



Glen Canyon Dam. Photo by Randy Montoya

WATER AND ENERGY

A wide-ranging analysis of water vulnerability across the Pacific — including the US, China, Russia, and Japan — has identified hundreds of locations where energy production depends upon scarce water supplies. Read about the study by Sandians Vince Tidwell and Barbie Moreland on page 5.

Exceptional service in the national interest

Sandia LabNews



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Exascale rising!



Exascale Computing Project awards \$39.8 million for application development

First investments made by recently formalized project

By Neal Singer

Improved computer climate models of the Earth's clouds and more accurate simulations of the combustion engine are goals for two projects led by Sandia that were funded in the first round of grants from DOE's break-out \$39.8 million Exascale Computing Project (ECP).

Sandia also will conduct research with other laboratories on three exascale projects whose goals range from developing physics models for more efficient wind energy production to improving understanding of materials at the molecular level, and simulating quantum mechanical effects in materials.

The 22 projects chosen by the ECP were selected for their societal significance and their ability to advance through exascale computing.

Jackie Chen (8351) leads one of 15 fully funded projects: Transforming Combustion Science and Technology with Exascale Simulations. Mark Taylor (1446), chief computational scientist for DOE's Accelerated Climate

(Continued on page 10)

FLC in ABQ

Regional tech transfer pros talk entrepreneurship, collaboration



Federal Laboratory Consortium for Technology Transfer

By Nancy Salem

Partnerships were top of mind as more than 120 tech transfer experts from 22 federal labs in 15 states came to Albuquerque for the 2016 Federal Laboratory Consortium (FLC) Mid-Continent and Far West Regional Meeting. It was the first-ever FLC regional meeting in the city and featured a talk by Jetta Wong, director of the DOE Office of Technology Transitions (OTT).

Titled "Catalyzing Innovation Through Regional Collaboration," the conference held Sept. 13-15 at Hotel Albuquerque focused on growing entrepreneurs and commercializing technologies. The FLC is a nationwide network of more than 300 members that provides a forum to develop strategies and opportunities for linking laboratory mission technologies and expertise with the marketplace.

Keynote speaker Gary Oppedahl, the city of Albuquerque's economic development director, said collabora-

(Continued on page 4)



EMPLOYEE RECOGNITION AWARDS. PAGES 6-8



HENAAC WINNERS

SANDIA CHEMIST Bernadette Hernandez-Sanchez and cyber researcher Vince Urias honored as 2016 HENAAC winners. Story on page 9.



Inside...

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- California site marks 20 years of bio research 3



ECP CAMPAIGN, OCT. 3-21. PAGE 12

That's that

I read a book years ago about Skylab, the early-1970s follow-on to the Apollo program, and some parts of it have stuck with me for decades. Skylab, the first American space station, was built around the voluminous third stage of a mammoth Saturn V rocket. In an Apollo lunar mission, that stage would have provided the punch to send astronauts from Earth orbit to the moon, but in an orbital mission the third stage was not needed, so its interior space was fitted out like the ultimate high-tech, bus-sized RV. Three crews rotated into Skylab for one- two- and three-month missions in 1973 and 1974.

Technically, Skylab was a great success. Astronauts proved human crew members could work and solve tough problems in the vacuum of space and NASA scientists and engineers learned a lot about long-duration missions, which would be essential knowledge for planetary exploration.

However, the program was not without its hiccups. In *SkyLab 4*, the three-month mission, there was a famous crew "strike." Here's how Wikipedia describes it:

"The crew's initial task of unloading and stowing the thousands of items needed for their lengthy mission proved to be overwhelming . . . and the crew soon found themselves tired and behind schedule. . . . [T]he astronauts complained of being pushed too hard. Ground crews disagreed; they felt that the astronauts were not working long enough or hard enough."

Said *SkyLab 4* Commander Jerry Carr at one point, "We would never work 16 hours a day for 84 straight days on the ground, and we should not be expected to do it here in space." Ground Control disagreed, strongly, and basically told the crew to quit complaining and get back to work. That was the last straw for the three highly trained, highly motivated overachievers.

In protest, the crew literally cut off communications with Earth and spent a full day relaxing and doing things at their own pace. NASA wasn't happy but the "strike" led to mission changes and played a big role in shaping the way NASA dealt with workload planning on subsequent human-crewed missions.

According to the Skylab book, during the post-flight debrief one of the program planners said the only real problems with the mission stemmed from "the biological interface." That is, with the human crew members. But, of course, the "biological interface" was the whole point of the program.

* * *

What brings the Skylab program to mind is a news story I read the other day about a NASA/University of Hawaii experiment that has just come to an end. After a year in a mock-up of a Mars habitat, six volunteer crew members with astronaut-like qualifications emerged back to planet Earth. And it seems that once again, there were issues with the biological interface.

The habitat was the size of a modest apartment – 1,200 square feet. More than one crew member reported that over time, the frustration of simply never being able to get away from everyone else was almost unbearable.

"One of your biggest enemies is boredom," said German physicist and crew member Christiane Heinicke.

"The other big enemies, of course, are the rest of the crew," she said with a laugh. But clearly, it was a laugh with an edge. Asked if she planned to keep in touch with her crewmates now that the mission was over, Heinicke replied carefully, "Um, well, three of them I'm definitely going to stay in very close contact with."

Sounds like the way I feel after a big family reunion at Thanksgiving, although I might not go so far as to say "three."

NASA has announced its intention to land a human crew on Mars as early as 2030 – just 14 years away – an ambitious goal. As in all forward-looking research programs, NASA's Mars teams will be breaking a lot of new ground. Among key unknowns: How well can a crew function for months at a time in a real Martian outpost? Because of the Mars habitat experiment, some of the human issues are more clearly understood now. Thanks to those volunteer "astronauts," planners for upcoming Mars missions have a better handle on that pesky biological interface.

And maybe they'll take to heart a lesson that goes all the way back to Skylab: Whatever else they do, planners need to make sure to include BIG windows. By far the favorite pastime of all nine astronauts who flew Skylab missions was to gaze out the window, looking down on their home planet and – surely – contemplating their place in the scheme of things.

See you next time.

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

Materials society names Sandia's Don Susan Fellow

By Sue Major Holmes

Don Susan, a researcher in Sandia's Metallurgy and Materials Joining Dept. 1831, has been named a Fellow of ASM International in recognition of distinguished contributions to materials science and engineering.

The society's citation says Don received the honor, one of the highest in the field of materials, for "sustained contributions in the areas of physical metallurgy and joining research, materials characterization, and failure analysis."

The 22 members of ASM's 2016 class of Fellows will be honored at the society's annual awards dinner Oct. 25 in Salt Lake City during the Materials Science & Technology 2016 conference.

"It's a big honor for me, especially knowing the Fellows who came before me," Don says. "It's a big honor to follow in their footsteps."

Don, who joined Sandia in 2000, says the award recognizes a broad range of work during his career. His areas of expertise include hermetic connector technology, tin-lead and lead-free solder metallurgy, active brazing alloys, electrical contact alloy metallurgy, high-strength stainless steels, metallography and quantitative image analysis, and failure analysis. He is a co-inventor on work that led to a patent on glass-ceramic to metal sealing for high-temperature, high-pressure applications.



DON SUSAN



"I have a lot of interests and I'm glad to be recognized by ASM as a generalist in metallurgy," he says.

Interest in materials science came from dad

When Don was young, his father worked in a Honeywell facility that made plastic film, and "I guess the materials science aspect rubbed off on me, except it was metals, not polymers," says Don, who holds a doctorate in materials science and engineering from Lehigh University.

He also has worked on shape-changing alloys and was principal investigator for a three-year project to create high-temperature shape-memory alloys. In addition, over the years he worked on numerous teams conducting materials research and component evaluations to ensure the safety, security, and reliability of the nation's nuclear weapons stockpile.

Don recalls a project on an iron-cobalt based alloy called Hiperco that turned out to be satisfying for him and his colleagues because they solved a problem in an unexpected way.

Hiperco had poor mechanical properties, but the team found a way to increase its strength by two to three times through a process called Equal Channel Angular Extrusion, which extrudes a bar of metal in a way that can be described as going around a corner. "We were all skeptical at first, but it works," Don says. "This was a very satisfying project because it was a bit of a surprise to all of us."

Fellows serve as advisers to ASM International to enhance its standing as a leading organization for materials and provide a resource to serve the worldwide community of materials scientists and engineers in the years ahead. The society established the honor in 1969 to recognize Fellows' contributions and to develop a broadly based forum of technical and professional leaders to be advisers.

ASM International was founded in 1913 as the American Society for Metals. Today, it has more than 30,000 members worldwide and is the world's largest association of metals-centric materials scientists and engineers.

2017 Open Enrollment coming soon

Open Enrollment is your annual opportunity to review and update your benefit elections.



- Active Employees: Oct. 31-Nov. 17
- PreMedicare Retirees: Oct. 15-Nov. 18
- Medicare Retirees: Oct. 15-Dec. 7

* * *

Find out more at hbe.sandia.gov.

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Sandia chronicles 20 years of bioscience research

By Michael Padilla • Photos by Randy Wong

A commitment to national security, enhancing partnerships, and a strong focus on research and development were the primary themes highlighted at a recent 20th anniversary celebration for Sandia's biological sciences program. The event also commemorated the fifth year of Sandia/California's Applied Bioscience Laboratory.

On Tuesday, Aug. 30, Div. 8000 VP Marianne Walck and former Center 8600 director Malin Young, now deputy director for Science and Technology at Pacific Northwest National Laboratory, led the event.

Marianne highlighted the work conducted at Sandia to provide biological solutions to critical challenges in energy and homeland security. She acknowledged the world class researchers and thanked everyone who has been involved in biosciences at Sandia.

"Sandia could not have done all the great things without the technical staff, technologists, postdocs, and student interns who demonstrate the talent, innovation, and determination to forge this exciting research area," Marianne said.

"Biology's special requirements are very different from our nuclear weapons work. I am thankful to our mission support for making this new capability happen at Sandia," she said.

Marianne read remarks by former 8000 VP Mim John, who was unable to attend the event. Mim wrote that Sandia first began bioscience work in the 1992-93 timeframe.

"With the end of the Cold War, our historic missions were certain to decline," Mim wrote. "We had started a small effort in computational biology. At that time, the nation was taking a nuclear holiday with the fall of the Soviet Union, but we had started to see some worrisome events in the chemical and bioweapons world."

