

Meet Doug Bruder

Sandia's Associate Labs Director for Defense Nuclear Nonproliferation has a passion for exploration.

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Published since 1949

Exceptional service in the national interest

Sandia LabNews

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Deputy Secretary of Energy visits Sandia



IN HIS VISIT to Sandia this week, Deputy Secretary of Energy Dan Brouillette got an overview of a wide range of the Labs' mission-related work. After being welcomed by Labs Director Steve Younger, Brouillette was briefed by Associate Labs Director Steve Girrens on the status of Sandia's Nuclear Weapons Modernization Programs and then was briefed on programs and activities at various facilities, including MESA, Z, the Neutron Generator Facility, and the Counterfeit Detection Center. The deputy secretary also participated in a discussion led by Steve on new management challenges and opportunities

and sat down for lunch with early career employees from across the Labs. Following an all-hands meeting for members of the workforce, Brouillette closed out his day at Sandia with a meet-and-greet with representatives from the offices of New Mexico's congressional delegation. In the photo here, Sandia Pulsed Power Sciences Director Keith Matzen, left, explains some of the intricacies of Sandia's Z machine to Brouillette as Steve, left background, and James Colgary, Brouillette's chief of staff, look on.

(Photo by Randy Montoya)



Sandia supports W80-1 Alt 369 FPU. 3



The infrastructure for more solar at Sandia. 7



Recycling smarter at Sandia 6

Superior hydrogen catalyst just grows that way

By Neal Singer

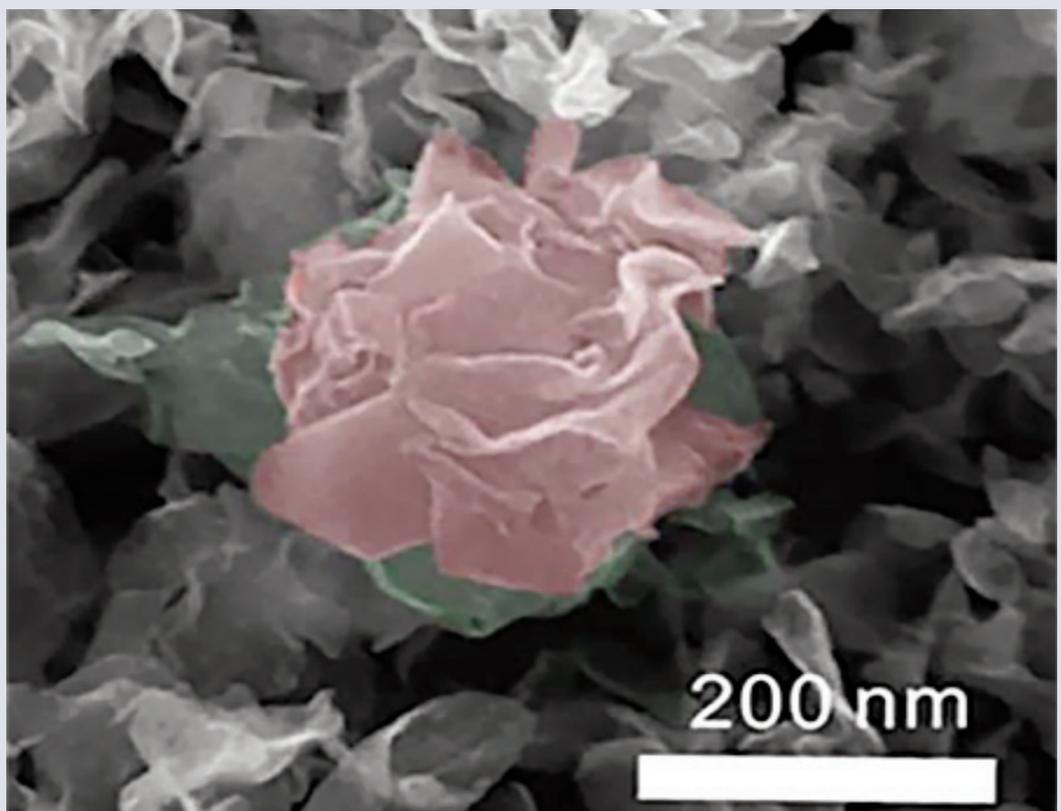
Replacing your everyday gas guzzler with a hydrogen fueled car could drastically reduce your carbon footprint. So why don't we all make the switch?

One of the major barriers to mass market acceptance of hydrogen fueled vehicles is the expensive platinum catalyst required to operate hydrogen fuel cells efficiently.

In an effort to bring down the cost of hydrogen fuel cells, research led by Sandia and the University of California, Merced used a dirt-cheap compound

(Continued on page 5)

NOT ORGANIC? These inorganic "flowers" (color added) were created by Sandia researcher Stanley Chou and UC-Merced colleague Vincent Tung in a spray printing process that uses molybdenum disulfide (MoS_2) to create a "flowering" hydrogen catalyst far cheaper than platinum and reasonably close in efficiency.



Veterans Day 2018
HONORING THOSE WHO SERVE
See page 3 and page 4.

That's that

It's our own origin story: In 1949, President Harry Truman wrote that famous letter to American Telephone & Telegraph Company President Leroy Wilson, encouraging the company to manage what was then called Sandia Laboratory. AT&T's Bell Labs, at the time the nation's preeminent industrial R&D enterprise, was deemed by the Atomic Energy Commission to have the right suite of technical management skills and experience to take on management of Sandia. The lab's work, Truman wrote to Wilson, "is of extreme importance and urgency in the national defense and should have the best possible technical direction."

In appealing to Wilson's patriotism, Truman wrote, "I hope that after you have heard in more detail from the Atomic Energy Commission, your organization will find it possible to undertake this task. In my opinion you have here an opportunity to render an exceptional service in the national interest."

From its very earliest days, Sandia embraced that phrase – "exceptional service in the national interest" – as its motto and a key expression of its highest principle. Likewise, when we come to work for the Laboratories, that motto becomes our own, and along with the statement of our core purpose as articulated by Labs Director Steve Younger – Sandia develops advanced technologies to ensure global peace – helps keeps us focused on why we're here.

I got to thinking about "exceptional service" when I was considering the meaning of Veterans Day. Those of us who never served owe a debt of gratitude to those who did. But for us at Sandia, I think our appreciation runs deeper than simple gratitude. We know what "exceptional service" means and we know, too, that our veteran colleagues were providing "exceptional service" long before they were hired at Sandia. Where we have devoted our careers to that high ideal, our Sandia veterans put their very lives on the line for the nation, which means for all of us.

