the opportunity to pursue interesting and rewarding work. My award is a reflection of the teamwork at Sandia. I am constantly learning from my colleagues."

Regina Griego named fellow of INCOSE

Joins 61 other systems engineering professionals

Regina Griego (2950), currently on special assignment with NNSA in Washington, D.C., has been elected a fellow of the International Council on Systems Engineering (INCOSE). Regina was the technical director for INCOSE in 2009-2010 and founding president of the INCOSE Enchantment Chapter. She is also an Industry Fellow for Stevens Institute.

INCOSE President Samantha Brown of BAE Systems informed Regina of her election in a letter that stated, in part, "You join a distinguished group of, now, 62 individuals whose contributions to the art and practice of systems engineering are recognized and respected worldwide. By providing intellectual leadership to the discipline as a whole and enhancing the INCOSE organization through your support to the board of directors and other leaders, INCOSE fellows have the ability and opportunity to contribute significantly to the INCOSE mission to 'Share, promote, and advance the best of systems engineering from across the globe for the benefit of humanity and the planet.'"

Regina's appointment, effective immediately, will be formalized at INCOSE's International Symposium in Denver in June.

In her current NNSA assignment, Regina is working in NNSA's Nuclear Weapons Stockpile Division as a senior systems engineer and functions as a systems and enterprise engineering adviser.

At Sandia, Regina has provided early lifecycle systems and enterprise engineering support on a number of strategic projects and led multiple systems engineering capability efforts. She began her career at Sandia designing and implementing telemetry systems.

REGINA GRIEGO

Before joining the Labs, Regina was the deputy director of Advanced Technology Inc., developing computer-based systems in the area of flight safety.

Regina earned a doctorate in computer engineering from New Mexico State University, a master's degree in computer science from the University of Colorado, a master's in electrical and computer engineering from the University of Arizona, and a bachelor's degree in electrical and computer engineering from New Mexico State University.

INCOSE
International Council on Systems Engineering

Nadine Miner, Margaret Harvey, and Marie Brown win 2011 Women on the Move Awards

eliminating racism
empowering women
ywca

By Iris Aboytes

At ceremonies held March 2 at the National Hispanic Cultural Center, Nadine Miner (6114), Margaret Harvey (3021), and Marie Brown (40) were awarded YWCA Women on the Move awards.

The YWCA recognizes leadership, commitment, innovation, focus, and dedication to community through the Women on the Move award. YWCA seeks women who have demonstrated their guiding principles of social and racial justice and empowerment of women.

As part of the ceremonies, New Mexico Gov. Susana Martinez was presented with the La Estrella (the star) Award in honor of her historic contribution to women in politics. The award was presented by Elizabeth Gonzales (10222), who serves on the YWCA board of directors.

NADINE MINER

Nadine works in the area of modeling and simulation for the nation's military. Nadine's nomination highlights her mentoring of dozens of young women in science, technology, electronics, and mathematics. She is a K-12 science coordinator, and is currently on the board of directors for the Albuquerque Little Theatre. Nadine is also the science coordinator for Alice King Community School and a volunteer with the United Way's Women in Philanthropy. She also created Shade Our Kids, a program designed to protect kids from skin cancer risks.

"Nadine serves her community with her time, talents, and financial contributions," say her nominators John Miner (Intel) and the Albuquerque Little Theater. "She is fearless in her dedication to a project and inspires others to do their very best. Her organizational and time management skills and her efficiency are textbook examples of how to get the job done.

MARIE BROWN

Marie is the diversity projects leader and a long-time advocate for social and racial justice. She is a former Albuquerque police officer. She is involved with American Indian students in the Dream Catchers' Program. Marie's current position affords her the opportunity to implement and carry out the work of diversity and inclusion throughout the Labs.

"I have never met an individual who is more genuine and selfless than Marie," says her nominator Esther Hernandez (40). "She is energetic, creative, and tireless. She challenges herself and others to reach higher levels of intent and impact. The hallmark of Marie's character is her integrity."