During that time Sandia explored how the California site could contribute to chemical and biological weapons defense.

Since then, the biological sciences program has grown to include some 120 researchers located in Livermore and Emeryville, California, and Albuquerque. The work is primarily funded by DOE, DoD, DHS, and NIH. The Laboratory Directed Research and Development program was a major source of funding in the early days of bioscience work at Sandia, and LDRD continues to play a significant role today. Bio funding from DOE's Office of Energy Efficiency and Renewable Energy is at an all-time high. External partnerships include multiple national laboratories and universities. Inventions have led to start-up companies and licensing with many others.

Bioscience work is strongly aligned with Sandia's Energy and Climate and Global Security Program Management Units. Various projects support the Labs' Nuclear Weapons and Defense Systems & Assessments programs.

Young reminisced about joining the bio program in 1999 during the microChemLab era, a Grand Challenge LDRD project that had a distinct focus on biodefense. Bio-engineering and bioscience at Sandia soon led to research in medical diagnostics and host-pathogen interactions.

During the mid-2000s, the program expanded into algae, diatom (a group of algae), and genomes-to-life projects. New Mexico brought biomaterials and bioimaging strengths to the program.

Center 8600 Director Anup Singh, who first joined Sandia as a post-doc, said he looks forward to the continued success of Sandia's bio program, including new projects such as Co-OPTIMA (continuation of fuels and engines), agile biofoundry, and the NanoCRISPR Grand Challenge project, which exploits new gene editing capabilities.

"Sandia will soon be in the forefront of gene editing technologies both in constructive applications and in countering the threats enabled by gene editing," he said. "We have ushered in a new era in biological engineering and Sandia will continue to focus on these areas."



FORMER CENTER 8600 DIRECTOR Malin Young, now deputy director for Science and Technology at Pacific Northwest National Laboratory, current Center 8600 Director Anup Singh, and Div. 8000 VP Marianne Walck.



CAMERON BALL (8621) demonstrates the SMART Trap to Malin Young.



ARUL VARMAN (8614) discusses his work with Marianne Walck.



DR. STEPHANIE BALL (8527), left, gets an overview from Leanne Whitmore (8623) about her work in systems biology.



OSCAR NEGRETE (8621), left, discusses the NanoCRISPR Grand Challenge project to Oliver Kilian (8614).

FLC regions meet in Albuquerque

(Continued from page 1)

tion is important among the many government and private-sector groups trying to build the economy. “We’re all working on stuff across a large spectrum,” he said. “We need to set up environments where it is easy to collaborate, communicate, and connect.”

He said technology transfer from national labs has been strengthened by giving business people access to scientists, engineers, and intellectual property (IP). “Tech transfer is absolutely doable,” he said. “I encourage you to keep doing what you’re doing and work together.”

Oppedahl, a self-described serial entrepreneur who commercialized two Sandia technologies, said the labs should encourage entrepreneurs. “These are people with ideas who look at a situation, know there’s an opportunity to improve it, and pursue it despite obstacles,” he said. “Let’s establish an entrepreneurial mindset and try new things. We can make it happen, make big changes, and see growth. We can stay ahead in the world.”

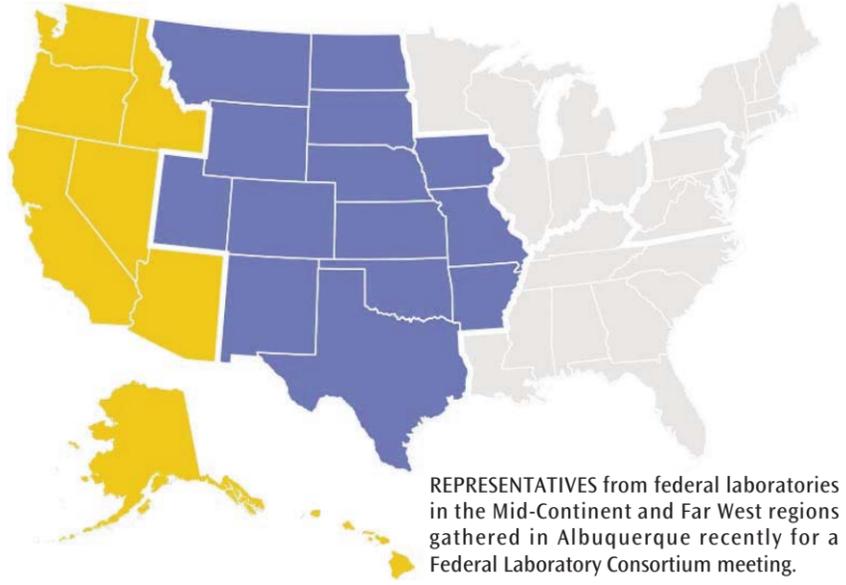
IP for the marketplace

In a panel on creating entrepreneur-friendly communities, Lisa Kuutila, chief economic development officer for the University of New Mexico (UNM), said it takes many people to build an entrepreneurial ecosystem. She said business incubators, investors, skilled management, and

service providers are needed to get baby companies off the ground.

Collaboration results in critical intellectual property for the marketplace, Kuutila said. “We work with Sandia, Los Alamos, the Air Force Research Laboratory,” she said. “Agreements are in place. It’s a well-oiled machine.”

Jackie Kerby Moore, manager of Technology and Economic Development Dept. 1933, said Sandia has played a major role in Albuquerque’s economic development as one of the city’s biggest employers. It began in 1998 with the Sandia Science & Technology Park, which has grown into a 300-plus acre master-planned business community affiliated with Sandia and adjacent to Kirtland Air Force Base. The park houses 42 companies and organizations, 2,163 employees, and has created, directly and indirectly, almost 6,600 jobs.



REPRESENTATIVES from federal laboratories in the Mid-Continent and Far West regions gathered in Albuquerque recently for a Federal Laboratory Consortium meeting.

Sandia continued down the economic development road with the New Mexico Small Business Assistance Program, which lets small companies with a technical challenge work with Labs scientists and engineers; Entrepreneurial Separation to Transfer Technology, which lets Sandia employees leave the Labs to start or help expand technology companies; Small Business Vouchers, a DOE pilot that gives small, clean-energy companies access to national laboratory expertise and resources; and the Entrepreneur Exploration program.

“Our goal through this program is to invigorate an entrepreneurial culture at Sandia and to inspire entrepreneurship,” Jackie said. “We want to stimulate collaboration and commercialization.”



TECH TRANSFER GATHERING — From left, Andy McIlroy, deputy chief technology officer and director of Research and Partnerships Center 1900; Jackie Kerby Moore, manager of Technology and Economic Development Dept. 1933; Jetta Wong, director of the DOE Office of Technology Transitions; and Mary Monson, senior manager of Industry Partnerships Dept. 1930 joined technology transfer experts from 22 federal labs at the Federal Laboratory Consortium Mid-Continent and Far West Regional Meeting in Albuquerque. (Photo by Linda von Boetticher)



FIRESIDE CHAT — Jackie Kerby Moore, left, and Jetta Wong discussed DOE tech transfer programs and their impact on the economy at the FLC meeting. (Photo by Linda von Boetticher)

About the Federal Laboratory Consortium

The FLC was organized in 1974 and formally chartered by the Federal Technology Transfer Act of 1986 to promote and strengthen technology transfer (T2) nationwide. Today, more than 300 federal laboratories, facilities, and research centers, and their parent agencies make up the FLC community. Members of the FLC community include world-renowned scientists, engineers, inventors, entrepreneurs, academia, laboratory personnel, and T2 professionals.

Over the years, the FLC has made great strides in providing the tools, services, and educational resources that reflect the latest science and technology legislation through the most current technological platforms



of the time. Whether it be through improved communications like social media, or by offering T2 strategy training sessions through regional grass-roots efforts, the organization has always sought to create an environment that adds value to and supports the T2 efforts of its members and potential partners.

A suite of commercialization tools

Mary Monson, senior manager of Industry Partnerships Dept. 1930, in a panel on the role of federal labs in creating entrepreneurs and commercializing technologies, said Sandia focuses on partnerships that align with the Labs’ mission and capabilities. She said Sandia has 700 active tech-transfer partnerships in the region. “We want to help improve the local, state, and national economies,” she said. “We have a whole suite of tools and use all of them.”

Mary said a particular focus is allowing scientists and engineers to engage in business at levels that make them comfortable, from training and getting a feel for entrepreneurship all the way to leaving the Labs to start or expand a company. “We have a responsibility to the community to help stimulate the economy,” she said.

Joel Sikora, manager of Business Development and IP Management Dept. 1932, in a panel on federal lab/university partnerships, said a longstanding Sandia partnership with UNM through the joint Advanced Materials Lab has produced 33 patents, 22 licenses, and 10 R&D 100 and two FLC awards. “We have a successful Memorandum of Understanding that defines the roles of each partner, how we work together, and how we manage IP,” he said. “Research partnerships are vital to educating the next generation of scientists and engineers. They get access to world-class facilities, and the Labs get a top-notch student workforce.”

The conference concluded with remarks by Wong in a fireside chat moderated by Jackie. Wong said Energy Secretary Ernest Moniz is a strong supporter of tech transfer and is engaged in the national conversation. “In 2015 he wanted to up our technology transfer game and expand and enhance the commercial impact of the DOE research and development portfolios,” she said. “How do you tie those portfolios together to accelerate the commercialization of new technology and in so doing create more impact?”

That question led to establishment of OTT, which was given responsibility for the Technology Commercialization Fund authorized by the Energy Policy Act of 2005. Both are working to bring more lab technologies to market.

Wong urged the group to think about what’s next. “Where is the technology and what does the market need?” she said. “We want to know what’s going on and best serve the stakeholders.”