In *Twelfth Night*, William Shakespeare wrote, "Some are born great, some achieve greatness, and some have greatness thrust upon them." I think the Bard left out one other possibility: our veterans chose greatness. They chose to be part of something bigger than themselves, and not for material reward or accolades but because they heard the call and answered.

Our Armed Forces veterans embody commitment, teamwork, self-sacrifice, and courage. They are the living exemplars of "exceptional service in the national interest" and we at Sandia are privileged to count so many veterans among our numbers. With their values and experience, they make us a better, stronger, and braver institution.

* * *

Speaking of veterans, I came across something the other day that astonished me.

The last American World War I veteran died in 2011 and we are losing our World War II veterans at an accelerating rate. According to The National WWII Museum, just 558,000 of the 16 million Americans who served in uniform in World War II were still alive at the beginning of 2017, including 3,800 in New Mexico. An estimated 362 WWII vets are dying each day.

While the members of the Greatest Generation are passing into history, their offspring still number in the 10s of millions. Those of us whose fathers or mothers served in World War II will still be around for decades to come. That's to be expected. But here's what I didn't expect: There are still children of Civil War veterans living among us, at least as of 2015, the most recent data I can find. Apparently some veterans of the War Between the States took young brides well into the 20th century and were fathering children into the 1920s and 1930s. Those children are in their 80s or 90s now but there are still a few around, along with probably too many grandchildren to count.

As time goes by, we see the 20th Century not as "news" or "current events," but as history. The 19th Century? Well, that's *ancient* history. But we are never really far from our past; it reaches out and touches us every day. Think about it: That elderly lady or gentleman you saw a couple of years back in the rest home lobby might possibly, just possibly, have been the child of someone who fought at Gettysburg. And that astonishes me.

See you next time.

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

One-stop shop improves HR, financial reporting at Sandia



New Enterprise Business Intelligence Portal represents 'revolutionary' upgrade

By Amy Treece

After two years of intensive work, Sandia's IT organization is rolling out the Enterprise Business Intelligence (EBI) Portal, which provides a modernized suite of Human Resources reports/queries along with financial and supply chain data via an upgraded user interface.

"EBI is fairly revolutionary," says Tracy Jones, manager of Sandia's enterprise business intelligence organization. "This is a one-stop shop that provides Human Resource business partners, talent acquisition staff, and finance personnel with self-service capability in a way similar to what the Analytic Reporting Capability software does for financial reporting."

Over the years, users have run up against the limitations of the Labs' HR reporting tools, requiring them to create ad hoc reports to generate the information they needed. The new tool should make those problems a thing of the past, Tracy says. The EBI Portal, he says, will significantly reduce the excessive time and effort needed to gather, interpret, and communicate data used for management decision making and legal/regulatory compliance, while also ensuring the data is consistent and accurate.

Samantha Oesterling, a software systems engineer working on this project since it began in 2016, says, "Systems such as Reportville and HR Queries are becoming difficult to maintain as technology is upgraded. It's imperative to reduce the vulnerabilities they have and take Sandia to a place where needs are being met while security is aggressively maintained."

Supports Labs' strategic objectives

The EBI team spent a lot of time focusing on the user interface and experience.

"All employees requiring access to these reports need to have a portal that is intuitive and easy to navigate," says business systems analyst Jean Plummer. "This supports Sandia's strategic objective to improve the effectiveness of Laboratories operations. With the new EBI Portal, we're making it possible for managers as well as HR and financial employees to dedicate more time to other activities supporting the mission rather than having to dig up all the right data from multiple sources."

Reportville will be decommissioned on Nov. 10. HR Queries is slated for retirement in January or February 2018, but based on new data, that date could be accelerated. More information on the sunset of both programs will be on the EBI Portal home page, and announcements will be published in the Sandia Daily News. Currently, Reportville and HR Queries are accessible to quite a few Sandia employees. Due to the personally identifiable information available in some EBI reports, access will now be limited to those with a strong business need. Reportville users and managers will be automatically imported, but all other employees will be given access based on function and approval by Carol Manzanares, a senior manager in Human Resources.

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Bldg. 894, east entrance, lobby

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Bldg. 836, lobby

Bldg. 831/832 north lobby

Bldg. 861, Cafeteria lobby

Bldg. 870, lobby

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CGSC, lobby

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800(A), outside of Vicki's

Anthony Trimble continues service to the nation at Sandia

By Madeline Burchard

Sandia Emergency Planner Anthony Trimble says the rivalry between military branches gives rise to great deal of friendly smack talk.

“You can imagine that this kind of joking happens a lot in my family, because my siblings and I have all served in different branches,” Anthony says. Two of his brothers served in the US Army and his sister served in the US Air Force. Despite the teasing, he says their shared military experience has only made them closer.



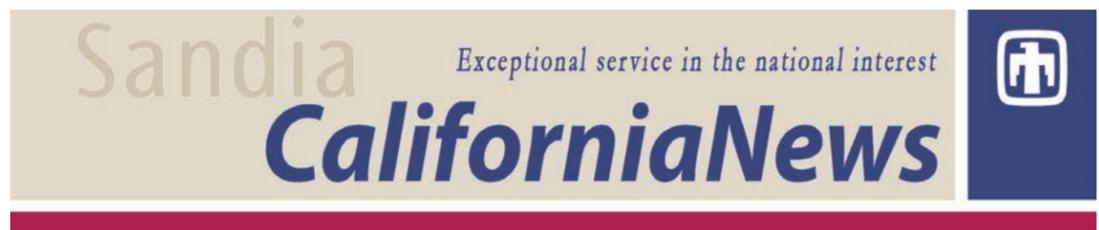
“I HAVE HAD THE HONOR of serving in a variety of Marine Corps units, each of which taught me critical skills,” says Sandia emergency planner Anthony Trimble.

Anthony says his own service in the Marine Corps, and its long-standing reputation for training the best of the best, is a constant source of pride in the Trimble family.

“I have had the honor of serving in a variety of Marine Corps units, each of which taught me critical skills,” he says. “These skills have helped me succeed in my work at Sandia’s California site.”

