

Digital in-line holography helping answer questions about burning fuels

By Sue Major Holmes

Transportation accidents, such as trucks crashing on a highway or rockets failing on a launch pad, can create catastrophic fires. It's important to know how burning droplets of fuel are generated and behave in those extreme cases, so Sandia researchers have developed 3-D measurement techniques based on digital in-line holography.

Digital in-line holography, known as DIH, is a laser-based technique that has been around since the 1990s. Sandia advanced the technique with new algorithms to mine critical information from recorded holograms and new applications in tough fire environments, says Dan Guildenbecher (1512).

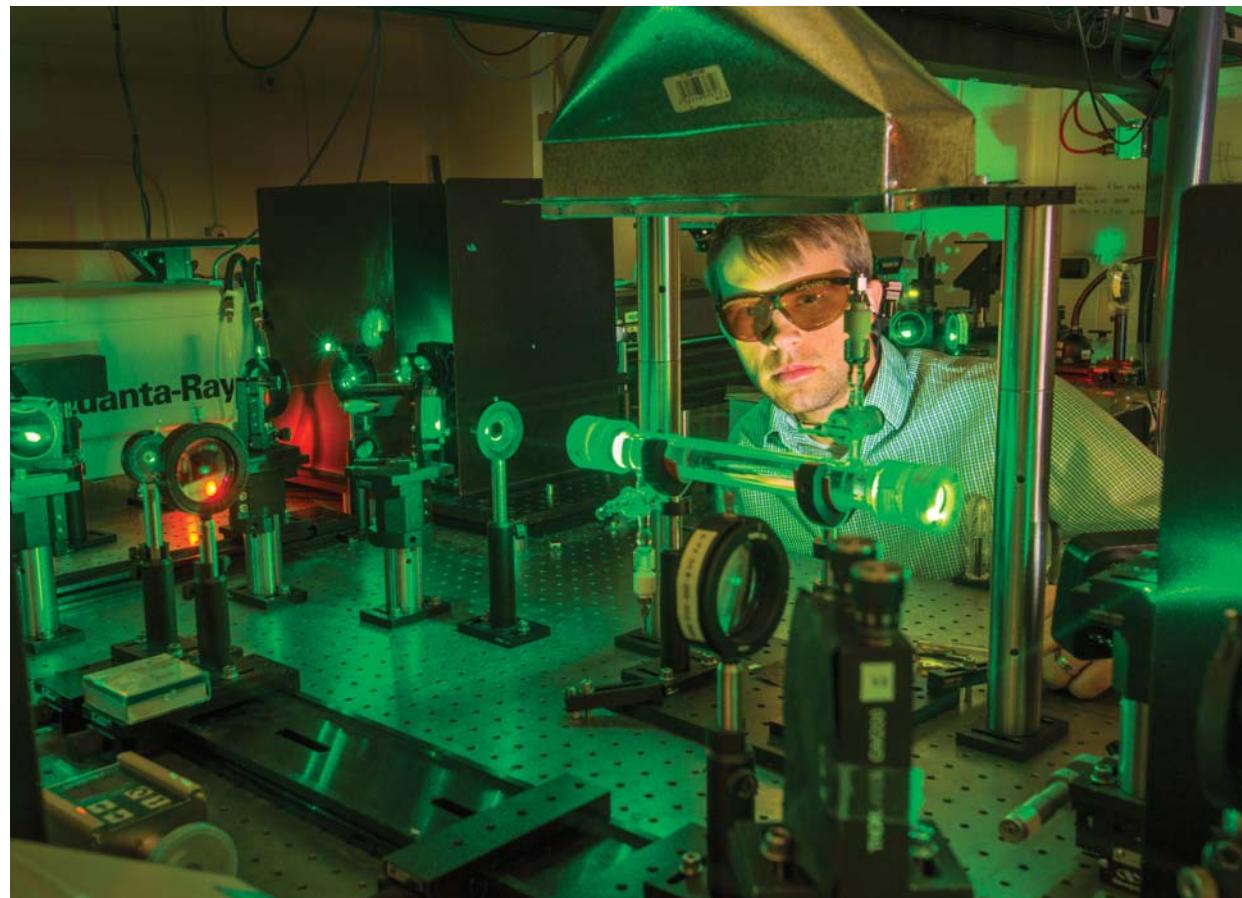
"We live in a 3-D world, and if you think of traditional imaging, it's 2-D," he says. "This technique is one of the few that can give you a 3-D measurement of a flow."

DIH passes a laser through a particle field. The interaction between the laser and the particles creates diffraction patterns, which a camera records. Researchers

(Continued on page 5)

SANDIA RESEARCHER Dan Guildenbecher (1512) and colleagues have developed three-dimensional measurement techniques based on digital in-line holography to understand the generation and behavior of burning droplets of fuel from incidents such as transportation crashes. In his lab, Dan simulates a four-wave mixing cell to generate phase-conjugate light, one of the techniques used.

(Photo by Randy Montoya)



Lab to market

Twistact wind power technology tapped to continue on the road to commercialization

By Nancy Salem

A helping hand was extended by the Livermore Valley Site's LabCorps program to the Sandia researchers who would like to commercialize a technology designed to bring more wind energy to the grid.

Twistact and its principal investigator (PI) Jeff Koplow (8366) were chosen for the DOE entrepreneurship pilot program along with Lawrence Livermore National Laboratory's (LLNL) Optimization of Building Efficiency and its PI Yining Qin.



DIVISION 8000 VP MARIANNE WALCK and California Rep. Eric Swalwell attended and addressed the April 1 event in Livermore, California, where LabCorps officials announced the technologies from Sandia and Lawrence Livermore national laboratories that will continue in its entrepreneurial pilot program.

(Photo by Randy Wong)

Jeff and Qin each will receive \$75,000 to develop commercialization plans for the technologies. The two project teams made up of the principal investigator, an entrepreneurial lead, and industry adviser, will attend LabCorps business training later this year. The teams also will have access to a suite of commercialization resources,

(Continued on page 4)

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Inside . . .

UNM Anderson School honors Sandian	2
◀ Sandians support girls' interest in Math and Science	3
40 years on the job at Sandia/California	3
Sandia researcher to deliver lecture on nanoscience	4
Sandia hosts nonproliferation visit	6-7
Speaker discusses inclusive work culture	8
IARPA Director briefs Sandians	8
New building preserves records, designs	12
Chief of Naval Operations visits Sandia	12

Explosive Destruction System begins first stockpile project

By Patti Koning



TOM RABER (8137) PREPARES THE EXPLOSIVES DESTRUCTION SYSTEM (EDS) explosive containment vessel for shipment to the US Army Pueblo Chemical Depot. Over the next five years, two EDS units are expected to process more than 1,000 chemical munitions as part of a larger cleanup operation at the Pueblo, Colorado, facility.

(Photo by Dino Vournas)

Story on page 9.

That's that

I mentioned here not long ago that I was about to mark my 20th anniversary at Sandia. I'd like to follow up by reporting that my colleagues sprung a surprise celebration for me to note the occasion. I was able to sit back and hear some very nice things said about my contributions to the team and to the Labs over the course of two decades. It was a gratifying moment and despite the inclination on my part to say "Aw shucks," I have to admit that my ego and vanity did get a nice stroking that day. I almost sounded like the proverbial indispensable man.

Now juxtapose that nice ceremony with what transpired over the next three weeks. To celebrate a milestone in my ongoing recovery from shoulder surgery - I was able to remove a sling I'd been wearing 24/7 for six weeks - my wife and I took a long-planned vacation. That two weeks turned into almost a month away from the office as a couple of health issues slammed me at the end of that vacation.

I don't want to get into the TMI - too much information - syndrome here, so suffice it to say that I'm doing fine now but there was a stretch there where I was deeply frustrated, not just because I was ill and not getting better as fast as I'd like, but also by the fact that I wasn't able to get back to work.

The obvious take-away from this experience is that the work goes on with you or without you. In my case, the team of which I'm very lucky to be a part stepped up to make sure that tickets were punched, deadlines met, and obligations fulfilled. It's no great insight to recognize that you are not, after all, indispensable.

Here's the more important lesson for me: I found out how grateful I am to be able to come to work every morning by my own choice.

If you ever get to thinking you've had enough and would just like to hang it up - and we've all had those days, haven't we? - I ask you to consider how you'd feel if one day the decision were taken out of your hands, if no matter how much you wanted to get back to work you just couldn't do it. That's when you come to understand that work is a gift, one you have to accept with all its ups and downs until by your own choice - that's the key, by your own choice - you're ready to move to the next stage of your life.

Of course, working at Sandia gives all of us a big advantage in this regard, where service to the nation is our reason for being. Being employed here is a special privilege - being away from the Labs against my will for a couple of weeks has really made me see that.

* * *

Uh-oh. The tinkerers are at it again, rolling out new schemes to "fix" the national pastime. We baseball fans are a conservative bunch (when it comes to baseball, at least) and cringe when the marketers and front office types get these periodic notions that they need to make the game more relevant, hipper, faster, TV-friendlier, or whatever.

Over the years, the tinkerers have played with the height of the pitcher's mound, fiddled around with the strike zone and done other things on the margins of the game that have aimed to find the magic balance in that existential struggle between the batter and the pitcher. The litany of grievances goes on: Those who would tamper with the game created the designated hitter rule and even introduced limited video replay to second-guess umpires' on-field calls.

The worst idea yet, though, is the introduction in the minor leagues this year of the pitch clock, purportedly to "speed up the game." But part of the appeal, part of the beauty, of baseball, is that it was not, like other contests, constrained by the element of time. The old coach, his mouth wadded with tobacco, could always settle down the green rookie, uttering baseball's sweetest words: "Relax kid, you got all the time in the world." Not anymore.

Oh well, they say everything changes, and I guess that even includes baseball. Still, when it comes to the national pastime, I feel like the old timer, who on his hundredth birthday is being interviewed by the cub reporter for the local paper. The kid says, "Well, I guess you've seen lots of changes in your day." Oh yes, says the geezer, "and I've been against every one of 'em."

See you next time.