Margaret is currently manager of Employee and Labor Relations and previously led Sandia's strategic diversity efforts to ensure compliance with EEO/AA regulations and investigate internal complaints. She has led the Building Bridges program, a leadership-driven dialogue to build trust, inclusion, and respect for the individual. Margaret also supports outreach education programs that aim to reverse the under-representation trend of women and minorities in the sciences by engaging 6th-12th graders in professional development opportunities.

MARGARET HARVEY

"Margaret is an unsung hero partly because of her quiet, humble, and compassionate spirit," says her nominator Linda Bay Chu (3512). "She listens deeply and considers all perspectives to identify solutions. She works tirelessly and selflessly, and is the last to promote her achievements."

Other Sandia Women on the Move nominees are: Marcey Hoover (1516), nominated by Duane Dimos (1500); Seethambal (Sita) Mani (5719), nominated by Richard Cernosek (5719); Leslie Phinney (1513), nominated by Dan Rader (1513); Sarah Renfro (920), nominated by Anthony Sanchez (910); and Melissa Sisneros (6134), nominated by Michael Skroch (6134).

Lori Mann (3512) and Chris Monroe (3036) were instrumental in submitting Sandia's nominations.

James Romero becomes a raging bull on the dance floor

By Iris Aboytes

Dancing with the Stars has just announced the participants for this season. Missing from the list was our own Jim Romero (4136) who recently participated in Lovelace's Day of Dance. James and his partner Barbara McDonald from Enchantment Dance Studio danced the pasodoble.

TRIP THE LIGHT FANTASTIC — Jim Romero and dance partner Barbara McDonald train for the Lovelace Women's Hospital Day of Dance competition.

Sponsored by Lovelace Women's Hospital, the competition had local celebrities paired with professional dancers competing against each other. Lovelace organizers said the dancing event is designed to celebrate fun ways to care for your heart. Day of Dance is a national event. This year's contestants included Pablo Gutierrez, Univision; Trish Hoffman, Albuquerque Police Department; cosmetic surgeon Dr. Jeff Morehouse; Kiki Garcia, KOB-FM; Deanna Sauceda, KRQE; and Jim. Trish Hoffman and her partner took the top prize.

"We trained for about six or seven weeks, two to three times a week, for two hours," says Jim. "The pasodoble is a very dramatic dance. Full of twists and turns, the music is what is typically played during the bullfighters' entrance into to the ring. My routine also had two lifts in it. I did a lot of weight training so that I could lift my partner overhead while spinning. I am grateful to her for her patience and knowledge of dance.

A retired firefighter, Jim was approached about dancing for charity at a car show. He was reluctant at first, but decided to do it once told it was a benefit for women's health. Jim, a paramedic, is now an emergency management incident commander. "I love helping others and making a difference in an emergency environment," Jim says.

Jim says he would certainly do it again, but says the thrill is nothing like delivering babies. He delivered 13 while he was a member of the fire department, one in an elevator at the old Sheraton hotel while the woman's husband was in a meeting.

Jim has many hobbies; his most consuming is working on his car and attending the many car shows around the Southwest.

"I own a silver 1999 Corvette," Jim says. "It has black checkers running up the sides, and has been completely modified inside and out. I have done all the body and engine work myself. The paint scheme was my design; however, I had a local artist paint the design work. The car looks nothing like the original. It has taken 10 years for it to look like this, and I am still not done. Miss New Mexico 2010 selected my car from many others to escort her in the 2010 New Mexico State Fair parade."

He has won 60-70 trophies. "My hobby has almost become an obsession," says Jim. "I don't drive it too much anymore. I have invested much time and money fixing it up," says Jim. "I do drive it to car shows though; I don't trailer it."

Jim's favorite show by far is the Corvettes and Ghostriders show in Tombstone, Ariz. He has placed first many times and most recently won in the best modified category. Tombstone receives anywhere from 200-300 Corvettes from around the country.

The dancing gave Jim a new hobby. In the future, he would like to take dance classes with his wife, Debra Romero (9514).

Lovelace Women's Hospital's Day of Dance events included education on heart disease and no-cost health screenings. The dancing celebrated the message that being heart healthy is about being happier and about having more fun when being active.

JIM AND HIS WIFE, DEBRA (9514), at the Corvettes and Ghostriders show in Tombstone, Ariz.