Sandia’s own People magazine hot off the press



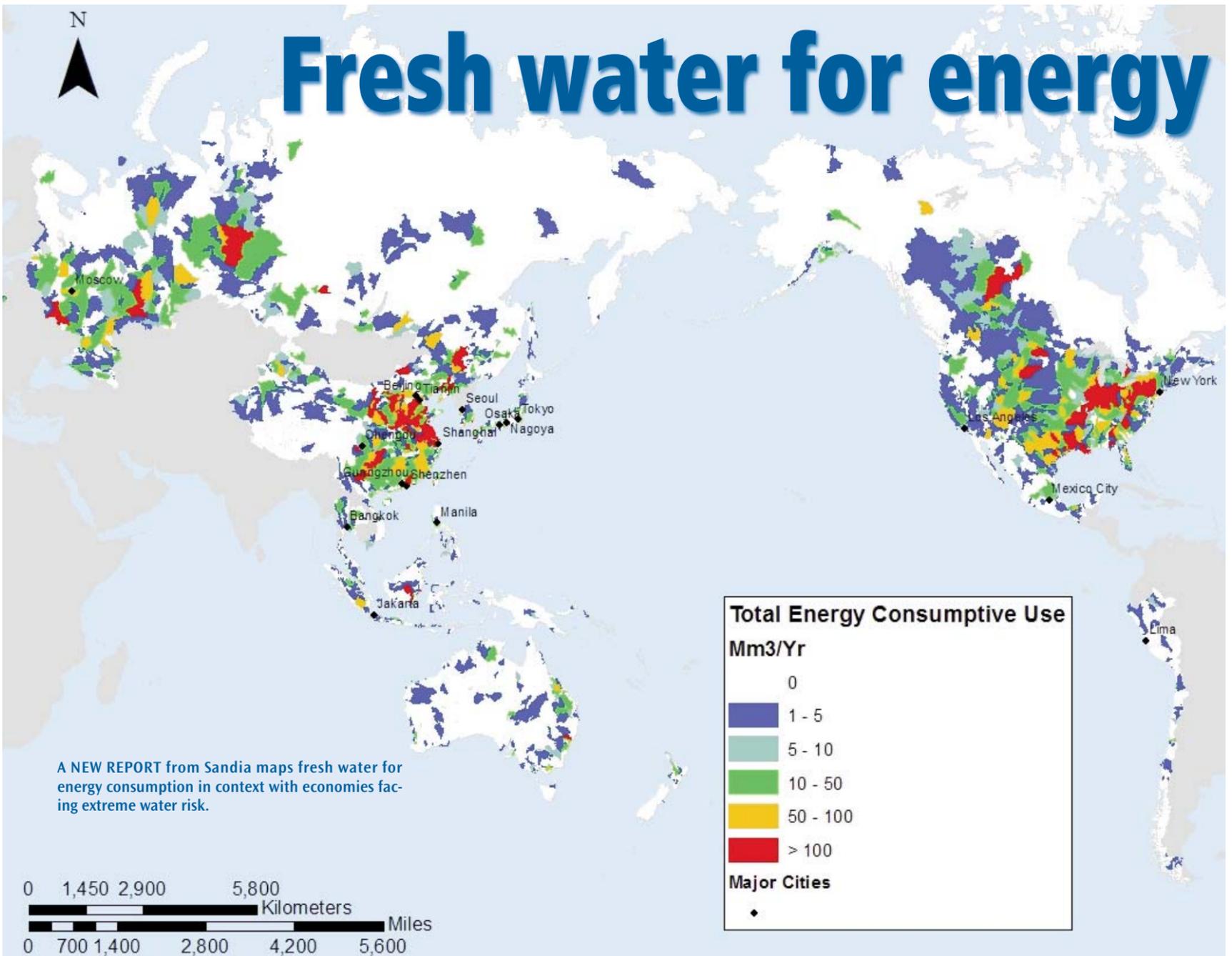
The latest *Sandia Research* magazine is focused on one thing — people. In a follow-up to an issue earlier this year that highlighted Laboratory Directed Research and Development (LDRD), the Labs’ research magazine staff turned to the people behind that groundbreaking scientific and engineering work.

Get to know 10 of the Labs’ most interesting researchers, not just their accomplishments but what makes them tick. They share their photos, backgrounds, hobbies, and passions in research and life.

You’ll also read about the impact LDRD has on building the skillset and career of a scientist or engineer. Andy McIlroy, deputy chief technology officer and director of Research Strategy and Partnerships Center 1900, says LDRD “offers people an opportunity to grow. It goes back to creativity and innovation. It gives them another way to contribute to the scientific community and national security. LDRD plays a key role in building and sustaining Sandia’s foundations.”

Sandia’s successes start and end with its people. And in the new *Sandia Research* magazine, you’ll see why.

Sandia Research magazine can be found under the news tab on the sandia.gov website. Printed copies circulate to leaders in government, academia, and business, but there are a limited number available at the Labs for distribution. Please contact Nancy Salem at mnsalem@sandia.gov if you’d like a printed copy.



Study maps water-energy dependence in Pacific Rim

By Rebecca Brock

A wide-ranging analysis of water vulnerability across the Pacific — including the US, China, Russia, and Japan — has identified hundreds of locations where energy production depends upon scarce water supplies.

The Sandia study, “Mapping Water Consumption for Energy Production Around the Pacific Rim,” was published in *Environmental Research Letters*.

Prepared for the Asia-Pacific Economic Cooperation (APEC), a regional economic forum, the first-of-its-kind

report maps out every power plant, refinery, and mine in 21 Asia-Pacific economies that rely on fresh water for energy. Simultaneously, it shows the data in context to regions at high to extreme risk of drought and dwindling natural water supplies.

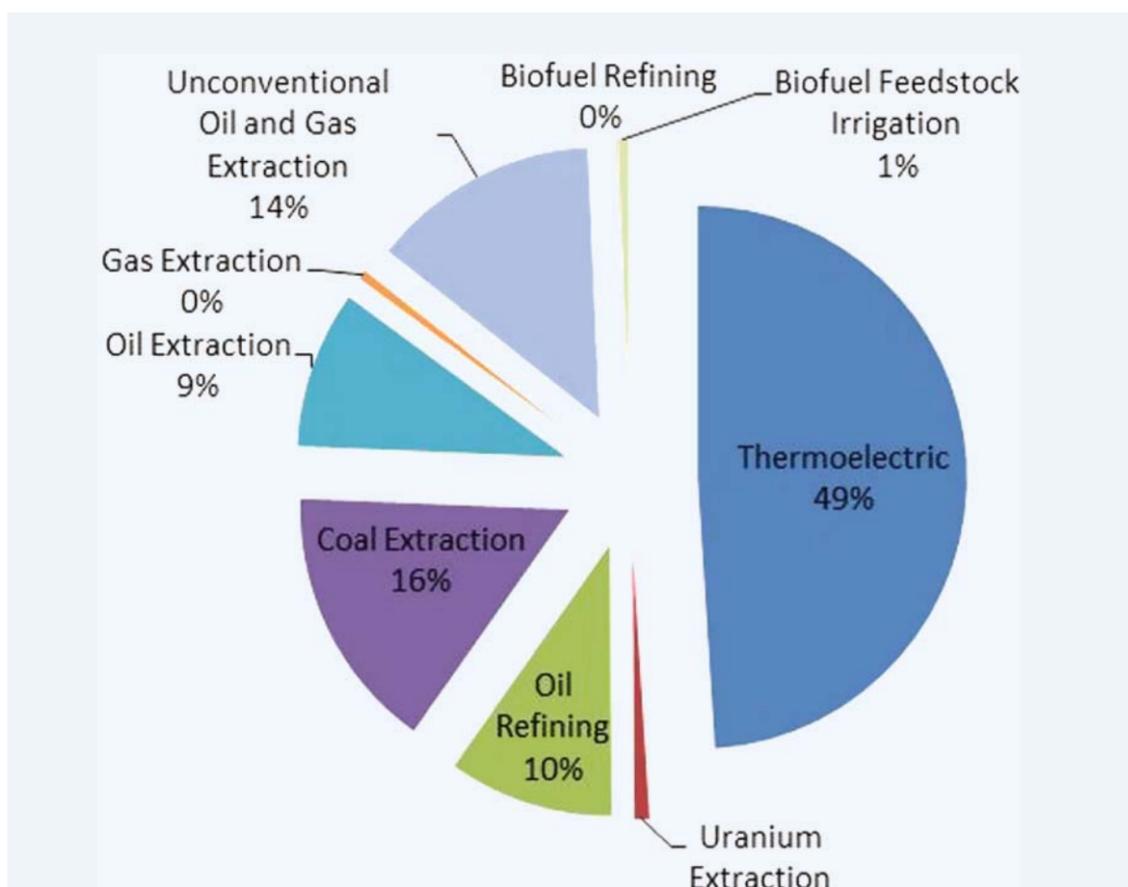
“This is the first time we have worked on a project of this scale to illustrate how much fresh water is used for energy development,” says Sandia hydrologist Vince Tidwell (6926), who co-authored the report with technologist Barbie Moreland (6926). “The purpose was to lay out a foundation to raise awareness in these economies about energy-water issues and vulnerabilities they are facing.”

The report compares demand in 10 energy sectors

where fresh water is consumed to produce energy — including thermoelectric and hydroelectric power production; coal, uranium, natural gas, and oil extraction; refining of biofuels, oil, and natural gas; and production of biofuel feedstocks.

Among the 21 APEC economies are some of the world’s biggest energy users, where economics, population growth, and other factors contribute to mounting water demands. The US alone has more than 1,200 thermoelectric power plants, more than 500 refineries, and 800-plus mines.

Vince says he was surprised by the number of energy facilities across Asia-Pacific economies in locations facing water risk. The study identified 32 percent of the 2,511 watersheds consuming fresh water for energy are also char-



PERCENT WATER CONSUMPTION by energy sector in the Asia-Pacific Economic Cooperation (APEC) region. In total, 38.9 billion cubic meters per year of water was consumed by the energy sector across the APEC economies (excluding hydropower). As the chart above shows, thermoelectric power generation was by far the largest consumer of water at 19.0 Bm3 yr⁻¹ or 49 percent of consumption. In thermoelectric power generation fresh water is consumed in the process of cooling steam back to liquid water. (Image credit: Sandia National Laboratories)

“Where we have energy growth and demand in regions with high or extreme water risk, we start to worry. Our hope is the hard data in this publication will get people to pay attention.”

— Sandia researcher Vince Tidwell

acterized as being at high to extreme risk of running out of fresh water. For six of the economies, watersheds at risk represented half or more of all basins consuming water for energy.

“Where we have energy growth and demand in regions with high or extreme water risk, we start to worry. Our hope is the hard data in this publication will get people to pay attention,” Vince says.

APEC’s Energy Working Group recently established an Energy Resilience Task Force co-chaired by DOE for the US and the Philippines. One major work stream under this new task force is to address energy-water nexus challenges. This Sandia report helps develop a baseline understanding of challenges across the APEC region so additional activities may be developed.

The study also supports DOE’s Water-Energy Nexus program, generated from the 2014 report, The Water-Energy Nexus: Challenges and Opportunities, outlining the interdependence between energy and water. It was funded for APEC by DOE’s Office of International Affairs.

