Senate confirms Lt. Gen. Frank Klotz as new NNSA administrator

Secretary of Energy Ernest Moniz praised Lt. Gen. Frank Klotz, saying at the time of the confirmation, "His breadth of military and national security leadership experience makes him uniquely suited to lead the NNSA." Acting NNSA Administrator Bruce Held resumes his position as associate deputy secretary. See the story on page 2.

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Paul Hommert updates Senate subcommittee on Sandia's nuclear weapons mission

IN TESTIMONY LAST WEEK before the Senate Armed Services Committee's Subcommittee on Strategic Forces, Sandia President and Labs Director Paul Hommert outlined the Labs' nuclear weapons mission work. Paul discussed weapon modernization programs and the strong ties between the nuclear weapons mission and other key national security missions. He also assessed the Obama administration's fiscal year 2015 budget request to Congress in light of the modernization programs. His testimony was an update to the presentation he made last October to the subcommittee. To view the full subcommittee hearing go to http://tiny.sandia.gov/vk6bk (available only on Sandia's internal Techweb — Paul's testimony starts at approximately the 7:20 mark). His written testimony, submitted into the subcommittee record, can be downloaded as a PDF file at http://tinyurl.com/ldtbcw6. (Photo by Charles Votaw)

Research challenges

'Power on Demand' is 11th challenge

By Sue Major Holmes

Sandia has launched the eleventh in a series of high-stakes research challenges, "Power on Demand."

Like the previously announced challenges, it focuses on an important national security question. The civilian world needs a secure and sustainable energy future for everything from transportation to large-scale storage and power generation facilities, while the defense realm has power needs ranging from electric ships to satellites.

Research Quality Standards case study
How to get funded without sacrificing your integrity. Page 4

The research done under the challenges is critical for Sandia's missions, now and for decades to come, and advances the frontiers of science and engineering, acting Div. 7000 VP and Chief Technology Officer Julia Phillips told a March 13 session that introduced the latest topic.

The challenges draw on a cross section of disciplines at the Labs and span the gamut from fundamental discoveries to technology development. Julia said they're

(Continued on page 4)

Safe by design intent

In plutonium experiments, performed to gain information of key interest for stockpile stewardship, the potentially dangerous material requires additional cautions to keep it quarantined from Z's primary containment chamber. Story on **page 2.**

Inside . . .

Watching neurons

They are with us every moment of every day, controlling every action we make, from the breath we breathe to the words we speak, and yet, there is still a lot we don't know about the cells that make up our nervous systems. Story on **page 6.**

Core nuclear weapons mission is 'enormous'

Executive VP for National Security Programs Jerry McDowell gives perspective on nuclear weapons mission

By Sue Major Holmes

Deputy Labs Director and Executive VP for National Security Programs Jerry McDowell says Sandia's core nuclear weapons mission is enormous but his job boils down to three things: taking care of today's stockpile, sustaining the stockpile into the future, and addressing the long-term stewardship of capabilities, operations, and infrastructure.

Jerry discussed Sandia's nuclear weapons mission in an April 2 presentation, offering his perspective on the program's future and the challenges of balancing short-term and long-term stockpile stewardship obligations. His talk in New Mexico's CNSAC auditorium was webcast to Sandians at all sites.

SANDIA has finished eight days of testing a full-scale mock unit representing the aerodynamic characteristics of the B61-12 gravity bomb in a wind tunnel. See story on **page 5.**

"Taking care of the stockpile we have today is all about making sure that the legacy commitment we made to safety and security endures today and forever," Jerry told the full auditorium. "It's an incredible responsibility."

Headlines about nuclear weapons work tend to focus on sustaining the stockpile into the future. "It's what most people want to talk about," he said, outlining examples of stockpile programs and successes in a series of slides featuring charts and photos, including a recent wind tunnel test for the B61.

The B61 "is hugely important in the national scene and a litmus test of whether Sandia can deliver on its commitments," Jerry said. While the ups and downs of sequestration and the ebb and flow of budgets affect the program's pace, "if we don't do this, we don't get to do much of anything else," he said.

THE B61 LEP, said Deputy Labs Director and Executive VP for National Security Programs Jerry McDowell during an April 2 all-hands meeting, "is hugely important in the national scene and a litmus test of whether Sandia can deliver on its commitments." (Photo by Randy Montoya)

He also discussed the "amazing results" of plutonium work at the Z machine; modernizing the arming, fuzing, and firing system for the W88 Alt 370; and the annual stockpile assessment process that culminates in a personal letter from Labs

(Continued on page 5)

That's that

In late March, Labs Director Paul Hommert sent an email to members of the workforce Labs-wide taking note of the passing of Sandia Corp. Board of Directors member James Schlesinger. Paul's heartfelt and sensitive letter got me thinking about my first "encounter" with Dr. Schlesinger. Not that I ever met him, of course, but it must have been when I was still in my 20s — we're talking a while ago here, folks — I read an essay by Schlesinger in *The Atlantic* or *Harper's* about the state of America's post-Vietnam defenses and the changes that would be needed to address the security issues for the remainder of the 20th century.

The essay was so smart, so tightly reasoned, so compelling that here I am, 40-something years later, still remembering it (at least in its essence).

Schlesinger spent a consequential life in public service — Director of Central Intelligence, Secretary of Defense for two presidents (Nixon and Ford), and the first Secretary of Energy for a third (Carter). After leaving government, he continued to be engaged in the public policy arena through his writing and in advisory and consulting capacities. In 2001, when I heard that Dr. Schlesinger had been named to the Sandia Corp. board, I took it as one more affirmation that we're not just another workplace. It says something about us that a man of Schlesinger's stature and reputation chose to share his fierce intelligence and his lifetime of experience and wisdom with us for more than a decade. I'm sure we're a better place for it.

* * *

One of the real pleasures of my job is hearing from fellow Sandians and retirees who want to pass along a funny, clever, interesting, or provocative story. Often, they're not looking for me write to anything, it's just that they have gleaned, after reading my column over the past several years, that I heartily appreciate a good yarn, a good joke, anything that tweaks my brain, tugs at my heartstrings, or tickles my funny bone.

It was in this spirit that I read with great delight a recent email from Penny Jones (2216). "When I came to the Labs many years ago," she wrote, "I was the only Penny. It stayed that way for a long time. A friend of mine was up for reinvestigation last December. She'd used me as reference and emailed to let me know the investigator would be calling me. The call never came, but it's been my experience that these things take time. I didn't think anything more of it until one day my friend called to ask why I told the investigator 'I don't know that woman and I've never seen her before.'

"Well, of course, I'd never said any such thing, so I started digging around and found that we now have four Pennys. That was surprising enough, but it turns out my phone number is 845-xxyz and another Penny's number is 845-xxzy. I ask you: What are the odds?"

I don't know about the "odds," but I'd say it *is* pretty odd, alright.

In corresponding with Penny, I couldn't help but ask if she got teased by kids a lot because of her name. Did they taunt her with calls of "A penny for your thoughts?" Oh, yes, Penny says, "and a lot worse."

I can imagine. I mean, your name could be Penny Nichols.

One more thing: In the course of our email exchange, Penny passed along another funny tidbit: When she and her husband were married, there were seven James Jones' at the Labs, four of whom were named James F. Jones. Back in the days before the directory used nicknames, Penny says, when she wanted to call him, "I figured out which one he was by process of elimination. He wasn't a director, he wasn't in California, and he wasn't in AIII."

Now, tell me Sandians aren't great problem-solvers!

See you next time.

— *Bill Murphy (505-845-0845, MS0148, wtmurph@sandia.gov)*

Frank Klotz confirmed as new NNSA Administrator

Lt. Gen. Frank G. Klotz, US Air Force (Ret), has been confirmed by the Senate as DOE's Under Secretary for Nuclear Security and Administrator for the National Nuclear Security Administration (NNSA).

FRANK KLOTZ

"Lt. Gen. Klotz's confirmation comes at a critical point for the National Nuclear Security Administration," said Secretary of Energy Ernest Moniz. "His breadth of military and national security leadership experience makes him uniquely suited to lead the NNSA, fulfilling its commitments to the management and security of the nation's nuclear weapons, nuclear nonproliferation, naval reactor programs, and nuclear and radiological emergency preparedness efforts."

Moniz thanked Bruce Held, a former Sandian, for his service as acting NNSA administrator since last June. With Klotz's confirmation, Held will return to his position as associate deputy secretary.

In his new role, Klotz is responsible for the management and operation of NNSA, as well as policy matters across the DOE and NNSA enterprise in support of President Obama's nuclear security agenda.

Prior to his Senate confirmation, Klotz served in a variety of military and national security positions, including roles as commander of Air Force Global Strike Command, assistant vice chief of staff and director of the Air Staff, vice commander of Air Force Space Command, and commander of the 20th Air Force.

Klotz served at the White House from 2001 to 2003 as the director for Nuclear Policy and Arms Control on the National Security Council, where he represented the White House in the talks that led to the 2002 Moscow Treaty to reduce strategic nuclear weapons.

Earlier in his career, he served as the defense attaché at the US Embassy in Moscow during a particularly eventful period in US-Russian relations.

A distinguished graduate of the US Air Force Academy, Klotz attended Oxford University as a Rhodes Scholar, where he earned an MPhil in international relations and a DPhil in politics. He is also a graduate of the National War College in Washington, D.C. Most recently, Klotz was a senior fellow for strategic studies and arms control at the Council on Foreign Relations.

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LOCKHEED MARTIN

Plutonium: Safe by design intent

By Neal Singer

Before Z fires, orange and then red lights flash in the guts of the machine. Warning horns sound throughout the building, alerting researchers and their visitors to move from the area housing the 104-foot-diameter, pulsed-power accelerator and into protected locations. Closed-circuit video cameras scan Z's high-bay and surrounding walkways and roof to make sure no one could possibly be harmed by each of the machine's near-daily firings.

But that level of safety and security is just for "ordinary" shots that may exceed the temperature of the sun, mimic the conditions around black holes, or determine the state of water on exoplanets.

Plutonium experiments are a different matter. Performed to gain information of key interest for stockpile stewardship, the potentially dangerous material requires additional cautions to keep it quarantined from Z's primary containment chamber, which otherwise would have to be thoroughly scrubbed.