Ethics Office staff almost all new, but they arrive with decades of Sandia experience


JENNIFER PLUMMER


BILLIE WEATHERLY


GWEN DRAKE


ANTHONY SANCHEZ


DIANE NAKOS


ANN GUTIERREZ

By Heather Clark

Sandia's Ethics Office has seen an almost complete turnover in its managers over the past year, but though many of the office's staff members are new to the center, they bring many years of experience at Sandia to their new jobs.

"The Ethics Office has essentially an all-new leadership chain from the Labs director on down to the ethics officers. We'd like Sandians to know who we are and to be comfortable coming to talk to us, if the need ever arises," senior manager Billie Weatherly says.

The turnover includes: President and Labs Director Paul Hommert, Executive Vice President and Deputy Labs Director for Mission Support Kimberly Sawyer, Jennifer Plummer, acting director of the Ethics and Business Conduct Center 900, Billie, Ethics Office managers Diane Nakos and Gwen Drake, and Ann Gutierrez, an administrative staff associate, who join Anthony Sanchez.

Billie, Diane, and Gwen each have worked across many areas at the Labs for more than 30 years.

The Ethics Office helps employees deal with sensitive workplace concerns by providing three major services: consultations and guidance, investigations, and awareness and training, Billie says.

Consultations and guidance are provided to employees who call the Ethics Help Line at 505-844-1744, make appointments, or contact the office by mail or email.

Maintaining confidentiality

The ethics officers realize employees might be hesitant to file a complaint, so they allow complaints to be made anonymously or confidentially. If an employee calls the Ethics Helpline, caller identification is blocked so the caller's identity remains anonymous, Diane says.

However, remaining anonymous can make follow-up conversations and the officers' ability to clarify issues difficult, if not impossible, she says. So callers are encouraged to provide their names to ethics officers, who will keep their names confidential to the extent possible.

Billie says that a survey of reporting parties conducted by Lockheed Martin indicates they are satisfied that they are treated respectfully, kept informed on case status, and that confidentiality is maintained.

"We try to get callers to say who they are, and assure them that it will remain confidential with us because when they report anonymously, it's very difficult for us to investigate. We can't follow up with them, we can't call them back, and we often need to follow up and get facts or new information narrowed down," Diane says.

Identifications are required only if the issue involves workplace violence, security, or safety issues, Diane says.

While much of the work of ethics officers is to mitigate ethics concerns either through consultation or awareness activities, they also investigate ethics complaints they receive to determine whether there has been a violation of policy, corporate values, or any processes. However, they are not to be confused with Corporate Investigations, which is a separate group in the Ethics and Business Conduct Center that investigates complaints involving waste, fraud, and abuse, Billie says.

And, investigations are not the main focus of the Ethics Office.

"We're not just here to investigate when business misconduct has occurred. We're trying to provide the resources, guidance, and communication that help people stay on the ethical track and not become the subject of an investigation," Billie says.

In fiscal year 2010, the Ethics Office provided guidance on 203 cases and investigated 40 ethics cases. Of those, 31 percent of the cases were substantiated and required additional action, according to the office's data.

The top cases concerned interpersonal skills, intimidation or harassment, policy issues, hiring or job placement concerns, conflicts of interest involving personal relationships or favoritism, and concerns about performance appraisals, the data show.