Anthony started with the backbone of the Corps — the Marine infantry. Working with the 3rd Battalion, 23rd Marines showed him how the infantry supports operations across multiple companies and platoons. During his first three years in the Marines, he was the weapons company radio chief. Being assigned to a company removed from headquarters required flexibility and creativity, he says.

After his time with the infantry, he spent several years at the Marine Aircraft Wing Headquarters as the communications platoon sergeant. “Managing people has a steep learning curve with little room for mistakes,” he says. “However, there are many rewards. I loved seeing young Marines take on challenges and succeed with limited resources. They had energy and enthusiasm while adapting to and overcoming challenges.”



He says that he now finds this same energy at Sandia, where challenging problems are tackled every single day.

Once a Marine, always a Marine

Doing his part for the country is bigger than just putting on a uniform, Anthony says, adding that he’s a Marine 24 hours a day, seven days a week.

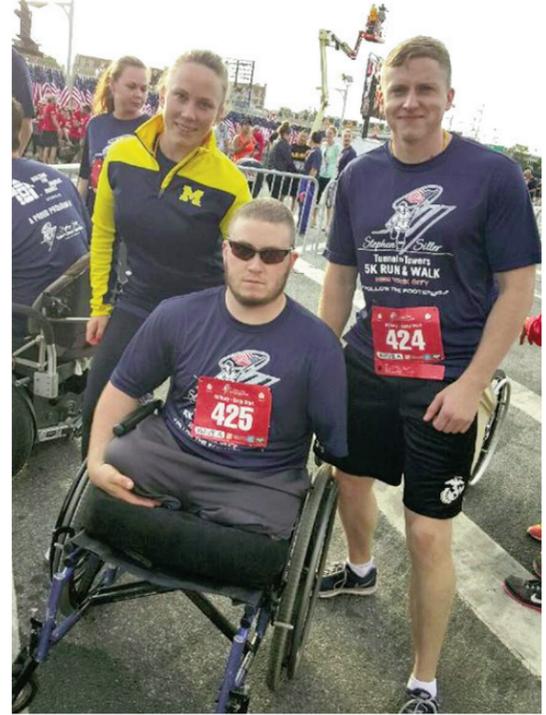
As part of continuing his public service, he helps coordinate the Toys for Tots program at Sandia/California.

“Being involved with this campaign has been as rewarding as any of my military service experiences. The Sandia community is incredibly generous and supportive of the effort to provide underprivileged children with a great Christmas.”

Sandia has donated more than 500 toys annually for the past several years. Last year’s campaign ended at a critical moment.

“As we were pulling into the local Toys for Tots distribution center to unload 543 collected toys, we found volunteers anxiously waiting for us,” he says. “The center had run out of toys minutes before we arrived. They were about send volunteers home because they could no longer fill the needs from local nonprofits. Toys from Sandia helped save the day and provide children with a special Christmas.”

The goal this year at the California site is to surpass last year’s contributions. “We are confident that the site will help us meet that goal, and will continue to support this effort for years to come,” he says.



ANTHONY TRIMBLE, right, with his sister and brother. Military service is a family tradition, with all three siblings serving in the Armed Forces.



GIVING BACK — Anthony Trimble helps coordinate the Toys for Tots program at Sandia/California.

Sandia supports First Production Unit of W80-1 Alt 369

By Michael Padilla

Sandia Labs was an integral part of NNSA’s completion of the First Production Unit (FPU) of the W80-1 Alteration 369.

Sandia’s System Engineering team was present during the FPU build to observe the execution of the new procedures, verifying that procedures are correctly performed and meet requirements to yield a quality product.

“The team was present to resolve any technical issues that might arise during the build,” says Michael Forman, manager for the Sandia program. “In this instance, the timely completion of documentation and resolution of two technical issues by the Systems Engineering team were critical to the early completion of the FPU.”

During the W80-1 Alt 369 FPU build, Jim Berg and Al Ver Berkmoes observed and documented the results of the nuclear explosives operations in engineering evaluation releases (EER) to ensure that the process met requirements. Upon successful completion of the build, the EER and qualification engineering release were signed, completing the FPU build and allowing full production of W80-1 Alt 369 respectively.

Sandia team members critical to the aggressive push to deliver FPU by Sept. 30 included: Jim, Al, and Robert Kinzel from system engineering; Don Bender and Cary Pratt from quality engineering, and Jennifer Hidalgo, Charles Lloyd, Carmen Lucero,

and Debbie Stephens from Document Control.

According to NNSA, this accomplishment is an important step toward maintaining nuclear capabilities that will help deter attacks on the United States and its allies.

“NNSA can now successfully kick off fiscal year 2018 by entering full production for the W80-1 Alt 369. Such modernization efforts are key to maintaining the safety, security, and effectiveness of the nation’s nuclear weapons stockpile,” said Brig. Gen. Michael Luton, NNSA’s principal assistant deputy administrator for military application.

The W80-1, a warhead carried by the air-launched cruise missile, was introduced to the stockpile in 1982. An alteration is a change to a component that does not alter the weapon’s operational capability. The Alt 369 replaces Limited Life Components in the war-



head.

The W80-1 Alt 369, scheduled to run through December 2020, will remain operational until the transition to the life-extended W80-4, supporting NNSA’s strategy to ensure the American nuclear arsenal continues to be safe, secure, and effective.

Consolidated Nuclear Security LLC performed FPU assembly operations at the Pantex Plant in Amarillo, Texas, supported by Sandia/California, and Lawrence Livermore National Laboratory.

A desire to serve



Sandia's Susan Berlin-Sanders remembers a sister who loved adventure and her country, and lost her life in the line of duty in Afghanistan

By Nancy Salem

Phyllis Pelky was teaching high school in Rio Rancho when she invited an Air Force recruiter to speak to her class. She wanted the students to think about the many career options life has to offer. They listened, but the person who ended up being recruited was Phyllis herself.



TEACHER PHYLLIS PELKY built a second career in the US Air Force.

"She called and told me she was joining the Air Force and I said, 'Seriously? You're 33 years old!'" says Susan Berlin-Sanders, Phyllis's sister and a Sandia computer server administrator. "This was in 2004, and she felt a sense of duty to do something after 9/11. The military resonated with her. She wanted to serve her country."

Phyllis enlisted and made the Air Force a second career, moving for more than a decade to several assignments and rising to the rank of major before becoming aide de camp to the superintendent of the Air Force Academy in Colorado Springs. "It was a special, prestigious job," Susan says. "She was at the right hand of the general in charge of the academy."

