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# Q&A with the ALD:

## Looking into Associate Labs Director Dori Ellis' crystal ball

By Jules Bernstein

**L**ab News team member Jules Bernstein recently caught up with Associate Labs Director Dori Ellis to get her thoughts on where Division 8000 has been in the last year and where it's going. She reflects on the first year of NTESS management, expected growth at the California site, and aspects of Sandia culture she'd like to preserve during these times of change.

### A peek at the past

**Jules Bernstein:** Sandia recently celebrated the one-year anniversary of the Labs' transition to NTESS management on May 1, 2017. What stands out for you looking back at the first year?

**Dori Ellis:** One of the big achievements has been preparing to get ramped up on the W80-4. We've put a lot of energy into finding the right space, hiring people — we've hired over 300 this year — and making sure we have the right configuration and the right people to get moving. We've got a substantial uplift coming.

**JB:** Sandia/California has had some key visits this past year including DOE Secretary

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**ANNIVERSARY AMBLE** — Associate Labs Director Dori Ellis (front, left) joins a group including Sandia solar tower engineers and U.S. Rep. Ben Ray Lujan, for a tour of the National Solar Thermal Test Facility at Sandia Albuquerque as part of ceremonies marking the 40th anniversary of the test facility. (Photo by Randy Montoya. Story and additional photos, pages 6-7)

# Researchers discover new source of formic acid over Pacific, Indian oceans

## Sunlight drives molecules far from equilibrium, enabling new chemical pathways

By Michael Padilla

**I**nsights from experiments at Sandia designed to push chemical systems far from equilibrium allowed an international group of researchers to discover a new major source of formic acid over the Pacific and Indian oceans.

The discovery was published in the July 3 issue of Nature Communications and featured on the editor's highlights webpage. The project was a collaboration among Sandia, the University of New South Wales, the University of Leeds, the University of the Pacific and the University of Minnesota.

In addition to being the smallest organic acid and an important chemical for communication among ants, formic acid plays an important role in atmospheric chemistry, affecting rainwater acidity. However, global atmospheric models significantly underpredict the amount of formic acid present in the troposphere compared to direct measurements.

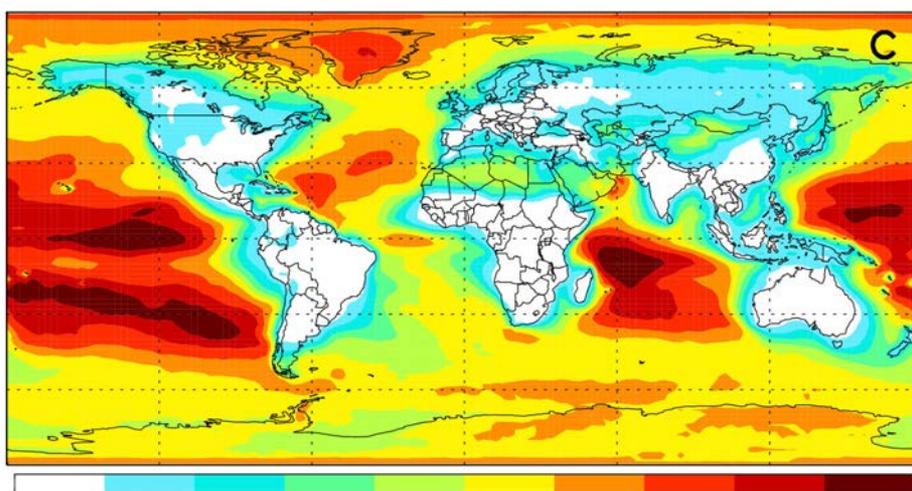
Inspired by earlier work led by Sandia researcher Craig Taatjes of combustion chemistry, Sandia physical chemist David Osborn and his colleagues hypothesized that vinyl alcohol could be a chemical precursor to the missing formic acid.

However, there was a hitch: vinyl alcohol is a metastable form, or isomer, of the common molecule acetaldehyde. At equilibrium and room temperature, there is only one vinyl alcohol molecule for every 3.3 million acetaldehyde molecules. Something would need

to push this mixture far from its natural composition for there to be enough vinyl alcohol molecules to potentially impact formic acid concentrations.

The answer to this puzzle came through David's explorations of a foundational scientific Grand Challenge from the DOE's Office of Basic Energy Sciences, which funded the work: to harness systems far from equilibrium. Forcing a chemical system far from equilibrium could allow chemists to explore unusual molecular configurations that may have valuable properties for energy capture and energy storage.

David's team thought that photons — in particular ultraviolet light — would be an ideal



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**FORMIC ACID RISING** -- This map of Earth shows the fraction of formic acid concentration arising from the new chemical pathway involving non-equilibrium concentrations of vinyl alcohol. This pathway accounts for more than half of the total modeled formic acid production over large areas of the Pacific and Indian oceans. (Graphic by Professor Dylan Millet, University of Minnesota, as published in Nature Communications)

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# Cutting it short

## Sandia develops critical tool for gene editing safety project

By Jules Bernstein

**D**iseases currently considered incurable could one day be eliminated with a single injection. New gene editing technologies can cut disease out of a person's DNA, but they aren't safe to leave in the body for long.

That's why scientists are searching for ways to shorten the amount of time gene editors remain in the body after they've hit their target. To that end, Sandia has developed a test to quickly, accurately and simultaneously screen thousands of molecules for their ability to shut down DNA-cutting proteins.

This inexpensive test is the first of its kind for measuring gene-cutting activity. It is compatible with high-throughput testing, meaning that it can look at the effectiveness of thousands of molecules at once. This is key because finding the few that work amongst the millions that don't is a bit of a guessing game. As Sandia virologist and project lead Brooke Harmon explained, "Screening is a fishing expedition. Sometimes, you miss."

Sometimes though, you succeed. The effectiveness of this test and the way it works are described in a new



**INHIBITOR HUNTERS** — Inhibitor search team scientists Kyle Seamon (left) and Edwin Saada hold stacks of 384-well plates used to search for small-molecule Cas9 inhibitors. (Photo by Jules Bernstein)

paper published in Analytical Chemistry, the American Chemical Society journal.

Gene editing technology is based on the immune systems of bacteria. Using a system popularly known as CRISPR, bacteria save pieces of DNA from invading

(Continued on page 8)

# 86 that acronym!

## Changing how we use acronyms is a tiny thing with big benefits

By Kelsey Tresemer, systems engineer for Advanced and Exploratory Systems

UCSC. PDR. SSOMI. POC. FSA.

Acronyms. All government agencies and national laboratories have a deep relationship with these linguistic abbreviations. Sandia is blessed not only with its own set of technical and corporate acronyms, but is also required to understand acronyms of the U.S. military, federal government and any other laboratory with which we collaborate.