For these special shots, Z is fitted with a sub-chamber designed to isolate the few grams of test plutonium from the primary containment system. Then an ultrafast valve is fired by explosives to seal the sub-chamber. But 'ultrafast' is a relative term. In the microseconds it takes for the explosion to seal the valve, a permissive signal sent by the explosion instructs Z to send its nanosecond electrical pulse and huge magnetic field into the sub-chamber. The accelerator shot is so fast that Z does its work before the closing valve can cut off Z's flow of energy. However, the valve does close in time to prevent plutonium particles from spraying all over Z's containment system, a negative result that would require enormous time and manpower to clean up.

PLUTONIUM SHOT — The silver-and-gold target structure on the display pedestal, left, is set inside a stronger, safe-by-design container , right, when plutonium is tested. (Photo by Randy Montoya)

These precautions make plutonium shots at Z "safe by design."

Sandia hosts Cleantech Open networking event

Story by Patti Koning

On Tuesday, March 18, Sandia, in partnership with Lawrence Livermore National Laboratory (LLNL) and the i-GATE Innovation Hub, hosted the first Cleantech Open networking event in the Tri-Valley. The Cleantech Open is a nonprofit organization that runs the world's largest accelerator for clean-technology startups.

"We are delighted to partner with LLNL and i-GATE to host this event to bring together entrepreneurs and investors with the goal of bringing more clean technology to the marketplace," said Div. 8000 VP Steve Rottler.

A total of 121 people — primarily from the Silicon Valley — participated in the event at the Livermore Valley Open Campus (LVOC). Attendees included clean-technology entrepreneurs, industry and lab researchers, and investors.

"The mission of Cleantech Open is to find, fund, and foster entrepreneurs in the clean tech space," said Yuet Lee, the chair of Cleantech Open's National Mentor Program. "Forming a company is difficult. What we offer is networks of resources to help companies get started." He noted that more than 800 entrepreneurs have been mentored during the program's nine-year history and that about 60 percent of these entrepreneurs are still in business.

Companies that participate in Cleantech Open have the opportunity to win cash prizes. Each of the eight regions awards $20,000 in cash and services to the finalist with the best clean-technology idea in the region and another $10,000 in cash and services to the regional winner of the sustainability award. The national winner, chosen from the eight regional finalists, receives a grand prize package worth up to $200,000 in investment and additional services.

Congressman Eric Swalwell (Calif.-15th) started off the event with a fireside chat exploring the impact of angel investing. The panel discussion featured veteran investors Larry Kelly, managing director of Kelly Ventures and a member of the Band of Angels, and Peter Freeman, co-founder and chief executive officer (CEO) of Global Renewable Energy ENgine (GREEN) and chair of the Clean-Tech subcommittee for the Keiretsu Forum.

"Right now, we are having a national debate about the role of the federal government in federally funded research," said Swalwell. "The federal government must continue to be at the table when it comes to federally funded research. If it were up to me, we would double LDRD funding. We'd actually bring it up to 20 percent to match the majority of tech companies in the Bay Area."

The Cleantech Open also featured a Lab to Market panel discussion led by Brandon Cardwell, i-GATE's vice president of strategy and business development. The panelists included Elizabeth Cantwell, LLNL director of economic development; Rob Lamkin, CEO of Cool Earth Solar; Andy McIlroy (8310), Sandia senior manager for LVOC development; and Brian Steel, co-director of the Cleantech to Market program at UC Berkeley's Haas School of Business.

MATTHEW LAVE (6112), left, discusses Sandia's solar energy research with Rob Lamkin, CEO of Cool Earth Solar. (Photo by Dino Vournas)

"One challenge with the Labs is a scale mismatch," said Andy. "We are large institutions, governmental in nature. So we work on timelines and project scales that are quite different from the entrepreneur community. Companies want to move on the scale of hours to days while we are used to working in months to years."

Lamkin pointed to a gap in willingness to take risks, illustrated by the nearly two years that it took to finalize Sandia's partnership with Cool Earth Solar on a clean-energy demonstration field in the LVOC. "As entrepreneurs, we are willing to take risks. We have to do it every day," he said. "We saw the advantages in this partnership and thought it would take weeks to get the deal done. Being able to bridge that divide was key to our success. It wasn't for the faint of heart, but we got it done, in large part because there were people at Sandia like Andy who stood up for us."

In response to an audience question, Lamkin said he would go through the whole experience again, even if he knew from the start that it would take two years. "Cool Earth Solar suffered from a bit of trailblazing," said Andy. "Their project is quite innovative because it's an installation they run on the LVOC as part of their own business. I think this has broken down barriers and demonstrated that the LVOC provides an opportunity to take risks and innovate."

Cantwell noted that LLNL has successfully brokered many deals with small companies in a shorter timeframe — less than six months. "I would love to see federal oversight of tech transfer focused regionally," she added. "I think regional networks are incredibly powerful, more powerful than broad country-sweeping networks."

Sandia CaliforniaNews

As another means for collaborating with the labs and the public sector, Cardwell pointed to the DOE's Advanced Research Projects Agency-Energy (ARPA-E) program, which promotes and funds R&D projects for advanced energy technologies.

"We usually have two to three ARPA-E funded projects each year," said Steel. "It's a wonderful program that funds things that wouldn't otherwise be funded. But it's also interesting because the milestones are quite rigid, maybe as a backlash against Solyndra. That doesn't allow as easily for the natural pivoting you see with startup companies."

The event concluded with a networking reception and a showcase of clean-technology programs at various companies, such as Sandia's solar, algal pond monitoring, and hydrogen fuel cells efforts and LLNL's pursuit of statistical analysis and modeling for wind and other renewable energy sources. Other companies featured in the technology showcase included Safe H20, KalpTree Energy, and GREEN.

CLEANTECH PANEL — Brandon Cardwell (far left) hosts the Lab to Market panel discussion, featuring, left to right, Rob Lamkin (Cool Earth Solar CEO) , Brian Steel (co-director of the Cleantech to Market program at the Haas School of Business at the University of California, Berkeley) Andy McIlroy, and Elizabeth Cantwell (LLNL). (Photo by Dino Vournas)

Research challenges

CENTER 1100 DIRECTOR Charles Barbour discusses Power on Demand, the latest in a series of Research Challenges laid out over the past several months.

(Continued from page 1)

designed to have long but finite lives and must show progress over the entire span, rather than just at the end. In addition, she said, they leave behind a legacy.

Workshops allow Sandians to engage a challenge as it takes shape, and Julia invited researchers to help the challenges mature and evolve. She pointed out that while many of the titles are very broad, Sandia will emphasize areas where it can have a significant impact. Each challenge must define a goal and the critical steps to take along the way, and decide what other institutions could be its partners, where it can find resources, and how to publish what it learns while at the same time protecting intellectual property.

Physical, Chemical, and Nano Sciences Center 1100 Director Charles Barbour said power needs are ubiquitous. "Power on Demand" will focus on electrical power, aiming to develop systems with the smallest size and weight for the largest possible amount of energy.

That requires tackling underlying fundamental science questions, engineering applications, and technical challenges for devices, materials growth, and power systems, Charles said.

For example, researchers could study whether ultrawide bandgap materials can power devices with improved performance or whether an understanding of how to design alternative power systems to reduce size and weight can be transferred to different power levels, he said.

Charles urged researchers from all over the Labs to sign up for the challenge. "This is your chance to really make a difference for Sandia and for the world," he told the introductory forum. "This is a big deal. Everybody has power needs."

"Power on Demand" will look at generation, storage, and conversion questions; how to ensure predictable performance despite different needs for different customers; and novel approaches to power generation and harvest even in harsh environments, Charles said. It will work in three different power-level categories, ranging from single, low-power applications to the grid scale, that have common scientific questions and engineering needs, he says.

Sandia is the right place for the work because of its leadership in compound semiconductor materials and device research; its expertise in battery materials and devices; its strong partnerships with industries, universities, and other national laboratories; and its incomparable facilities, including the Battery Abuse Testing Lab, the Microsystems & Engineering Sciences semiconductor fabrication complex, and the Center for Integrated Nanotechnologies operated by Sandia and Los Alamos national laboratories, Charles said. In addition, he said, Sandia understands national security missions and needs.

Since June 2013, Sandia has started challenges on "Resiliency in Complex Systems," "Science and Engineering of Quantum Information Systems," "Revolutionary Approaches to the Stockpile," "Beyond Moore Computing," "Data Science," "Trusted Systems and Communications," "First to High-Yield Fusion," "Engineering of Materials Reliability," "Detection at the Limit," and "Cyber Resiliency." One more is expected to be introduced later this year.

Research Quality Standards: Case studies

How to get funded without sacrificing your integrity

Note: Sandia recently published a new* Research Quality Standards *document that, rather than providing a step-by-step set of requirements, focuses on case studies to define best practices in the world of research. Here is one case study drawn from the 50 in the document. From time to time the* Lab News *will publish others.

A Sandia team was performing on a reimbursable R&D project. The customer imposed very stringent performance requirements for the next phase. Multiple bidders proposed approaches to achieve the desired performance without adequately acknowledging the significant risks and challenges that would have to be overcome for success.

In contrast, the Sandia proposal included a detailed analysis of the approach, identifying and assessing risks, along with the performance impacts that those risks would incur. This process identified that the performance requirements could only be met if all three of the new technology components achieved their theoretically optimal performance, which was unrealistic.

As a result, the customer developed a strong appreciation for the scientific and engineering thoroughness and integrity of the Sandia team, which, in turn, resulted in a deep trust that the Sandia team had the customer's best interests in mind. The project was awarded to Sandia, with acknowledgement of the risks, and it grew into a significant program for Sandia.