But Phyllis had one more ambition — to go to a war zone. "She wanted that experience," Susan says.

Phyllis volunteered to be deployed and was sent to Kabul, Afghanistan, where she died on Oct. 11, 2015, at age 45, in the line of duty. "It was a huge loss. We were devastated," Susan says. "She was a great person, a kind, capable, and gifted person."

The loss is particularly painful on Veterans Day, which falls not long after the anniversary of Phyllis's death. "I think about the sacrifices people make so we can be free," Susan says. "We honor all the people who have served in the military, and my sister was one of them. It means a lot to me."

Two sisters growing up

Phyllis and Susan came from a family of seven children, six girls and a boy, raised in Oak Lawn, Illinois. The family moved to Rio Rancho when Susan was 12



SISTERS — Susan, right, and Phyllis grew up in a large family in Oak Lawn, Illinois. "We were very close," Susan says.

and Phyllis 9. Their father, a former railroad worker, was hired at the Motorola plant in Albuquerque.

The two girls were close growing up. "We played a lot. I kept a picture of the two of us as kids that's special to me," Susan says. "She had huge blue eyes and was



SUSAN BERLIN-SANDERS says her sister wanted to help her country following the 9/11 terrorist attacks.

(Photo by Randy Montoya)

very mischievous. All the kids have different stories about Phyllis. One I remember clearly is the time she drew a big picture of mountains on a wall in our house and signed my name to it. I, of course, got in trouble."

Susan says Phyllis had a strong moral compass and stood up for kids who were bullied. In third grade, she took on an older boy who was picking on others. "She confronted him and he got in her face so she gave him a punch and sent him home crying," Susan laughs, recalling the scene. "She was eight years old. She wanted to get the other kids out of the line of fire. She knew the right thing to do in every situation."

At Cibola High School, Phyllis developed a love of languages and travel — she biked across Europe with friends after high school — and thought about becoming an interpreter. "She wanted to do adventurous things," Susan says.

Phyllis studied French and German at the University of New Mexico and graduated with a degree in education. She also started a family, marrying David Pelky and having two sons in her early 20s.

She had taught German, French, and humanities for seven years at Rio Rancho High when the Air Force recruiter changed her life. She easily qualified for service, acing the physical training. "She was always in great condition, worked out all the time," Susan says. "She tested at the level of a 25-year-old man." And because she had a college degree, Phyllis entered Officer Training School. She was commissioned as a second lieutenant in June 2004.

Her first assignment was at Whiteman Air Force Base in Missouri as a pilot coordinator. "They thought they would teach her things, but she ended up teaching them," Susan says. "They were blown away by her abilities."

She led the Equal Opportunity Office at Kadena Air Base in Japan for four years then went to Montreal, Canada, to earn a master's degree at McGill University. She was then assigned to the Air Force Academy, where she taught languages for four years before being tapped as aide de camp to Superintendent Gen. Michelle Johnson. "She and her family, who followed her to her various posts, loved Colorado Springs, and talked about retiring there," Susan says.

A terrible day

But first came a one-year deployment to Afghanistan in support of NATO-led Operation Freedom's Sentinel. "We worried about her when she told us where she was going," Susan says. "It seemed like a dangerous place to be."

Phyllis served as a personnel specialist training Afghans to organize their air force. Four months into her deployment, Phyllis was on a helicopter crossing the air base when it crashed. "She went to meetings all the time across the base and it was unsafe to walk so they generally took a helicopter," Susan says. "On this trip, it was a morning meeting and they were on their way back when the helicopter went down."

Five of the 10 people on board died on impact, all sitting on the same side of the aircraft. Susan's phone began ringing a few hours later. "Everyone was calling," she says. "It was a terrible, terrible day."

She had last heard from Phyllis about three weeks before the accident when she wrote in the family

newsletter about her experiences in Afghanistan and what her family was up to. One of her sons and his wife were expecting a baby, and Phyllis was looking forward to being a grandmother. "Three weeks later, she was gone," Susan says.

In February 2015, Phyllis invited Susan and another sister to spend her birthday with her in Colorado Springs. "We spent a whole weekend with her and had a really fun time," Susan says. "When we all lived in Albuquerque we would have girls' nights out. We got to do that again. I'll never forget that weekend."



ON DEPLOYMENT — Phyllis, right, served in Afghanistan four months before her fatal helicopter ride.

Remembered by hundreds

About 400 people attended Phyllis's military funeral on Oct. 26, 2015, at the Air Force Academy in Colorado Springs, where she is buried. She was saluted for three miles along the route as she left Peterson Air Force Base following her dignified transfer. "Everyone was there from the academy, lots of students. She made great friends there," Susan says. "Generals and commanders spoke. They all loved her. It was very touching."

Phyllis's younger son, Zachary Pelky, followed her footsteps into the Air Force and is a second lieutenant in pilot school in Texas. Her older son, Alex Pelky, lives in Colorado Springs with his wife Brandi and their young daughter. Her widower Dave also lives in Colorado Springs.

Susan says she still goes to grief meetings and credits the organization TAPS (Tragedy Assistance Program for Survivors) — which offers support groups, mentors, retreats, and social events to people who have lost a military family member — with helping her come to terms with her sister's death.

She says she used to be one of those Sandians who kept walking when the national anthem played at 5 p.m. on Kirtland Air Force Base. But no more. "When my sister passed away, it gave me a renewed feeling of why we play the anthem, what patriotism is all about. It changed my whole mindset," Susan says. "Now I stop and give Phyllis a moment of silence at the end of my day."

USAF Chief of Staff Gen. David Goldfein visits Labs



USAF CHIEF OF STAFF GEN. DAVID GOLDFEIN, accompanied by a delegation of Air Force personnel including Maj. Gen. Shaun Morris, commander of the Air Force Nuclear Weapons Center, and Col. Richard Gibbs, commander, 377th Air Base Wing, visited Sandia last month to receive briefings on Sandia technologies, capabilities,

and programs in support of the Air Force's nuclear mission. In the photo here, NNSA Sandia Field Office Manager Jeff Harrell welcomes the general to the Labs. Joining the two is Sandia Associate Labs Director for Nuclear Deterrence Steve Girrens.

(Photo by Randy Montoya)

Hydrogen catalyst

(Continued from page 1)

to create an uneven surface that resembles a plant's leaves. The extra surface area helps catalyze hydrogen almost as well as platinum does.