Whether you are an experienced Sandian who regards our Labs' reliance on these condensed words as a necessary yet irritating quirk or a you are newer employee constantly stumbling over them during meetings, we all recognize the problem. Despite its persistence, acronymophilia is surprisingly solvable with a few changes to our daily routine.

Acronyms are ancient shortcuts. SPQR replaced the older term ROMA on pre-Christian Roman coins when the new government's name, "Senatus Populusque Romanus," didn't fit. Many medieval religious scribes abbreviated common theological terms to save time and manuscript space. In the 19th century, European and U.S. businesses relied on acronyms to maximize advertising space and turn their stock trade names into household terms. For example, Nabisco is the National Biscuit Company, and Esso is the symbol for ExxonMobil, formerly SO for Standard Oil.

For modern-day considerations, acronyms are part of a small family of grammatical abbreviations comprising acronyms and initialisms. An initialism is taking the first letter, or first few letters, of a series of words to form a new string – which may or may not be pronounceable (NATO vs. FAQ). A true acronym is when an initialism forms a new, pronounceable word, such as SCUBA standing for self-contained underwater breathing apparatus.

Acronyms and initialisms carry a price for their utility. Psychological studies show they increase feelings of inclusivity and superiority in their parent groups but engender feelings of alienation and exclusion for new team members (Ariely, The Upside of Irrationality). They are favored by writers as convenient ways of referring to

well-understood ideas, but heavy acronym use shifts the intellectual burden of understanding to the reader, who then must take extra time to Sherlock their way to comprehension (Pinker, The Sense of Style).

Additionally, many acronyms use the same letters but mean something entirely different, depending on their domain. For a fun exercise, Google the acronym TAG. This need for explicit knowledge of domain language can be bewildering to Labs staff



ACRONYMOPHOBIA — Kelsey Tresemer attempts to understand the daily deluge of workplace acronyms.

### Lab News Notes

**Editor's Note:** Lab News seeks guest columnists with observations on life at the Labs or on science and technology in the news and in contemporary life. If you have a column (500-750 words) or an idea to submit, please contact Jim Danneskiold, the acting editor.

daily basis, we could prevent communication problems stemming from acronym confusion or errors due to jargon overuse, saving the time spent fixing those problems. I propose three simple alterations to our acronymical culture.

First, technical writing guidelines prevent acronym confusion by requiring that authors always define acronyms upon first use. At Sandia, we can easily apply this convention to our emails, documentation or meeting minutes. Writing out point of contact (POC) instead of POC might be a hassle, but do it once and you have eliminated any possibility of confusion.

Next, good verbal communication relies on the listener's ability to follow the speaker from thought to

thought. The instant you use an unknown acronym, you've lost their attention and, before you regain it, they could miss a key piece of information. Saving a few seconds isn't worth risking an error in understanding a requirement. The habit of using acronyms in conversation is simply an opportunity for misunderstanding and should be avoided, when possible.

Lastly, and most powerfully, if you cannot avoid the first two guidelines, cultivate a culture of respect in your group for asking clarifying questions. If something is unfamiliar or an acronym is undefined, encourage team members to stop the discussion and request a clear definition. You not only will be surprised by how many acronyms are used daily

and not understood, but you also ensure that everyone on your team maintains a common working knowledge of your domain language.

Information is inherently lost when a complex or nuanced idea is transmuted into an acronym. The definition of these abstractions can further decay or evolve over time, ultimately meaning different things to different people. An interesting example is the acronym A2AD or anti-access/aerial denial, a buzzword describing China's recent military strategy in the South China Sea. It was popularized at the Pentagon and even appears in the 2018 Nuclear Posture Review. However, the chief of naval operations, Adm. John Richardson, recently banned the use of A2AD because of persistently inadequate knowledge about its actual, nuanced meaning.

If we subtly change how we use acronyms on a

Just as we would not use a screwdriver to hammer a nail, we should not rely on acronyms for clear technical communication. An agile workforce must be able to respond quickly and precisely to the needs of our customers and country. This responsiveness demands that Sandians not only transition quickly to new projects, but that we move swiftly and efficiently between domains to respond to full-spectrum threats. Changing how we use acronyms may seem like a tiny, annoying request, but if we can avoid an error, a misunderstanding between our lab and our customers or a feeling of alienation by a new hire, we not only will improve the quality of our products, our Labs will be stronger for it.

and not understood, but you also ensure that everyone on your team maintains a common working knowledge of your domain language.



### Sandia National Laboratories

Albuquerque, New Mexico 87185-1468

Livermore, California 94550-0969

Topopah, Nevada • Nevada National Security Site

Amarillo, Texas • Carlsbad, New Mexico • Washington, D.C.

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Jules Bernstein and Michael Padilla, Guest Editors

Laura Hatfield, Production

Jim Danneskiold, Acting Editor . . . . . 505-844-0587

Darrick Hurst, Managing Editor . . . . . 505-844-8009

Michael Lanigan, Production . . . . . 505-844-2297

Tim Deshler, Production and Web . . . . . 505-844-2502

Randy Montoya, Photographer . . . . . 505-844-5605

Jules Berstein, California site contact . . . . . 925-294-3609

Contributors: Michelle Fleming (ads, milepost photos, 844-4902), Neal Singer (845-7078), Stephanie Holinka (284-9227), Michael Baker (284-1085), Troy Rummler (284-1056), Valerie Larkin (284-7879), Lindsey Kibler (844-7988), Meagan Brace (844-0499), Manette Fisher (844-1742), Kristen Meub (845-7215), Michael Padilla (925-294-2447), Jim Danneskiold (manager, 844-0587)

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## California teamin'

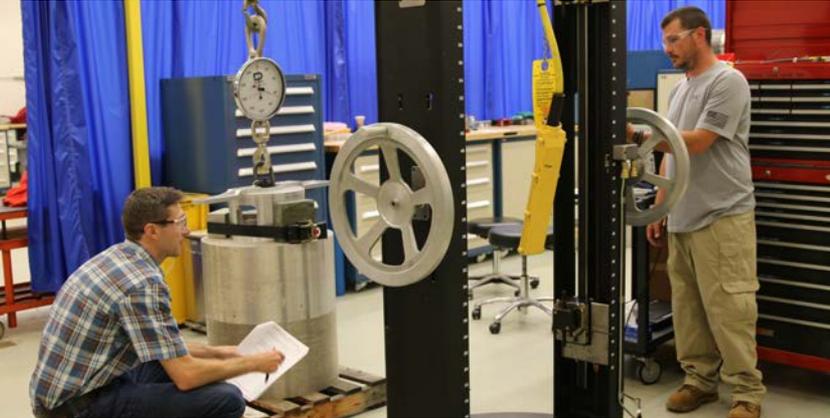


TEAMWORK MAKES THE DREAM WORK — Jules Bernstein, Madeline Burchard and Michael Padilla are all smiles after working together to get out this edition of Sandia Lab News, the 12th annual featuring stories from Sandia's California campus and beyond. Special thanks to Kelsey Tresemer, Kristen Meub, Brent Haglund, Randy Montoya and Dino Vournas for their contributions. (Photo by Brent Haglund)