Moral of the story:

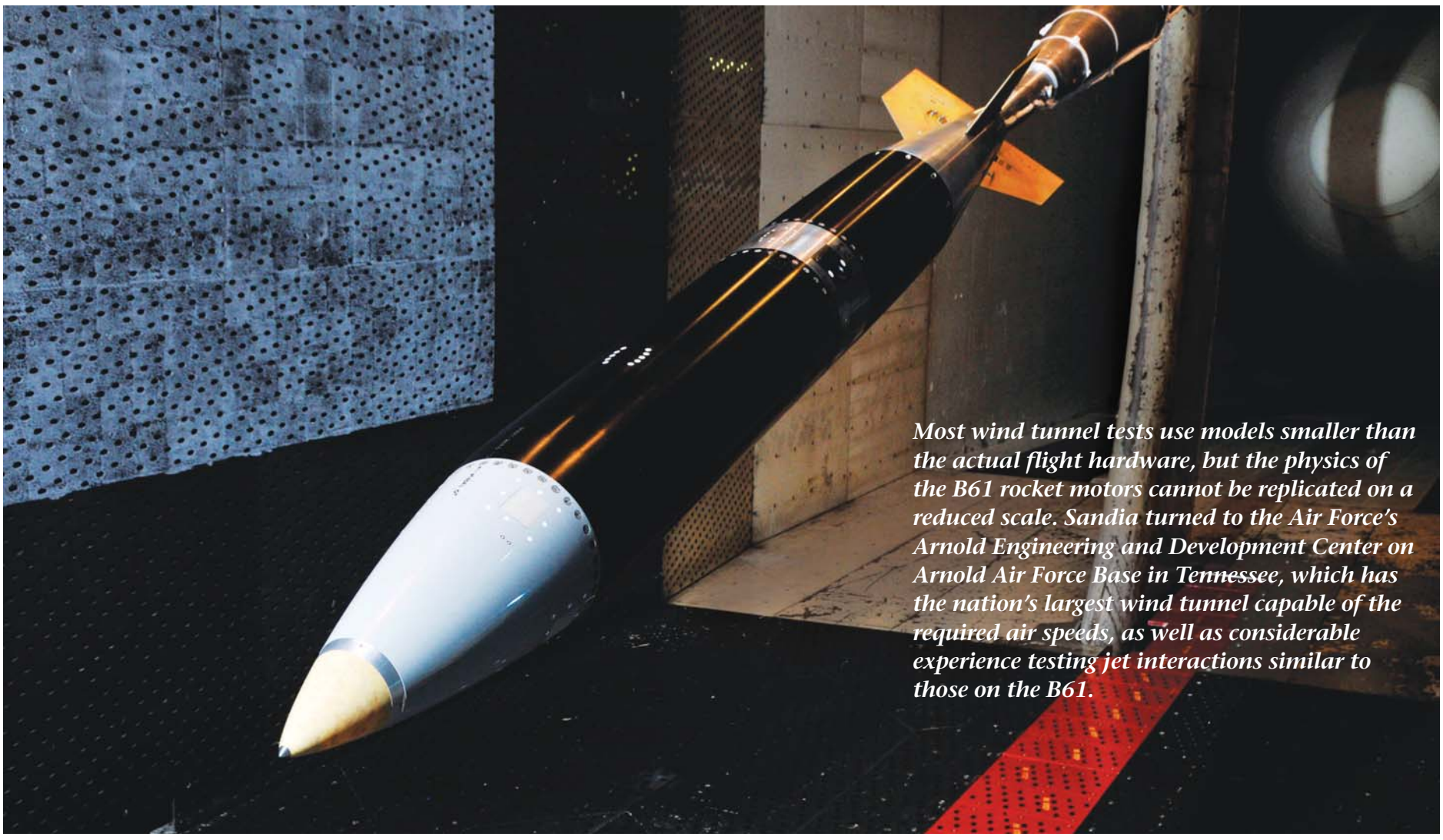
It is important to fully describe the value and benefits of your proposal followed by a full description of the threats, risks, and costs. If you describe only the value and benefits you become a "used car salesman" and risk being viewed as someone without integrity. If you describe only the threats, risks, and costs no one will fund you because the negative message is too hard to accept emotionally (the same is true if you describe the threats, risks, and costs before describing value and benefits — the order is important). The ideal approach is to first explain the value and benefits of the proposal to create a vision in the mind of the customer of why this is important and then follow it with a detailed explanation of the threats, risks, and costs so the decision maker can make a well-informed decision. This keeps emotions in proper balance while also providing a true picture of the decision they are about to make. Customers may not always decide to fund you but often they will. More importantly, their level of trust in you will be extremely high, which positions you in their minds as a valuable strategic partner they will come to with their future problems.

Author talks about continuing challenges of controlling nuclear weapon systems

INVESTIGATIVE JOURNALIST AND BEST-SELLING AUTHOR Eric Schlosser, speaking at a recent National Security Speakers Series event, discussed his book, *Command and Control: Nuclear Weapons, the Damascus Accident and the Illusion of Safety*, which examines the history of attempts to control the safety, security, and reliability of nuclear weapons since the 1940s.

Schlosser's book features an account of the crisis near Damascus, Ark., in 1980 when a Titan missile exploded, sending its undetonated nuclear warhead into a ditch 200 yards away. His account of the accident includes a discussion of Sandia's leadership role in successfully and dramatically improving the safety and security paradigm for the entire US nuclear arsenal.

Schlosser made clear in his remarks at Sandia that he deeply respects the talents, skills, and courage of Sandia scientists and engineers who have worked for decades to ensure that nuclear weapons always work if and when they are needed and will never work under any other circumstances no matter how unlikely those circumstances might be. He said he feels the stockpile today is far safer than it was 20, 30, or 40 years ago, thanks in no small part to the efforts of Sandians. However, he cautioned that in his view, "So long as nuclear weapons exist in a fully assembled form, the risk [of unintentional detonation] will never be zero and no expense should be spared in their management." At left, Schlosser addresses an audience of Sandians at the National Security Speaker Series. In the photo below, Schlosser meets with Sandian Dan Summers, who has been a leader in Sandia's nuclear weapon safety and use control work for many years. (Photos by Randy Montoya)



B61-12 WIND TUNNEL MODEL in the US Air Force Arnold Engineering and Development Center wind tunnel at Arnold Air Force Base in Tennessee. (Photo courtesy of NNSA)

Wind tunnel tests support improved aerodynamic design of B61-12 bomb

By Sue Major Holmes

Sandia has finished eight days of testing a full-scale mock unit representing the aerodynamic characteristics of the B61-12 gravity bomb in a wind tunnel.

The tests on the mock-up were done to establish the configuration that will deliver the necessary spin motion of the bomb during freefall and are an important milestone in the Life Extension Program to deliver a new version of the aging system, the B61-12.

The B61 must spin during flight — spin that is controlled by a combination of rocket motors and canted fins on the tail. Engineers determined from flight tests in the 1990s that plumes from the rocket motors worked against the fin performance, counteracting the torque from the motors and reducing the vehicle spin rate. Sandia engineers termed that phenomenon "counter torque."

But data from a 2002 wind tunnel test to characterize counter torque were not fully applicable since the B61-12 uses a significantly different tail design than earlier versions. Engineers needed another series of wind tunnel tests to characterize counter torque on the new configuration to give them confidence the new system will meet the required spin environment in flight, says Vicki Ragsdale (2159).

Although Sandia has its own wind tunnels, the complex test required a wind tunnel big enough for a full-size mock B61. Most wind tunnel tests use models smaller than the actual flight hardware, but the physics of the B61 rocket motors cannot be replicated on a reduced scale. Sandia turned to the US Air Force's Arnold Engineering Development Center on Arnold Air Force Base in Tennessee, which has the nation's largest wind tunnel capable of the required air speeds, as well as considerable experience testing jet interactions similar to those on the B61. The 2002 test was conducted in the same wind tunnel.

The new test, which took three years to plan, was designed to explore the chaotic behavior of the counter torque and its implications for B61 aerodynamics.

Test improves understanding of previously uncharacterized phenomenon

When the data began rolling up on computer screens in the wind tunnel control room during February's test, Sandians were on hand to analyze the information immediately. They crunched numbers and debated physics for several days, and determined the test had uncovered a previously uncharacterized physical phenomenon that Sandia researchers believe arises uniquely because of the unusual shape of the rocket motors and from other features. The theory they had been using was based on a simpler configuration.

The Sandia team revised the remainder of the wind tunnel tests to provide fresh data to unravel the complex physics of the behavior observed at near-sonic flow conditions. The improved understanding will inform the design of the B61-12 and provide an additional technical basis for the well-characterized performance of the versions of the B61 in the current US stockpile.

"We were able to come up with a theory for where this effect is coming from," Vicki says. "It's not a wind tunnel effect and it is something we will see in flight, so we have to account for it."

Jerry McDowell

(Continued from page 1)

Director Paul Hommert to President Barack Obama, through the secretaries of Defense and Energy and the chairman of the Nuclear Weapons Council. He assured the audience Paul would say that signing the document conveys "the confidence I feel from the cumulative effect of all the experts that I have at the laboratory."

Smallest stockpile since Eisenhower era

Today, the US stockpile is the smallest since the Eisenhower administration, and the average age of the weapons in it is the oldest ever, Jerry said. He predicts the stockpile will continue to shrink, intensifying the emphasis on making sure it's safe, secure, and effective.

Sandia, faced with a push in recent years on modernization, moved money for new tools and facilities to weapons design, Jerry said.

The Labs will deliver on its nuclear weapons programs, he said. But for Sandia's long-term benefit, that can't be done "at the expense of starving our core capabilities or our infrastructure," he said.

"This is the blood, the bone, the sinew, the tendons; this is what makes this place work," he said.

In a question-and-answer session, Jerry listed specific upgrades for buildings and tools and singled out materials science. Funding for that area is down from what it was about a decade ago, which could impede a long-term commitment to fundamental materials research, he said.

Modernizing the stockpile also is about making sure the nation understands the threats it faces in today's world, he told the audience. He expanded on that thought in answering another question, saying the US must take a realistic look at how evolving relationships with other countries shape stockpile needs and adaptability.

"There's nothing about nuclear deterrence that kept the Russian forces out of the Crimea and I don't think we ever expected that," he said. "There's nothing about nuclear deterrence that's going to keep a suicide bomber from getting on a bus in some country and causing horrific damage. But there's still a role for nuclear deterrence to play. Security will be a more balanced approach. . . . There's a role for nuclear weapons and there's a role for other national security activities that leverage off the nuclear weapons capability base."