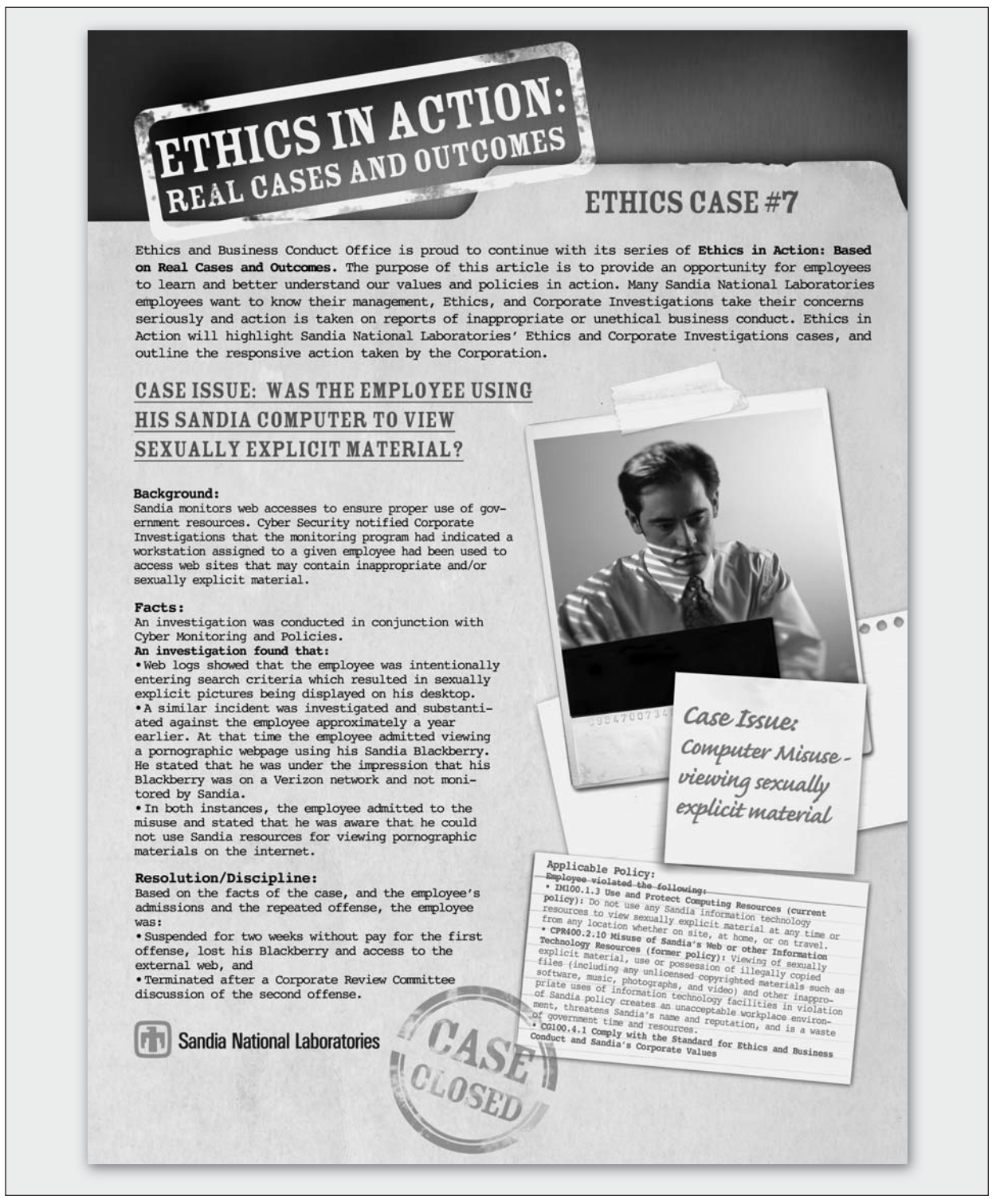
Those reporting ethics concerns will be informed at the end of an investigation whether their complaint was substantiated and whether a violation occurred, but for confidentiality reasons, they will not be told what disciplinary measures, if any, were taken, Diane says.

Good business practice

Jennifer Plummer, acting director of the Ethics Office, says it's a good business practice for Sandia to have a place where employees can ask questions before they take action or before questions become a problem.

"Working for a company where management supports and takes action based on our values is really important, as is the confidence employees have in the company they work for," Jennifer says.

The Ethics Office has many plans for making employees aware of their services in the future. They are reinvigorating their Ethics in Action series to make employees aware of potential ethics issues and how to avoid or handle them. They are about to launch the annual awareness training to be taken by all Labs employees and a new animated series about ethics.