Sandia based the Asia-Pacific study on its decades of experience analyzing water data and developing water models, along with expert research in water technology and development. Sandia’s core mission to solve complex national security problems includes safeguarding resilient and sustainable energy-water systems.

42 individuals, 82 teams

2016 Employee Recognition Awards program honors teams, individuals for exceptional contributions

Sandia's Employee Recognition Awards are presented to individual employees and teams nominated by their peers and chosen by a division selection committee with final approval by the division VP for their accomplishments during the past year. ERA awards underscore the importance placed on individual and team contributions to Sandia mission success. ERA categories include, for individuals, exceptional service, leadership, technical excellence, safety, and Sandia values, ethics, and integrity. Teamwork awards recognize technical, administrative, and support accomplishments and team safety accomplishments.

Sandia this year recognizes 42 individuals and 82 teams for their outstanding contributions to mission success.

Individual honorees



Giorgio Bacelli
6122



Leah Barker
3510



Michael Basile
2668



Thomas Bauer
8226



Ross Burchard
6531



Charis Ann Church
1540



James Clenaghan
1747



Candice Cooper
5421



Diana de la Rosa Galey
4236



Michael Descour
1725



Todd Patrick Fielder
9546



Cindy Fulcher
9545



Vivian George
2951



Rudolph Richard Griego
10575



Jason Juedes Haas
5621



Jenny Harding
302



William Hilbun
5785



Robbin Hinojos
4258



Gabrielle Rose Holcomb
10222



Carl Lee Jacques
1529

Team honorees

Team member names at <http://tiny.sandia.gov/zwjhb>

Division 1000

Division 1000 Non-NRTL Assessment Coordination and Inspection Team

This team completed over 5,300 equipment inspection entries for non-NRTL equipment from May to December 2.

HERMES III Source Region Effects Experiment Team
In recognition of outstanding teamwork during the planning, setup, and execution of first-of-a-kind experiments on HERMES III.

SPRF/CX Thermal Titanium Critical Experiment Team

The team developed an innovative critical experiment with titanium to improve criticality safety analyses for spent fuel processing to improve safety, while reducing processing costs.

Full Waveform Inversion (FWI) Full-Physics Development and Implementation Team

For the development and implementation of forward modeling and adjoint gradients for visco-anisotropic physics.

Enceladus: Quantum Computer Benchmarking Team

For ground-breaking research developing and applying methodologies for benchmarking novel computer technology against conventional classical computers, including an evaluation of the D-Wave 2 computer.

Dropkinson Bar Development Team

Invented a new "Dropkinson bar" apparatus for intermediate-rate mechanical testing that advances in-depth understanding of material behavior under a broader range of mechanical environments.

B61-12 JT61AE-Impact1 Radiography

Delivery of technical basis to inform proper assembly as well as post-test hazard condition of hi-fidelity test units.

Discovery of Metallic Hydrogen Under Compression Team

Groundbreaking Discovery of an Abrupt Transition of Hydrogen from an Insulator to a Metal at High Pressure, as First Hypothesized in 1935.

Sierra Diagnostics Development Team

Design, Development, and Fielding of a New Suite of Diagnostics on Z (APE, SOPI, CVDs) in Support of External Customer Requests for the Sierra Campaign.

MESA MicroFab Gallium Arsenide (GaAs) Incident Response Leadership Team

Cross-lab effort of 100 Sandians, led by this team, responded effectively to contain, recover, and prevent recurrence of a GaAs safety incident in Sandia's MicroFab.



The B61-12 FTDU Flight Test Team — For technical excellence demonstrated through successful execution of three B61-12 F-15E flight tests

Programmable Acoustic RF Filter Team

The Programmable Piezoelectric RF Filter Team used innovative approaches to realize the first switchable contour-mode resonators and demonstrate a path toward high-Q reconfigurable RF filters.

Predictive Tribology of Metals Team

For outstanding effort in creating a general, science-based, predictive model of friction in metal contacts.

Energy and Climate PMU Proposal Team

The proposal team partnered with the technical and financial line staff to manage the preparation, submission, and tracking of 339 proposals in FY15.

Division 2000

Mk5/W88-0 ALT 940 Team

The W88 ALT 940 team completed two product development phases in less than a year to realize leveraging opportunities with the ALT 370 program W88 ALT 370 Systems, QUALification, QUALity, REquirements, SURveillance (SQUARES) Integration Team

For outstanding teamwork to close requirements TBXs, complete requirements traceability, and plan requirements verification in a manner that delighted Navy/NNSA and our design agency partners.

B61-12 FTDU61-DFT1,2,3 Flight Test Team

For technical excellence demonstrated through successful execution of three B61-12 F-15E flight tests

Controller and Cryptographic Processor Hardware Integration Team

The CMS Hardware team persevered through Group 2 build on schedule to conduct environmental testing despite a shortened integration schedule, and encountering several difficult challenges.

Thermal Battery Destructive Testing Team

The Thermal Battery Destructive Testing Team has provided timely and respon-

(Continued on next page)



PROGRAMMABLE ACOUSTIC RF FILTER TEAM



Brittany Johnson
10591



Natalie Jouravel
8512



David Lartonoix
0151



Freman Leaming
4821



Darryl Melander
9525



Mary A. Miller
1755



Robert Miltenberger
4128



Ganesan Nagasubramanian
2545



Tara Jean Olivier
6625



Adam Pimentel
1852



Ali Pinar
8962



Thomas Reichardt
8128



Christopher San Marchi
8367



Jeffrey Spooner
5322



Gregory Stihel
6810



Anthony S. Tafoya
5947



Margeri Velasquez
10617



Tristan Wren Walters
10512



Mary Watson
4847



Jimmie Wolf
9336



Sharissa Young
151

Individual not pictured: Benjamin Olson

THE ERA PROGRAM has seven nomination categories. Two team categories recognize 1) technical, administrative, and support team contributions and 2) team safety initiatives. Five categories recognize individual achievements.

- **The Team Technical, Administrative, Support** category recognizes teams whose exceptional contributions are critically enabled by teamwork, and model the values of people working together toward a common goal, proactively looking for, and acting upon, opportunities to improve, while being fully accountable for their performance.
- **The Team Improves Workplace Safety** category recognizes teams whose passion for safety has positively influenced and matured safety culture, fortified Sandia's physical safety infrastructure, or created or improved safety programs. Exemplifies Safety as an essential Sandia value.
- **Individual Technical Excellence** — The Technical Excellence category recognizes individuals whose innovative science and predictive, science-based engineering capabilities contribute to the transformation of Sandia's business practices and provide solutions to National Security problems.

• **Individual Exceptional Service** — The Exceptional Service category recognizes commitment and efforts to implement and proactively seek improvements to the organization, and/or Sandia's reputation while enabling others to succeed.

• **Individual Leadership** — The Leadership category honors employees who have demonstrated exceptional creativity, courage, and integrity in leading others to the successful accomplishment of Sandia's work. This is also the category to acknowledge an individual for demonstrating exceptional people skills, modeling and reinforcing key behaviors and attitudes which are aligned with Sandia's organizational values.

• **Individual Sandia Values, Ethics, and Integrity** — The Sandia Values, Ethics, and Integrity category recognizes individuals who have exemplified Sandia's values and demonstrated the highest standards of integrity and business ethical conduct.

• **Individual Safety Leader and Change Agent** — Recognizes individual's demonstrated commitment to influence immediate or sustainable improved personal and organizational safety performance or physical workplace safety improvements.



CL-20 MORPHOLOGY PERFORMANCE TEAM

(Continued from preceding page page)

sive support for B61 and W88 thermal battery programs with changing needs and aggressive schedules.

CL-20 Morphology Performance Team

The effect of CL-20 morphology on exploding bridgewire performance was characterized through preparation of unique CL-20 formulations incorporated into EBWs and evaluated through functional testing.

Circuit Resistance Investigation Team

The team's investigation of a new degradation mechanism and creative problem solving has provided a profound understanding of the impact to surety mechanisms.

Production Crypto Facility (PCF) Development Team

For exceptional teamwork in the development of the Production Crypto Facility in coordination with the GPS Directorate, Hughes Design Group, and the Aerospace Corporation.

Center 2600 Electrical Safety Committee

To provide enhanced guidance for laboratory electrical work, the team developed principle-based policies and procedures for use in Center 2600 when conducting electrical testing.

ALMOND Design Team

The ALMOND design team solved several long-standing DoD technical challenges in fuze survival against extremes of pressure and density resulting in significant follow-on work.

Partial Fill Lightning Arrestor Connector (LAC) Analysis

Developing an innovative solution using statistical and quantitative

analysis for low granule fill Lightning Arrestor Connectors resulting in closing of six Significant Finding Investigations.

ELNG Rapid Tooling and Process Engineering Support

By combining rapid innovative tooling and continuous process development, the 2700 Tooling and Process Engineering team increased ELNG yields by 30%.

Equipment Lifecycle Management Team

This team has done an outstanding job of procuring and delivering to production, analytical and development updated process equipment.

Center 2700 Security Team - Security By Design

The Center 2700 Security Team executed Security By Design (SBD), a multifaceted, proactive approach to security.

B61-12 PA-200 Vibration Flyaround (VFA) Team

Aircraft Compatibility team from Organizations 2917, 1557 and 2667 completed a 4-week/8 flight test measuring B61-12 vibration, acoustics, and temperature on NATO's PA-200 Tornado aircraft.

NW Accident Response Group (ARG) Explosive Ordnance Disposal (EOD) Combined Exercise DOGEAR Team

The Sandia ARG team planned, led and executed a full team response in the first custodial unit EOD exercise engagement in over 5 years.

02950 Centrifuge Team

For exceptional technical competence exhibited while repairing one of the large, high-onset WETL centrifuges to resume laboratory performance testing of weapon systems.



DIVISION 3000 GPA SWAT TEAM

Division 3000

Division 3000 GPA SWAT TEAM

Exceptional team analyzed impact of using GPA as dominant screening criterion and predictor of job performance; made recommendations to MST for actionable hiring process improvements.

Energy Hubs Team

Energy Hubs, purpose-built spaces designed to support and promote employee well-being, demonstrating Sandia's commitment to health, safety, and diversity.

New Retirement Calculator Team

Designed and implemented a new retirement calculator for added functionality, resolution of past issues, increased efficiency, and inclusion of represented participants for better customer experience.