# TAG team puts work stand to the test

Story and photos by Michael Padilla

Sandia's Test Assembly Group recently conducted a work stand proof load test. The stand will be used throughout the assembly of the W80-4. For the proof load test, the work stand was exercised throughout its range of motion while under load. This test identified the allowable range and ensures no issues will arise during assembly of the weapon system. The Test Assembly Group is a key partner with the W80-4 System Team for critical hardware needs. The Test Assembly team provides technical expertise for the assembly of weapon test assets, to ensure the work is conducted safely, correctly and on time.



MEASURE TWICE AND ADJUST AGAIN — W80-4 systems engineer Dave Hauser (left) and Mike Bordner double check the work stand setup prior to applying the load.



RANGE OF MOTION — Mike Bordner (left) and Steve Ikebe, engineering support technologists with the Test Assembly Group, test out a work stand to better understand how it will perform during assembly of the W80-4.

# Interns showcase posters on the patio

By Michael Padilla  
Photos by Austin Fausto

On July 25, Sandia/California interns showcased what they learned from their summer projects at the annual Posters on the Patio event.

The event featured about 45 interns who presented their posters as teams and individuals.

Div. 8100 Director Andy McIlroy kicked off the event by delivering the welcome address. He spoke about the importance of interns at Sandia and the many contributions they make each year. Associate Labs Director Dori Ellis attended and spoke with several interns to learn about their projects. She also joined the interns for lunch.

The event was hosted by the Sandia/California Student Intern Programs team led by Carol Lewis. Melissa Weigand was the primary event coordinator.

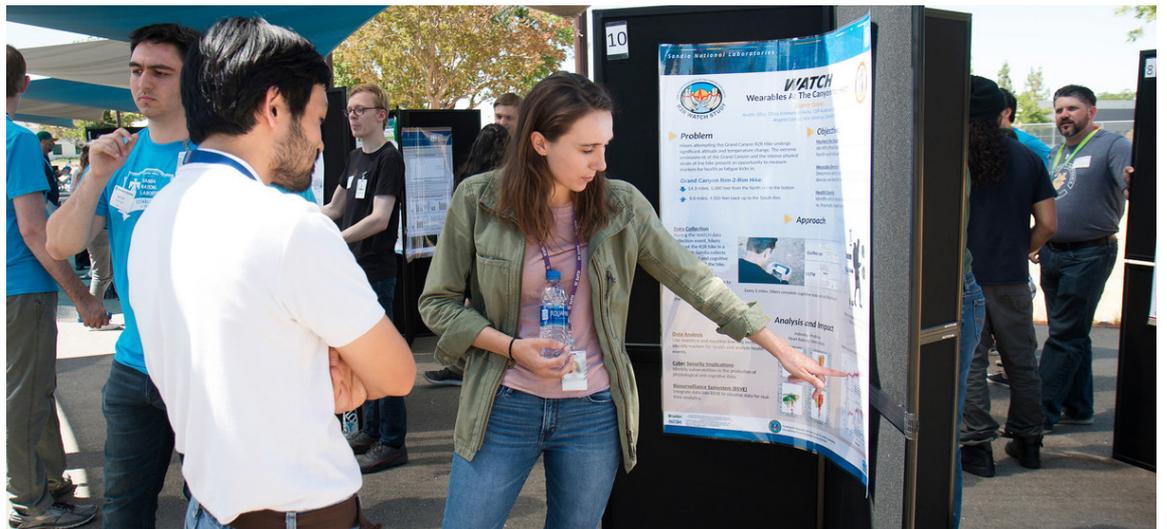
“The Posters on the Patio event is a great way to highlight the work done by the interns and showcases the dedication of the mentors,” said Melissa. “Having the interns onsite at Sandia/California during the summer is a great addition to the site. It’s wonderful to see their enthusiasm for the work that they do here and for the Labs in general.”



BRITNEY LAU participated in the Posters on the Patio event and discussed her work on phage therapy, which involves the use of engineered viruses to cure bacterial infections in wax worms. The research one day could be expanded to the search for phage therapies to treat human infections.



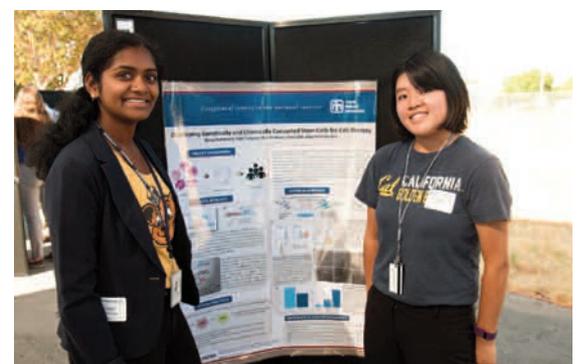
MELISSA WEIGAND AND CAROL LEWIS spearheaded this year's Posters on the Patio event.



SOPHIE QUYNN talks about Sandia's Wearables at the Canyon for Health study.



GUY WATSON explains his group's poster, "Virtualizes Integrated Network Monitoring System," at the annual Posters on the Patio event.



NAVYA PEDDIREDDY AND NIKKI TJAHJONO were part of a team that presented a poster on "Developing Genetically and Chemically Converted Stem Cells for Cell Therapy."

## Q&A with the ALD

(Continued from page 1)

Rick Perry and NNSA Administrator Lisa Gordon-Hagerty. What is the key message you want to leave with visitors like these?

**DE:** There are at least a couple of takeaways. One has to do with the unique functions and capabilities that are located in California, and our relationships to Lawrence Livermore National Laboratory and to the technology industry here in the Bay Area. We really do have a unique position relative to some of the other labs, even as compared to our New Mexico lab. It's much easier for us to connect with these groups in the neighborhood.

The other takeaway is that we take our work very seriously, we take our relationship with our New Mexico counterparts very seriously, we really do want to project and be one laboratory.

The 'one laboratory' emphasis is partly so we can more seamlessly deliver on our mission and on services. It also means that we are using the same policies and practices to the extent that we can around security and safety, how we work and how we hire.