- Bill Murphy (MS 1468, 505-845-0845, wtmurph@sandia.gov)



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Recent Patents

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

* * *
Dahwey Chu (1718), Michael L. Holmes (1750), Thomas Gurrieri (1753), Randolph R. Kay (1753), Darwin Serkland (1766), David V. Campbell (1767), Seethambal S. Mani (5771), Jeffrey L. Rienstra (5771), and Subhash L. Shinde (6123): Focal Plane Array with Modular Pixel Array Components for Scalability. Patent No. 8,907,439.

F. Patrick Doty (8126), Patrick L. Feng (8126), and Mark D. Allendorf (8300): Doped Luminescent Materials and Particle Discrimination Using Same. Patent No. 8,853,651.

Mark S. Derzon (1719), Paul C. Galambos (1719), and Ronald F. Renzi (8625): Ion Chamber Based Neutron Detectors. Patent No. 8,912,502.

Anup K. Singh (8620): Dielectrokinetic Chromatog-

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UNM Anderson School honors Sandian

By **Rebecca Brock**

Fabian Aragon (10597) was honored with the Young Alumni Award from University of New Mexico's Anderson School of Management April 7 at the 26th Annual UNM Anderson Hall of Fame Awards Banquet and Fundraiser.

The Young Alumni Award recognizes professionals under age 40 who have demonstrated outstanding achievement in professional success, contributions to the community, and involvement in continuing education.



FABIAN ARAGON

Fabian has shown a commitment to student outreach throughout his career at Sandia. Honoring the Las Vegas, New Mexico native, UNM's Anderson School cites, "Through his job Fabian serves in various capacities to guide students through mentoring, coaching, and helping them reach their career aspirations." Fabian has been a significant part of the Business Community's student recruiting program that has recruited and hired 70 year-round business interns in the last three years. Additionally, he has spearheaded the growth of the Div. 9000 recruiting program.

As the manager of CIO & IT Business Operations, Fabian oversees a budget of more than \$250 million and a staff of 24. Two members of his staff nominated him for the UNM award. He provides financial and business operations to Div. 9000 and Center 8900, delivering the management of service centers, projects, purchasing, and management assurance. His varied accomplishments at Sandia include improvements to the Labs-wide cost efficiencies program and leading the P-Card program to enable mission partners to buy what they need in an efficient manner.

He earned his bachelor's in accounting from UNM in 2004 and his master's of accounting from UNM in 2006. At Anderson he was the founding treasurer of the student chapter of the Association of Latino Professionals in Finance and Accounting.

"This award means a lot to me, because I had the privilege to go to UNM with some folks who are doing great things at Sandia and in the community," Fabian says. "There are a lot of outstanding graduates from UNM and the Anderson School of Management who work at Sandia, so I am quite fortunate to be honored with this award."

raphy Devices. Patent No. 8,911,606.

Erik Brubaker (8127), Scott Kiff (8127), and Peter Marleau (8127): Time Encoded Radiation Imaging. Patent No. 8,866,100.

Michael J. Rye (1819), Alfredo M. Morales (8126), and Nancy Y. C. Yang (8341): Method to Fabricate Micro and Nano Diamond Devices. Patent No. 8,852,998.

Anup K. Singh (8620) and Anson Hatch (8621): Methods, Microfluidic Devices and Systems for Detection of an Active Enzymatic Agent. Patent No. 8,871,496.

Jeffrey P. Koplow (8366): Power Selective Optical Filter Devices and Optical Systems Using Same. Patent No. 8,854,713.

Alex L. Robinson (2632) and Mark D. Allendorf (8300): Materials, Methods and Devices to Detect and Quantify Water Vapor Concentrations in an Atmosphere. Patent No. 8,904,850.

Dennis L. Youchison (1353): Methods for Making a Porous Nuclear Fuel Element. Patent No. 8,920,871.

William C. Sweatt (1513), Michael R. Descour (1725), Robert Boye (1728), Bryan James Kaehr (1815), Shawn M. Dirk (2735), and David R. Wheeler (5964): Method to Create Gradient Index in a Polymer. Patent No. 8,859,190.

Retirees (only):

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Sandia researchers volunteer to support girls' interest in math and science

By Jessica Scully

Armed with hot-glue guns, linguini, lasagna, and spaghetti, 22 girls in Lauren Beghini's (8259) workshop designed and built pasta bridges to withstand heavy loads. When finished, no two bridges looked the same. Along with a lesson on loads and stability, that variety is what Lauren, a Sandia mechanical engineer, and her husband, the co-leader of the "Engineering Bridges with Pasta" workshop, wanted the girls to understand.

"There's a stereotype that engineering is nerdy and is just calculations," Lauren says. "I want girls to see the creative and expressive side too."

Lauren was one of several Sandia volunteers at the Feb. 28 Tri-Valley Expanding Your Horizons (EYH) event at Las Positas College. EYH conferences are annual one-day events that provide 6th- to 12th-grade girls with hands-on workshops to nurture their interest in science, technology, engineering, and math (STEM).

Sandia on behalf of Lockheed Martin is a sponsor of the Tri-Valley conference, which was started 30 years ago by a group of women scientists and educators.

The conferences, which mix hands-on workshops with special activities and programs for parents, are part of the broader Expanding Your Horizons Network. The network began in the Bay Area in the 1970s with a group of women scientists and educators concerned about the lack of women and girls in math courses. The network now holds more than 80 conferences across the United States, Asia, and Europe. Each year, up to 25,000 girls participate.

Hundreds of girls, parents attend

About 400 girls attended the Tri-Valley conference, along with some of their parents. Each girl participated in two hands-on workshops. The 17 workshop choices included three led by Sandians: Lauren, programmer Kina Winoto (8965), and mechanical engineers Stacy and Kevin Nelson (8259 and 8256, respectively).

Kina began her workshop, "Safe and Sound: Cyberthreats and Countermeasures," with a Skittles



KINA WINOTO (8965) volunteers with Expanding Your Horizons to help expose girls to computer science as a field of study and career. (Photo by Randy Wong)

illustration of public key exchanges. She then explained email phishing, targeted spam, and other cybersecurity issues. Finally, she led the girls through a Python email programming activity so they could learn how spammers send mass emails.

"Computer security is a hot topic in the news," Kina says. "People this age know how to work technology, but they don't know all the ramifications."

In Stacy and Kevin's workshop, "Look Out! We're Surrounded by Lego Robotics," girls worked together to create 100-piece Lego robots and write programs to direct the robots' movements.

"I want the girls to see that programming is nothing to be intimidated by," Stacy says. "Everyone knows what Legos are, so it's a great way to introduce these concepts."

Girls and parents benefit

Evelyn Andrade and Lucinda Quintal, both 13, and Emily Jones, 15, participated in Stacy and Kevin's morning workshop. After finishing the assigned three programs, the girls wrote two more.

Emily says the workshop provided "room for creativ-

ity" and space to focus. "All the people actually want to be here and are willing to work," she says.

Lucinda enjoyed partnering with other girls. "This might be a little bit stereotypical, but girls tend to work together better and communicate better in this subject. Boys want to take over and make it all themselves," she says.

To help parents support their daughters in math and science, the Tri-Valley EYH conference included an adult program that covered topics such as college planning and financial aid options.

Parent Chris McNeilly found the presentation on the University of California's academic requirements especially helpful.

He said he hopes that by being "surrounded by people more like her" at EYH, his 13-year-old daughter will realize that being good at and liking math and science are not gender-specific.

"We still play with Legos at home," says McNeilly. "It's kind of her secret shame when it doesn't have to be."

Volunteers encourage girls, battle stereotypes

By volunteering at EYH, the Sandians say they hope to help bring more women into STEM fields and combat stereotypes about women and science.

Lauren has been involved in outreach to girls since she was a graduate student at the University of Illinois at Urbana-Champaign. "Sometimes girls don't view engineering or women engineers as cool and fun," she says. "I try where I can to change that image."

Stacy and Kevin have given their workshop at three Tri-Valley conferences and plan to lead it at several upcoming EYH conferences.

"As a female, I think it's very important that we encourage young women to pursue STEM fields," Stacy says. "And this is a fun workshop to teach."

Sandia California News

Forty years later, a job has become a family

By Nancy Salem

Martha Campiotti was barely 18 years old when she interviewed at Sandia as part of a business school assignment. She was tested on typing, dictation, and vocabulary, and reported to her class what it was like to go through a job interview. She thought that was the end of it.

She graduated and went to Hawaii on vacation. "My dad called and said someone was looking for me about a job," she says. "They wanted me to go to work when I got back."

It was Sandia calling, and Martha (8366) signed on as a secretary trainee in the Personnel & Industrial Relations group in August 1974. She met then-8000 VP Tom Cook and thought Sandia would be a good place to work for a few years. That was 40 years ago.

"I found a home here," Martha says. "The work is challenging and I have made wonderful friends for life. I consider everybody here family."

Martha, who was raised in a Navy family of seven children in Dublin and Hayward, California, spent her first two years at Sandia floating as a fill-in secretary. One of her jobs was being a "copy girl" to the VP's office. "It was back when we still used typewriters, and there was only one copier per building," Martha says. "The VP's office would call and say they needed copies of something and I would stop what I was doing, go get the papers, and stand in line at the copy machine."

The temporary assignments let Martha work with different groups and get to know the Labs. When the time came to bid on a permanent position, she went with the Environmental Test Division in Area 8. It was the first of many divisional secretarial jobs Martha held over the next 20 years in such organizations as Structural Mechanics, Engineering Support, and Materials Processing.

She went on to become a program administrator, staff secretary, administrative support, and office management assistant in Microsystems Processing, Materials & Energy Processing, and Microtechnologies. Six years



MARTHA CAMPIOTTI (9366), left, works the 2014 regional Science Bowl in Livermore, California, with her daughter Chloe. Martha, who recently celebrated her 40th work anniversary, is a longtime Science Bowl volunteer. She's also involved with the girls' STEM outreach program Expanding Your Horizons.

ago, Martha went to the Combustion Research Facility as an office management assistant in such areas as Energy Systems Engineering & Analysis, Combustion & Industrial Technology, and Thermal Fluid Science & Engineering.