World's safest, most effective stockpile

Jerry also said the US stockpile — "unquestionably the world's safest and most effective" — faces a changing world, and what works for stockpile surveillance now may not in the future. Surveillance today is based on sound statistics for a stockpile of a given size, but Jerry wonders what happens if it becomes significantly smaller. "Would you still use this statistical approach to surveillance? Would you capitalize on modeling capabilities? Instead of being retrospective, 'I'll catch what has already happened,' would you try to be prospective, 'I'll try to predict when a problem might arise.'"

Sandia must think about such questions to keep from becoming complacent, he said. "So don't forget you must always exercise your talent, you must always renew your capability, you must always be open to change and to getting better," he said. "That's fundamental."

To see the webcast (available only on Sandia's internal website), go to http://tiny.sandia.gov/3pyyh.

MURAT OKANDAN (1719) holds one of the microscale actuators that could lead to better understanding of brain function, which could help with prevention, diagnostic, and treatment techniques for brain disorders. (Photo by Randy Montoya)

Watching neurons fire from a front-row seat

By Stephanie Hobby

They are with us every moment of every day, controlling every action we make, from the breath we breathe to the words we speak, and yet, there is still a lot we don't know about the cells that make up our nervous systems. When things go awry and nerve cells don't communicate as they should, the consequences can be devastating. Speech can be slurred, muscles stop working on command, and memories can be lost forever.

Better understanding of brain function could lead to new prevention, diagnostic, and treatment techniques, but the brain is complex and difficult to study. If you were to hold it in your hand, you would likely marvel at how much your brain feels and moves like Jell-O. This tissue is laced with neurons with tiny cell bodies, which generate electrical signals to control nervous system functions. Those signals can be recorded and measured if a suitably small electrode is in the vicinity, but that presents challenges. Brain tissue is always moving to different degrees in response to the subject's movement and breathing patterns. In addition, the nerve tissue is incredibly sensitive, and if disrupted by a foreign body, the cells trigger an immune response to encapsulate the intruding probe and barricade it from the electrical signal it's trying to capture and understand.

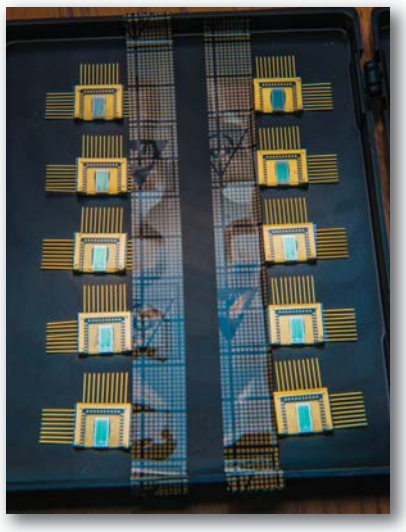
Working to develop intelligent neural interfaces

That challenge led Jit Muthuswamy, an associate professor of biomedical engineering at Arizona State University, Tempe (ASU), to pursue a robotic electrode system that would seek and maintain contact with neurons of interest in a subject going through normal behavioral routines. "We are working to develop chronic, reliable, intelligent neural interfaces that will communicate with single neurons in a variety of applications, some of which are emerging and others that are almost to market," Muthuswamy says. "Things like brain prosthesis are critically dependent on us being able to interface with single neurons reliably over the course of a patient's life with a prosthetic application."

Key to the success of the above robotic approach are the microscale actuators that would be needed to reposition the electrodes. This led Muthuswamy in 2000 to seek out Murat Okandan (1719) and the unique microsystems engineering capabilities available at Sandia's MESA facility.

"The process flow we use to make these isn't available anywhere else in the world, so the level of complexity and mechanical design space we had to design and fabricate these was immensely larger than what other researchers might have," Murat says, adding that he has been working with Muthuswamy's research team since that initial contact to find a suitable method to track individual neurons as they fire.

In the past, probes were made of a sharpened metal wire, inserted in the tissue. The closer the probe is to the neuron, the stronger the signal, so experimenters ideally try to get as close as possible without disrupting surrounding tissue. The problem is that even a thin wire is too big; such a probe can take measurements around the neuron, but is far too cumbersome to be reliable for long durations.



THE MICROSCALE ACTUATORS' unique design provides significantly more data than scientists have previously had access to. (Photo by Randy Montoya)

Equally important is capturing the signals from an awake animal; given their size and rigidity, current probes are generally not suited to gather recordings as the animal responds to its environment. Those units are not self-contained, hindering the ability of the animals to move around freely.

The microscale actuators and microelectrode are critical to addressing both of those issues and interacting with individual nerve cells with minimal damage to surrounding tissue. The microscale actuators and associated packaging system developed at ASU and Sandia enable the probe to move autonomously in and out of the areas surrounding the cell collecting measurements while compensating for any movement in the neuron or brain tissue.

About the size of a thumbnail, the self-contained unit has three microelectrodes and associated micro actuators. When a current runs through the thermal actuator, it expands, and pushes the microelectrodes outward over the edge of the unit, which is flat to fit against the tissue. Because the actuator is so small, it can be heated to several hundred degrees Celsius and cooled again 1,000 times per second. It takes 540 cycles to fully extend the probe, but that can be done quickly — in a second or less.

Scale of this system is unique

Thermal actuators have been used for years at Sandia and elsewhere, but the scale of this system is unique. "The idea that we could build this system to achieve multiple millimeters of total displacement out of a micron-scaled device was a significant milestone," says Michael Baker (1719), who designed the actuator. "We used electrostatic actuators in the past, but the thermal actuator provides much higher force, which is needed to move the probe in tissue."

The microelectrodes are made of highly doped polysilicon, which the team discovered has a number of advantages. It is almost metal-like in its conductivity, but durable enough for millions of cycles and provides a high signal-to-noise ratio, which is much greater than previous wire probes, and provides high-quality measurement signals.

Muthuswamy and Murat are currently developing the capability to produce richer data with resolution in the sub-micron range to be able to go inside cells and take measurements there. They are also working on stacking the existing chips and decreasing the space between probes. Muthuswamy's Neural Microsystems lab at ASU has developed a unique stacking approach for creating a three-dimensional array of actuated microelectrodes. "By building a three-dimensional array, we would have access to significantly more information, rather than just a slice," Murat says. "We're very encouraged by the progress we have made, and are looking forward to building on that progress."

Resilient cities focus of new Sandia, Rockefeller Foundation pact to help 100 communities worldwide

Scientific, engineering solutions for disaster recovery, sustainability

By Heather Clark • Photo by Randy Montoya

Sandia will bring decades of experience solving problems with practical engineering and modeling complex systems to cities around the world under a new agreement to support the 100 Resilient Cities Centennial Challenge, pioneered by the Rockefeller Foundation.

The challenge, which will help 33 cities in its first year, seeks to make communities more resilient — better prepared to withstand natural or manmade disasters, recover more quickly, and emerge stronger.

"We are eager to partner with the 100 Resilient Cities Centennial Challenge," says Jill Hruby, VP of International, Homeland, and Nuclear Security, who signed the memorandum of understanding. "We see this as an opportunity to bring the best minds in science and engineering to help people around the world recover from the shocks and stresses of modern threats and times."

Michael Berkowitz, managing director of 100 Resilient Cities at the Rockefeller Foundation and the CEO of the 100 Resilient Cities Centennial Challenge, says, "We're excited to welcome Sandia National Laboratories as the newest partner to the 100 Resilient Cities platform, and for them to begin offering 100 Resilient Cities network members Sandia's technical expertise in developing risk assessments, modeling complex systems, and finding innovative engineering solutions that can help cities build resilience."

Five-year partnership to bring framework of best practices to cities

Sandia has developed resilience methodologies, models, and other tools that could be used to create a resiliency framework based on best practices worldwide, but adapted to cities' individual needs, project lead Charles Rath (6921) says.

"The ultimate goal is to improve global stability by kick-starting a worldwide resiliency movement," he says. "We want to use this experience to develop models and best practices that can be shared with cities across the world."

Under the five-year memorandum, Sandia will supply cities with a toolkit of infrastructure and socio-economic models that will help local leaders better assess specific resilience challenges, set priorities, and select the most cost-effective way to address them.

"Sandia's experts have deep knowledge in how to address nearly every challenge a city might face — everything from how to make its energy grid more resilient to how to achieve a more clean and sustainable water supply," Charles says.

Among Sandia's experts who will work with cities:

Systems risk analyses define threats, vulnerabilities, and consequences

Trisha Miller (8116), a systems risk analyst, helps cities think about threats facing them, how a city might be vulnerable to those threats, and what the consequences are.

To define a city's risk, Trisha taps experts across the Labs to look at the likelihood of natural or manmade disasters. In the case of terrorist attacks, she tries to understand how someone who wants to harm a city would be motivated, make decisions, and act.

To assess a city's vulnerabilities, Trisha ties together threats and consequences to uncover potential weaknesses. The analyses also identify critical infrastructure, such as transportation, electricity, communications, hospitals, and other facilities that would be vulnerable.

Finally, the analyses identify potential consequences, such as how many people would be injured in a natural disaster or how many buildings would have to be closed, to help cities prioritize how to become more resilient, she says.

"We're a systems engineering lab. That means we look at processes from end to end, defining the problem, identifying the needs, defining the requirements, engineering a solution, and making it happen," Trisha says.

Looking at complex systems — in this case, cities — also encourages municipal developers to address multiple risks, rather than create a separate plan for each hazard, she says.

This process "helps cities prioritize and have an explanation of why they're investing in one thing versus another," she adds. "It helps build consensus."

Electrical grid experts at Sandia bring resiliency to power supply

Abraham Ellis (6112), an electrical grid expert, works with a team on infrastructure resilience to prevent the kind of damage suffered in New York and New Jersey after 2012's Superstorm Sandy.

Sandia researchers are using the Labs' Energy Surety Design Methodology, which has a successful track record at military facilities, for two projects in New Jersey funded by DOE.

Sandia is working with the city of Hoboken, N.J., to assess and develop designs for improving the resiliency of the city's electrical grid after the storm.

Sandia also is working on a study with New Jersey's Transit Corporation, NJ TRANSIT, to provide a resilient energy supply system to trains running between New York and New Jersey during power disruptions.