Lead researchers, Sandia materials scientist Stanley Chou and UC Merced's Vincent Tung have applied for a joint patent for the spray-printing process, which uses inexpensive molybdenum disulfide (MoS_2). The increased surface area of the rippling "leaf" creates three times as many catalytic contact points as other MoS_2 structures, and the new creation can handle higher temperatures than platinum without sintering and gumming up the cell.

The work is part of an effort to more cheaply power hydrogen-fueled cars, desirable because they emit water rather than carbon monoxide or carbon dioxide.

Nature as an ally

The production method uses nature as an ally rather than a hindrance, Stanley says. "In traditional thinking, forces such as gravity, viscosity, and surface tension must be overcome to achieve the manufactured shapes you desire. We thought, instead of thinking of these forces as limitations, why not use them to do something useful? So, we did."

Tung says the method uses natural processes to produce materials for extremely inexpensive fuel cell terminals to liberate hydrogen. "The printing process also allows for continued deposition, with the ability to scale for industry," he says.

The team mixed MoS_2 with water and used the printing process to expel micron-sized droplets into an enclosed area about 2 feet high. As they dropped, the droplets

first separated into flat, nanoscopic subunits. These dried further as they fell, their shrinking volume producing an uneven 3-D surface much like the leaves of plants, with tiny ridges, hills, canals, caves, and tunnels. Landing on a substrate and on each other, the "leaves" were still moist enough to bond as though attached at critical points by tiny droplets of glue. Thus, the nanostructures did not lose their individuality but instead, by maintaining their identities, created tiny tunnels within and between them that permitted extraordinary access for atoms of hydrogen to seek their freedom from chemical bonds.

The inspiration for creating a bio-inspired 3-D form arose from studying the cuticle folding process, a mechanism used by plants for controlling diffusion and permeability on leaf surfaces, Stanley says.

"We see our catalyst as an inorganic material acting like a plant. The nanostructures, like leaves, are varied in shape, with tiny rises and falls," he says. "The structures take in an external material to produce hydrogen rather than oxygen, and one day may be powered by sunlight." Right now, very low-voltage electricity does the job.

Doubts about the strength of the structure formed in such a serendipitous manner, Tung recounts, were settled when a 170-pound student unwittingly trod upon one of the first MoS_2 -catalyst creations when it accidentally fell to the floor. A few hundred nanometers thick, it rested upon a centimeter-square carbon substrate but was otherwise unprotected. Electromicroscopic investigation showed the tiny structure to be undamaged. The "leaves" also have proved to be long lasting, continuing to produce hydrogen for six months.

The work is the subject of a technical article published online Oct. 12 in the journal *Advanced Materials*. Researchers from King Abdullah University of Science and Technology, Lawrence Berkeley National Laboratory, and Yale University also contributed to the article.

The work at Sandia was funded by DOE's Office of Science. Work at UC Merced was supported by a university startup fund.

Global Burst Detector III systems ready to launch

THE FINAL PAYLOAD of the next generation of Global Burst Detector, GBD III, has received approval for delivery to the space vehicle contractor for integration. The first launch of GBD III is expected May 2018. This generation of systems, hosted on GPSIII, will join Global Burst Detection systems on prior generations of GPS satellites including GPS IIF and GPS IIR.

The Global Burst Detection system looks for nuclear detonations around the world, offering real-time information to US policymakers about potential activity. Sandia has developed and delivered satellite-based nuclear detonation detection systems since the Vela satellites in 1963, the work now done on behalf of the National Nuclear Security Administration, NA-22. The GBD systems are delivered on behalf of NNSA to the Air Force's Space and Missile Systems Center, which is responsible for space vehicle integration, launch, and on-orbit operations. — Mollie Rappe

MEMBERS OF THE GBD TEAM, shown with the five major GBD subsystems on the bench in the background, celebrate the milestone. Pictured here are, top row left to right, Anthony Sanders, Tammie Towndrow, Rachel Trojahn, Matthew Weiss, James Garson, David Patterson, Alicia Aragon, and Dylan Bryant; and bottom row left to right, Barb Wampler, Ellen Pope, Ana Nevarez, and Regal Ferrulli. Sandia is the systems integrator, producing three of the subsystems, with Los Alamos National Laboratory producing the other two.



America Recycles Week — recycling smarter



TRASH AUDITS like this one at the IPOC building are one way MSP2 determines how much recycled material still goes into the waste stream.
(Photo by Randy Montoya)

By Stephanie Holinka

Nov. 15 is America Recycles Day, and the news this year is that Sandia is focused on smart recycling.

Everyone knows the drill: Each year, Sandians, like other Americans, are asked to recycle more, and we have. But international market changes underway may impact how and where those recyclables are processed.

China drives recycling market changes

For many years, China has been the largest importer of US recyclables and has become the world's largest processor of recyclables. But that industry has come with a cost. Over time, China claims, the quality of recyclables being imported into China has gone down, resulting in sorting, cleaning, and disposal expenses for waste within the recyclables supply chain. This drives down margins in an already thin-margined industry, and raises Chinese disposal costs.

Add to that the rise of China's middle class and consumer culture, and it's led to China making industry changes that have large implications for American organizations and municipalities that generate recycling for export.

"There are other markets, but China is the big one," says Sam McCord from Sandia's Materials Sustainability & Pollution Prevention (MSP2) program. "Changes made by China are driving changes in the entire industry and in recycling practices."

Since 2013, China's Operation Green Fence has sought to improve the quality of recyclables being brought into China for processing. More recently, China's Operation National Sword has tightened importing rules intended to help Chinese processors avoid some of the waste problems that come from recyclables contaminated with pollutants like food and trash, and their own increasing recycling amounts. The standards are tightening, and the results will be felt by Americans.

"In the US, some municipalities are concerned their recyclables won't be accepted by China any more, and those municipalities have to find other processing partners or make the difficult decision to landfill the materials they can't offload," says Sam.

RECYCLE
America Recycles Day
NOVEMBER 15

RECYCLE
ALL RIGID PLASTICS

RECYCLE
MIXED PAPER INCLUDE ALL PAPER TYPES, EXCEPT WHITE COPY PAPER

ZERO WASTE
2025

Sandia National Laboratories

Sandia and many other large members of the New Mexico Recycling Coalition are taking action to increase participation and decrease contamination, Sam says.