"What I love about Sandia is you can work in so many different areas and learn so much," says Martha, who has no plans yet to retire. "I love the variety."

Martha says in her 40 years she has seen Sandia/California become more diverse in work and in staff. The biggest change has been in technology. "I started on an IBM Selectric. Computers were just beginning to appear in offices," she says. "In the late '70s, some people said secretaries didn't need a computer but I got someone in my department to rig one up for me. It was huge, using RL02 disk drives, and was not consistent. It was a trying time."

Martha is active at the Labs and in the community. She headed Sandia's Asian Pacific Leadership Committee for 12 years and is a member of the California Division Diversity Council and the Diversity & Inclusion Action Team. She has worked for 15 years as a coordinator on Sandia/California regional DOE Science Bowls and both the Tri-Valley and San Joaquin County

Expanding Your Horizons (EYH), a STEM outreach program for girls in grades 6-12. "It's fun to see these smart little kids, so bright and fast, with so much energy," says Martha, who has two daughters with husband Richard Campiotti, who retired from Sandia 12 years ago after 38 years as an engineer. "I love to meet people and touch their lives."

Martha's manager Tom Felter says she brings enthusiasm and kindness to her work at Sandia. "Martha has influenced the country's future through her early and long-term commitment to working with young people in programs like Expanding Your Horizons," he says. "She is the living symbol of a caring Sandia. She sets a tone and attitude that is both accepting and practical. Her friendly laugh makes any task or unexpected complication seem like fun."

Martha's senior manager Art Pontau says she has contributed to the spirit and culture at Sandia in countless ways. "Martha is a truly a remarkable person," he says. "The warmth, compassion, and respect she's shown for everyone she's worked with is legendary. Martha talks about Sandia being home and the people here being family. That's because of how she has treated us all these years."

Digital holography

(Continued from page 1)

then use computers to solve diffraction integral equations, allowing them to take light recorded at the camera plane and refocus it back to the original planes of the particle locations. That gives the position of particles as they were in 3-D space.

In a propellant fire, large molten aluminum drops form at the burning surface. They're lofted into the environment and can severely damage anything they fall on. Researchers study this by passing a laser through fire while high-speed cameras record the diffraction patterns. Refocused digital holograms provide a clear picture of the burning particles. By measuring the size and velocity of thousands of such particles, researchers can better understand how the particles are formed and transported in this flow.

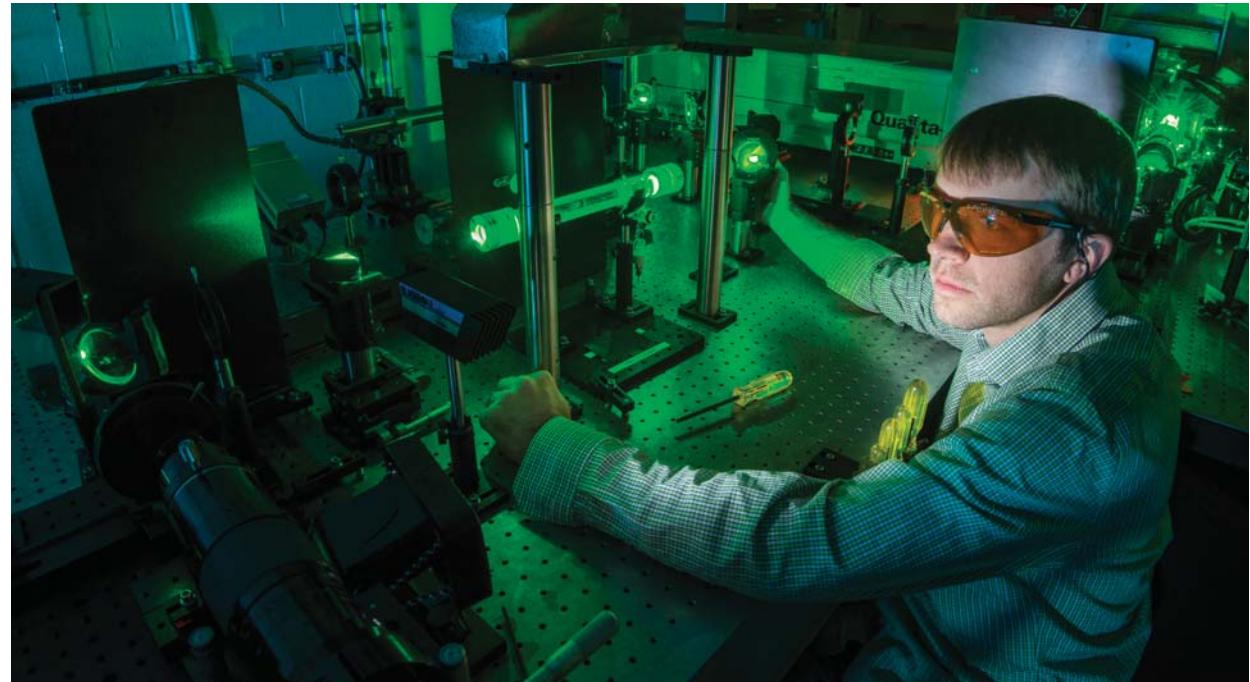
Interested in 3-D particle measurements in complex environments

"Fundamental understanding of particle formation and transport is necessary to develop next-generation [computer] models that predict this scenario," Dan says. "Due to the corrosive environment, it's very difficult to measure these phenomena using traditional instruments. You need to have advanced diagnostics and advanced modeling."

Sandia's digital in-line holography method uses nanosecond lasers to freeze the motion of particles and kilohertz imaging to track droplets' size and velocity. Recording and quantifying all droplets in a 3-D volume — the digital hologram — lets researchers quickly measure thousands of individual drops, allowing for accurate quantification of size and velocity. In addition, measuring particle shape enables them to differentiate spherical drops from other particulates in the flow.

Previous work on particle-field DIH largely focused on measuring spherical particles in controlled environments. However, Sandia needed to measure arbitrarily shaped objects in difficult, real-world environments. So Dan and colleagues developed new data processing algorithms that automatically measure complex particle structures in 3-D space, quantifying their accuracy through laboratory experiments. "Validation experiments were instrumental to improving the technique and gave us the confidence to apply the method to a wide range of applications," he says.

Sandia has a long history of developing groundbreaking imaging for a wide range of applications. For example, recent rapid advances in high-speed digital imaging have enabled 2-D videography at frame rates from kilohertz to megahertz. This has greatly increased our experimental resolution of many important phenomena," Dan says. "Digital holography is one of a handful of techniques which allow us to expand these



ADVANCING THE TECHNIQUE — Sandia researcher Dan Gildenbecher (1512) works with a technique known as digital in-line holography, a laser-based technique that has been around since the 1990s. Sandia advanced the technique with new algorithms to mine critical information from recorded holograms and new applications in tough fire environments. (Photo by Randy Montoya)

technologies to 3-D."

DIH is important diagnostic tool in many areas

The researchers also have used DIH to quantify liquid breakup due to strong gas flows and impacts on surfaces. They measured complex, ring-shaped ligaments in 3-D space, which provided new physical insight into how droplets form. "In a transportation accident, the breakup of liquid fuel leads to wide dispersion of droplets and large-scale fire. Liquid breakup must be understood to predict the scale and intensity of such fires," Dan says.

"By focusing on doing something cutting edge, we discovered applications that no one else had attempted and measured phenomena we never expected," he says. "I liked that we were able to find so many ways to utilize this exciting technology."

They also looked at shotgun particles, which Dan says was fun but had a practical purpose. "There's interest in understanding how particulates behave in explosive environments, and we set up a shotgun as a simulant for this environment." Results of the successful demonstration were published in a 2013 paper in *Optics Letters*.

The team published additional papers in such publications as *Applied Optics*, *Optics Express*, and *Experiments in Fluids*, and presented their work at numerous conferences over the past three years. Dan was invited to give

talks at the 2015 Gordon Research Conference on Laser Diagnostics in Combustion in Waterville Valley, N.H., and the 2014 Laser Applications to Chemical, Security, and Environmental Analysis conference in Seattle. Dan and Phillip Reu (1512) of Sandia, along with professor Jun Chen and doctoral student Jian Gao of Purdue University, were awarded the 2014 ASME Fluid Engineering Division's Robert T. Knapp award at the ASME summer meeting. The award recognizes an outstanding original paper resulting directly from analytical or laboratory research.

DIH is a crucial diagnostic tool for a new Laboratory Directed Research and Development (LDRD) project to quantify the breakup of molten components in shock-induced flows. In this environment, changing temperatures and the small size of the particulates distort the hologram image. Dan and colleagues will look at potential improvements to DIH methods that could correct those distortions.

Dan became interested in the field when, as a doctoral student, he ran into limitations in commercial diagnostics for studying multiphase flows. When he joined Sandia in 2011, he teamed with researchers working in digital imaging.

An Early Career LDRD project and the Weapon System Engineering Assessment Technologies (WSEAT) program funded the development work. Team members included Dan and Phillip in collaboration with Chen and Gao.

Hongyou Fan to present Kavli distinguished nanoscience lecture at MRS

By Neal Singer

Sandia researcher Hongyou Fan (1815) was selected by the Materials Research Society (MRS) and The Kavli Foundation to deliver the 2015 Fred Kavli Distinguished Lecture in Nanoscience.

Hongyou is believed to be the first national laboratory scientist to be so honored.

"I am glad that I have an opportunity to promote and enhance Sandia's reputation as a leading research institute," he says.

"Being selected to deliver the Kavli Lectureship is a high honor from MRS," says manager Bill Hammetter (1815).

Hongyou's opening keynote address for the spring MRS meeting was delivered April 6 in San Francisco.