Sandia is providing NJ TRANSIT with a design concept for a microgrid, which, if built, would be the largest microgrid by capacity and geographical footprint in the US, Abe says. A microgrid is connected to a utility electrical grid, but can also operate as an "island" grid that self-sufficiently produces power when there is a disruption in the main grid.

The power system is being planned with resiliency in mind. For example, the generation plant and transmission and distribution lines will be protected from wind and storm surges, he says.

Resiliency requires planning ahead for disasters that might happen once every 50 years or more. That can cost millions of dollars up front, but can reduce a city's exposure to billions of dollars in economic impact and repairs after a disaster, he says.

Abe is excited about working with city governments and believes resiliency can become an attribute of cities, just like quality schools and clean water.

"Resiliency should contribute to the economic vitality of a city," he says.

Clean water a human right, integral to resilient cities

Hydrologist **Vince Tidwell** (6926) believes access to clean water is a human right and works toward that end in his profession and as a volunteer traveling to South America and Africa to provide technical know-how.

"It's always been in my heart. I'm trying to give back a little bit of what we take for granted in the US by recognizing that a lot of people don't have access to good, clean water," Vince says.

In the US, helping cities with water issues has expanded in recent years from a focus on natural disasters or malevolent activity that affect water supplies to include more chronic issues of population growth and climate change and their impact on water resources.

Like many Labs researchers, Vince can work with cities to study their entire systems by taking into account water issues along with other concerns. "We're really bringing together the energy, the water, the land, the food, environmental issues, looking across the board in trying to fashion a more holistic view of how these work together," he says.

For example, Sandia can help explore the interplay between water and energy, water and food supply, or other trade-offs; the laboratory can help developing cities provide safe drinking water, sanitation, or build needed infrastructure in a cost-effective and efficient manner through the use of technology; or perhaps identify specific technologies to produce clean drinking water.

Vince recognizes that many cities already have high-caliber water experts. He envisions a collaborative approach with cities to understand water-related issues, perhaps running scenarios and see how different solutions affect outcomes.

Mark Ehlen (6924), co-project lead, says citizens in resilient cities should notice the benefits of resiliency not only during disasters, but also in their everyday lives.

"A resilient city is livable and workable. There's clean air, a good standard of living, not too much congestion, housing and education are affordable, and there's a sense of community," he says. "Resilient cities can evolve over time to accommodate an increase in population, increased disparities in income so that in the long-term, social mobility is preserved."

Hard work and generous spirit

Volunteers recognized for hard work, commitment to the community

By Stephanie Holinka

GUEST SPEAKER at the Sandia Serves Volunteer Breakfast Angela Reed Padilla, right, CEO of Big Brothers Big Sisters of Central New Mexico, thanked the employees for their service, and challenged them to participate in the Mentor2.0 program (see details in the story below). Some 250 Sandia volunteers attended the breakfast, which honored the 1,000 Sandians who logged more than 105,000 volunteer hours in the community last year. Joining Padilla at the podium is a student participant in Big Brothers Big Sisters' Mentor2.0 program.

A few recent events acknowledged the hard work and generous spirit of Sandia's many volunteers.

At the annual Sandia Serves Volunteer Breakfast on April 10, Sandia honored the many employees, contractors, and retirees who selflessly donate their time and talents to better the community. Approximately 250 volunteers attended the event.

Nearly 1,000 Sandians logged more than 105,000 volunteer hours in 2013 in activities ranging from mentoring children and rescuing animals to building computer labs and houses.

"Sandians are generous with their time and talent," says Patty Zamora (3652), coordinator for the breakfast. "The event recognizes their service and lets them know we're grateful for all they do."

Community Involvement Dept. 3652 Manager Amy Tapia served as the event host and master of ceremonies.

Human Resources Center 3500 Director Karen Gardner opened the breakfast by discussing the generosity of Sandia employees, not only in terms of time and service but also monetarily, pointing out that Sandia contributed over $6 million to United Way and more than $13,000 to Shoes for Kids. Karen noted that Lockheed Martin Corp., on behalf of Sandia, donates more than $1.4 million annually to nonprofit organizations in support of science, technology, engineering, and math (STEM) education, supporting veterans, and meeting basic human needs.

Ted Kreifels (424) discussed his experience as a mentor, expressing both the joys of knowing the ways in which his efforts made a difference and his occasional struggles when he was less sure of the impact.

Guest speaker Angela Reed Padilla, CEO of Big Brothers Big Sisters of Central New Mexico, thanked the employees for their service. She challenged them to participate in the Mentor2.0 program (see story below), which uses technology to partner students in two schools with a mentor. Using technology for much of the interaction between the mentee and mentor allows more time-stretched volunteers to participate.

PROJECT LINUS volunteers were among the some 250 Sandians who attended the Sandia Serves Volunteer Breakfast last week. Project Linus was born in the 1990s when the founder read about children finding comfort in security blankets. She began making blankets to donate to children's hospitals and was soon joined by other volunteers. There are now over 100 chapters in the US.

Last week, Community Involvement Dept. 3652 also accepted the "Corporate Star Award" on behalf of Sandia at the Mayor's Day of Recognition. The award was given to the Labs for excellence in volunteerism.

More than 280 Sandia employees were also recognized with the President's Volunteer Service Award, given to individuals, families, and groups that logged more than 100 volunteer hours in a year. The award was established by executive order in 2003 to encourage Americans to donate more than 4,000 hours, or two years of their lives, to community service.

SALVADOR RODRIGUEZ (6221), seen here with Albuquerque Mayor Richard Berry, was recognized for his creation of Manzano Mesa elementary school's science club and his work on the Manos program. He was one of dozens of Sandians recognized for their volunteer activities.

Mentor 2.0 programs changes lives: of kids and mentors

Note: Community Involvement Dept. 3652 Manager Amy Tapia wrote this first-person account of her experience as a volunteer mentor for a high school student.

Dear Sandia Serves volunteers,

High school graduation can be a stepping stone, a final milestone, or sometimes a stone wall. As a result, many New Mexico students do not see college on their horizon. I hope to help Mary (not her real name), a freshman at South Valley Academy, have the skills she needs to navigate the path to college graduation.

I am Mary's mentor through the Big Brothers Big Sisters' technology-enriched mentoring program Mentor2.0. More than 30 of us from Sandia are completing our first school year with students at South Valley Academy and Amy Biehl charter schools. I signed up because it sounded like a pretty easy way to mentor a student. I went to a short interview and training, submitted information about myself, and waited for my "match." In the fall, I received my first email from Mary. I was pleased to learn that we had a lot in common, and the online platform guided me through my response. I have to admit: In my first email to Mary, it took me more than an hour to compose two paragraphs! I found myself reflecting about my own experiences as a freshman, and thinking about some of the differences between Mary's life and my own. During the year, we have enjoyed many guided emails focused on non-cognitive skills like perseverance, resiliency, and self-advocacy, and we get together at the school once a month. Mary is a good student, but she is very shy. Her grades are lower than they might be because she is uncomfortable participating in class. We have set goals to help her, and this week she shared that she successfully completed a classroom presentation. It was a joy to see the pride in her face as she told me that her heart did stop pounding by the end of the presentation.

The challenges these students face include academic, family responsibilities, peer pressure, and social challenges. One of the unique aspects of the program is that the students are participating in a Mentor2.0 class. A Big Brothers Big Sisters staff person teaches the class and gets to know the students. She reads the emails and checks in regularly with the mentors, providing invaluable advice. I also appreciate the community atmosphere at the monthly gatherings with mentors and students.

Being Mary's mentor is very rewarding and I am looking forward to seeing her graduate in 2017. I want to help her build her self-confidence, seek educational options, and explore career opportunities. I am excited to be a part of her journey.

The Mentor2.0 program is recruiting mentors for the 2014-2015 school year. Find out more by visiting www.bbbs-cnm.org/mentor2.0, by calling 505-837-9223, or by emailing mentor2.0@bbbs-cnm.org. Apply by going to https://bbbs-cnm.imentorinteractive.org/.

Sincerely,
Amy Tapia

Employee death:

Jim Keagy: Gentle family man was quiet but funny — and serious when he had to be

JIM KEAGY and Pam Schorzman (4128) at Tonopah Test Range at the end of a B61 drop test recovery mission. Jim, who passed away at age 61 in late March, was based in Albuquerque but participated, directly or indirectly, as a radiological control technologist in every Joint Test Assembly test at TTR for more than 10 years. Jim loved being part of the TTR community and the feeling was mutual. (Photo by Jim Galli)

Here's a little story: Jim Keagy and a colleague used to have so much fun in each other's company that their project leads decided to move them to separate offices. Far from putting a damper on Jim's spirits, the change drew out the mischievous side of his personality. The next day, he and his buddy hung Progresso soup cans on a string between their offices, which, of course, elicited some hearty laughs and maybe sent a sly message: We'll work hard, but we'll have fun, too.

Jim, a radiological control technologist in Dept. 4128, died in late March at age 61 after a tough year of medical challenges.

Jim was a gentle man — on that everyone agrees — and the quiet type. Quiet, but not retiring: He knew his stuff at work and with his earthy sense of humor was great at making his colleagues laugh out loud. It was just fun working with the guy.

He was a man, too, who had very clear priorities in his life: faith, family, friends, and work. He was a man who found a deep Christian faith, was a devoted husband, father, and grandfather, a great friend, and, at work, totally committed to Sandia's values, not least of which included a strict commitment to excellence. His friend John Walter (4128) says, "Jim brought his Christian beliefs to work and tried to live by them: Do unto others and always have a kind word. He will be greatly missed by all who knew him."

And his family was always front and center in his heart and mind, John says. "His computer screensaver always had photos of his wife, Connie. He loved his kids and his grandkids and always talked about them and how proud he was."

Jim loved the simple things in life: Four-wheeling and fishing in the mountains were favorite pastimes. He even enjoyed mowing the lawn.

JIM KEAGY with his granddaughter. Jim's priorities were faith, family, friends, and work.

A member of the TTR family

If family was a priority for Jim — and clearly it was — then work, for him, was like having a second family.

Pam Schorzman (4128), a rad control tech who worked with Jim for almost four years, remembers that when she came into Dept. 4128 she knew very little about the weapons side of Sandia.