We've had challenges around differences in the way we provide physical security. In New Mexico they have a guard force of full-time, regular Sandians and here we have a contract workforce. The security organizations in both places are working very closely together, along with our counterparts at Lawrence Livermore, because we share some services with them.

**JB:** What aspects of Sandia culture do you feel are especially important to preserve as we move into the future?

**DE:** Sandia has a very strong culture of 'get 'er done.' It's important we don't lose that. As an engineering laboratory we have capabilities that we can bring to bear not just on the weighty problems of nuclear security and deterrence, but also in applied engineering for energy programs and many of our other areas. We really have a foundation here that's different than many of our laboratory counterparts.

The other aspect of the character here is generosity of sharing across technical areas. People are willing to be part of a team as opposed to being an individual doing their own thing, which means Sandia can take on very large, complex programs that we couldn't otherwise execute.

Sandia rewards teamwork. There's still competition of course. We all got here by being competitive. But ultimately people are able to subordinate their own personal outcome if needed so that the laboratory has a better outcome overall.

**JB:** Are there aspects of Sandia culture that you feel we should work to leave behind?

**DE:** There has been something of a cultural divide between our mission delivery organizations and our mission enabling organizations. We are trying to bring those two sides of the organization together seamlessly so that we not only deliver a superior engineering product, but we deliver it in the most efficient, effective way possible. It's giving respect to the professionalism of our enabling services and focus on bringing their best work to bear on our problems.

### Reflections on the present

**JB:** Some programs have seen cuts in funding, and with budget cuts often comes changes in morale. What advice do you give to those impacted by these cuts?

**DE:** The cuts that we're seeing are much smaller than we expected. Even though this administration made some very strong statements about intent with the President's budget, the truth is Congress express their priorities. We're seeing very little happening to overall budget sizes. Some of the priorities are changing in some areas, however. Next year as a laboratory we're once again expecting to see substantial increases. Our big challenge is going to be finding the right people and

adequate space to be able to execute on the money coming in.

**JB:** Can you share an example of a time in your career where you successfully navigated morale challenges? What was your strategy?

**DE:** Every program has a beginning and an end. It's not unusual for people who've devoted a lot of time and energy to a program to be disappointed when there are changes. The main thing is to make sure you're working with your manager and senior manager on what's coming next because heaven only knows we've got a lot of work coming. If you can be a little flexible around what you want to do, there's plenty of work.

**JB:** We have heard a lot about the increased volume of work headed our way as a result of the Nuclear Posture Review. Do you have advice for navigating work/life balance in times of high workload?

**DE:** Work/life balance may be a bit of a misnomer. It's more like a teeter-totter. We do try very hard to make sure people have a meaningful work experience and then have time to go home and spend time with their family or friends, or however they like to spend their free time. But there will be times when we're called upon to do more, and we appreciate that people

are willing to do that, recognizing that it does come at a cost.

We're trying to do things like the 4/10 schedule. We're hopeful that we can extend the 4/10 to our nonexempt staff soon. We are waiting on some changes to the time reporting system to meet current regulations. I'm very eager to see how that works. Here in California, our folks may be experiencing a very long commute. Being able to come to work one day less a week can eliminate four hours of frustration.

**JB:** What's happening to the Redwood Center mobile buildings at Sandia/California?

**DE:** We're tearing it down. It's very old, and isn't the kind of space we'd like to have our employees living in. The intention here is to get it gone and put the emphasis not on maintaining old buildings, but rather on improving the space that has a lifetime that's a little longer. We're not going to build new office space yet. There are things we'd like to do to the site, and we've got them included in the budgets going forward. Next year we should see updates to building 928 and a new data center to replace the system we've had for so long. We also hope to put another roughly 50 people in an updated mobile 50 by the end of this fiscal year.

### Gazing into the future

**JB:** We have seen a lot of opportunities for Division 8000 members to work together. Any new projects coming up that you'd like to see more interaction from across the division?

**DE:** We have brought energy and homeland security together, which gives us an opportunity to work on things like resilient energy systems and civilian cyber projects. Those are projects that are going to be not just across our division, but across the laboratory. Those cross-organizational, cross-functional teams really can do much more than individual organizations. We're looking forward to that kind of work.

We also support all of the other mission portfolios. Of course, Nuclear Deterrence support is a huge part of the work that we do here. But we also support the Defense Nuclear Nonproliferation, National Security Programs, and Advanced Science and Technology.

**JB:** We have seen a lot of growth around Division 8000, what can we expect for the upcoming year? What are some of the challenges we've experienced around this growth, and how do you recommend we deal with these challenges going forward?

**DE:** There are at least two challenges: space and people. We're having to move people around, probably more intentionally than we have before. We've gone back to collaborative space with many people and low partitions as opposed to hard offices. The hiring in California and in our 8800 New Mexico center are really

challenging for a couple of different reasons. In the science areas, large numbers of the graduate students we have access to as postdocs are foreign nationals, which is more challenging for us to handle.

With sciences, engineering, and even some mission enabling functions there's also the hyper competitive nature of opportunities and salaries in the Bay Area. We've lost people to three times or more their salary. While we've won awards nationally for quality of life, when you look at a factor of three on your salary it's a little hard to say no, at least short term.

One of the things we are seeing are people who have gone to some of these startups or a Google or Facebook, working very long hours there with a long commute, and maybe putting together enough money for a down payment on a house or other objective. Then, some of them are coming back because of the quality of the mission, the quality of the people you get to work with, and the work/life balance.

## ALD's amusements

It's not all work all the time for our Associate Labs Director — it is summer after all. Here, Dori shares some of her thoughts for the off hours.

**JB:** What are your top books for summer reading?

**DE:** One of the books I'd recommend from a diversity and inclusion perspective is *Turtles All The Way Down*. It's a look at a young woman who has some mental

health issues, and it lets you inside her head. Her reality is very different from the reality of those around her. All of us have our own reality, regardless of what our mental health status is. And sometimes it's easier to give people the grace, the benefit of the doubt, and try to understand what their reality looks like. While I wouldn't call it light reading, I would strongly encourage it.

I went to the White Men and Allies session last week and it had such a profound impact on me. Some of our people of color talked about the challenges of being in an environment where just by virtue of their skin color or how they look, they feel fearful. One of them said they were going to buy a gun for their home. What a tragedy that the dialogue has descended so far into discord. One of the things we have to do here inside the lab boundaries is make sure we're talking about values, tolerance, respect and integrity. We can't do anything about the political climate, nor should we take a political stand as a Laboratory, but inside the Laboratories we can take a much stronger stand on behaviors. I can't force you to think one way or another. But if you're going to work here, I can ask you to behave in a professional way.