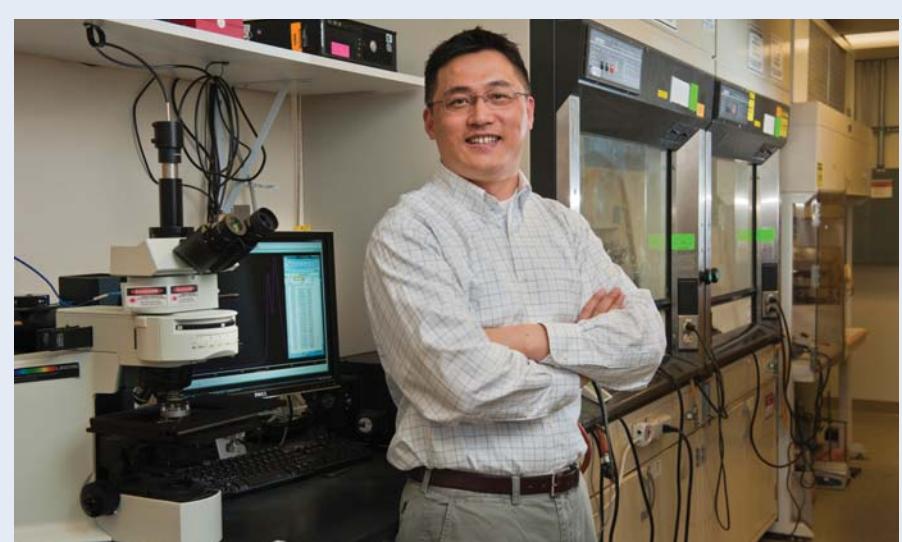
His pioneering research in the field of nanoparticle assembly and integration has supported a paradigm shift from nanoscience discovery to practical nanotechnologies.

His talk, "Nanomaterials under Stress: A New Opportunity for Nanomaterials Synthesis and Engineering," discussed his stress-induced fabrication method that applies mechanical compressive force rather than chemistry to create new nanomaterial arrays with precisely controlled structures and tunable properties.

"By manipulating nanoparticle coupling through external pressure instead of through chemistry, a reversible change in their assemblies and properties can be achieved and demonstrated," says Hongyou. "In addition, once past a certain threshold, external pressures force these nanoparticles into contact, thereby forming one- to three-dimensional nanostructures without relying on traditional process where atoms/ions are locked in a specific crystal structure. Therefore, their architecture can be readily tuned to produce desirable properties for practical applications."

Hongyou is a distinguished member of the technical staff at Sandia. He received a bachelor's degree in chemistry in 1990 from Jilin University, China, a master's degree in polymer chemistry and physics in 1995 from the Chinese Academy of Sciences, and a doctorate in 2000 from the University of New Mexico in the field of nanoporous materials and composites.

His current research focuses on the development of new synthesis methods and self-assembly processes to fabricate multifunctional nanomaterials for applications in nanoelectronics, photonics, and energy storage.



HONGYOU FAN

Major honors and awards he has received include Sandia's Laboratory Directed Research and Development Award for Excellence (2007), two *R&D Magazine* R&D 100 Awards (2007 and 2010), two Federal Laboratory Consortium Outstanding Technology Development Awards (2008 and 2013), a University of New Mexico Outstanding Faculty Mentor Award (2005), and the Asian American Engineer of the Year Award (2012).

The Kavli Foundation supports scientific research and promotes public understanding of scientists and their work, with particular emphases on astrophysics, nanoscience, and neuroscience. The first Fred Kavli Distinguished Lectureship in Nanoscience was presented at the 2007 MRS Fall Meeting, at which Sir Harold Kroto of Florida State University, winner of the 1996 Nobel Prize in Chemistry, presented a lecture titled "Nanoscience, Science, and Sustainability," to an overflow audience of nearly 1,000.

Twistact wind

(Continued from page 1)

including technology validation and testing, facility access, techno-economic analysis, and other incubation services.

"Our team was delighted to be selected. We worked very hard on our presentation," Jeff says. "We were highly motivated because the quality of instruction and mentoring provided by LabCorps during the past two months completely exceeded our expectations. It was remarkable. We think that going through this program, which allows innovators to see things through the perspective of customers and end users, will make us better innovators."

The goal of LabCorps is to accelerate the transfer of innovative clean energy technologies from DOE's national laboratories into the marketplace. The program aims to better train and empower national lab researchers to successfully transition their discoveries into high-impact, real-world technologies in the private sector.

It is a collaboration between Sandia, LLNL, the University of California at Davis Childs' Family Institute for Innovation and Entrepreneurship, and the i-GATE Innovation Hub, a Livermore, California, business incubator. Over the past two months, nine teams of researchers from Sandia and LLNL attended a series of seminars at Davis and i-GATE to prepare for a final pitch on March 31 before the Livermore Valley Site selection committee. One team was selected from each laboratory to continue in the program.

The announcement was made at an April 1 event at i-GATE attended by Rep. Eric Swalwell, D-Calif.; Livermore Mayor John Marchand; Sandia Div. 8000 VP Marianne Walck; LLNL Director Bill Goldstein; i-GATE executive director Brandon Cardwell; and researchers from Sandia and LLNL.

"Transitioning clean energy technologies from the laboratory to the marketplace is difficult, but it's also vitally important that we do so," Marianne said. "This is a great opportunity for our researchers to receive federal support for their entrepreneurial efforts."

Goldstein said the program "underscores the value of the partnership between Sandia/Livermore, Lawrence Livermore, and i-GATE to successfully commercializing laboratory ideas."

New approach to an old problem

Twistact is designed to take wind energy to the next level. "It can eliminate the need for rare earth magnets in multi-megawatt wind turbines, which is the last major hurdle to proliferation of cost-effective wind power," Jeff says. "Anticipated rare earth supply disruptions are holding back large-scale investment in wind power."

Twistact also should allow construction of very large wind turbines to achieve better economies of scale that exist at 10 megawatts and beyond, and reduce the



JEFF KOPLOW (8366) PRESENTS TWISTACT wind power technology at the March 31 LabCorps selection event in Livermore, California. Nine teams from Sandia and Lawrence Livermore national laboratories made final pitches before the Livermore Valley Site selection committee. One team was chosen from each laboratory to continue in the DOE entrepreneurial and commercialization program. Jeff was the Sandia pick to move ahead.

weight of wind turbine housings and, potentially, construction costs.

"Twistact is a new approach to the very old problem of how to transmit electrical power between something that moves and something that doesn't," Jeff says. "Think of a moving subway train taking power off a stationary third rail."

It is done now with a sliding contact device, a brush or shoe, that rides along a surface. But sliding electrical contacts easily wear out. "Twistact connects an electrical circuit between something moving and something stationary or, in the case of a wind turbine, something rotating and something not, without a sliding contact and without electrical arcing."

The technology could be important for wind turbines because it makes the use of copper and steel instead of rare earth magnets practical in the generators. "Twistact technology is designed to eliminate the need for high-maintenance components like gear boxes and brush contacts," Jeff says.

More business potential

Three other Sandia teams participated in LabCorps training and were in the running to move ahead in the program: CodeSeal for Energy Grid Protection and PI John Solis, Seagoing Algae Biorefinery and PI Ryan Davis (8624), and Laser-less Particle Image Velocimetry and PI Ethan Eagle (8362). All of the teams were encouraged to continue to use the i-GATE facility and resources to pursue their business plans.

CodeSeal is a computer technology designed to help power companies keep the lights on. The program monitors control systems and detects and protects critical software from malware and a variety of security gaps before there are blackouts or cascading failures.

The Seagoing Algae Biorefinery would tap into coastal algal blooms and process the algae biomass for use in biofuels and other commodity products. The algae would be collected onto a harvesting tanker with an integrated biorefinery on board. The seagoing refinery is designed to increase supplies of a proven biomass resource that is currently limited by the cost of land-based production, and help prevent coastal dead zones associated with uncontrolled algae blooms.

Laser-less Particle Image Velocimetry (PIV) gives scientists and engineers a better tool to gather data on engine flows at high speed needed to maximize miles per gallon. It uses a novel light-emitting diode (LED) driver and optical arrangement to gather more than five times the information of conventional laser-based PIV. Other benefits include its compact size, increased safety, and the system would cost half as much.

The successful LLNL team is working on a technology to improve energy efficiency in commercial buildings by up to 30 percent. It is developing a control technology based on an algorithm that offers efficient performance, smart diagnosis, and optimized control for the large-scale systems in commercial buildings, which account for 40 percent of domestic electricity consumption and 1.5 billion metric tons of carbon dioxide emissions.

"LabCorps has given these researchers an opportunity to develop their business and entrepreneurial skills," said Jim Presley, an investor with Pacific Private Capital who is on the LabCorps Industrial Advisory Board. "From the first interactions to now, I have seen a transformation in their understanding of business concepts. The LabCorps participants will greatly increase the chances of attracting investors to pull the technologies into the commercial world."

Sandia mathematician named 2015 SIAM Fellow



TAMARA KOLDÀ

By Patti Koning

Sandia mathematician Tamara G. Kolda (8966) has been named a Fellow of the Society for Industrial and Applied Mathematics (SIAM).

Tamara is one of 31 members selected for fellows status this year and the third Sandia scientist to earn the honor. Bruce Hendrickson (1400) and Pavel Bochev (1442) were named fellows in 2012.

"Being named a SIAM fellow is a tremendous honor," says Tamara. "This organization means a lot to me, both professionally and personally."

Selection as a fellow is an honor the society reserves for its most distinguished members. Tamara was recognized "for contributions to numerical algorithms and software in multilinear algebra, optimization, and graph analysis."

A distinguished member of the technical staff, Tamara has been at Sandia since 1999. Her research interests include multilinear algebra and tensor decompositions, graph models and algorithms, data mining, optimization, nonlinear solvers, parallel computing, and the design of scientific software. Tamara has received several awards, including a Presidential Early Career Award for Scientists and Engineers (2003), an

R&D 100 Award (2004), and two best paper prizes (IEEE International Conference on Data Mining 2008 and SIAM International Conference on Data Mining 2013). She is a distinguished member of the Association for Computing Machinery.

Tamara is a twice-elected member of the SIAM Board of Trustees, section editor for the *SIAM Journal on Scientific Computing*, and a member of the editorial board for the *SIAM Journal on Matrix Analysis and Applications*. She has previously served on the SIAM Activity Group on CS&E as chair, vice chair and secretary as well as the SIAG on Linear Algebra as secretary.