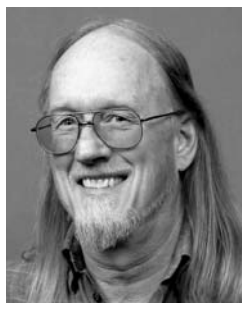


Mileposts

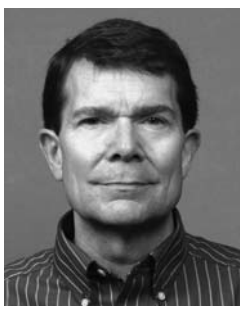
New Mexico *photos by Michelle Fleming*
California *photos by Randy Wong*

Kent Biringer
35 6821

Gary Webb
35 5336

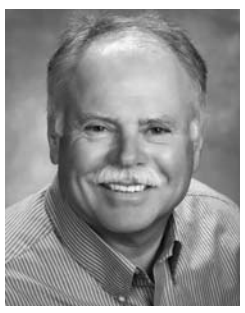


Victor Yarberry
35 1749



Bruce Bainbridge
30 2952

Jeanne Lewis
30 2952



Neville Moody
30 8651

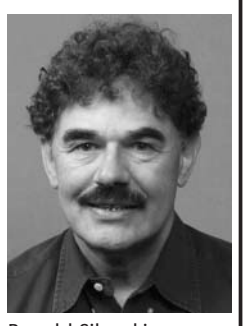
Michael Quinlan
30 4840

Lisa Branum
25 10661

Recent Retirees

Berweida Learson
36 10660

Janet Ahrens
30 6753



Ronald Sikorski
26 2994

Michael Morrow
25 5953

Isabel Martinez
20 4821

Labs announces changes to voluntary life and accident insurance plans

Change to take effect April 1 offers reduced premium rates

Note: *This information provided to the Labs News by Sandia's Pensions organization*

Effective April 1, 2011, Voluntary Term Life, Voluntary Group Accident, and Dependent Group Life insurance benefits will be provided by Metropolitan Life Insurance Company (MetLife). MetLife will be replacing Prudential, The Hartford, and Mutual of Omaha, the current providers of these coverages. This change will affect non-represented employees, represented employees, and retirees.

Your elections and coverage amounts as of April 1, 2011, will be transitioned from each of the prior carriers to MetLife.

The following features are highlights of the new voluntary life and accident insurance plans provided by MetLife:

• **Reduced premium rates:** Voluntary Term Life insurance premium rates will be reduced by at least 20 percent for all ages over 30. Premium rates for Employee and Employee + Family coverage under the Voluntary Group Accident Plan will be reduced by 7 to 20 percent. Although the new Dependent Group Life premium rates are higher than current levels, they represent a savings of at least 40 percent over the rates proposed by Mutual of Omaha during contract renewal discussions.

• **Enhanced online services:** MetLife is scheduled to provide participants with full record-keeping services and online access to coverage and beneficiary designations. Instructions for the simple registration process required the first time you access the MetLife website will be included in communication you receive at your home address in the upcoming weeks. MetLife will be requesting that you provide beneficiary information for each plan that you're enrolled in at www.metlife.com/mybenefits website or with MetLife Customer Service at (866) 492-6983 between 8 a.m. and 11 p.m. ET. on or after May 1, 2011.

• **Additional benefits:** Employees enrolled in Voluntary Term Life insurance will also have access to Will Preparation and Estate Resolution services.

• **Open enrollment and expanded coverage options:** In early summer 2011 MetLife and Sandia will offer a special enrollment opportunity to apply for or increase your life and/or accident insurance coverage. This enrollment will offer enhanced levels of Spouse and Child life insurance under the Dependent Group Life plan, increased plan maximum under the Voluntary Group Accident plan, and opportunities to change your existing coverage. Approved coverages will be effective July 1, 2011. An enrollment kit will be sent to your home with further information.

• **ERISA coverage:** Effective April 1, 2011, the Voluntary Term Life, Voluntary Group Accident and Dependent Group Life insurance plans will be governed by the Employee Retirement Income Security Act (ERISA).

Active employees will continue to have payroll deductions for the voluntary insurances. Since the cost for March premiums were deducted from your February Sandia payroll checks, there will be no deduction for these insurances on your three March paychecks. A few employees will see premium deductions or refunds during March for recent enrollment or changes in coverage. Deductions for April coverage at MetLife's new rates will first appear on your April 14 paycheck. With the provider change, payroll deductions will be on all 26 paychecks annually instead of the current 24. The premiums for MetLife voluntary insurance deductions will appear as new line items under the deductions section of your paycheck starting in May.