One of the takeaways from the session is how much overlap many of us have in ways we didn't realize. For example, many people in that group came from very humble beginnings. And many others grew up in a family in which mental health issues, alcohol or drug abuse were a part of their life. Still many others once lived in a neighborhood that was all segregated. So many of us that might seem different do have a lot of shared experiences.

Another book I recommend is the recently released one by James Patterson and Bill Clinton, *The President is Missing: A Novel*, about the challenges faced by a president. Of course, it's a murder mystery and action packed. But it also looks at the responsibilities that come with being a national leader that may come at a personal price. The same is true whether you're the leader of a department, group, center or division. It's not always easy.

**JB:** What TV shows, if any, could you recommend as worthy of binge watching?

**DE:** We've been watching a series called *Reverie*. It's a story of a computer program which lets you take a virtual trip into a world of your own creation, and the blessings and problems associated with that. It's very interesting premise. For people struggling, the temptation is to go into their reverie and stay there. The premise of the show is that it's a very unhealthy thing to do.

**JB:** Is it better to be lucky or smart?

**DE:** If you're really lucky, you'd have been born smart.



'HEAVEN ONLY KNOWS WE'VE GOT A LOT OF WORK COMING' — Dori Ellis on how Division 8000 is preparing to tackle its future. (Photo by Dino Vournas)



CHANGES ON CAMPUS — Dori Ellis walking past the California site's Redwood Center, which is currently being demolished. (Photo by Dino Vournas)



FIT AND FUN — Dori enjoying the dog days of summer. (Photo courtesy of Dori Ellis)

# Keeping perspective during a long recovery

Sean Dunagan calls events that led to WIPP's three-year closure a 'cautionary tale'

By Michael Padilla

Sean Dunagan knows firsthand how to bring a major project back online after a three-year shutdown.

Following the February 2014 events that closed the Waste Isolation Pilot Plant in Carlsbad, New Mexico, Sean was the senior WIPP recovery manager at DOE. During his more than two years with the agency, he also served for a year as acting deputy manager of the Carlsbad Field Office. He is now back in Sandia's employ as the manager of special projects and remote site support for the Labs' Carlsbad office.

"I see the events that led to WIPP's closure as a cautionary tale — one that could potentially happen at any DOE site or lab," Sean said. "Our task now is to recognize preventable mistakes before they occur and to stay focused on safety and excellence."

## Learning from the WIPP shutdown

Sean cited two major contributors for the incidents that led to the shutdown at WIPP: overprioritizing the schedule and allowing a once-exemplary workplace culture to deteriorate.

"Prioritizing the schedule affects us all," he said. "We all constantly battle external and internal pressures to meet deadlines and targeted schedules."

A report from the formal DOE Accident Investigation Board concluded that the WIPP workplace culture had degraded by 2014, causing workforce members to become complacent. Sean agreed that the exemplary culture that characterized WIPP early in its 15 years of operations had deteriorated over time.

"Any company, department, team or individual can fall victim to a degradation in culture," Sean said. "Each of us at Sandia should frequently step back and reevaluate if our priorities or cultures have changed or need to be changed. In the situation at the WIPP site, the priority had shifted to increasing waste disposal production over safety."

As the WIPP science advisor to DOE's Office of Environmental Management, Sandia is responsible for assessing long-term performance at WIPP 10,000 years into the future.

WIPP permanently disposes of defense-related transuranic waste, a byproduct of the nation's nuclear weapons production program. The waste consists of tools, rags, protective clothing, sludges, soil and other materials contaminated with radioactive elements, mostly plutonium. There are two types of transuranic waste: newly generated waste from ongoing NNSA mission work, and legacy waste created decades ago, which has been stored at various locations in the DOE complex.

During its first 15 years of operation, WIPP had received more than 11,800 shipments of transuranic waste and had disposed of more than 90,000 cubic meters of waste.



JUBILATION BENEATH THE EARTH — Workers in WIPP's underground complete the first waste emplacement since 2014. (Photo courtesy of WIPP)



TROUBLE TIMES TWO — Two unrelated incidents in February 2014 shut down the repository and suspended shipments for three years: the Feb. 5, 2014, salt haul truck fire (left) and the Feb. 14, 2014, drum breach and radiological release. (Photos courtesy of WIPP)



SALTY SYMPOSIUM — Paul Shoemaker, left, senior manager for defense waste management, and Sean Dunagan, manager of Special Projects and Remote Site Support for Sandia in Carlsbad, talk about WIPP. (Photo courtesy of Paul Shoemaker)

## Closing and reopening WIPP

Two separate WIPP events in February 2014 led to the repository's shutdown. On Feb. 5, hydraulic fluid leakage caused a salt haul truck to catch fire in the WIPP underground. Six employees were treated for smoke inhalation. On Feb. 14, a drum containing organic materials and nitrate salts breached, triggering a radiological release that exposed 22 employees on the surface at the WIPP site to approximately the same amount of radiation as in a chest X-ray.

Once WIPP was shut down, no waste could be shipped to the repository from any DOE site. During the three years until WIPP reopened, formal Accident Investigation Boards met to understand why the fire and release occurred and to recommend corrective actions to prevent recurrence. DOE headquarters, the Carlsbad Field Office and Nuclear Waste Partnership, the management and operating contractor for WIPP, developed and implemented a series of corrective actions as part of the WIPP recovery process.

In December 2016, DOE authorized WIPP to resume waste emplacement operations after the site completed a series of independent reviews and pre-start corrective actions. During the official reopening of WIPP in January 2017, then-Secretary of Energy Ernest Moniz thanked everyone involved — the workforce, the contractor, federal management and the

community — for their tireless efforts to make WIPP a safer place.

A key takeaway from Sean's work on the recovery project was the importance of gaining a larger perspective while keeping each audience in mind. An incident of this magnitude attracts a lot of attention and help from outside entities, he said.

"I tried to understand the situation from several points of view: workforce members worried about their jobs, stakeholders concerned about their community, DOE as the facility owner with responsibility for the contamination, elected officials trying to determine the best path forward and regulators who oversaw the facility and had to figure out how it could resume operations," Sean said. "My role was to provide an outside, unbiased perspective."

Sean grew up in Carlsbad, so he was able to look at the WIPP recovery process from the vantage point of a local. He also drew upon his ties to the community for insight about how outside groups viewed Sandia.

"It's important to understand how situations or problems that we encounter are seen from different points of view," he said. "As an organization, we must then try to understand how Sandia, our workforce members and even we as individuals are perceived in turn. Participating in this introspective process will enable good decisions and progress to be made."

Sean said there were many obstacles and challenges to overcome following the shutdown of WIPP.

"The list of the challenges that we faced was pretty lengthy," he said. "From budget woes, changing political climates, safety issues, technical concerns — the list could go on and on."