Division 4000

Sandia Committee on Electrical Safety (CES)

The Sandia Committee on Electrical Safety has significantly improved the hazard awareness and safety of electrical operations across the Lab.



ROCKET MOTOR DISPOSITION CAMPAIGNS TEAM

Rocket Motor Disposition Campaigns Team

Successful disposal of 917 rocket motors: 100 Star Hot Gas Generators, 386 Mighty Mouse rocket motors, 429 Zuni rocket motors, and 2 Recruit rocket motors.

Copper-64 Activated Glass Microspheres Production and Characterization Team

The team successfully produced and characterized copper-64 embedded glass microspheres in support of the development of a promising new technology for the treatment of cancer.

HSPD-12 Badge Reader and Indicator Lights Implementation Team

For designing and implementing an engineered solution to significantly reduce security incidents involving Closed Area access control.

Security Program Planning Team for the DOE/EA-22 Inspection

Successful inspection results were achieved through the EA-22 Inspection Planning Team's proactive approach to preparing Sandia's Security Program and related Line organizations

Saturn Section Lift Troubleshooting and Repair Team

FMOE Operations, Engineering, and Project Management teams facilitated complex troubleshooting and repair of the Saturn Center Section Lift, enabling key support of SNL mission activities.

Facilities Construction Safety Excellence Team

For driving safe execution of over \$105M in project work during FY15 with zero recordable injuries.

(Continued on next page)



PARTIAL FILL LIGHTNING ARRESTOR CONNECTOR ANALYSIS



FACILITIES CONSTRUCTION SAFETY EXCELLENCE TEAM

SANDIA NATIONAL LABORATORIES EMPLOYEE RECOGNITION AWARDS



MICA DATA LINK TEAM

(Continued from preceding page)

Division 5000

MICA Data Link Team

The MICA Data Link team has enabled LPI/LPD communications for DTRA, unparalleled by current schemes, allowing continuous remote monitoring of locations of national interest.

Dionysus Team

Highly successful aircraft integration, OCONUS deployment, and operational support of the Sandia miniSAR "Dionysus" radar system, supporting the USSOUTHCOM Intelligence, Surveillance, and Reconnaissance Mission B61-12 Weapon Control Unit Product Realization Team

The WCU PRT has demonstrated incomparable commitment to the nation developing and supporting hardware that led to the successful B61-12 Development Flight Tests in 2015.

Low Cost Missile Defeat (LCMD) Phase 1A Team

The LCMD Phase 1 Team delivered critical analyses and technology maturation demonstrating program feasibility which secured the sponsor's decision to fund a \$274M LCMD Strategic JCTD.

Integrated Military Systems Sled Test Team for the Navy

As the national team integrator, Sandia coordinated a sled test evaluating payload performance in extreme environments with a multi-agency team using "Safe by Design" principles.



REMOTE INTERFACE DESIGN, BUILD AND INSTALLATION TEAM

Remote Interface (RIF) Design, Build and Installation Team

The Remote Interface (RIF) team delivered a newly designed system to two OCONUS locations in support of the \$90M FROGS Ground Station.

The Space-Based Infrared System Geosynchronous Stare Processor (GSP) Development Team

The GSP teams' effort has resulted in enhanced situation awareness to our Combatant Commanders, protecting our warfighters and enhancing the United States' national security

The Skypunch Team

In recognition for their innovation and execution strategies to provide Sandia its first R&D Cloud Computing Environment via 100% open source technologies.

Norwegian Fire Lizard (NFL) Team

The Norwegian Fire Lizard (NFL) team matured an LDRD prototype and developed it into TRL 8 technology that has been deployed to the warfighter.

SHA Investigators Team

For the research and development of novel approaches to solving difficult SHA related problems.

LOBOS Search and Rescue Beacon Team

For outstanding responsiveness and effectiveness in the face of urgent, short turnaround customer need for the design, build, and fielding of lifesaving technologies.

GBD III Prime SIGHTS Subsystem Preliminary Design Review Team

For exceptional teamwork to successfully complete the GBD III Prime Spectral Imaging Geolocation Hyper-Temporal Sensor (SIGHTS) Subsystem Preliminary Design Review.

Retro-Reflector Data Device (R2D2) Team

The R2D2 team successfully delivered a complex integrated modulator retro-reflector data device capable of transferring data at high rates not previously achieved.

Bialystock Team

The team applied advanced data analytical techniques to answer a national security question that remained unanswered for at least the past 25 years.



BIALYSTOCK TEAM



Program Accomplishments Team

For your contributions and team work that led to several important deliveries in 2015. Thanks to everyone for your dedicated service to this program.

Division 6000

High-Temperature Falling Particle Receiver Team

For planning, designing, constructing, and successfully testing the world's first continuously operating high-temperature particle receiver with adherence to engineered safety, quality, and technical excellence.

DRC WANDERER Team

The Team Demonstrated Unprecedented Energy Efficiency and Endurance in Legged Robots While Operating with Safety and Integrity at an Historic, High-Profile Public Robotics Event.

Trailer Communications System 2 (TCS2) Development Team

Delivered the next generation secure communications system for the Safe-Guards Transporter used in the transportation of national security assets by DOE.



THOR FIELD CAMPAIGNS TEAM

Thor Field Campaigns Team

The Thor field campaigns demonstrated technical innovation in active source seismology and infrasound and increased US capabilities in nuclear nonproliferation.

West Africa Ebola Diagnostic Laboratory Coordinator Team

For exceptional service as laboratory coordinators for the Ebola diagnostic laboratories supported by the Defense Threat Reduction Agency in Sierra Leone, Guinea, and Liberia.

Public Hearing Team for Mixed Waste Landfill Class 3 Permit Modification Team

The Mixed Waste Landfill (MWL) Permit Hearing culminates 11 years of activities to complete corrective action and obtain regulatory closure by the NM Environment Department.

Division 8000

Surety Analysis Team

In recognition of the outstanding work in surety risk analysis, in particular for support of the W80-4 program.

W88ALT370 Telemetry PRT Team

The Telemetry team delivered quality product that was critical to W88/DASO-26 mission success, while challenged by shortened timelines and late changing scope.



SNL ALGAE TESTBED TEAM

SNL Algae Testbed Team

This team designed, built, and commissioned an algal facility to understand and mitigate pathogens/predators that "crash" algae cultures, a critical barrier to commercializing algae biofuels.

W80-4 Phase 6.1 System Engineering Team

The W80-4 System team created conceptual warhead options as a part of the joint NNSA-Air Force Phase 6.1 study for the Long Range Stand-off Warhead.

Sandia Attraction and Retention in the Bay Area Talent Marketplace Team

A multidisciplinary team spanning NM and CA performed analysis of attraction and retention challenges and developed solutions for strengthening Sandia competitiveness in the Bay Area.

Building 910 Second Floor Information Technology Infrastructure Deployment Team

This team successfully deployed Information Technology infrastructure under intense schedule constraints achieving critical milestones leading to the DOE certification of a high security space.

Division 9000

Trust Enhancement Project (TEP) Team

For exceptional teamwork in the designing/deployment of a TRUST Engineered Environment that will significantly improve the protection around critical data for the Nuclear Security Enterprise

High Performance Computing Infrastructure Monitoring Team

Sandia's HPC Monitoring team released the R&D 100 Award winning Lightweight Distributed Metric Service and used it across the Trilab to improve performance and cost.



9545 .NET DEVELOPMENT TEAM

9545 .Net Development Team

The 9545 .Net Development team delivers low-cost, quality applications quickly and effectively. The team delivers impactful applications that fit customer needs.

Analytics for Sandia Knowledge Team

The ASK Team has deployed new analytic technologies that have revolutionized the delivery of corporate analytic data and analytic visualizations.

Division 10000

The Subcontract Labor Law Compliance Team

For exceptional teamwork in implementing new tools, processes, and standards to ensure Sandia and its subcontractors were in full compliance with United States labor law.

Strategic Partnership Project (SPP) Budget & Reporting (B&R) Conversion Team

Strategic Partnership Project Budget and Reporting Account Conversion Project.

Safety Welcome Wagon Initiative, 10500 Pilot Team

The Welcome Wagon Pilot Team brought to life an idea originating from Division 10000 FY15 Safety Maturity efforts, changing the way staff think about safety.

Service Center/Holding Project (SC/HP) Overhead Billing Team

Developed effective and efficient IT solutions for Service Center/Holding Project overhead billings across Sandia, creating significant efficiencies and cost savings.



COST SAVINGS IMPLEMENTATION TEAM

Cost Savings Implementation Team

For innovation in developing and creating a consolidated report of all Sandia Procurement Cost Savings/Cost Avoidance associated to purchases.

Division 11000

Sandia's Non-Disclosure Agreement (NDA) Team

Sandia's NDA Team operates at the Speed of Business but does not sacrifice quality.

Executive Support

FY16-FY20 Sandia Strategic Planning Team

The team worked with Sandia's executives to develop the Labs' five-year strategy and develop an innovative approach to communicate the plan to the workforce.

20th Anniversary and National Security Lab Day Stockpile Stewardship Program Display Team

For providing beautiful display materials with a powerful, strategic message to inform high-ranking federal government and state department visitors at the event.

Additive Manufacturing Qualification Team

For significantly advancing the strategy for insertion and qualification of additive manufactured components into the nuclear weapon stockpile.

AWG-711 Special Nuclear Material Air Transport Package Design Team

This team designed an air-transport shipping container for UK SNM components and materials, to meet very stringent US and UK air-transport regulatory requirements.

Lost and Stolen Property Enhancement Team

For streamlining the reporting process for lost/stolen property, eliminating duplication of effort, and providing a simplified process for customers.



LOST AND STOLEN PROPERTY ENHANCEMENT TEAM

Paving the way

Sandia researchers earn top Hispanic science and engineering honors

By Rebecca Brock

Two outstanding Sandia innovators have been recognized nationally for their technical achievements with 2016 HENAAC Awards from Great Minds in STEM. Chemist Bernadette “Bernie” Hernandez-Sanchez (1815) has won Outstanding Technical Achievement, and cybersecurity researcher Vincent Urias (9526) was named a Luminary Honoree. While the talents of these two researchers span very different fields of science, their commonalities are remarkable: Both grew up in impoverished areas of Albuquerque, attended underserved Albuquerque Public Schools high schools, started at the Labs as high school interns, and were the first in their families to go to college.