Retirees will have April premiums for elected Voluntary Term Life coverage deducted from their monthly pension payments. Retirees will be contacted by MetLife in April to select direct bill or paper statements for future premium payments.

For questions regarding your current level of coverage, view your Benefits Summary under HR Self Service on Sandia's Techweb, or call (505) 844-HBES (4237). Customer service representatives are available Monday through Friday during normal office hours.

More information will be posted to www.HBE.Sandia.gov as it becomes available.

Voluntary Term Life

For employees currently enrolled in Voluntary Term Life insurance coverage with Prudential, coverage will continue at your elected level. Your cost of coverage will be at the new reduced rates in the included rate table. During open enrollment employees will have the opportunity to increase coverage by 1 times salary without the provider requiring evidence of insurability. Coverage maximum remains at six times pay.

Voluntary Group Accident

Employee or Employee+Family coverage will continue at the reduced premium rate reflected in the included rate table. Common carrier coverage will be included as a standard policy feature in the Employee and Employee+Family plans and will no longer be available as a separate coverage. During open enrollment employees may change their existing coverage levels, and coverage maximums will be increased to $500,000, in multiples of $10,000, limited to 10 times pay.

Dependent Group Life

For employees currently enrolled in Dependent Group Life insurance through Mutual of Omaha, coverage will continue at current levels with MetLife. The cost of coverage will change to the new rates provided in the included rate table. Increased levels of coverage for both your spouse and dependent children will be available during open enrollment at the rates listed in the included rate table. The definition of "spouse" under this coverage has been expanded to include eligible domestic partners.

Comparison chart: *New rates to take effect for voluntary term life, group accident, group life*

Voluntary Term Life
(Premium costs per $1k coverage per month)

Age	Rate thru 3/31/11	Rate as of 4/1/11
<25	$ 0.02	$ 0.02
25-29	$ 0.02	$ 0.02
30-34	$ 0.04	$ 0.03
35-39	$ 0.05	$ 0.04
40-44	$ 0.07	$ 0.05
45-49	$ 0.12	$ 0.08
50-54	$ 0.20	$ 0.13
55-59	$ 0.26	$ 0.17
60-64	$ 0.40	$ 0.27
65-69	$ 0.63	$ 0.43
70-74	$ 1.00	$ 0.68
75-79	$ 1.64	$ 1.11
80 & over	$ 2.06	$ 1.51

Voluntary Group Accident

(Premium costs per $1k coverage per mont	Rate thru 3/31/11	Rate as of 4/1/11
Employee only	$ 0.025	$ 0.02
Employee + Family	$ 0.043	$ 0.04

Dependent Group Life

(Premium cost per month)	Rate thru 3/31/11	Rate as of 4/1/11
Option 1: Spouse $6k, Child $2k	$ 1.51	
Option 2: Spouse $10k, Child $4k	$ 2.81	
Option 3: Spouse $20k, Child $4k	$ 4.54	
Option 4: Spouse $20k	$ 4.47	
Option 5: Child $4k	$ 0.54	
Spouse		
Option 1: $6,000		$ 1.50
Option 2: $10,000		$ 2.50
option 3: $20,000		$ 5.00
Option 4: $35,000		$ 8.75
Option 5: $50,000		$ 12.50
Child Rate		
Option 1: $2,000		$ 0.26
Option 2: $4,000		$ 0.52
Option 3: $6,000		$ 0.78
Option 4: $10,000		$ 1.30

Marking Women's History Month at Sandia . . .