Tamara and the other members of the 2015 class of SIAM fellows will be honored in August at the International Congress on Industrial and Applied Mathematics in Beijing.

Established in 1952, SIAM is an international community of applied and computational mathematicians, computer scientists, and other scientists and engineers that advances the fields of applied mathematics and computational science. The society publishes books and premier journals and also sponsors a selection of conferences and programs. For more information, visit www.siam.org.

Sandia hosts first Nonproliferation Treaty Transparency Visit

Story by Heather Clark
Photos by Randy Montoya

Sandia's success in life extension programs for a variety of nuclear weapons will allow for future reductions in the nuclear weapons stockpile, NNSA Deputy Administrator Don Cook told visitors during Sandia's first Nonproliferation Treaty Transparency Visit.

Also led by US Ambassador Adam Scheinman, Special Representative of the President for Nuclear Nonproliferation, and attended by other officials from NNSA, Los Alamos National Laboratory, and the Sandia Field Office, the visit was a major US initiative leading up to the Review Conference of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). The conference occurs every five years and will take place in New York, April 27-May 22.

The recent visit allowed 12 international attendees to observe firsthand Sandia's multidisciplinary technical work and learn about the technical infrastructure and workforce that support US implementation of the NPT. The group visited the Technology Training and Demonstration Area (TTD) at the Center for Global Security and Cooperation. At the TTD, they learned about Sandia's contributions to treaty monitoring, arms control, civilian nuclear power, and safeguards support to the International Atomic Energy Agency (IAEA), as well as chemical and biological risk reduction. The group also visited the Z machine, the Integrated Security Facility, and the Thermal Test Complex. On Friday, the same group received similar presentations and tours at LANL.

Cook said that increased confidence in the safety, security, and effectiveness of the nation's deterrent comes from science-based stockpile stewardship and life extension programs, and ultimately paves the way to future reductions in the US nuclear weapons stockpile.

"The reason for that is we've got a substantially decreased stockpile from the Cold War and the president has said we can go further," he said, adding the difficulty is that the stockpile is older than it's ever been, and old weapons components are subject to degradation as a result of aging.

Cook said he anticipates that stockpile downsizing likely would come from the significant number of weapons the US maintains as a "hedge" against technical failure.

"We extend the life of the weapons, we get more confidence, and we have improved safety and security. Technically, they'll have the same requirements — no new requirements or capabilities — but because we've got greater confidence, then we can begin reducing the hedge weapons," he said.

The US is pursuing a strategy that will reduce the number of nuclear weapon types from 12 to five, Cook said. The first step in achieving this goal is the current B61-12 Life Extension Program (LEP).

The DOE/NNSA stockpile stewardship activities, Cook said, will result in:

- a reduction of the number of bombs by a factor of two;

- the removal of the last megaton-class weapon, the B83, from the stockpile;
- a reduction of more than 80 percent in the special nuclear materials in the bomb portion of the air leg of the nuclear triad; and
- a commensurate reduction in overall destructive power.

Deputy Laboratories Director and Executive VP for National Security Programs Steve Rottler (0002) said that Sandia's transition to extending the life of the stockpile began in the 1990s with W87 LEP, the 2000s with the W76 LEP, and continues today with LEPs on the B61 and W80, an alteration on the W88, and a replacement of the arming and fuzing assembly for the Minuteman warheads.

"We're frankly facing a workload and challenges that this laboratory and the complex have not dealt with in almost 30 years," he said.

Steve spoke about Sandia's commitment and general approach to nuclear weapons safety.

"An important philosophy in our approach to underwriting the safety of nuclear weapons is we do not get involved in estimating the probability that a weapon will be exposed to an accident environment. We assume that in the lifetime of every nuclear weapon in our stockpile it will be exposed to a whole set of abnormal environments," he said.

To withstand any abnormal environments, the weapons are designed so the components providing electrical energy to set off the weapon will fail long before all the barriers in place to prevent that electrical energy from setting off the weapon would fail, he said.

"We do that with very, very high confidence," Steve added.

The Labs play a "critical role" in "advising the government about the focus necessary to achieve the level of confidence and safety we have in our stockpile today. While we never rest on our laurels, it is a supremely engineered level of confidence," Sandia President and Labs

Director Paul Hommert told the visitors. "It is a legacy, which those of us in this business take deeply seriously, that is embodied in this institution."

Vice President of Energy, Nonproliferation, and High-Consequence Security Jill Hruby (6000) told the visitors about Sandia's support for national nuclear security programs, arms control treaties and verification, and international threat reduction.

"We make sure that our weapons are secured in all places and at all times," she said.

Jill discussed a variety of Sandia programs, including work to ensure the safety of nuclear weapons during ground transportation, security perimeter detection systems for nuclear weapons facilities, the development of tools for arms control treaties with monitoring provisions, and efforts to secure weapons grade materials.

Senior manager Pablo Garcia, who organized Sandia's portion of the visit, says the visit went "extremely well" and visitors left informed about the interface of US nuclear weapons policy and the technical work.

"All of them told me personally that they were very impressed by the event, the capabilities they saw, and most importantly, the dedication to our mission by everybody they met," he says.

Sandia "enjoyed hosting our international visitors and showing them how the Labs' science and engineering expertise is helping strengthen the nation's commitment to the Nuclear Nonproliferation Treaty. Our work contributes to preventing nuclear weapon proliferation, enabling a safe, secure, and effective stockpile and promoting the peaceful use of nuclear energy," Paul says.

"The open dialogue with our guests, visits to our Z pulsed-power machine, Thermal Test Complex, Integrated Security Facility, and a viewing of nonproliferation technologies showed our guests Sandia's ongoing commitment to making the world more secure."



JOEL LASH, senior manager of Z Facility R&D Org. 1670, at right, describes Sandia's Z pinch capability to an international delegation visiting Sandia to observe firsthand the Labs' multidisciplinary technical work and learn about the technical infrastructure and workforce that support US implementation of the Treaty on the Non-Proliferation of Nuclear Weapons.



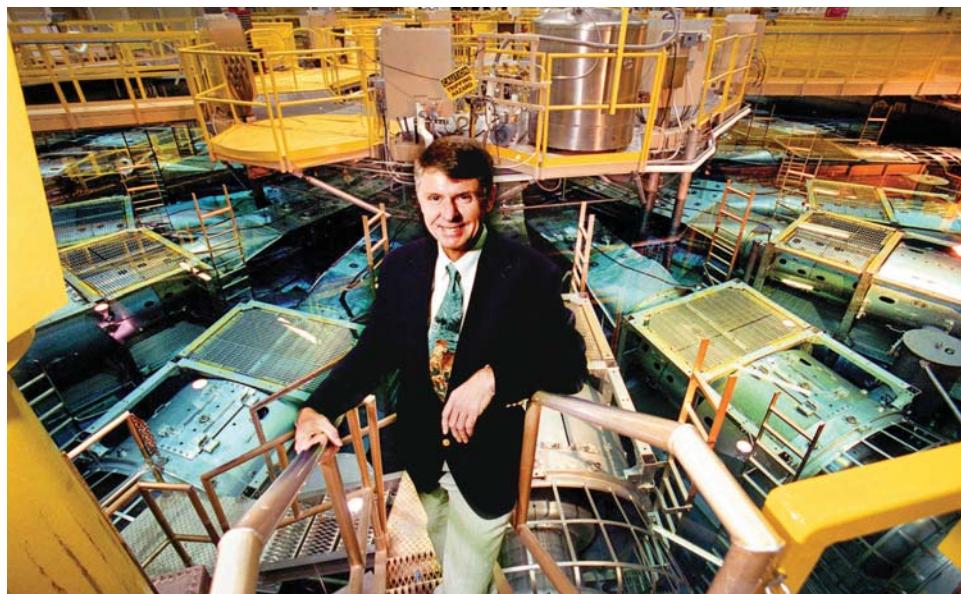
VICE PRESIDENT of Energy, Nonproliferation, and High-Consequence Security Jill Hruby (6000), center, shows NNSA Deputy Administrator Don Cook, right, a display during a tour of the Technology Training and Demonstration area in Sandia's Center of Global Security and Cooperation.



SENIOR MANAGER Susan Pickering (6230) describes Sandia's work in nuclear energy safety to visitors.



MARY CLARE STODDARD (6831), center, explains Sandia technologies to visitors during a Nonproliferation Treaty Transparency Visit that included a tour of the Technology Training and Demonstration area at Sandia's Center of Global Security and Cooperation.



NNSA DEPUTY ADMINISTRATOR Don Cook poses in front of the Z machine in 1997 and during his most recent visit last month.



THE VISITORS TOURED several remote sites, including the Thermal Test Complex.

Speaker discusses steps toward an inclusive work culture

By Blythe Clark and Tommy Woodall

Unconscious bias in the workplace is not a topic meant to cast blame, but rather a topic for which we all share responsibility and have the power to change, according to a recent speaker at Sandia.

In her talk, Abigail Stewart presented "Creating an Inclusive Culture at Work." Stewart is the Sandra Schwartz Tangri Distinguished University Professor of Psychology and Women's Studies at the University of Michigan (UM) and Director of the UM ADVANCE Program, which aims to create a diverse and inclusive culture at UM.

The event, hosted by the Sandia Women's Action Network (New Mexico) and the Sandia Women's Committee (California) kicked off Women's History Month.

Stewart said biases stem from schemas, or hypotheses people draw upon *unconsciously* — particularly at the beginning of a relationship. These biases extend beyond majority groups, she says, despite what is often presumed.

"Women have gender schemas just like men, and



(Photo by Joanne Leonard)

ABBY STEWART

they have the same content. We often have explicit attitudes that conflict with our schemas. The fact that you have a feminist or anti-racist perspective does not mean you don't have a gender or race schema like everybody else," said Stewart. "You do."

She said that while some schemas help us "trust our gut" in making quick judgments, others can be harmful, particularly in the workplace. Without a more conscious approach, she said, people can unknowingly exclude important information in hiring or promotion decisions simply because it contradicts societal schemas.