How/what Sandia recycles

MSP2 team member Ralph Wrons says about 120,000 to 130,000 pounds of white paper annually is shipped in locked semi-trailers to a domestic paper recycling mill, where a Sandian witnesses the paper being unloaded onto a conveyor and into a pulping vat.

"The end product actually becomes materials for the copy paper production process, and Sandia buys its copy paper from one of the paper mills that processes Sandia's recycled white paper," Ralph says.

The process for plastics and mixed paper is a little different.

Sam says Sandia annually sends more than 60,000 pounds of rigid plastics and more than 150,000 pounds of mixed paper to a local processor/broker that also processes the city of Albuquerque's recyclables.

Each time a load of plastic or mixed paper is ready, the broker puts it out for bid on the secondary materials market, and will sell it to the highest bidder. That highest bidder may or may not be domestic.

Keep Sandia recyclables clean

To ensure that Sandia's recyclables are acceptable for processing, Sandia's MSP2 program is asking Sandians to ensure that Sandia recyclables are clean and free of contamination that could limit its usefulness for processing.

"Ensure that only rigid plastics are put in plastics recycling bins, and that the plastics are free of food and other waste," Sam says.

Sam says plastic films can damage equipment used in the recycling processing process. Sandia facilities that use lots of plastic films recycle them separately, and Sandia recycles about 2,500 pounds of films, but that larger-scale film recycling isn't practical at this time.

"Recycle white paper only in the bins that are intended for just white paper, and ensure that mixed paper bins are clean and free of waste such as food and trash," says Sam.

Keep Sandia's recyclables supply chain clean

Here are some ways to keep Sandia's recyclables clean and contamination-free:

- Only recycle clean, rigid plastics in the plastics recycle bins
- Keep mixed paper bins free of trash and other non-paper recyclables
- Recycle white paper only in white paper bins

New "Zero Waste by 2025" signs on recycling bins will include recycling guidance.



SANDIA CLASSIFIED ADS

Note: The Classified Ad deadline for the Nov. 24 issue of the Lab News will be Thursday, Nov. 16 at noon instead of Friday, Nov. 17. This deadline change applies to this issue only.

MISCELLANEOUS

PURSES/WALLETS, Coach, Dooney & Bourke, lightly used, sold individually, contact for photos & prices. Maestas, 505-550-0163.

WIRELESS HEADPHONES, Beats Solo 3, great gift, new in box, retails \$299.95, asking \$119 min. Tachau, 505-717-7761, leave voicemail.

MINI 3D PRINTER, UP, used, 4.7" x 4.7" x 4.7" build area, print ABS, PLA & more, \$200. Wilson, 303-218-8405.

SWING SET, Backyard Discovery Patriot II, currently partially dismantled, paid \$1,200, asking \$400. Valdez, 331-5597.

ELECTRIC STOVE, glass cook top, black, new, \$250 OBO. Harrison, 505-730-7819.

FARMERS BENCH, "Norecs", Egyptian antique, beautiful, hand-carved, 4 remaining, \$500 ea. Montgomery, 918-0980.

YOUNG AT HEART DICKENS VILLAGE/CONCERTS, Nov. 24-25, Dec. 1-2, Nazarene Church on Paseo, details at <http://www.yahchoir.org>. Martin, 858-3009.

PINBALL MACHINE, Top Ten, circa 1975, works great, comes w/spare parts, \$700. Greer, 281-4688.

CAMPER SHELL off Dodge Dakota, will fit other trucks, outside dimensions, 80" x 95", photos available, \$250 OBO. Hanks, 505-249-1931.

CUSTOM BDA UTILITY TRAILER, 2015, top/side load, excellent condition, located in East Mountains. Willmas, 505-281-9124.

RECLINER, leather chair & ottoman, classic design, Ekornes brand, originally purchased at TEMA, \$800. Wells, 505-292-0179.

BEDROOM SET, Ethan Allen, vintage, solid maple, queen bed, nightstand, corner desk, chair, 2 dressers, \$1,000. Hughes, 806-676-3584, lindseygloe@gmail.com.

iPHONE 7 PLUS, 128GB, rose gold, Sprint, 2 cases, \$600 OBO. Cappadona, 334-717-8136.

LED CHRISTMAS TREE, 9-ft. Fraser, multi/clear, 3 sections auto connect, remote, stand, nylon storage bags; 7-1/2-ft. lighted Concord Pine, Lumination decorations, \$50 ea. OBO. Hagerman, 401-1402.

DINING ROOM SET, exquisite, seats 8, protective cover, 5 yrs. old, originally \$10,000, asking \$3,000 OBO. Miller, 505-514-8744.

IGUANA, 2 yrs. old, 3-ft. long, w/3 large cages, heat lamps & other accessories, \$100. Cross, 891-0964.

SILENT AUCTION, help Fabulous Felines raise funds for veterinary care, <http://www.fabulousfelines.org>. Stubblefield, 263-3468.

LUXURY CAT TREE, large, Fantasy Forest, used little, professionally cleaned; outdoor cat cage. Miller, 505-298-3815.

BEER/ICE WATER GLASSES, set of 4, 17-5/8 oz., Riedel of Germany, Ouverture, in original box, never used, \$35. Wagner, 505-504-8783.

TRANSPORTATION

'06 DODGE STRATUS SE, 4-dr., 2.7 V6, 112K miles, runs great, good condition, great student/commuter car, \$2,300 OBO. Argo, 505-235-2484.

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: From Techweb search for 'NewsCenter', at the bottom of that page choose to submit an ad under, 'Submit an article'. 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.

'12 BMW 328i, 57K miles, factory warranty until July 2018, excellent condition, \$17,900. Wencel, 505-712-6356.

'05 HONDA CIVIC VP, 4-dr., 1 owner, garaged, no mechanical issues, cosmetic rear damage, 96K miles, \$4,000. Buerger, 505-299-2608.

'10 DENALI, AWD, loaded, white pearl, sunroof, 3rd row, 109K miles, excellent condition, \$21,000 OBO. Reyes, 505-459-6393.

'18 SUBARU FORESTER, premium wheel pkg., roof rack, etc. silver, AT, 3K miles, priorities changed, \$22,250. Martin, 623-687-7673.

'04 NISSAN FRONTIER DESERT RUNNER, king cab, 2WD, V6, gray, 49K miles, good condition, \$8,000. Padilla, 286-4466.