"Jim took me under his wing and mentored me. He took me on my first drop test recovery out in Tonopah," recalls Pam.

Those tests require RCT support and Jim loved being there, being close to the action, supporting the mission where the rubber really meets the road.

"I was at TTR [the Tonopah Test Range] last week," Pam says, "and the people out there are at a loss because they loved having Jim as much as he loved being there. He is truly missed but he will always be a part of our team."

TTR Test Director Rick Scarine worked with Jim for 10 years, during which time Jim was involved, directly or indirectly, in every Joint Test Assembly test performed at the range.

"Jim was a treasured member of our TTR test team," Rick says. "We'll miss his professionalism and his dry sense of humor, but mostly, we'll miss his friendship. Jim was the best."

Jim's son-in-law, Chris McKean (4127), would agree. "In all my life I haven't known anyone who was more supportive personally or professionally," he says. "He was a respecter of persons, in the good way. He listened as well as anyone could, spoke less than most, and was a genuinely good man. His sense of humor was endearing, often slightly off-color, and always as dry as burnt toast. He was my father-in-law, but calling him that is less than what he was; he was a great friend."

That sense of humor showed up in some unlikely ways. For example, Jim strung along Chris Mullaney (4236) with a running gag for years. As Chris, an emergency planner and long-time veteran of Sandia's emergency response team, tells it, "I had been deployed with Jimmie, had responded with him, and worked with him quite a lot. We were friends. When you go on travel with someone, you get close, you get to know them more. I always thought I was older than him because he told me so, repeatedly, until I saw in his obituary that he was actually my senior by seven or eight years. That's funny, and that was Jimmie. He was a great guy."

A great combinations of skills and temperament

Jim was not all fun and games. He could be all business, too. Colleague Richard Stump (6623) recalls that "As an emergency responder for the Radiological Assistance Program and Accident Response Group, Jim was always ready to serve in any way possible. Regardless of the date or time, Jim was among the first to answer a page or a request for help. Jim will be greatly missed by our emergency response teams."

And Jim brought more than a strong technical bent to the task at hand. Says Ted Simmons (4128): "Jim had the perfect combination of technical and soft skills for his work. When screening spectators at major events, for example, he could gently get someone aside, determine they were a nuclear medicine patient, and then send them on their way without threatening them or degrading their experience. He was a model Sandia technologist."

As good as Jim was at his job, as dedicated as he was to it, it is not so much the crackerjack RTC that his colleagues remember as the man, the friend.

Bob Morrison (2950) recalls the three years he spent as Jim's officemate in T-City. "He was a great and godly man," Bob says, "and I'm proud to say, friend. We enjoyed many a lunchtime together listening to Rush Limbaugh and Dr. Laura — wondering who would ever want to call into her — until we just got fed up and had to change the station. I look forward to seeing Jim again."

And Al Horvath (6634) remembers of Jim, "He would always be the one to go out of his way to help others. Sandia is better for the time that he was here and worse off because he is gone. He will be greatly missed."

Eric Staab (5403), who worked with Jim for many years, says, "He was the big brother I never had." The two, Eric and Jim, loved to walk at Harding Field.

"We often spent time together walking under the trees, talking and listening to the cicadas chatter. During those walks, he'd sometimes talk about his wild and free days in the distant past, in the days before he found his faith. Jim loved to eat and I often met him for lunch at the bowling alley on base for green chile stew and then dessert at DQ. More than anything else, I would like the time to have one more lunch with Jim to say goodbye."

Jim, a longtime resident of Pampa, Texas, before moving to Albuquerque in 1992, is survived by his wife Connie, to whom he was married for 36 years; a daughter, Jane McKean and husband Chris of Albuquerque; a son, David Keagy and wife Christine of Dallas; his mother, Marilyn Keagy of Pampa; three sisters, four grandchildren, and several nieces and nephews.

— Bill Murphy

Jim Keagy: Opening his home and his heart

Colleague Pam Schorzman (4128) shares a story that reveals the deeply generous nature of Jim Keagy, who passed away at age 61 in late March:

"A while back," Pam writes, "Jim and his wife Connie went out for the evening to a little place in Nob Hill. There was a gentleman there singing. When he was done, Jim overheard the man talking to his wife about where they would spend the night. Apparently they lived out of their truck as they traveled across the country. Jim and Connie talked it over and invited the couple to spend the night at their home. As it turned out, the man had been a contestant on the show 'The Voice' and had been told he was not going to return, so he started traveling across the country performing. The couple took them up on their offer. When they left the next day, Jim told them that they had an open invitation to stay whenever they were in the area.

"I attribute his kindness from his upbringing in his small hometown of Pampa, Texas," Pam says. "That kindness never left him."

Mileposts

New Mexico *photos by Michelle Fleming*


David Campbell
35 1767


G. Ronald Anderson
30 1718


Walter Gill
30 1532

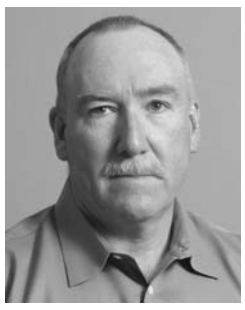
Recent Retirees


Carol Ashby
34 7911


Gordon Leifeste
30 1647


Len Lorence
30 1341


Glenn Rackley
30 2616


Bobby Rush
30 5342

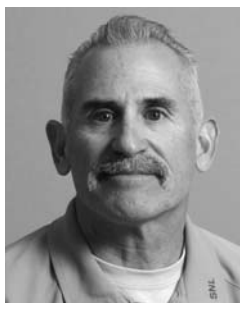

Danny Thomas
30 2136


Jim Lee
33 1300


Cassandra Shaw
21 711


Randy Williams
30 5358


Charles J.E. Montoya
25 6012


Ruben Padilla
25 4237


Randy Peterson
25 6510


Sue Phelps
25 5785


Gwen Lunsford
19 2957


Susie Bowling
13 10598


Steve Silva
25 6622


Patricia Smith
25 5351


Jay Vinson
25 2910


Michael Wilson
25 6921


Kathy Congable
20 754


Becky Krauss
20 11000


Analisa Martinez
20 5403


Lori Montano-Martinez
20 2555


Sandy Pino
20 10679


Tazmin Ralph
20 10520


Joe Simonson
20 1716


David Chacon
15 857


Jeremy Cottle
15 10221


Frank Dempsey
15 1526


Anita Dotson
15 243


Carla Forrest
15 2951


Adam Green
15 2624


Arne Gullerud
15 5417


V. Dina Howell
15 10662


Kristy Kaneshiro
15 901


Monico Lucero
15 10221


Mary Ann Monia-Archibeque
15 6521

Michael Morgan
15 1718

Jacquelyn Rambo
15 2722

Brian Rigdon
15 5634

Tracy Sanchez
15 5338

Jason Shepherd
15 5621

Sandia Classified Ads

MISCELLANEOUS

FICUS TREE, 4-ft., houseplant needs new home, healthy, but needs bigger pot, free. Wallis, 505-681-7785.

GUITAR AMP, Fender Champ DSP 30, $40. Stubblefield, 263-3468.

DVD PLAYER, Sony DVP-SR500H, w/remote, $25; queen mattress, Sealy Posturepedic w/box spring, excellent condition, $350. Hennessey, 915-241-8634.

GOLF SET, Tourline III, 2PW, U Grouve, graphite shafts, $100; tennis racquets, like new, Prince or Wilson, $50 ea. OBO. Garcia, 280-5815.

CORNER DESK, w/90-in. bookcases, file cabinets, 120-in. of working space. Halbleib, 797-4979.

BEDFRAME, queen, w/wood pencil posts, canopy, ornate iron foot/headboard, American Furniture, $140. Diaz, 821-0868.

GUITAR AMP, Fender, 1967 Super Reverb, 4-10-in. speakers, 40-Watt, excellent condition, $2,200 negotiable. Pregent, 294-0033.

iPAD, 3rd gen, w/original charger, case, HDMI out, USB/SD card adapters, excellent condition, $300. Elisberg, 505-550-1632.

GUITAR AMP, VOX Valvetronix VT100, 100-Watt, 2-12-in. speakers, purchased new in 2010, unused for 3 yrs., $400 OBO. Dawson, 281-1235.

LEATHER COUCH, white, Natuzzi, $750; black futon, $50; 26-in. Vizio computer monitor, w/built-in speakers, $100. Walkington, 505-235-1025.

HDTV, RCA, 50-in., 1080i CRT, picture needs work, great condition, you haul, free. Vrooman, 249-8414.

SECTIONAL, 3-pc., w/2 recliners, excellent condition, photos available, $325 OBO. Rutten, 869-6381, ask for Elaine.

ROLL-TOP DESK, oak, nice, 7 drawers, 9 cubbies, heavy wood, brass handles. Silva, 345-1779, ask for Mannie.

GE WALL OVENS, 27-in., 2, good condition, 1 needs control board, will replace, $430/both. Banks, 293-5248.

CABINET VANITY, wood, double basin, & more, $475; trailer hitch, 3,500-lb., $50; bamboo tiki torches, 4, $20; TV wall mount, w/bolts, $25; framed artwork, Rufino Tamayo, $125. Ramos, 972-951-0290.

LED TV, 32-in., Insigna D310, new in box, w/warranty, Best Buy, $150. Wong, 515-4087.

HIGH CHAIRS, 2, Fischer-Price Space Saver, $20 ea.; Graco Pack n' Play, 2, $30 ea.; excellent condition. Carroll, 292-5436.

MATTRESS, queen, box spring, frame, chosen carefully for my back, excellent condition, must go, $250. Nguyen, 217-778-9378.

35MM CAMERA, Canon Rebel X, w/24 x 70mm, 80 x 200 mm lens, 200E flash, Spacemaster mount & case, $35. Flores, 296-7919.

PIANO, Acrosonic Baldwin, upright, $600. Endres, 263-1616.

GOOSENECK FLATBED, 20-ft., 2-axle, dual wheels, 24K GVW, 5-ft. beaver tail, 3 loading ramps, $8,500. Fleming, 869-9165.

CARGO CARRIER, Yakima Space Booster, 6' x 2', excellent condition, $300. Serna, 301-8652.