She discussed how taking steps to successfully minimize evaluation bias (the unconscious reliance on our schemas when judging for hiring, promotion, or awards) has been a major focus area of ADVANCE. To illustrate the need, Stewart shared results from recent studies in which application packages were created as identical copies, save for one variable.

In one case the variable was gender, which was indicated by changing the applicant's first name. When study participants were asked to rate whether they would hire "Karen" or "Brian" for an assistant professorship, "Brian" was preferred 2:1 over "Karen."

In the next case, parental status was indicated by adding or omitting "Active in PTA." In comparison to non-mothers, mothers were less likely to be recommended for hire, offered lower starting salaries, and viewed as less competent and committed to paid work. However, fathers experienced no disadvantage and were seen as more committed to paid work and offered higher starting salaries than non-fathers.

Recognizing such biases and developing policies and practices to minimize them is key to moving beyond a traditional monoculture with a singular path to success, Stewart said. When the National Science Foundation (NSF) initially funded ADVANCE and its sister

programs in 2001, Stewart said NSF recognized monocultures as "organizational dinosaurs" for doing science.

"We operate in a diverse and pluralistic world," said Stewart. "Diversity is not only consistent with excellence, but is a *pre-condition* to excellence."

Stewart said that underrepresentation, quantified as below a critical mass of 30 percent, can lead to a self-reinforcing cycle where disadvantages continually accumulate — unless the cycle is interrupted.

"It's not bad actors; it's a systemic feature. This will reproduce itself unless we intervene," Stewart says.

She recommended institutions start by focusing on recruitment practices and policies, where impact can occur quickly, while working on institutional culture in parallel. She also emphasized the importance of mentoring.

"At the beginning, people thought, '*The good people don't really need mentoring; they just rise.*' We don't hear that anymore. Some people get more mentoring 'accidentally' or 'by the way,' and other people don't. That's not fair. You need to ensure that it happens structurally," Stewart said.

Creating an inclusive culture not only impacts underrepresented groups, but also creates an environment in which everyone thrives, Stewart said. The ADVANCE program's 2012 survey data showed a marked impact since 2001 on institutional climate, work satisfaction, and intention to stay across *all groups*, she said, whether in the majority or the minority.

Stewart stressed that success requires continual self-evaluation as an institution as well as full leadership engagement and commitment.

"Cultural change isn't easy, it's not fast, but," she said, "it's possible."

Stewart's presentation is available at <http://tiny.sandia.gov/stewart>.

IARPA director briefs Sandians

The Intelligence Advanced Research Projects Activity (IARPA) is focused on bringing together the best minds in the nation to address challenging problems for the Intelligence Community, IARPA Director Peter Highnam told a group of Sandians during a presentation April 2. The presentation followed a tour of various Sandia facilities

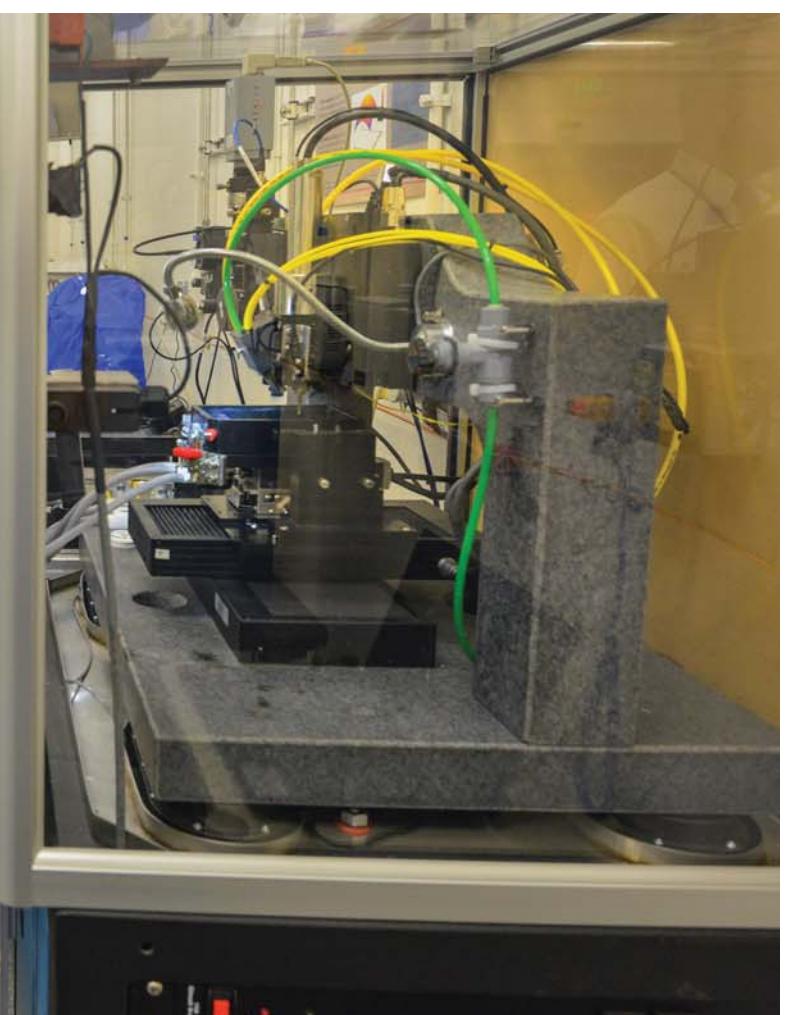
In working with the Intelligence Community, Highnam said IARPA's work is extremely focused, with clear, measurable goals, and its projects typically cover a three-to-five year span.

"We use five [Heilmeier] question sets to frame everything we do," he said. "We have it tattooed on us. It's trickier than it looks to get these questions

right." They include specifics around what the researcher is trying to do, what they will be doing that's new, and what kind of difference the project could make if it's successful.

The approach has worked. "We've been very successful at predicting real-world events," he said. "We make sure we get information to people who have to make tough decisions, whether they want to or not."

Sandia has had associations in the past with IARPA, with staff serving on programs such as their Circuit Analysis Tools (CAT) Program, and the Trusted Integrated Chips (TIC) Program. Several tools from the CAT Program will be placed in the recently occupied Counterfeit Detection Center.



INTELLIGENCE ADVANCED RESEARCH PROJECTS ACTIVITY Director Peter Highnam, left, with Cindy Longenbaugh (5642) and Bradley Gabel (5644) during his tour of Sandia.
(Photo by Randy Montoya)

Explosive Destruction System begins first stockpile project



THE DESIGN AND DEVELOPMENT OF THE EXPLOSIVE DESTRUCTION SYSTEM has been ongoing since 1994, involving a large and diverse Sandia team. Jerry Stofleth (5439), front row far right, has been with the project since its inception and Dan Golling (8137), third row in the maroon shirt, has worked on it nearly as long. A subset of the current team shown here includes, left to right, front row: Darwin Burney (8137), Jerry; second row: Roger Watson (8137), John Didlake (8137), Brent Haroldsen (8137); third row: Will Bolton (8137), Michael Schwinghammer (8234), Dan Golling (8137); fourth row: Jack Wass (8137), Jerry Belluomini (8234), and Tom Raber (8137). (Photo by Dino Vournas)

Sandia California News

By Patti Koning

Last month, the Explosive Destruction System (EDS), designed by Sandia for the US Army, began safely destroying stockpile chemical munitions.

The project to destroy 560 chemical munitions at the US Army Pueblo Chemical Depot in Colorado with EDS is a prelude to a much larger operation to destroy the stockpile of 780,000 munitions containing 2,600 tons of mustard agent stored at the Pueblo depot since the 1950s.

The bulk of those munitions will be safely destroyed in the Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP), which will begin operation later this year. The munitions to be destroyed in EDS are considered unsuited for processing by the plant's automated equipment because they have leaked or have been sampled in the past.

"EDS was originally designed for nonstockpile chemical munitions at recovery sites, many of which are deformed and corroded," says mechanical engineer Brent Haroldsen (8137), the Sandia project lead. "Stockpile munitions are generally in better shape, but there are always a few that are leaking or damaged. That's where EDS will come in to keep the plant moving efficiently."

The Program Executive Office, Assembled Chemical Weapons Alternatives (PEO ACWA) is overseeing the pilot plant as well as the Blue Grass Chemical Agent-Destruction Pilot Plant near Richmond, Kentucky. Once the pilot plant begins operation, the EDS systems will remain at the site to process any additional reject munitions unsuitable for processing in the Pueblo pilot plant.

Latest EDS model destroys munitions twice as fast

The two EDS units that will augment the pilot plant operation work much faster than the original EDS, which took two days to process a single munition. Sandia designed that system for the Army in the late 1990s to destroy munitions that were discovered unexpectedly.

To safely destroy a few damaged munitions at a time, possibly in populated areas, the original design emphasized transportability, flexibility, redundancy, surety of destruction, and simplicity of manual operation — not rapid processing.

The Army first used EDS in 2001 at the Rocky Mountain Arsenal in Colorado and then at other locations where abandoned munitions were recovered. Sandia then created a larger version, capable of destroying multiple munitions simultaneously and handling munitions with a higher explosive charge. In 2010, Sandia engineers created the Phase 2 Pilot (P2P), which decreased the processing time from two days to one through changes to the heating and cooling system and door clamp design. (See the Sept. 7, 2012, issue of *Sandia Lab News*.)

Over the years, the basic operation of EDS has remained the same. At its core is a leak-tight vessel in which munitions are placed. An explosive shaped charge opens the metal shell, exposing the chemical agent and burster, a small explosive that disperses the agent. The burster explodes or deflagrates safely inside the vessel. A reagent is then pumped into the chamber to neutralize the chemical agent. The chamber is heated and turned to mix the chemicals and speed the reaction.

Stockpile munitions easier to process

The new EDS, called the Phase Two Retrofit (P2R), incorporates many of the P2P improvements along with a separate boiler/chiller container and larger pipes and pumps to transfer fluids more quickly. Working

with stockpile munitions also simplifies the explosion process.