'07 FORD EXPLORER, Eddie Bauer edition, only 124,500 miles, good condition, photos at <https://photos.app.goo.gl/LC> CvtstEMu7u7m8Y33, \$6,250. Steele, 505-480-8314.

'72 BEETLE, needs electrical work, won't key start, new tires, \$1,700. Townsend, 352-5390.

'98 MERCURY TRACER LS, 4-dr. sedan, FWD, reliable work/school transportation, clean, \$1,500. Sedden, 505-299-8159.

'16 CHEVY STINGRAY CORVETTE, coupe, Z51, 2LT, Torch Red, 6K miles, excellent condition, \$53,000. Beenau, 505-264-1390.

'13 CHEVROLET CAMARO LT, GM certified pre-owned (transferable), black, low miles, excellent condition, NADA \$18,300, asking \$17,900. Varro, 505-228-7292.

'97 F250 XLT, extended 3-dr. cab, Snug Top camper, 98K original miles, runs great, \$4,500 OBO. Edmund, 881-7974 or 463-0099.

'12 NISSAN LEAF, all electric commuter, black, 28K miles, great condition, \$6,500. Turner, 505-750-2383.

'13 TOYOTA HIGHLANDER LIMITED, Platinum Warranty to 120K miles or 2021, 76K miles, \$24,800. Sahlstrom, 541-224-3869.

REAL ESTATE

5-BDR. HOME, 3 baths, 4,280-sq. ft., separate in-law quarters, swimming pool, Four Hills, pre-inspections done, \$444,000. Ramos, 505-220-5201.

3-BDR. CUSTOM HOME, 2-1/2 baths, 4-1/2 car garage, 2,700-sq. ft., 3-fenced acres, <http://themountainsnm.yola-site.com>, \$349,000. Matthews, 505-980-4917.

3-BDR. HOME, 3 baths, new floors, new master bath, new windows, new appliances, NE neighborhood (87122), \$279,000. Wilcox, 505-400-1289.

2 ACRES FOREST LAND, East Mountains, well, septic, power, 46 Adobe Ln., \$59,000; 2-bdr. home, 2 baths, 1,568-sq. ft., 50 Adobe Ln., \$155,000. Anderson, 505-453-5522.

3-BDR. HOME, 1-3/4 baths, 1,795-sq. ft., quiet neighborhood, near schools & park, Lomas/Juan Tabo, MLS#904627, \$218,000. Nigrey, 928-486-4467.

4-BDR. HOME, 2-1/2 baths, 2,690-sq. ft., La Cueva High neighborhood, MLS#895705, \$375,000. Lin, 505-369-5312.

3-BDR. HOME, 1-3/4 baths, extra room for storage & large workshop, updated corner lot, large backyard access for RV, near Kirtland, \$129,900. de la Fe, 459-4685.



The infrastructure for more solar at Sandia

By Jennifer Sawayda

Sandia will soon become a bigger player in solar energy research with the installation of a new 500 kW transformer at the Photovoltaic Systems Evaluation Laboratory (PSEL), located north of Tech Area I.

This will increase the amount of photovoltaic (PV) energy generated at PSEL to the equivalent of up to 100 large residential PV systems.

"Currently, we have more PV deployment than our local grid interconnection can handle," says PSEL site lead Bruce King. "Increasing our grid interconnection capacity has been a goal of mine for many years, and partnering with Facilities was a natural avenue to make it happen. The new transformer will allow us to grow to 750 kW total capacity and will drive expansion opportunities in the future."



A NEW 500 kW TRANSFORMER at Sandia's Photovoltaic Systems Evaluation Laboratory will enable the Labs to deploy more solar energy around the New Mexico campus.

The transformer will lead to additional PV research and serve the dual purpose of enabling the deployment of more onsite renewable energy at Sandia. It also will allow PSEL to bring in more research and development opportunities for the Labs. According to Bruce, these additional opportunities will enable Sandia to increase its ability to study and test PV systems beyond the panels themselves.

"To study full-size systems, we have to be able to put the energy they generate somewhere," Bruce says. "What better place than on to the grid where it can be used? This new transformer will allow us to harvest the



energy generated while we study new technology designed to boost the efficiency and reliability of PV panels."

Operating since the late 1970s, PSEL conducts DOE-funded research in photovoltaic energy, performance, and system designs with the goal to develop more sustainable solutions for the nation's energy infrastructure. The site also provides a dedicated platform for PV manufacturers to validate how well they work under different environmental conditions.

"We look at performance differences and how panels react under different conditions," Bruce says. "We use this information to develop performance models to better predict system power, to assess new PV module architectures, and to monitor the durability of PV modules."

The procurement of the transformer was made possible through the collaborative efforts of personnel with PSEL and Facilities and Emergency Management. Facilities provided funding and a spare transformer that allowed PSEL to embark on this initiative. Implementation of these renewable-type projects assists Facilities with meeting DOE requirements related to Leadership in Energy and Environmental Design (LEED) certification — a green building certification system — by generating onsite renewable credits.

"The PSEL transformer upgrade and the 60 kW PV system deployment are part of a broader Sandia initiative to deploy more renewables onsite and modernize our electrical infrastructure," says photovoltaic and

distributed systems manager Abraham Ellis, who championed this project.

Greater investment in solar energy has garnered support from other organizations at Sandia. The High Performance Computing facility installed approximately 60 kW of PVs at PSEL to offset its energy usage as part of their LEED certification.

"Since we couldn't put solar energy on our building, we felt offsetting was the best way to achieve this," says Tom Klitsner, senior manager in computing systems and technology integration. "PSEL already had the infrastructure, and we helped invest in the panels and installation."

Investing in renewable energy sources like solar is an important step toward Sandia's sustainability goals. The use of renewables such as solar energy is a key part of this process. Future collaborative efforts among different organizations are anticipated to support greater solar energy research at Sandia.

"It illustrates how a partnership between Facilities, R&D groups, and other mission-enabling organizations can address corporate objectives while also enhancing research capabilities. We see the opportunity for more partnerships like this in the future," Abraham says.

Over the next few years, PSEL will continue expansion opportunities to generate more onsite solar power both for solar R&D research and to modernize Sandia's energy infrastructure. Thanks to the installation of the new transformer, Sandia is on its way to achieving this objective.