PIANO, professional upright, 48-in. Studio Hallet-Davis, storage bench, gloss black, like new condition, $2,800. Robinson, 505-252-2264.

GATHERING TABLE, tall, wood, w/4 chairs, only 2-1/2 yrs. old, dark two-tone, $300. Ortiz, 554-8494.

ANTIQUE RADIOS; Philco model 41-295, working, $175; RCA Radiola 60, not working, $75. Bobbe, 505-350-9544.

HOT TUB, 7' x' 7', seats 5-6 people, new cover, always indoors, remodeling & need the space, you haul, $750 OBO. Schluter, 505-281-5954.

LUXURY WHEEL COLLECTION, Dropstar, 4, brand new, still in box, DS20 Rimz, size 20x8.5, $1,000. Gutierrez, 505-917-0763.

DESK WRIST WATCH, Timeworks Clock Company, brand new, photos available, originally $120, asking $55. de la Fe, 903-0717.

'14 2SS CAMARO RIMS, only 3 mos. old, (2) 20x8.5, (2) 20x10, $600 firm. Casias, 814-4866.

ARMOIRE, like new condition, photos available, $200 OBO. North, 715-7430.

BUNK BED, metal, full/twin, w/futon, $250; oak desk armoire, $150; photos available. Hernandez, 505-200-2520.

TREADMILL, folding, 3.0-chp motor, whisper weave tread belt, originally $1,500, asking $200; recumbent exercise bicycle, Pro-Form 965 R, great working condition, $75. Felix, 573-0595.

ELECTRIC GOLF CART, almost new, needs new batteries, $1,500; elliptical trainer, $100; treadmill, $175. Marsh, 350-1339.

FLAGSTONE, large rose & peach colored pieces, ~200-sq. ft. available, $2/sq. ft. Eller, 417-4390.

DESKTOP PC, Dell Inspiron 580S, Intel Core i3, Win7, 6 GB RAM, 1TB HDD, $175. Elmazi, 505-856-2197.

DINING SET, solid oak, 42-in. round, w/leaf, extends to 42" x 60", 4 chairs, excellent condition, $250. McDonald, 554-2048.

GOLDEN RETRIEVER PUPPY, male, health guarantee, first shots, parents on premises, AKC, permit #VILL0021, $700. Fullmer, 505-916-4825.

HOME THEATER PROJECTOR, Pioneer Elite Kuro HD, 3 D-ILA chip for ultimate picture quality, $1,300. Laskar, 856-7806.

ELLIPTICAL, Pro-Form 6.0 ZE model no. PFEL3909.1, 64"H x 46"L, 1 yr. old, like new, $225. Mattern, 823-9543.

PORTABLE AIR CONDITIONERS, 3: 10,000-BTU, Sharp, $300; 8,000-BTU, Commercial Cool, $250; 5,000-BTU, Electrolux, $250. Meinelt, 350-3255.

REFRIGERATOR, Frigidaire, side-by-side, black, water/ice in door, clean, works perfectly, you pick up, $250. LaFleur, 379-1709.

PICKUP BED TRAILER, 3/4-ton overloads, camper shell, 16-in. tires, $350. Fleming, 869-9165.

BEDROOM SET, full-size mattress, headboard, footboard, frame, 6-drawer dresser, mirror, 2-drawer nightstand, honey color, $500. Ulibarri, 881-3551.

STROLLER, Eddie Bauer, excellent condition, paid $350, asking $60; 4-drawer chest, large mirror, $300; antique armoire, $800; Heywood Wakefield buffet, $500 OBO. Brown, 505-232-2626.

How to submit classified ads

DEADLINE: Friday noon before week of publication unless changed by holiday. Submit by one of these methods:

- **EMAIL: Michelle Fleming (classads@sandia.gov)**
- **FAX: 844-0645**
- **MAIL: MS 1468 (Dept. 3651)**
- **INTERNAL WEB: On internal web homepage, click on News Center, then on *Lab News* link, and then on the very top of *Lab News* homepage "Submit a Classified Ad." If you have questions, call Michelle at 844-4902. Because of space constraints, ads will be printed on a first-come basis.**

Ad rules

1. Limit 18 words, including last name and home phone (If you include a web or e-mail address, it will count as two or three words, depending on length of the address.)
2. Include organization and full name with the ad submission.
3. Submit ad in writing. No phone-ins.
4. Type or print ad legibly; use accepted abbreviations.
5. One ad per issue.
6. We will not run the same ad more than twice.
7. No "for rent" ads except for employees on temporary assignment.
8. No commercial ads.
9. For active Sandia members of the workforce, retired Sandians, and DOE employees.
10. Housing listed for sale is available without regard to race, creed, color, or national origin.
11. Work Wanted ads limited to student-aged children of employees.
12. We reserve the right not to publish any ad that may be considered offensive or in bad taste.

TRANSPORTATION

'09 F150 LARIAT, 64.8K miles, $21,000. Buckler, 505-489-8560.

'05 FORD FOCUS, manual transmission, PW, PL, AC, CD, high miles, good condition, $1,700 OBO. Russell, 505-424-9700.

'01 BMW Z3, heated leather seats, black interior, power soft-top, sterling gray, 62K miles, $15,000. Miller, 281-3696.

'09 TOYOTA AVALON LIMITED EDITION, 41.5K miles, pristine condition, $19,000. Lloyd, 280-6130.

'06 BMW 330ci, ZHP pkg., manual transmission, bright silver, 80K miles, $13,000 OBO. Pholphiboun, 505-400-1457.

'12 HYUNDAI ELANTRA LIMITED, fully loaded, Bluetooth iPod control, GPS, full warranty, 41K miles, $16,900. Rudys, 235-5602.

'08 SUBARU OUTBACK, AT, 5-spd. overdrive, leather, dual moon roof, 80K miles, very good condition, $14,500. Marchand, 205-8098.

'99 TOYOTA SIENNA LE, fully loaded, 1 owner, 119K miles, good condition, $3,950. DuBay, 268-0307.

'99 LEXUS RX300, for parts or project, mechanic says engine has no compression, $1,250. Lifke, 505-382-9448.

'09 NISSAN 370Z NISMO, red, 350-hp, 6p Synchro transmission, 12.2K miles, near mint condition, $29,500. Osuna, 508-363-4124.

'02 DODGE GC SPORT, V6, AT, new battery & windshield, blue, 180K miles, $3,200 OBO. Haddal, 831-236-4105.

'00 FORD RANGER, super cab, standard, bed liner, 200K miles, excellent condition, $4,100 OBO. Crosby, 260-1070.

'94 TOYOTA 4RUNNER SR5, V6, fair condition, everything works, $2,200. Willmas, 281-9124.

'99 CHEVY S10 PICKUP, V6, extended cab, white, cruise control, clean, 124K miles, $4,950 OBO. Scott, 505-426-5656.

FORD EXPLORER, Eddie Bauer Sport XL, V6, PS, PB, AM/FM/CD, 99,456 miles, very good condition. Guerra, 252-0024.

'02 MUSTANG, V6, 5-spd., upgraded stereo, 128K miles, excellent condition, $4,400. Woodall, 505-797-7702.

'99 FORD RANGER XLT, 2WD, 3.0L, V6, 140K miles, fair condition, $2,200 OBO. Kubal, 505-903-8501.

'05 HONDA ELEMENT, 4WD, AT, AC, 1 owner, excellent tires, 95K miles, very good condition, $5,300. Viken, 612-275-1227.

'90 HONDA CIVIC HATCHBACK, new tires, needs work, $500. Williams, 379-8994, leave a message, will return call.

RECREATION

'96 HARLEY-DAVIDSON FLHTCI, Dresser, lots of chrome, 24K original miles, mint condition, $10,000. Garcia, 505-515-4462.

'13 BMC GRANFONDO GF01, road bike, 56 cm, carbon/Ultegra Di2/road tubeless, low miles, $7,000 new, asking, $3,500. Basiliere, 505-205-4580.

ARCTIC FOX 4-SEASON TRAVEL TRAILER, 27-ft., sleeps 6, lots of storage, excellent condition, financing available, $15,995. Cox, 505-292-5568, ask for Andy or 505-321-0393, ask for Bill.

'08 KZ DURANGO 325BH, 5th wheel, bunks, lots of extras, excellent condition, $24,000 OBO. Crespin, 610-1084.

'05 KYMCO PEOPLE 250 SCOOTER, silver, 12K miles, well cared for, $1,500 OBO. Verley, 410-9885.

'11 TRAVEL TRAILER, Forest River Flagstaff Shamrock, hybrid, 21SS, 1 slide out, extras, mint condition, $19,500. Garcia, 293-2810.

'12 TRAVEL TRAILER, Forest River, Flagstaff V-Lite, 30 WRKSS, 2 slides, 1-1/2 baths, extras, mint condition, $26,900. Sandoval, 792-7883.

SUZUKI C90T, highway bars, foot pegs, lights, throttle locks, windshield lowers, driver backrest, excellent condition, $4,300. Nation, 306-7831, ask for Brad.

REAL ESTATE

4-BDR. HOME, 2-1/2 baths, 2,777-sq. ft., formal living & dining rooms, family room, loft, 2-story, huge yard, near Coors & I 40, MLS#806686, will consider REC. Maestas, 505-459-7650.

5-BDR. HOME, 4,992-sq. ft., finished walk-out basement, theater, new kitchen, on 2 acres, Ranch-style, East Mountains, $449,900. Weaver, 505-480-9551.

2-BDR. HOME, SE Ridgecrest neighborhood, 10 mins. to base, 1809 Ross Place SE. Scott, 505-345-0513.

3-BDR. HOME, 2 baths, 1.934-sq. ft., 1.89 acres, oversized 2-car garage, work & storage space, East Mountains, MLS#770167, $225,000. Moore, 505-307-5237.

2.4 ACRES, Cedar Oaks, on North 14, top of the hill lot, gated access, spectacular views, must see, $48,000. Elizondo, 256-1099.

PAAKO GOLF COURSE LOT, great view, utilities, discounted for quick sale, $99,000 w/plans. Sikorski, 505-573-1503.