Becky Hunter enjoys telling others to live and tell their story

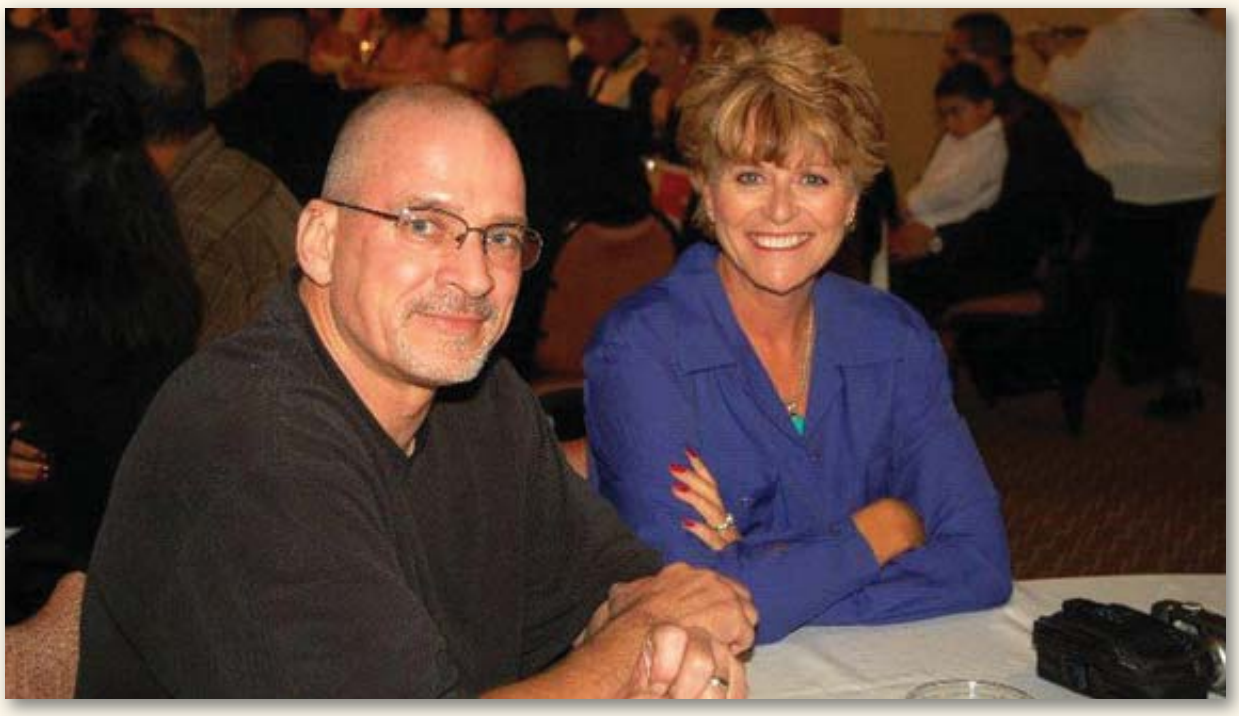
By Iris Aboytes

Working at Sandia was not in Becky Hunter's (10661) plan. She was at New Mexico State University focused on working and earning her degree when a recruiter approached her about coming to work at Sandia. That was in May of 1978.

She listened, especially when she was told about Sandia's tuition assistance, the 24 vacation days, and the numerous benefits. It was too good to pass up. So instead of completing work on her degree, she took a detour to Sandia and became a secretary.

The first eight months were dedicated to training. Sandia training at the time was in the basement of the old Coronado Club. She became proficient in working with classified documents, timecards, expense vouchers, and numerous other forms. She became adept on the many Sandia policies.

BECKY HUNTER was featured in an *Albuquerque Journal* article during Secretaries' Week in April 1985.



BECKY's husband, Jeff, was her high school sweetheart and is her No. 1 supporter and cheerleader.

Part of the training included being a floater/trainee, a secretary who does not have her own home, so to speak. Each week she is assigned to help other secretaries or sits in for them when they are away or need help for special projects.

It wasn't until she had read the SLIs (Sandia Laboratories Instructions) and knew them from page to page, did she question her coming to Sandia.

"Send me somewhere busy before I quit," Becky told her supervisor. "I want to be at the heartbeat of all the things the Sandia recruiter spoke to me about."

In her first assignment, Becky supported two departments whose role was primarily in support of sensor systems mounted on perimeter fencing.

"Combined, the two departments had about 30 Sandians and an officemate, Millie Hooker, who had been at Sandia quite awhile," says Becky. "We grew to be great friends. I learned a lot from her. We answered all their phones, typed all their SAND reports, and personally delivered the mail. We made all the travel plans, then walked to Bldg. 802 and picked up airline tickets and cash for next week's travels. It was a different time."