HENAAC, formally the Hispanic Engineering National Achievement Awards Conference, honors Hispanic researchers who have made significant contributions to the nation’s technical community. Awardees are peer-reviewed and come from a wide range of private industry, academia, military, and government organizations. Bernie and Vincent will be recognized with other national winners at the 28th annual HENAAC Conference in Anaheim, California, Oct. 5-9, during National Hispanic Heritage Month.

Bernie Hernandez: A Material Girl

“The first time I ever met a scientist was when I started my internship at Sandia,” says Bernie, who is from Albuquerque’s South Valley, where few people she knew went to college. Today, she is a highly accomplished chemist, and the first woman at the Labs to receive the prestigious HENAAC award for Outstanding Technical Achievement.

“This award is gratifying,” Bernie says. “I am so thankful. There is still so much more work I want to do. What I love about chemistry is making new materials, and seeing how those materials can be applied to so many different aspects of our community and our world.”

Bernie’s technical achievements focus on the morphology, structure, and properties of nanomaterials for real-world applications ranging from renewable energy to homeland security. As the principal investigator on Sandia’s Marine & Hydrokinetic Advanced Materials Program, Bernie’s work has made strides in the field of water power. She studies materials challenges such as corrosion for underwater devices that aim to harness clean energy for electricity. In one such project she is developing nano-engineered copper-silver coatings to keep microorganisms from growing on equipment. She says the coatings come from techniques she has spent more than 10 years developing in Sandia’s Advanced Materials Lab (AML).

In another project, Bernie works with a local company, bioLime®, through the New Mexico Small Business Assistance program. She is helping the business improve the chemistry of stucco, a staple material in Southwestern homes that is prone to aging and cracking.

Bernie has also contributed to Sandia’s NanoCRISPR Grand Challenge project, funded by the Laboratory Directed Research and Development program, and to the improved chemistry of lithium-ion batteries and ferroelectric perovskite materials.

She holds a PhD in inorganic solid state chemistry from Colorado State University and a bachelor’s degree in chemistry from New Mexico Institute of Mining and Technology. She has published 28 technical papers and has been awarded two patents.

Bernie says her longtime mentor at the AML, chemist Tim Boyle (1815), has been among her most important role models.

“Bernie’s expertise in solving complex materials problems is on the cutting edge of many fields,” says Tim. “In addition to her technical work, she is dedicated to increasing the number of students entering science by tirelessly donating her time and effort.”

Bernie has mentored more than 50 student interns in her lab, many of whom have gone on to pursue graduate degrees in chemistry. Sonia Mendoza, a chemistry student from Universidad del Valle de Mexico says, “Working with Bernie, I learned to challenge myself and that anything is possible, no matter your background. Bernie taught me to not always trust published work, but to prove things yourself through science.”

Maddison Casillas, a freshman at UNM who works in her lab, says, “Bernie has spent countless hours just explaining concepts to me. She has not only taught me chemistry, but she has also taught me lessons that have helped me with my everyday life.”

In addition to helping undergraduates succeed, Bernie works with elementary and middle school students from underrepresented communities to get them excited about science. “I like to give back, because I look at them and see myself. I understand the importance of being introduced to new concepts and role models in order to encourage



October 5-9, 2016

student interest.” she says.

It’s that passion that got her involved in Sandia’s MANOS program for Hispanic youth, where she volunteered in the community teaching basic chemistry classes. From her MANOS curriculum evolved the CSI: Dognapping Forensics Program — a lively, interactive outreach program she designed with Tim Boyle to show kids that science is fun. CSI: Dognapping has since reached 5,000 local schoolchildren, and was honored by the American Chemical Society with the 2015 ChemLuminary Award for Outstanding Kids & Chemistry.



BERNADETTE HERNANDEZ-SANCHEZ (1815) is the first woman at the Labs to receive the prestigious HENAAC award for Outstanding Technical Achievement. (Photo by Randy Montoya)

“Bernie is one of the most dedicated volunteers at Sandia,” says Amy Tapia (3652), Community Involvement manager. “She has lived the journey herself and is eager to help others. She supports students through meaningful programs that provide them with the skills they need to be successful.”

Vincent Urias: “Just do it”

Vincent was raised by his grandparents, who immigrated to the US from Guatemala in the 1960s, fleeing persecution. He says they instilled in him a love of the United States and the value of service. Speaking about his grandmother Josephine today, Vincent says, “I can’t slow her down. She is in her 80s, volunteering four days a week in a first grade classroom, and walking to work every day.”

Vincent, too, is a non-stop force of energy. He has achieved notable success in Sandia’s cyber defense programs, supporting national security for partners including the US Department of Defense. His research includes large-scale cyber modeling and simulation environments at Sandia, called Emulytics™, that have allowed for the testing of software systems at the scale of large enterprises. From that work came a striking innovation that earned him a patent — an advanced security technology called Deception.

Says Vincent’s manager, David Duggan (9526), “To be able to perform this type of testing before deploying software systems was a capability missing from the software engineer’s toolbox until now. Vincent is the visionary and driving force behind these innovations.”

Vincent holds a master’s degree in computer science and a bachelor’s degree in electrical engineering from New Mexico Institute of Mining and Technology. He is completing a PhD at New Mexico Tech in computer science.

Amidst work and school projects, Vincent has mentored more than 25 undergraduate students at Sandia. His manager says, “He’s got an infectious attitude and an outstanding work ethic that students can see and want to emulate themselves. He enables them to want to learn and do more in this field.”

Outside the lab, Vincent volunteers at the Hispanic Cultural Center to encourage minority students to pursue STEM education. He also serves as Stewardship chair of the United Way of Central New Mexico’s Hispanic Philanthropic Society, designing strategies to invest in local middle school youth.

Vincent says his advice to underserved students who are interested in STEM careers is, “The curriculum is going to be hard, but just do it. You can succeed.”

Vincent grew up in the low-income sector of Albuquerque informally known as “The War Zone,” or, the International District. Amidst a neighborhood occupied with gangs and drugs, his grandfather Alfred drove him to and from school every day, and retired “to focus on taking care of me,” Vincent says. “He thought it was a big job.” Vincent credits his drive to both of his grandparents, who taught him to never stop trying, and don’t be afraid to fail, he says.

At age 15 Vincent got a job at Sandia, working as an intern-level tech in the computer support unit (CSU). He tributes his success to the mentors he still calls his “adoptive parents” — Susan Sackinger, his first supervisor at Sandia, and her husband Phil Sackinger (5524) who mentored him in Sandia’s Engineering Science Center.

“I did not even know I was going to college until I came to Sandia,” Vincent says. “Being exposed to the talent, the technology, and the people here changed my life.”



VINCENT URIAS was named a HENAAC Luminary Honoree, which recognizes professionals in science, technology, engineering, and mathematics who initiate, collaborate, and lead key programs and research within their companies. (Photo by Randy Montoya)

Exascale computing ECP Timeline

(Continued from page 1)

Modeling for Energy executive council, will lead a project titled Cloud-Resolving Climate Modeling of the Earth's Water Cycle.

Other projects supported by Sandia computer scientists, engineers, and other researchers include Exascale Predictive Wind Plant Flow Physics Modeling, led by the National Renewable Energy Laboratory, with Oak Ridge National Laboratory and the University of Texas, Austin, as partners; Molecular Dynamics at the Exascale: Spanning the Accuracy, Length, and Time Scales for Critical Problems in Materials Science, led by Los Alamos National Laboratory, with the University of Tennessee; and QMCPACK: A Framework for Predictive and Systematically Improvable Quantum Mechanics-Based Simulations of Materials, led by Oak Ridge National Laboratory and five partners.

A billion billion calculations per second

Exascale refers to the next challenge in high-performance computing systems: machines capable of at least a billion billion calculations per second, 50 to 100 times faster than the most powerful supercomputers in use today.

All 15 fully funded projects and seven others that received seed funding involve partners from a total of 45 universities, national labs, and private companies.

Says Bruce Hendrickson, director of Sandia's Center for Computing Research (1400), "We are excited by the opportunity to lead DOE's efforts in these critical areas of science and technology. Sandia is committed to the ECP's goal of enhancing the impact of advanced computing through breakthroughs in computer science, software, and algorithms as well as hardware."

Says Jackie, "The development of an exascale high-fidelity combustion simulation capability has tremendous potential scientific, technological, and societal impact. Due to the unrivaled energy density of liquid hydrocarbon fuels, combustion will continue to provide much of the world's energy for at least the next 50 years. Combustion needs to be understood and optimized to prevent further climate change, to reduce emissions harmful to human health, and to ensure US energy security."

Multi-decade climate simulations

Says Mark, "Our project team will develop a cloud-resolving Earth system model for multi-decade climate simulations that realistically treat storms. This will improve our ability to assess regional impacts of climate change on the water cycle that directly affect multiple sectors of the US and global economies, especially agriculture and energy production."

"These application development awards are a major first step toward achieving mission critical application readiness on the path to exascale," says ECP director Paul Messina. "A key element of the ECP's mission is to deliver

The Project has three phases:

- Phase 1 – R&D before DOE facilities exascale systems RFP in 2019
- Phase 2 – Exascale architectures and NRE are known. Targeted development
- Phase 3 – Exascale systems delivered. Meet Mission Challenges

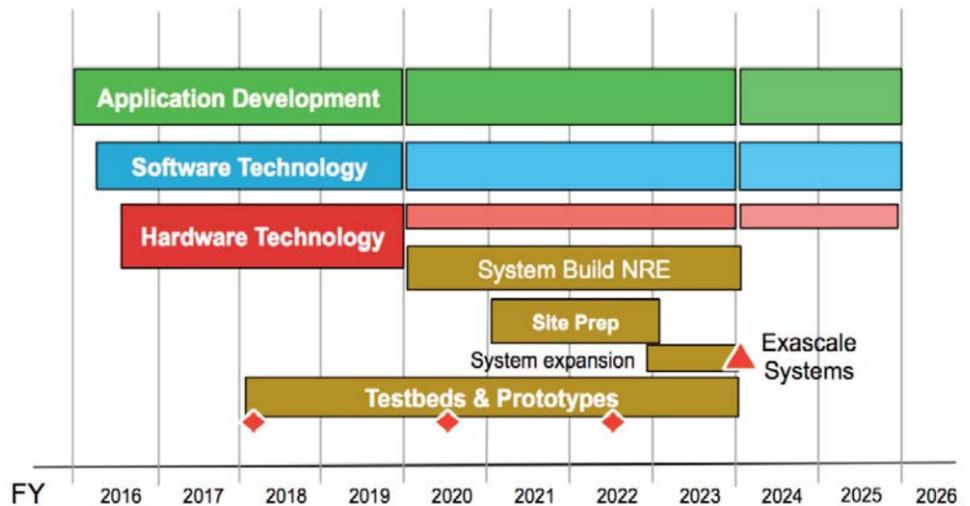


Image source: DOE Office of Science

breakthrough high-performance computing modeling and simulation solutions that confidently deliver insight and predict answers to the most critical US problems and challenges in scientific discovery, energy assurance, economic competitiveness, and national security."