4-BDR. HOME, 3 baths, 2,860-sq. ft., 3-car garage, Rutledge all-brick ranch, cul-de-sac, 0.4 acre lot, pool, O'Keefe/Eisenhower/El Dorado school district, $470,000. Klavetter, 299-4299.

4-BDR. HOME, 2-1/4 baths, 2,395-sq. ft., updated, 2-car garage, big backyard, near Juan Tabo and Comanche, $235,000. Adolf, 505-710-8291.

3-BDR. TOWNHOUSE, 1-3/4 baths, 1-car attached garage, Socorro near NMT, very nice condition, $125,500. Ghanbari, 883-3819.

1/2 ACRE IN ANGEL FIRE, within 1/4 –mile of country club & golf course, corner lot, Pine Valley Drive & Broadmoor, email w/questions, $30,000. Segura, 505-490-2756, Csegura505@gmail.com.

WANTED

CLEAN BEDDING, blankets, quilting materials, sewing & crochet thread, for needy and homeless project. Elis, 865-7941.

SUMMER ROOMMATE, furnished bdr., all amenities, close to base, $375 including utilities. Roche, 505-366-3884.

BABYSITTER, supervised babysitting of 17-mo. & 3 yr. old children, in our home. Montoya, 917-8791.

ROOMMATE, 3-bdr. home, 2 baths, West side, $150 deposit, $350/mo., + 1/2 utilities. Meeks-Nixon, 505-821-1375, ask for Michelle.

RESPONSIBLE BABYSITTER, mid July, to care for kids (12, 10 & 6 yrs. old), must be able to drive, West side, Albuquerque. Martinez, 792-3608.

FRUIT WOOD, apple, cherry, apricot, etc. for smoking meats, will pick up & haul away. Townsend, 352-5390.

COMPUTER DONATION, Grace United Methodist Church, Windows Vista or newer. Dykhuizen, 281-6892.

RESPONSIBLE, respectful person, available to live in & maintain your home, pets, & landscape. Jones, 433-5390, ask for Robert.

FEMALE ROOMMATE, 3-bdr. townhome, on base, $500 to half electric, call for more info. Caldwell, 859-358-4553, ask for Amanda.

LOST AND FOUND

FOUND: watch, in Bldg. 855, Monday, March 31, call to describe & claim. Perea, 845-8621, ask for Diana.

'Something invaluable'

Scientists help entrepreneurs make business dreams come true

By Nancy Salem

Bill Watts knows a thing or two about big data-center computers. One is that they're dangerous to move. "A server cabinet is eight feet tall with 3,500 pounds of equipment," he says. "If it starts to tip over you can't stop it."

Watts designed a swivel lift that could safely move large cabinets, a common requirement in data centers. "The servers are replaced every 18 months in places like Google and Microsoft. It was something in my industry that needed a solution," he says. "I decided I could do this."

But he needed help. He couldn't find all the parts for the lift, and its starter-type motor could interfere with sensitive electronics stored in the cabinets.

Last November Watts reached out to the New Mexico Small Business Assistance (NMSBA) program and was teamed with Sandia mechanical engineer Jeff Dabling (2614), who worked with colleagues to redesign the lift's power system, which included the motor, clutch, electronic brake, and controller. "They came up with the answers to all my questions," Watts says.

Watts' company, Data Center Transitions Inc. of Albuquerque, was among 354 small businesses in 29 counties that participated during 2013 in NMSBA, a public-private partnership among Sandia, Los Alamos National Laboratory and the state of New Mexico that connects small business owners with scientists and engineers who provide technical assistance. The program also contracts with the New Mexico Manufacturing Extension Partnership, University of New Mexico Management of Technology program at the Anderson School of Management, Arrowhead Center at New Mexico State University, and the New Mexico Tech Department of Management. NMSBA provided $4.6 million worth of assistance to New Mexico small businesses last year.

Ten projects that achieved outstanding innovations through the program in 2013 were honored April 3 at NMSBA's annual Innovation Celebration Awards luncheon at the Anderson-Abruzzo Albuquerque International Balloon Museum, held in conjunction with the 2014 Technology Ventures Corp. Innovation Summit.

Data Center Transitions received the Honorable Speaker Ben Luján Award for Small Business Excellence as the honoree that demonstrated the most economic impact.

"NMSBA has been bringing small businesses together with scientists and engineers from Sandia and Los Alamos national laboratories for 14 years. We are grateful to the principal investigators who work with New Mexico's small businesses," says Jackie Kerby Moore, manager of Technology and Economic Development Dept. 7933. "Together they are implementing innovative ideas and stimulating our state's economy."

ENTREPRENEUR BILL WATTS got help from Sandia scientists through the New Mexico Small Business Assistance program on the design of a lift that can move huge computer server cabinets. The partnership helped Watts reduce costs and manufacture the lift for such clients as Microsoft and Facebook. (Photo by Norman Johnson)

A data-center success story

Watts was a construction manager for major mechanical contractors for 25 years before going to work in 2000 for Intel Corp. at its data center in Santa Clara, Calif. He was soon in charge of all the chip-maker's data centers, setting standards and deciding how they were built. After a move to Albuquerque, he provided data-center training and assistance to Fortune 500 companies and other Intel customers.

In 2003 he designed a chimney-style cabinet that cools big computer servers, critical to efficient operation. The cabinet connects to the ceiling with ductwork that removes hot exhaust and replaces it with cool air. "A thermal effect vacuums the cabinet of heat," Watts says. "It worked well and turned out to be very successful. The whole data-center industry got on the bandwagon."

Chatsworth Products Inc. of Westlake Village, Calif., produced the cabinet and hired Watts away from Intel to train its salespeople in air flow and computational fluid dynamics. He later left Chatsworth and considered going into business. "I wanted to keep working but wasn't sure I wanted to get another job," he says.

Watts designed and built server cabinets and enclosures to control air flow, and began work on the server lift, called the MASS Lift. He founded Data Center Transitions in 2009 with a product line including server cabinet systems and structural enclosures to manage air flow.

He added the MASS Lift after his work with Sandia allowed him to cut costs by 20 percent and keep production in Albuquerque. His customers include Microsoft and Facebook, which have bought dozens of the lifts.

"Sandia was critical to the success of this," he says. "I had exhausted my capabilities. I'm not an engineer. I told them what I needed and how it should work. They didn't come back with five options. They did exactly what I requested, giving me the best product at the lowest price. It was incredible. And I made friendships that will go on forever. Sandia gave me something invaluable."

Measuring body fat

Another NMSBA success story involved a skin-fold caliper. Business owner Jeff Collins of Welltec of Albuquerque brought together five companies seeking help on Skyndex, a caliper that measures body fat percentage.

The companies needed help with the caliper's ergonomics and increased measurement range. Clint Hobart (6532) and his team of robotics experts at Sandia did analysis, modeling, and mechanical testing. Sandia's product redesign ideas opened new markets and could lead to $3 million in increased revenue.

Here are some other projects recognized at the Innovation Celebration:

• Tom Anderson of Customizabooks LLC wanted to sell his digital children's book apps outside defined channels and markets. He worked with University of New Mexico professor Steve Walsh and a team of students to develop a commercialization strategy and new customer base. The students also helped with advanced graphics and animations in Anderson's mobile apps. The collaboration helped him attract funding.

• Jeri Remley, founder of Enchanted Woodworks LLC, was making and selling educational wood puzzle kits for children but needed help with packaging. She worked with Griselda Martinez of the Arrowhead Center at New Mexico State University on package redesign and product development. Newly packaged samples at a regional trade show led to a 30 percent boost in sales. Remley has hired two new contractors and plans to open a retail store.

• The SportXast smartphone app allows fans to capture, watch, and share highlights of local sporting events. In an effort to automate player tagging in the highlights, SportXast's Molly Cernicek worked with Steven Brumby of Los Alamos National Laboratory to identify computer vision algorithms that could be integrated within the app. The company recently hired a computer vision developer to integrate features identified by Brumby.

• Solaro Energy Inc. invents, designs, and produces solar-powered lighting and attic ventilation systems. Owner Dennis Grubb worked with Andrea Holling of the New Mexico Manufacturing Extension Partnership on production workflow. She trained Solaro employees in Lean Manufacturing techniques and worked with staff to streamline production. Solaro's product cycle decreased from 40 to 22 minutes and production increased from 1,000 to 1,500 units a month.

• Three-dimensional metal printing involves making the product, then verifying it meets specifications. Mark Cola of Sigma Labs Inc. wanted to combine the two steps into one to ensure quality during 3-D printing. He worked with Frank Reinow and Jun Zheng of New Mexico Tech, who investigated imaging techniques that use high-resolution digital cameras for precision measurements. The company used the recommendations in its R&D efforts to commercialize the product.

NMSBA was created in 2000 by the state legislature to bring national laboratory technology and expertise to small businesses in New Mexico, promoting economic development with an emphasis on rural areas. Since its inception, the program has provided 2,195 small businesses in all 33 New Mexico counties with more than $39 million worth of research hours and materials. The program has helped create and retain 3,510 New Mexico jobs at an average salary of $38,735, increase small companies' revenues by $172.5 million and decrease their operating costs by $79 million. These companies have invested $56.4 million in other New Mexico goods and services and received $59.6 million in new funding and financing.

"I worked with two PhDs on the MASS Lift. Where can somebody like me get that kind of help?" says Bill Watts. "It's beyond belief that something like that is available to businesses here in New Mexico."

For further information about NMSBA, call Genaro Montoya at (505) 284-0625 or visit www.NMSBAprogram.org.

Take Our Daughters & Sons to Work/Earth Day

TAKE OUR daughters and sons TO WORK®

protect the earth EARTH DAY

SANDIA NATIONAL LABORATORIES

Take Our Daughters & Sons to Work Day, combined with Earth Day, will be held at Sandia/New Mexico on Thursday, April 24. Sandia employees and contractors may invite children to visit their workplace to learn more about their hosts' work and Sandia's mission. Children in grades 5 through 12 are eligible.

Go to http://tiny.sandia.gov/ir1g4 to view lists of scheduled activities and demonstrations. Preregistration is required this year; the form is available online at http://info.sandia.gov/todtwd/registration.html

For more information, contact Pam Catanach at pcatana@sandia.gov.