The extensive outside interest and offers of assistance made a deep impression on Sean. "We were trying to make progress while continuously hosting some external groups that were attempting to provide some type of support," he said. "All of the groups had good intentions, but continuous outside or additional support can be counterproductive."

In addition, the DOE team that Sean led in the WIPP recovery process was challenged by the need to devote tremendous amounts of time and energy to education. For example, they explained to numerous outside groups how a salt mine like WIPP works. The team also had to educate the public and elected officials on what happened, the impacts and the path to recovery.

## A continuing focus on the needs of the nation

Sandia has maintained a remote site in Carlsbad for its WIPP efforts since 1994, but the Labs' efforts for the national repository go back much further, says Paul Shoemaker, senior manager at Sandia Carlsbad.

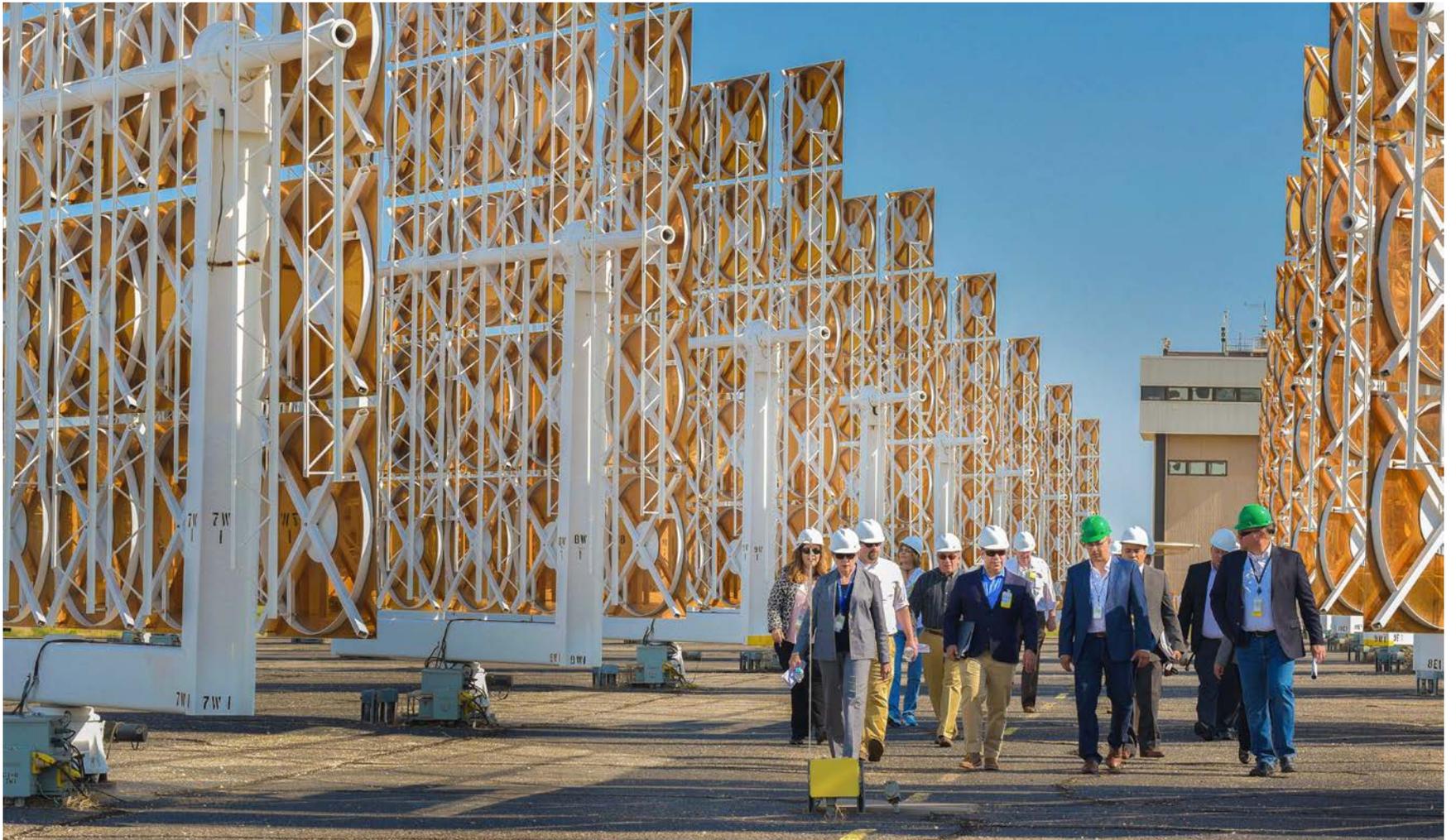
"Sandia has supported DOE and its predecessor organizations on matters pertaining to WIPP since 1974, with funding and work scope fluctuations, to be sure, but continuously over that time," Paul said. "That may make our WIPP work the longest-running single project in the history of the Labs."

About 55 people work there currently, Paul said.

Sean said that WIPP will continue to evolve with the national nuclear landscape.

"There are some substantial changes on the horizon for the WIPP site—unlike any we have seen since the facility opened—and we will be here to support them," he said.

# From concept to commercialization: 40 years of concentrating solar power research



**SOLAR STROLL** - Associate Labs Director Dori Ellis (front, left) crosses a field of heliostats toward the solar tower during the commemoration of the 40th anniversary of the National Solar Thermal Test Facility in Albuquerque. (All photos by Randy Montoya)

## Researchers, industry gather for celebration

By **Kristen Meub**

Photos by **Randy Montoya**

**F**rom heating up space shuttle tiles to making electricity from sunlight, the world's first multimegawatt solar tower has contributed to energy research, space exploration, defense testing and solar energy commercialization since it was commissioned at Sandia in July 1978.

To mark the National Solar Thermal Test Facility's 40th anniversary in July, present and past Sandia staff and managers, industry leaders and government representatives came together for a day of talks and tours focused on the history of the facility, its contributions to solar energy and other fields and the current research outlook.

The solar tower is a key component of a specific type of utility-scale solar energy technology that uses hundreds of large mirrors to reflect and concentrate sunlight onto a receiver on a tower. The heat from the concentrated sunlight is absorbed by either a liquid, gas or solid and either stored or used immediately

in a heat exchanger to generate electricity. This type of energy, called concentrating solar power, is appealing because it can supply renewable energy — even when the sun is not shining — without using batteries for storage.