He continues, "Application readiness is a strategic aspect of our project and foundational to the development of holistic, capable exascale computing environments."

The application efforts will help guide DOE's development of a US exascale ecosystem as part of President Barack Obama's National Strategic Computing Initiative (NSCI). DOE, the Department of Defense and the National Science Foundation have been designated as NSCI lead agencies, and the ECP is the primary DOE contribution to the initiative.

The ECP's multiyear mission is to maximize the benefits of high-performance computing for US economic competitiveness, national security, and scientific discovery. In addition to applications, the ECP addresses hardware, software, platforms and workforce development needs critical to the effective development and deployment of future exascale systems.

The ECP will fund projects in energy security, economic security, scientific discovery, climate and environmental science, and healthcare. It is led by six DOE national laboratories: the Office of Science's Oak Ridge, Argonne, and Lawrence Berkeley national labs, and NNSA's Lawrence Livermore, Los Alamos, and Sandia national labs.

Developing a broad set of modeling and simulation applications that support the DOE's scientific, engineering, and nuclear security programs is one of four primary ECP goals. Its other major goals are to develop productive exascale

cale computing (hardware and software); prepare two or more DOE facilities to house exascale machines by 2023; and to maximize the benefits of high-performance computing to US science and commerce.

The full list of application development awards follows:

Full Funding:

- Computing the Sky at Extreme Scales, Salman Habib (ANL) with LANL, LBNL
- Exascale Deep Learning and Simulation Enabled Precision Medicine for Cancer, Rick Stevens (ANL) with LANL, LLNL, ORNL, NIH/NCI
- Exascale Lattice Gauge Theory Opportunities and Requirements for Nuclear and High Energy Physics, Paul Mackenzie (FNAL) with BNL, TJNAF, Boston University, Columbia University, University of Utah, Indiana University, UIUC, Stony Brook, College of William & Mary
- Molecular Dynamics at the Exascale: Spanning the Accuracy, Length and Time Scales for Critical Problems in Materials Science, Arthur Voter (LANL) with SNL, University of Tennessee
- Exascale Modeling of Advanced Particle Accelerators, Jean-Luc Vay (LBNL) with LLNL, SLAC
- An Exascale Subsurface Simulator of Coupled Flow, Transport, Reactions and Mechanics, Carl Steefel (LBNL) with LLNL, NETL
- Exascale Predictive Wind Plant Flow Physics Modeling, Steve Hammond (NREL) with SNL, ORNL, University of Texas Austin
- QMCPACK: A Framework for Predictive and Systematically Improvable Quantum Mechanics-Based Simulations of Materials, Paul Kent (ORNL) with ANL, LLNL, SNL, Stone Ridge Technology, Intel, Nvidia
- Coupled Monte Carlo Neutronics and Fluid Flow Simulation of Small Modular Reactors, Thomas Evans (ORNL, PI) with ANL, INL, MIT
- Transforming Additive Manufacturing through Exascale Simulation (TrAMEx), John Turner (ORNL) with LLNL, LANL, NIST
- NWChemEx: Tackling Chemical, Materials and Biomolecular Challenges in the Exascale Era, T. H. Dunning, Jr. (PNNL), with Ames, ANL, BNL, LBNL, ORNL, PNNL, Virginia Tech
- High-Fidelity Whole Device Modeling of Magnetically Confined Fusion Plasma, Amitava Bhattacharjee (PPPL) with ANL, ORNL, LLNL, Rutgers, UCLA, University of Colorado
- Data Analytics at the Exascale for Free Electron Lasers, Amedeo Perazzo (SLAC) with LANL, LBNL, Stanford
- Transforming Combustion Science and Technology with Exascale Simulations, Jackie Chen (SNL) with LBNL, NREL, ORNL, University of Connecticut
- Cloud-Resolving Climate Modeling of the Earth's Water Cycle, Mark Taylor (SNL) with ANL, LANL, LLNL, ORNL, PNNL, UCI, CSU

Seed Funding:

- Enabling GAMESS for Exascale Computing in Chemistry & Materials, Mark Gordon (Ames) with ANL, ORNL, Iowa State University, Georgia Tech, Old Dominion University, Australian National University, EP Analytics, NVIDIA
- Multiscale Coupled Urban Systems, Charlie Catlett (ANL) with LBNL, NREL, ORNL, PNNL
- Exascale Models of Stellar Explosions: Quintessential Multi-Physics Simulation, Daniel Kasen (LBNL), with ANL, ORNL, Stony Brook, University of Chicago
- Exascale Solutions for Microbiome Analysis, Kathy Yelick (LBNL) with LANL, Joint Genome Institute
- High Performance, Multidisciplinary Simulations for Regional Scale Seismic Hazard and Risk Assessments, David McCallen (LBNL) with LLNL, UC Davis, UC Berkeley
- Performance Prediction of Multiphase Energy Conversion Devices with Discrete Element, Particle-in-Cell, and Two-Fluid Models (MFX-Exa), Madhava Syamlal (NETL) with LBNL, University of Colorado
- Optimizing Stochastic Grid Dynamics at Exascale, Henry Huang (PNNL) with ANL, NREL



A BATCH OF GOOD APPLES — On Saturday, Sept. 10, more than 30 Sandia volunteers helped harvest 10,000 pounds of apples from 100 trees in a Corrales, New Mexico, orchard for donation to Roadrunner Food Bank of New Mexico. One hundred total volunteers staffed the family-friendly event organized by Seed2Need, a nonprofit that aims to reduce hunger by providing families with fresh, locally grown produce. Community Involvement (3652) is organizing future volunteer activities with the group.

(Photo by Katrina Wagner)

SANDIA CLASSIFIED ADS

There will be no Classified Ads in the October 28 Lab News.

MISCELLANEOUS

CONVERTIBLE CRIB, wood, natural, 5 level mattress support, Simmons mattress, excellent condition, paid \$350, asking \$150. Liang, 505-823-1695.

DOG CRATE, furniture quality, cherry, used only 3 times, very good condition, photo available, \$75. Evans, 292-2367.

KOKEN BARBER CHAIR, works, porcelain base intact, black & aluminum, \$750. Altman, 505-463-6999.

COACH PURSES, small & medium sizes, great condition, \$5 & up. Eller, 417-4390.

CHILD CARRIER, Dueter Kid Comfort II, excellent condition, brand new at \$250, asking, \$100. Pan, 505-823-1695.

CLIMBING HELMET, 2016 blue Petzl Elios, size 2, used once for caving, like new, \$40. Beckett, 801-709-4639.

WOOD HEADER, laminated, 2" x 12" x 20', \$70; 3/4-in. plywood sheets, 3, \$14 ea.; 15-ft. ladder, \$50; patio umbrella, \$45; RV lounge chairs, more. Garcia, 554-2690.

CORNER DESK, large, built-in file cabinet, cherry veneer finish, great condition, photos available, \$75 OBO. Elmazi, 505-856-2197.

NORITAKE CHINA, Norma pattern, 6, 5-pc. place settings, plus serving pieces, \$350. Hitchcock, 299-2581.

SENTRY FIRE SAFE, business safe, model A5865, electronic & key locks, 2.0-cu. ft., \$100 OBO. Rosul, 900-3678.

THERMAL IMAGING DEVICE, EOTech X320, new, ideal for hunting, surveillance, reconnaissance & first response, MSRP \$3,799, asking \$2,600. Ross, 505-903-9999.

LAWN MOWER, good condition, \$40; Scotts Turf Builder mini broadcast fertilizer spreader, like new, \$20. Dai, 505-990-9116, ask for Steve.

PICNIC TABLE, w/attached benches, custom, extra-long, 35" x 84", solid wood, red-wood color, good condition, \$90. Murphy, 892-0288.

LCD HD TV, TCL, 40-in., 1080p, 60 Hz, in original box, all contents, HDMI ports can be glitch, \$50 OBO. Mann, 505-604-4236, ask for Brandon.

FABULOUS FELINES 10TH ANNIV. CELEBRATION, music by Michael Anthony, food, silent auction, Oct. 16, <http://www.fabulousfelines.org>. Stubblefield, 263-3468.

TRANSPORTATION

'10 CAMARO SS, w/RS pkg., 6.2L V8, 400-hp, 6-spd. AT, leather, heated seats, premium sound, red w/silver striping, 23.5-mpg highway, 62K miles, \$20,000. Breeze, 366-8585.

'03 GMC YUKON, 5.3L V8, 2WD, leather, tow pkg., 7 seats, 185K miles, garage kept, \$4,500 OBO. Ortiz, 505-917-7372.

'05 CHEVY MONTE CARLO LT, black, tinted windows, 134K miles, nice sporty looking car, runs perfect, \$3,200. Reckaway, 238-3238.

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 (classesads@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

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.

'02 TOYOTA SEQUOIA SUV, 4x4, V8, AT, 8-passenger, beige, 163K miles, good condition, \$6,000. Fernandez, 505-280-6151.

RECREATION

'05 HONDA CRF 450 X DIRT BIKE, \$2,500. Mixon, 505-977-8281.

'04 HONDA SHADOW VT600C, low miles, new seat, saddle bags, bike cover, excellent condition, \$2,400. Jenkins, 505-908-1553.

'07 HARLEY-DAVIDSON SPORTSTER XL, 883 ci, red, controls forward, buddy seat, saddle bags, 13K miles, \$4,000. Thalhammer, 298-8521.

'02 HONDA SILVER WING SCOOTER, 600 cc, 3,500 miles, adult driver, garaged, like new, \$1,800. Baca, 505-980-1169.

'10 COLEMAN TRAVEL TRAILER, 1 slide out, motorized awning, full bath & kitchen, w/generators, \$16,500. Fitzgerald, 505-918-1706.

WINDSURFING BOARD & RIG, Exocet Cruiser L, padded deck, excellent for beginners, 2 available, \$850. Teves, 505-363-3026.