She had worked at Sandia about five years and in a couple more departments before Roger Hagengruber (now retired) got promoted to vice president. His business manager, Pat Childers, suggested he interview her for the executive assistant opening. "We didn't bid on jobs back then," Becky says.

"I went into the interview with a little notebook of ideas I kept. I honestly thought this was my one chance to get some of my ideas in front of someone influential. He liked my ideas. I was pleasantly surprised when I was selected and became part of his team.

"During the next 16 years I worked with the executive assistants, other business managers, and Roger and Pat," Becky says. "It was great. I loved the challenging work and opportunities they gave me. I saw firsthand what a true leader does: They are people who build an inclusive environment, encourage you to learn new things, and share your knowledge with others. You're part of their team. They enable you to succeed. It was the best job I ever had at Sandia. I learned so much from so many."

When Roger told Becky he was retiring, she decided to look for a new position. "It was scary, but thrilling all at the same time," Becky says. "The secretary who came to Sandia for the benefits had gotten her master's degree, and now she was a manager. I can't believe that was 11 years ago."

Becky went back to school in 1993 when her daughter was 11 years old and her son was 7. It took her about nine years, one class at a time in the beginning, to complete her bachelor's and MBA.

Becky grew up in Los Angeles, Calif. and Belen, N.M. "Due to a birth defect, I wore braces on my legs until I was six years old, then I was liberated," Becky says. "I loved running, bike riding, I loved being outside, and I still do. If God would heal me, I would never forget."

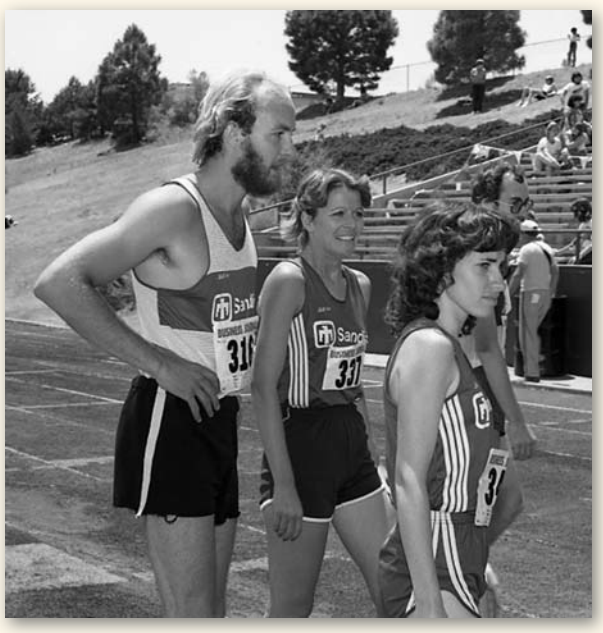
Becky and Jeff, her high school sweetheart, were at NMSU together. One of the reasons she came to Sandia was that she could marry Jeff, go to school, and work, all at the same time. A multi-tasker, Becky not only worked, married Jeff, went to school, and had her children, she was also a competitive runner and soccer player.

"Jeff, my No. 1 supporter and cheerleader was at home making chicken-fried steak for the kids," she says. "They have fond memories of those evenings. My family's encouragement helped me make it all the way."

Once Becky decided she wanted to be a Sandia secretary, she was driven to be the best. "I loved being a secretary, the cog in the wheel," Becky says. "Now I love being a manager — helping others reach their goals and ultimate potential. I tell them what I tell my children: 'Whatever you decide to do, be the best you can be. If you enjoy your work, you won't be a clock watcher. You'll want to share your experiences with others. You will go to work and enjoy the people you work with every day.'"

"My husband owns a highly successful auto repair business, my daughter owns a cosmetology business, and my son is a USMC reservist and works in the family business," adds Becky.

"I want to continue to help others build an environment that is inclusive, challenging, and embraces an opportunity to teach others and celebrates successes. My career is more than I thought it would be. I am grateful to my Sandia family, which has mentored me and pushed me. I have enjoyed it all. As a woman in the workplace, I feel I have it all. I am privileged to be in a position where I can encourage and help others live and tell their story. Because of the people in my life, every day is full of joy."



SANDIA CORPORATE CUP — Becky, in center, ran the last leg of the Pyramid Relay in 1982.