"Nonstockpile munitions are discovered in strange conditions, tangled in tree roots or covered with barnacles. Badly corroded munitions are often stabilized with plaster of Paris and then wrapped in plastic before processing. Consequently, the EDS was designed to be adaptable and flexible," Brent says.

But stockpile munitions, even problematic ones, are quite uniform. "So we need less flexibility in the design and we can use the shaped-charge explosives more effectively to cut the munitions," says Brent.

At the pilot plant, EDS will process six munitions a day, starting with 560 reject munitions already set aside. ACWA expects EDS to destroy about 1,300 munitions over the five-year operation, including reject munitions.

Improvements under way to vapor monitoring

In collaboration with Defiant Technologies, the EDS team also is working on an in-situ vapor monitoring system, which is an offshoot of Sandia's MicroChem-Lab gas phase system. To ensure the EDS vessel is safe to open following operation, a vapor sample must be collected and analyzed. An in-situ monitoring system would draw a sample from inside the vessel, eliminating the collection step and saving about 45 minutes.

The vapor monitoring system also can monitor for multiple agents simultaneously, so it could be used to monitor the environmental enclosure around EDS or at a munition recovery site. That monitoring is currently being done with specialized gas chromatographs, which are reliable but can only check for one agent at a time.

"The ability to monitor for multiple agents with a single system would further simplify operations," says Brent.

The two EDS units will spend several years at PCAPP. Meanwhile, the Army continues to use the EDS system to destroy recovered chemical munitions.

Mileposts

New Mexico photos by Michelle Fleming
California photos by Dino Vournas

Recent Retirees

Retiring and not seen in the Lab News pictures:
Linda Shepard (5562), 17 years.



Linda Shepard

39



Kent Biringer

6834



Daniel Hardin

38

8230



Larry Trost

35



Moses Jones

35



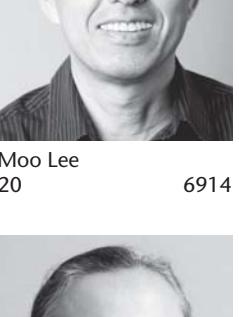
Gordon Roubik

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Judith Jojola

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Ralph Chapman

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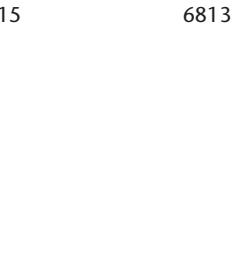
Michael Irwin

32



Dennis Miller

29



Ellen Cook

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Michael Wilson

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Tap Taplin

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Tom Burford

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Dan Carroll

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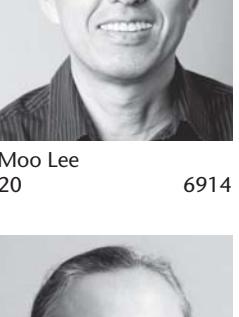
Gordon Roubik

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Judith Jojola

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Ralph Chapman

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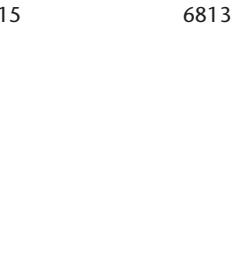
Michael Irwin

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Dennis Miller

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Ellen Cook

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Michael Wilson

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Jill Glass

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Brad Hance

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Richard McLendon

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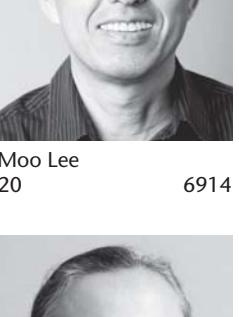
Carol Meincke

25



James Schreiber

17



Nora Stoecker

15



Jeanne Overall

12



Neal Singer

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Marty Shaneyfelt

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Edith Hendrix

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Darren Hoke

20



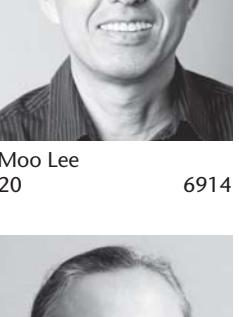
Jennifer Lange

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Moo Lee

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Eric Romero

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Neal Singer

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Sherry Stone

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Monica Ten Eyck

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Barbara Allison

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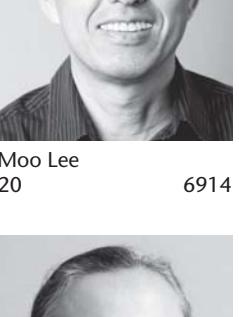
Reuben Baca

15



Lupe Barraza-Medina

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Chris Bell

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Robert Bernstein

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1853

Darren Branch

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Rachel Carlson

15



Adrian Chavez

15



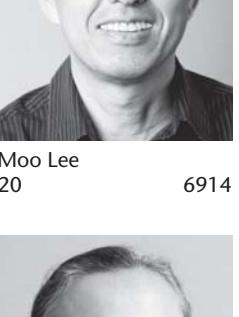
Bert Cox

15



Rich Dietrich

15



James Duncan

15



Walter English

15

2155

Sandia Classified Ads

MISCELLANEOUS

DVD PLAYER, Sony, w/remote, barely used, \$20. Hennessey, 505-269-6243.

TIRES, 4, LT 235/75R15 Cooper Discovery R/T 3, only 3K miles, like new, \$250. Fredericks, 864-3248.

APPLIANCES, all Whirlpool, 36-in. side-by-side refrigerator; dishwasher; stove; microwave; \$1,500 firm. Casias, 505-814-4866.

VINTAGE CHAMBER STOVES, 2, energy efficient, continues cooking w/fuel off, 3 burners, deep well, griddle/broiler. Lovato-Montoya, 342-0043.

ELECTRIC LAWN MOWER, Black & Decker, 15-in.; electric grass clippers, almost new; separately, \$100/\$40 or \$125 for both. Hawkins, 505-341-0314, ask for Rachel.

WICKER FURNITURE, love seat, 2 chairs, coffee table w/reversible cushions, used inside only, \$100 OBO. Roesch, 281-9751.

VACUUM CLEANER, Rainbow system, w/20+ pcs. including carpet cleaner, lightly used, \$340. Griego, 265-2130.

GUIDE TO PROJECT MANAGEMENT BODY OF KNOWLEDGE, 5th edition, current, new, never used, \$38. Stogsdill, 280-0595.

TV MONITOR, 15-in., Insignia, \$15; 16-1/2-in. computer monitor, ACER, \$20; good condition, OBO. Williams, 299-3108.

INK CARTRIDGES, HP 564, sealed, 3 of ea. color, plus photo, \$70 OBO. Harvey, 242-1619, mah0mdk@aol.com.

UPRIGHT PIANO, w/bench, you pick up, free. Havener, 505-363-4111.

SLEEP NUMBER BED, king, perfect condition, 3 yrs. old, paid \$2,400, asking \$1,600. Garrison, 292-8973.

PRIDE LIFT CHAIR, beige upholstery, like new, text for photos, paid \$650, asking \$300. Palya, 881-2720.

BARI SAX, low Bb, \$1,200; drum kit, Sunlite, \$300; Wii remote, Wii Fit, controllers, games, \$200. Tucker, 505-883-4041.

DINING SET, \$250; baker's rack, \$100; queen futon, \$100 OBO, must sell. Miller, 303-868-2227.

SPIN BIKE, w/DVDs, good condition, text for photos, \$250. Mariani, 505-948-2726.

COFFEE TABLE, 2 end tables, oak, good condition, \$90. Vrooman, 505-249-8414.

SOFA, La-Z-Boy recliner, \$850; medium brown recliner chairs, \$450 & \$350; \$1,500 for all; marble-top tables, \$350 & \$450. Drebing, 293-3335.

WEIGHT BENCH, w/160-lb. weights, multi-function Weider Pro, like new, little use, \$175 OBO. Franklin, 292-6951.

TVs, 2; DTV converter; microscope; Xbox; Trikke Sport scooter; Nintendo. Flores, 610-2374.

CAMPER SHELL, light gray, from '94 Ford 150 SB, \$400. Schroeder, 505-917-4516.

LAPTOP, Samsung 5.5 Ultra, touchscreen, Windows 8, Intel processor, like new, \$700 OBO. Garcia, 293-2810, ask for Tayler.

ELECTRIC HEDGER, 22-in., Black & Decker, \$25; Hewlett Packard 17BII financial calculator, w/manual & cover, \$25. Stavros, 296-2876.

TUBE AMP, Fender HR Deluxe, 40-W, home studio use, only 10 hrs., \$500. Pruitt, 281-5287.

DIGITAL CAMERA, Nikon D300S, DX 18-70 mm lens, extra battery, 2 32GB storage cards, charger, camera bag, \$1,500. Bonaparte, 505-980-7300.

DINING TABLE, Southwestern-style, wooden, whitewash finish, rectangular, w/matching hand-upholstered cushioned chairs, \$550. Moonka, 505-307-4879.

EXERBIKE, works well, nothing fancy, just sit on it & work up a sweat, \$50. Roberts, 275-2941.

UTILITY TRAILER, 5'x8', 4-ft. ramp, 2-ft. metal side rails, \$750 OBO; Sears top-carrier, Sport 20, \$80 OBO. Konkel, 235-8085, ask for Marty.

ALFALFA HAY, barn stored, in Peralta, \$7.50/bale, 25 bales min. Greenwood, 869-0153.

STORAGE CABINET, granite top, 71" L x 21" W x 32" H; tile-topped storage cabinet, 72" L x 22" W x 49" H. Spray, 505-385-2442.

MATTRESS, Serta, California king, pillow-top, box springs, bed frame, used only in spare bdr., like new, \$250. Black, 505-385-9468.

WASHER/DRYER, Maytag Bravos, ~4 yrs. old, electric dryer, good condition, you pick up, \$650 OBO. Davis, 505-814-8665.

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.

COUCH/LOVE SEAT, leather, coffee table, dining sets, entertainment center, all ranch-style, prices vary, photos available. Brown, 505-980-8660.