"The 40th anniversary of the NSTTF was well received by all who attended, though it was particularly special for those who have worked there," said engineer Ken Armijo, lead organizer for the celebration. "The event afforded folks the opportunity to meet the multiple generations of staff members that made the NSTTF successful. It was great to talk to those that came before, and discuss the exciting road ahead at the NSTTF with the impending DOE Gen3 work that will be starting this fall along multiple concentrating solar power technology pathways. It was inspiring to hear from the impressive lineup of speakers that gave podium talks, and to realize the tremendous potential we as NSTTF staff members have in making an impact in the U.S. and the world."

Speakers at the event included Armijo and Paul Gauche, NSTTF manager; Dori Ellis, associate labs director; U.S. Rep. Ben Ray Lujan; representatives of U.S. Sens. Tom Udall and Martin Heinrich and Rep. Michelle Lujan Grisham; Kevin Smith, SolarReserve's chief executive officer; and distinguished Sandia engineers Charles Andraka and Cliff Ho.

Rep. Lujan congratulated Sandia on the milestone and said that the facility is a perfect example of what's possible when the U.S. pursues a clean energy economy. He also noted that it offers remarkable capabilities for energy researchers, whose efforts help the nation support the development of solar energy.



**SUNGAZING** - From inside the tower, Associate Labs Director Dori Ellis (left), U.S. Rep. Ben Ray Lujan and researcher Ken Armijo look down at three test bays.



**CONCENTRATION** - Cliff Ho, mechanical engineer and lead researcher on several solar projects, talks to the crowd about the history of concentrating solar power technology over the last 40 years and where it is headed next.



**DON'T LOOK DOWN** - Ken Armijo, lead organizer for the solar celebrations, talks to U.S. Rep. Ben Ray Lujan on top of the solar tower. The tower stands 200 feet tall and overlooks a field of 212 heliostats.



**HISTORIC MOMENT** - In July 1978 (left), Sandia staff and dignitaries gathered for the commissioning of the National Solar Thermal Test Facility. This July, staff who have worked at the solar tower over the last four decades met for the 40th anniversary of the commissioning and recreated the moment captured in the original photo.



## The origins of Sandia's solar tower

Gauche said the DOE funded the creation of the solar tower and the National Solar Thermal Test Facility at Sandia during the height of the oil crisis in the late 1970s, when both concentrating solar power and photovoltaic solar energy were novel ideas.

"Concentrating solar power was a big deal during the later parts of the oil crisis," Gauche said. "The funding for research through the early '80s was, put in terms of 2018 dollars, somewhere in the region of \$100 million to \$200 million a year nationwide," Gauche said. "Funding levels have varied, but the U.S. has continued to consistently invest in concentrating solar power through the years."

When it was built, the solar tower used a large steam receiver to absorb the heat from concentrated sunlight for research and to demonstrate the technologies needed for multimegawatt tower-based concentrating solar power. Previous research by other groups used parabolic trough designs and kilowatt-scale tower designs.

Gauche said that in 1981 the research at Sandia led to a joint effort with Rocketdyne, a rocket manufacturer, to develop Solar One, which became the world's first operating solar tower. An operating tower can deliver power to the electrical grid, but not on a commercial basis.

"There are three main steps that were achieved," Gauche said. "Sandia had the research tower, which led to developing the first operating tower, and then there was commercialization as industry began to build and operate their own towers."

Solar One was based in Barstow, California, used a steam receiver and had about 10 times more mirror-like heliostats than Sandia's research tower, giving it 10 megawatts of electrical output. Gauche said Sandia and Rocketdyne in 1995 converted it to Solar Two, which used a molten salt receiver. Molten salts are heated to a high temperature and turn into a liquid. The hot salts flow through a receiver to absorb heat from sunlight and then can be stored in a tank until needed to generate electricity.

"This was the first demonstration of energy storage with concentrating solar power," Gauche said. "It delivered storage-based solar electricity to the grid in Southern California."

Solar Two was decommissioned in 1999 because, Gauche said, "it was a demonstration, and it had proved the point that concentrating solar power could work for utility-scale electricity generation."

## Supporting solar energy, space and security

Sandia's solar tower at the National Solar Thermal Test Facility continued as a research hub for concentrating solar power as Solar One and Solar Two were operating, but its ability to generate high radiation flux from sunlight has been useful for other applications as well.

"Sandia has diversified the facility and used the tower to test space shuttle tiles and ablative materials used for landers going to Saturn," Gauche said. "We've also done testing for the Air Force and other agencies for national security purposes."

Concentrating solar power research has continued to advance as well. Currently, Sandia is leading one of three teams selected by the DOE's Solar Energy Technologies Office to compete to build a high temperature concentrating solar power system with built-in heat storage.

Sandia's proposed system uses sand-like ceramic particles to absorb and store the heat from the concentrated sunlight. Sandia already has developed the world's first high-temperature falling particle receiver, and the research will refine and integrate that system into a complete pilot plant.

Sandia is also a partner on a team led by the National Renewable Energy Laboratory that is researching higher temperature molten salt capabilities. Potentially, the National Solar Thermal Test Facility could host pilot testing over a five-year period.

# Sandia engineer receives top honor

## National Academy of Engineers selects Brandon Heimer for symposium

By Michael Padilla

**S**andia researcher Brandon Heimer has been selected to participate in the National Academy of Engineering's (NAE) 24th annual U.S. Frontiers of Engineering symposium.

In its announcement, the academy called Brandon one of 84 of the nation's "top-notch" engineers ages 30 to 45 who are performing exceptional engineering research and technical work in a variety of disciplines. The participants, from industry, academia, and government, were nominated by fellow engineers or organizations.

The symposium will be hosted Sept. 5-7 by Massachusetts Institute of Technology Lincoln Laboratory. The event will cover cutting-edge developments in four areas: quantum computing, technology for humanitarian assistance and disaster relief, resilient and reliable infrastructure and theranostics, or targeted therapy based on specific diagnostic tests.

"It's a great honor to be recognized by my engineering mentors in the National Academy of Engineering and to stand alongside such accomplished peers," Brandon said. "I've had the privilege of working with four NAE members during my undergraduate and graduate education. They inspired me to make an impact on the world with my research, and I intend to use this opportunity as encouragement to continue that pursuit."

Brandon said he intends to take part in all four areas of the forum. He is using his expertise in bioengineering and microfluidics from his thesis research to develop a diagnostic to detect epigenetic changes to DNA. At Sandia, he has been an internal advisory board member for the NanoCRISPR Grand Challenge Laboratory Directed Research and Development project that seeks to deliver CRISPR — the technique that makes it possible to alter DNA within cells — as a therapy to combat infectious disease.

"I intend to draw upon both these experiences to contribute to the discussion of theranostics and bring what I learn back to Sandia and to my colleagues for inspiring research and development," he said. "This research will help provide physicians with tools to diagnose and treat disease potentially for warfighters serving in areas at high risk for infectious disease."