A passion for exploring

A peek into Associate Labs Director Doug Bruder's life and travels

By Mollie Rappe



FAMILY MATTERS – Doug, bottom left, and his parents and siblings.

When Doug Bruder was a little boy, August was for road trips.

His father taught geology at the junior college in Grand Rapids, Michigan, and every August the family would pack up and drive across the US, camping along the way. Doug's father would point out interesting geological features and took more photos of mountains than of the family. By the time Doug was 15, he'd been to all 48 contiguous states. It would take decades for him to hit Hawaii and Alaska.

As Doug grew up, running around his suburban dead-end street barefoot, collecting grasshoppers and bees for a "zoo," and competing with his neighbors at tree-climbing and hedge-hurdling became working at a sporting goods store after school, hiking and fishing, and participating in a table-tennis league.

By the time Doug was 16, he was in charge of open-



DOUG AND HIS GRANDDAUGHTER, Virginia, Doug wearing an Albuquerque Isotopes cap



DOUG AND LINDA at a Washington Nationals game in 2015.

ing the sporting goods store by himself on Saturdays. He'd answer questions on a wide variety of sports and gear, sell fishing and hunting gear, and even rent out cross-country skis. He made \$2 per hour and got an employee discount on the fishing and hunting gear. He says, "Looking back at it, it's amazing to me how much authority I was given as a high school kid."

Technical work with a touch of exploration

His dad's impromptu geology lessons sparked Doug's interest in all things technical. He'd always been good at math so when he learned about engineering in late high school, he thought that would be something he could succeed at.

However, engineering wasn't a passion for Doug. If he could do it all over again, and finances weren't a concern, he would probably go into archaeology. It's still technical work, but it involves exploring and is primarily outside — two of his passions. Of course, Doug admits, there's plenty of exploring the unknown in research and his current position.

After his wedding day, and the days his children were born, the happiest day of Doug's life was the day he got his first engineering position. Even though he had a master's degree in civil engineering from the University of Michigan, it was very hard to find a job due to the recession in the early '80s. His last semester, Doug received 50 or 60 rejection letters and his roommate, another engineering student, received about the same number.

Doug recalls, "My roommate and I would put our rejection letters up on the wall of our bedroom. It was a race to see who could get around the whole room first. I was at about 3 ½ walls when I finally got my first offer. When I got that first offer, it was a huge deal."

That's when Doug moved from small-town Michigan to bustling Washington, D.C.

'Let's Go Blue!'

After the move, it took Doug about a decade to accept the Washington Redskins as a preferred team along with his life-long

favorite, the Detroit Lions. Now he says the two teams are equal in his favor. It doesn't hurt, Doug admits, that the Lions have been "consistently the most mediocre team in the last 40 years."

As a University of Michigan alumnus, Doug is a Wolverines fan. He rather enjoys the banter that goes on between scientists and engineers comparing their alma mater's football teams, though he finds it a bit peculiar too.

Not only is Doug a football fan on weekends, but he also uses a lot of football analogies during the week. Doug says, "I'm constantly using sports analogies to describe work because I think sports are a great analogue to real life in many, many ways. My people better get used to me using a lot of football analogies."

Family across half the globe

Doug met his wife Linda on the same suburban, dead-end street he grew up on. She moved into the neighborhood during high school and they met while she was babysitting his sister's children. By this time Doug had moved about a mile away, but the proximity allowed the then-shy Doug to get to know her during low-risk activities like walks to the nearby park.

As of this September, Doug and Linda have been married for 34 years. They have three children — one son and two daughters.

Their eldest daughter is expecting her second child — their second grandchild — and lives in Virginia. Their son recently moved to Hawaii for a job at US Pacific Command. Their youngest daughter is going to college in Munich, Germany. With such a far-flung family, Doug and Linda Skype regularly and fly out to visit whenever they can.



ASSOCIATE LABS DIRECTOR DOUG BRUDER leads Sandia's Defense Nuclear Nonproliferation Div. 6000. In that capacity, he manages everything from cooperative international programs to robotics research. (Photo by Randy Montoya)

New adventure in Albuquerque

When their children could support themselves, Doug decided to retire from his government job. "We suddenly felt like life was open," he says.

About a year after his retirement as the director of research and development for the Defense Threat Reduction Agency, the position to help manage Sandia opened up.

Linda had never visited Albuquerque before, but she embraced the adventure and moved sight unseen. So far it's been a good move for them, Doug says. They're enjoying getting to know the Southwestern architectural style and getting to redecorate their house to fit. However, they're not big green chile fans. Doug says, "I like the taste of green chile, but it's just too hot. We just did not grow up with it."

At Sandia, Doug hopes to continue to enhance the Labs' reputation among both the scientific community and national security community. When he's ready to retire again, he wants to leave the Labs strong, full of excellent people and unique capabilities.

He is most proud when the people under him accomplish great things without him even being aware of them beforehand. Doug adds, "That just means that you have set the culture and the conditions so the people are succeeding without you even having to be involved in the details."

Weekend road trips

Another thing about Sandia Doug has enjoyed is the Labs' 9/80 schedule. At first he was hesitant, as he wasn't used to it, but now he loves it and how it supports a healthy work-life balance. Doug says, "Weekend getaways are a big deal for us right now. After 34 years of living in the D.C. area we had kind of run out of places to visit."

So far Doug and Linda have hiked a little bit around



LET'S GO BLUE – Doug, left, with wife Linda, their three children, Steve, Allison, and Katherine, and son-in-law, Jerry.

Albuquerque, walked around Santa Fe, and visited Durango, Colorado. They like Durango quite a bit and have ridden the train on the Durango and Silverton narrow-gauge railroad.

They plan to visit Carlsbad Caverns National Park and other nearby national parks. They also want to hike Sandia Peak and visit some pueblo feast days to explore the rich heritage of their new home. "We're not just looking forward to exploring the mountains and the beauty, but also the people and the cultures," says Doug.

For trips further afield, visiting their children in Hawaii and Germany is high on Doug and Linda's list. Also, Doug would love to experience Europe with Linda. He's seen quite a bit of Europe on business travel but she has only made limited trips, mostly to visit their daughter. In particular, he'd like for them to get the chance to explore southern Europe — especially Italy and Greece — and perhaps even take a Mediterranean cruise.

This August, Doug finally visited Alaska as part of business trip for Sandia. Through his work at the Labs, he got to check off his 50th state.