WHEELS, new-style Camaro, 5-spoke, 20-in., 8-in. front, 9-in. rear, silver, like new, \$500. Watenpaugh, 400-8856.

POP-UP THRIFT SHOP, benefits Junior League of Albuquerque, May 2, 8 a.m.-1 p.m., 3900 Osuna Rd. NE, 87109 (Adelante Bldg.).

Silva, 505-450-1383.

TRANSPORTATION

'09 HONDA FIT SPORT, 1 owner, 39.5K miles, excellent condition, \$12,500 OBO. Rajan, 505-323-6633.

'08 HONDA RIDGELINE, 1 owner, low miles, 44K miles, 4WD, traction control, complete maintenance log, \$19,450. Mowry, 264-4657.

'11 FORD EDGE SEL, AWD, loaded, leather, black exterior, 58K miles, \$18,999 firm. Lopez, 315-0090.

'12 HYUNDAI ELANTRA, limited, leather, full warranty, fully loaded, Bluetooth iPod control, GPS, 58K miles, spare tire, \$12,500. Rudys, 235-5602.

'06 SUBARU FORESTER 2.5 X, AWD, crystal gray metallic, AT, newer tires, leather seats, original owner, 34K miles, \$10,000. Harris, 858-0667.

'12 ACURA TSX WAGON, graphite, leather, navigation, heated seats, 30+mpg, Honda quality, 22.5K miles, \$36,000 new, asking \$21,500. Basiliere, 505-695-2482.

RECREATION

BICYCLE BUILT FOR TWO, Tandem, call or text, photos available. Hanks, 249-1931.

'02 KEYSTONE SPRINGDALE TRAVEL TRAILER, 19-ft., AC, heater, shower, tub, toilet, stove, refrigerator, all in excellent working condition, \$5,500 OBO. Regis, 505-269-9049.

'04 FLEETWOOD POP-UP CAMPER, heater, 3-way refrigerator, grill, new tires, sleeps 7, \$3,999. Smith, 366-4037.

'89 ALLEGRO MOTORHOME, 28-ft., low mileage, new tires, awning, belts, batteries, good condition, \$10,000. Duncan, 505-306-7614.

'05 KYMCO PEOPLE 250 SCOOTER, w/trunk & trickle charger, 12K miles, well cared for, \$1,400 OBO. Verley, 410-9885.

'07 PIAGGIO BV 250 SCOOTER, 68-mpg, extra stuff, 7.4K miles, excellent condition, \$2,550. Colborg, 604-4915.

'00 PACE ARROW MOTORHOME, lots of extras, Banks kit, 2 slides, excellent condition, \$32,900 OBO. Hibray, 821-3455.

'12 ELKRIDGE 5TH WHEEL, 38-ft., granite, fireplace, 4 slides, used twice, \$36,000 OBO; could include truck. Trujillo, 505-314-3925.

'01 HONDA CBR600F4i MOTORCYCLE, excellent condition, 1 owner, low miles, commuter bike only, salvage title, \$3,000. Garcia, 505-232-2010.

'11 JAYCO GREYHAWK MOTORHOME, 31-ft., class C, HWH leveling, slide out, satellite, genset, excellent condition, \$73,800. Gehrke, 263-7327.

REAL ESTATE

2-BDR HOME, 2 baths, 1,018-sq. ft., SW Albuquerque, 1-1/2 miles from freeway, \$118,000. Hidalgo, 505-269-7795.

2.67 ACRE LOT, Valencia county, beautiful, FSBO, \$48,000. Gurrieri, 856-1688.

3-BDR. HOME, 2-1/2 baths, 2-car garage, 2,070-sq. ft., refrigerated air, security system w/cameras, Westside, amazing views, \$245,000. Ahr, 903-0336.

2-BDR. CONDO, 2 baths, 1-car garage, 1,200-sq. ft., Socorro, near NMT, new appliances & blinds, fresh paint, \$129,950. Haskell, 323-3843.

3-BDR. SINGLE HOME, 1-1/2 baths, 1,057-sq. ft., NE Albuquerque, near base, MLS#836831, \$145,000. Valdez, 681-3732.

3.15 ACRES, Heatherland Hills subdivision, utilities, active well on property, 15 from Albuquerque, \$90,000. Steele, 505-220-6567.

5.04 ACRES, off Hwy. 53, Pine Meadows Ranches, near Ramah/El Morro, Cibola County, \$5,000 OBO. Jones, 352-1007.

WANTED

HOST FAMILY, open your heart to an international high school exchange student, host w/AFS. Hiebert-Dodd, 296-1158.

WTB-TRIATHLON WETSUIT, for upcoming open water swim, men's L or XL. Sais, 505-999-1270.

REEL-TO-REEL TAPE DECK, Pioneer, Teac, Technics & accessories. Pattison, 292-8969.

WOMEN'S SMALL/MEDIUM FRAME ROAD BIKE, good condition, willing to pay up to \$500. Black, 505-331-9147.

LAWN MOWER, good condition, preferably electric; treadmill, good condition & quiet. Chacon, 450-4321.



Mileposts

New Mexico photos by Michelle Fleming
California photos by



Carol Ferguson
15 10672



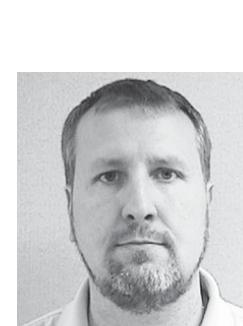
Kenneth Hatfield
15 9341



Steve Highland
15 6615



Stacy Kerns
15 2631



Jeffrey Martin
15 5946



Scott Pinnick
15 9341

New building preserves inactive records, earliest weapons designs

By Lindsey Kibler

Sandia has finished building a storage facility that will house more than 35,000 boxes of inactive records.

"The facility includes both historical collections held by the Sandia Corporate Archives and collections that are being maintained until they meet their required records retention period; the latter is the vast majority of the content," says corporate historian Rebecca Ullrich (9532). "Sandia determines the appropriate retention period from both the General Records Schedule provided by National Archive and Records Administration (NARA) and DOE-specific records schedules."

Albuquerque-based Summit Construction Inc. began the Inactive Records Storage Facility in the summer of 2013 and finished this January — under budget and eight months ahead of schedule.

The consolidation gives Sandia records managers easier access and improves the implementation of records management requirements. "Having everything in one place and organized electronically is a great benefit," says Susan Kitsch, manager of Recorded Information Management Dept. 9532. "If a scientist or engineer needs to read a researcher's notes from previous years, we can go to one place to find and retrieve that information. We can look at where it is shelved, quickly access that information, and maintain a proper chain of custody."

From compliance and historical perspectives, the new facility will ensure corporate archives and federal records are preserved and safeguarded from environmental hazards.

While the bulk of the boxes contain inactive records, there is a lot of material of broader historical interest, too. For example, the notebooks of Willis Whitfield, who invented the laminar-flow cleanroom in 1962, are stored in the facility.

Susan says, "This is our nation's history and this facility is going to allow us to manage our portfolio of information, preserve it, and protect it."

The facility was constructed using a "safe by design" method. HVAC systems and other equipment are mounted at ground level, which allows easy access for maintenance. In addition, keeping equipment off the roof prevents damage to the building's contents by eliminating a potential source of leaks, an NARA specification for records storage facilities. Other features of the 15,000-square-foot facility that meet National Archive and Records Administration requirements include:

- two-hour-rated fire barrier walls between records storage areas and other auxiliary spaces;
- seismically braced racking systems for proper air flow and fire suppression;
- fire suppression system constructed in conjunction with racking systems to mitigate water damage, if



TRACY RHODES (9532), records management professional, retrieves records using the new, more efficient shelving system in a recently completed records storage facility. (Photo by Randy Montoya)

sprinklers are needed;

- continuous climate control (temperature, humidity, and air exchange) and emergency power backup for egress lighting;
- building sited at least five feet above and 100 feet from the 100-year flood plain; and
- permissions-controlled access to the facility and records.

A representative from the NARA visited the building site periodically to view progress and ensure Summit and Sandia were meeting records storage specifications.

Originally, planners considered building modules offsite and then assembling the records center at its new location but eventually it was built on-site in three phases.

"We were able to construct the building on-site, at a lower cost," says Matt Cattaneo, who served as the facilities project lead and managed project costs. "This, in turn, allowed for creative teaming with Summit Construction and accelerated the second phase of construction, which put the project under budget and ahead of schedule." Matt was in Dept. 4822 during the project and is now the facilities operations lead in Dept. 4824.

Summit completed the job without injury or incident, which Matt attributes to the collaboration between the project and construction management team, led by construction manager Joseph Cordova

(4822), and the contractor.

The facility's opening in January marked the start of a two-year project to centralize, inventory, and organize the records. Non-records items will be identified during this time.

"Centralizing the records is a careful and controlled process. We are inventorying records as they are moved. This gives us a chance to see if anything is being stored past the recommended retention date and to ensure boxes are barcoded for the new shelving," says Rebecca.

Rebecca says such a detailed inventory and tracking system provides an added reassurance for people who have records in storage. "It's really a great addition to Sandia — to have an easier way to handle and preserve large amounts of corporate records — and it's really exciting to see the records being processed so efficiently."

Tracy Rhodes is the project lead overseeing the move and the records setup in the new building. The transfer of records is a large task but, Rebecca says, Tracy (9235) "makes it look easy."

Each quarter, 5,000 boxes will be loaded onto pallets and transferred to the new facility for inventory and placement. Two collections already have been transferred to the new building, with the next one scheduled in May.

Chief of Naval Operations visits Sandia

DURING A MARCH 25 visit to Sandia, Chief of Naval Operations Adm. Jonathan Greenert toured the Microsystems and Engineering Sciences Applications (MESA) facility and Z machine, and received briefings on a number of topics related to defense. Shown with Adm. Greenert are, from left, Steve Rottler, Deputy Labs Director and Executive VP for National Security Programs; Paul Hommert, Sandia President and Labs Director; Capt. Michael Studeman of the US Navy; Gil Herrera, director of Microsystems Science & Technology Center 1700; and researcher Darwin Serkland (1766).



(Photo by Randy Montoya)