REAL ESTATE

40 ACRES, southern Colorado, beautiful, w/tall Ponderosa pines, just 15 miles NW of Trinidad, \$1,100/acre. Miller, 505-271-8181.

2-BDR. TOWNHOUSE, 2-1/2 baths, 1,100-sq. ft., 1-car garage, views, Tramway & Candelaria, \$135,000. Lopez, 291-0010.

3-BDR. HOME, 2 baths, 2-car garage, 2,355-sq. ft., NE Heights, near Spain/Tramway, Georgia O'Keefe elementary, updated windows, bath, \$298,000 negotiable. Leming, 505-385-9111.

3-BDR. HOME, 2 baths, 3-car garage, sun room, upgrades, Willow Wood area, call for more info. Oborny, 350-5969.

WANTED

MOVING BOXES, all sizes. Vigil, 200-2222.

VIOLA LESSONS, in East Mountains, for high school student. Podgorski, 505-688-2632, ask for Jason.

CLOTHES, women size 6-8, good condition, for friend who lost everything due to life transition. Greene, 802-578-2056.

ROOMMATE(S), Volterra, 5 mins. to base, WiFi, no pets, \$475/mo. Guillen, 505-385-8189.

ROOMMATE, 3-bdr. home, 2-1/2 baths, 2,300-sq. ft., Mesa del Sol, \$550/mo., internet/utilities included. Hielo, 505-804-9032.

EXCHANGE DOG-SITTING, looking for family interested in exchanging dog sitting on occasional weekend trips. Singer, 298-5141.

ROOMMATE, 3-bdr. home, 2-1/2 baths, gated community, near Juan Tabo & Central, \$600/mo., utilities/internet included. Riker, 505-934-4738.

TAKE OVER LEASE, 2-bdr. apt., move in Nov. 7, no deposit required, Academy/Eubank, La Mirage, lease ends in Feb. but you can renew, \$1,040/mo. Baca, 505-730-9123.

Mileposts



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



Gary Rochau
40 6221

Recent Retirees




Gilbert Benavides
38 2616

George "Bill" Davidson
33 5525



Barry Ritchey
35 2555



Dale Coleman
30 5443



John Eldridge
30 5632



Paul Smith
25 6633



Marisela Sanchez
20 10668



Ken Hammond
15 6523



Karen Sloan
15 6020



Fawn Turner
15 5785

Lab News rack locations

Bldg. 802, elevator lobby
Bldg. 810, east lobby
Bldg. 822, south entrance
Bldg. 858 EL, lobby
Bldg. 880, Aisle D, north lobby
Bldg. 892, lobby
Bldg. 894, east entrance, lobby
Bldg. 898, east lobby
Bldg. 887, lobby
Bldg. 891, lobby
Bldg. 836, lobby
Bldg. 831/832 north lobby
Bldg. 861, Cafeteria lobby
Bldg. 870, lobby
Bldg. 823, lobby
Bldg. 701, next to elevator
IPOC, lobby
CGSC, lobby
CRSI, lobby
M.O. 308, lobby



ECP Campaign Oct. 3-21



Sandians have an enduring impact on the United Way Community Impact Council



DECADES OF DEDICATION — Mike Gomez, manager of Nuclear Security Enterprise Integration (252), says he and his wife Joann Gomez (423) have supported the United Way since 1984 because they've learned over the years how vast the needs are in the community. "I volunteer because I love helping the UWCNM meet some of our community's most vexing and difficult challenges," Mike says. (Photo by Stephanie Blackwell)

By Valerie Larkin

As manager of Nuclear Security Enterprise Integration (252), Mike Gomez and his team develop technical solutions that equip Sandia executives and other partners across the NSE with the models and information they need to make critical decisions and optimize their operations.

It seems fitting, then, that Mike is a dedicated member and chair elect of the United Way of Central New Mexico's (UWCNM) Community Impact Council (CIC), a group of volunteers whose task is decision-making and optimization. The CIC ultimately decides where UWCNM's Community Fund dollars are allocated, and it formulates the strategic vision and selection criteria that inform those decisions.

The Community Fund comprises donations from 17,826 individuals and companies, and each year between 100 and 150 central New Mexico nonprofit agencies apply for Community Fund grants. For the 2016-17 funding cycle, 95 grants were awarded across the UWCNM's focus areas of education, health and safety, and financial stability. During the 2015 Employee Caring Campaign, Sandians contributed \$6.6 million, and of that total \$1.8 million went to the Community Fund.

"I'm trying to apply my passion for optimization to

hopefully get to a paradigm where we squeeze every bit of value and impact out of every dollar that is given to the United Way. I'm an electrical engineer, and at the end of the day, I think one thing we have in common is we all try to make sure everything we do is optimized. So I try to take all the things that make me an engineer, and the things we do in my department, and apply them to my work with the United Way," he says.

A huge need

Mike became involved with the UWCNM Community Fund in 1999, the same year he came to Sandia. Before that, he sat on an Albuquerque City Council subcommittee that approved the city's information technology purchases. Through his involvement with the subcommittee, he became acquainted with Jerry Esch, a Sandian involved with the UWCNM's Community Fund who shared Mike's passion for ensuring allocation decisions resulted in a strong return on investment.

Mike has been a United Way contributor since 1984, and had volunteered with various UWCNM agencies across a spectrum of causes before Jerry encouraged him to work with the Community Fund in 1999. His volunteer hours have supported each of the Community Fund's focus areas.

"I guess over time I've developed a lot of passion around all three of those areas," he says.

Having lived in urban and rural areas of New Mexico, Mike has seen that the needs of the state are vast and often urgent. He says that when he has moved from United Way work in one focus area to another, he's been surprised by the level of need he's seen each time.

"The economic downturn caused a lot of government funding for many programs to be drastically reduced or outright zeroed. The recession was devastating to the most vulnerable populations," he says. In response, he says, "The UWCNM quantitatively and qualitatively steers grant awards to those who can most benefit, both in the rural and urban areas of central New Mexico."

A community-driven award process

Community Fund grant money is distributed to agencies by a community-driven process. First, a group of vol-

unteer financial professionals performs a Financial Standards Review of the applicant agencies. Those that pass are invited to apply for funding. Those that don't are put on a path to financial strength. Then more than 150 donors, volunteers, and community members assigned to Allocation Panels review and score the applications. The Panel's Award Recommendations and Panel Statements are shared with the CIC, which then makes the final allocation decisions.

"Sandians are very generous people, and Sandia is a very generous institution, and we should celebrate that. We're generous not only with our money, but also with our time. Sandia has a long legacy of serving on Allocation Panels and the CIC. In fact the current CIC chair, Bryan Barela, is now a staff augmentation contractor (elected while at Intel) and last year Justin Ford (5634) succeeded Org. 5630 Senior Manager Jim Novak on the CIC. Anyone is welcome and encouraged to volunteer to be on an Allocation Panel," Mike says.

Amy Tapia, Sandia's Community Involvement manager (3652), says, "Sandians are deeply involved in how the money from the Community Fund is allocated and we have a longstanding leadership role in the Community Impact Council that is instrumental in ensuring the funding goes where it's needed most. By pooling resources, the Community Fund is able to fund those most in need, which is difficult to do as an individual donor."

Impact on the council

Mike's tenure as chair of the CIC will begin next fall. As council chair, his aim will be to improve the overall experience for agencies that submit grant applications and for the volunteers who support the Community Fund. He wants to tailor a volunteer experience that recognizes individuals' desired engagement level and interests. He also intends to further streamline the application and decision-making process for funding awards.

"There is a huge need for support from UWCNM in our community. You wind up seeing so many people in dire situations that it can be easy to get discouraged. But when you've seen enough of it, it really inspires you to try to do something about it," he says.

Employee sees United Way impact from front lines

By Valerie Smith

Giving back to others has been part of Cheryl Atkins' makeup for almost as long as she can remember.

"I remember my mother handing my sisters and me

March of Dimes cards and having us walk up and down the block collecting donations," she recalls.

"She raised us to know that giving back is part of who we are."

Until about six years ago, United Way was seldom if ever a recipient of her generosity. It just wasn't on her radar as much as organizations that had personal meaning to her, such as animal causes. That changed when Cheryl, who had experience leading nonprofits in New York City, was tapped to head the Rape Crisis Center of Central New Mexico as executive director.

"That was one of the toughest jobs I ever had," she said, "but it would have been even harder without the support of United Way. I saw first-hand the difference they were able to make in the lives of people dealing with horrible trauma."

At the time, the Rape Crisis Center had about 20 counselors. They'd respond to calls around the clock, visiting hospitals to assist the victims, directing them to legal assistance, helping families, and in general ensuring that all support needed was provided. The Albuquerque Family Advocacy Center, a direct result of UWCNM, helped the victims get assistance from different agencies in a single location.

"Ever since that experience, I make sure that at least a

portion of the donation I make through the Employee Caring Program goes to the United Way Community Fund," Cheryl says. "I still designate to nonprofits that are important to me, but I make sure some goes to United Way to continue working where the needs in our community are greatest."



A DOGGONE GOOD IDEA — Cheryl Atkins visits with a friend at Animal Humane New Mexico. Cheryl says she donates a portion of her ECP contribution each year to nonprofits important to her and always designates a certain portion to go directly to the United Way of Central New Mexico Community Fund. (Photo by Randy Montoya)

In addition to UWCNM, Cheryl's donations almost always are designated to an animal cause and to Habitat for Humanity. Programs like the Roadrunner Food Bank that feed families are also frequent recipients of her designated contributions, as are programs that support art and education.

"Those are things I think everyone should have in their life — shelter, food, someone to love, art, and education," she says.



United Way Info Fair Oct. 3

Sandia's 2016 Employee Caring Program campaign kicks off Monday, Oct. 3, at an information fair from 11 a.m.-1 p.m. in the Steve Schiff Auditorium lobby and all are invited.

Representatives from the United Way of Central New Mexico will be on hand to answer questions about the Community Fund, Mission Graduate, and other programs made possible through the Community Fund. Come learn about the work of Sandia's affinity groups, including Guys Give, Women in Philanthropy, Hispano Philanthropic Society, the Tocqueville Society, and the Young Leaders Society.

Each attendee can select a United Way of Central New Mexico focus area (education, health, or basic needs/financial stability) to receive a \$20 donation. Attendees also earn 1,000 Virgin Health Points just for attending.

Learn more at give.sandia.gov.