One of Brandon's earliest projects at Sandia involved risk analysis of critical infrastructure for the Federal Emergency Management Agency's National Hurricane Program. He said the project lies at the intersection of the critical infrastructure and disaster preparedness symposium themes.

Brandon said he intends to learn more about quantum computing at the symposium.

"Quantum computing offers huge potential but also creates potential threats for national security," he said. Brandon is a senior member of the technical staff in research and academic programs.

Brandon received his bachelor's in chemical engineering from the University of Texas at Austin and a doctorate from MIT, where he also studied technological innovation, entrepreneurship and strategic management at the Sloan School of Management. His thesis researched protein engineering for biosensing on a microfluidic platform.

When Brandon is not spending time in his lab, he enjoys racing triathlons and SCUBA diving.



Brandon Heimer is among 84 of the nation's brightest engineers ages 30 to 45 selected to take part in the National Academy of Engineering's (NAE) 24th annual U.S. Frontiers of Engineering symposium. (Photo by Dino Vournas)

# Formic acid

(Continued from page 1)

tool to drive a chemical system far from equilibrium, but collisions between molecules inevitably lead to a restoration of equilibrium. For this reason, it wasn't clear whether the approach would work at atmospheric pressure, where collision between molecules occur about 7 billion times each second.

## Non-equilibrium conditions key in new chemistry

Using infrared spectroscopy to analyze the molecules after irradiation with ultraviolet light, thereby mimicking sunlight, David and his team confirmed that wavelengths from 300 – 330 nanometers can rearrange the atoms in acetaldehyde, converting it to vinyl alcohol. The experiments showed that when 100 acetaldehyde molecules absorb ultraviolet photons in this wavelength range, on average four of them are converted into vinyl alcohol. The process persists even at atmospheric pressure, so that molecules that have absorbed light are driven a factor of 100,000 away from an equilibrium mixture.

"This dramatic increase in vinyl alcohol concentration now enables new oxidation chemistry that isn't possible from acetaldehyde," David said.

His team postulated that vinyl alcohol could be oxidized to yield formic acid, a pathway supported by recent theoretical calculations that predicted a rate constant for this process. With the experimental and theoretical details in hand, David's collaborators could add this chemistry to local and global models of Earth's atmosphere to see how it might alter formic acid concentrations.

"This new chemistry produces about 3.4 billion tons of additional formic acid per year in the model, but this only amounts to 7 percent of formic acid in the global model," David said. "This is not enough to solve the mystery of the missing sources of formic acid that cause models to disagree with experiments. However, this new chemistry accounts for more than 50 percent of the total modeled formic acid production over the Pacific and Indian oceans, a result that was completely unexpected and may explain the previously puzzling origin of formic acid over open oceans."

Since 1999, David has explored the mechanisms of gas phase chemical reactions at Sandia's Combustion Research Facility. The high temperatures encountered in practical combustion provide a fertile ground to test fundamental questions of chemical reactivity. Improving the fundamental understanding of chemical change directly addresses DOE goals that span disciplines, such as the ability to transform energy in a controlled way between electrical, chemical and kinetic reservoirs.

"This research shows how photons can push systems far from equilibrium, creating new chemical pathways that could allow increased control over energy transformations, even in environments with many randomizing collisions that seek to reestablish equilibrium," David said.

The research also demonstrates how DOE-funded basic science can have unexpected impacts in other areas that are important to society, such as atmospheric chemistry.



NEW CHEMISTRY — David Osborn with models of acetaldehyde and vinyl alcohol. (Photo by Michael Padilla)

# Cutting it short

(Continued from page 1)

viruses. When the viruses return for a repeat attack, the CRISPR protein Cas9 is recruited by guiding RNA to bind, cut and destroy the viral DNA.

Scientists can now use Cas9 and guide RNA like molecular scissors to remove mutated DNA sequences and enable correction of genetic diseases. This opens the door to treatments for everything from cancer to genetic diseases like muscular dystrophy and cystic fibrosis to viral infections like Ebola.

However, the longer Cas9 is left in the body after it has cut its target, the more likely it is to find and cut a similar-looking piece of DNA that should not be altered, which could lead to illness.

The first step in finding chemicals that can shut down Cas9 after it has done its intended work was developing the tool to find them. Sandia biochemist Kyle Seamon explained that the assay they developed places two chemicals on opposite strands of a piece of DNA. On one strand, the test adds a fluorophore, which emits light, and on the other it adds a quencher, which absorbs the light.

Next, the test adds the potential Cas9 inhibitor. If the inhibitor did not work, then Cas9 will cut the DNA, separating the fluorophore from the quencher and causing the test to emit a bright light within 30 minutes. If the inhibitor worked, the assay won't glow.

But before the test can give this final result, the team has to add a chemical that causes Cas9 to release DNA. "Cas9 binds very tightly to DNA, even after it's already cleaved, and keeps the two halves together. It doesn't let go," Kyle said.

For this reason, few Cas9 assays have been developed to test DNA cleavage, and the assays that do exist have not been compatible with high-throughput applications. They are designed to screen one or two chemicals at a time. With this combination of elements in place, the team has so far been able to screen nearly 200,000 chemicals for their ability to inhibit Cas9, and have identified six that work.

## Continuing the search for the 'off switch'

The pharmaceutical and agricultural industries are very interested in making gene editing safer, and there are multiple approaches being undertaken by researchers around the world. Brooke's project, funded by Sandia's Laboratory Directed Research and Development office, is looking for small molecules that can be synthetically manufactured.

The naturally occurring anti-CRISPRs are small proteins. But even small protein molecules are so large they cannot be delivered into a cell for treatment without a separate chemical carrier such as a nanoparticle. Because protein delivery in general, and anti-CRISPR delivery in particular, is an important biotechnology goal, Safe Genes and other Sandia projects have focused efforts on developing a particle that can deliver large molecules into cells without causing any adverse reactions.

However, small molecules like the ones being sought by Brooke and her team can penetrate cell membranes on their own without additional chemicals or carriers. One aspect of the team's work going forward is to test hundreds of thousands of known small molecules for their ability to inhibit Cas9.

In addition to small molecules, the team also will screen small peptides and nanobodies for their ability to prevent Cas9 from cleaving DNA. In many ways, peptides are a happy medium between proteins and small molecules. Peptides can be engineered to penetrate cell membranes, they are less likely to result in side effects than small molecules, and they are easier to both produce and modify.

Antibodies are proteins that immune systems produce in response to invading foreign particles, and nanobodies are much smaller antibodies. They have several advantages in laboratory and clinical settings, including the ability to make a lot of them, keep them stable over time, and use them safely in cells. They are also able to successfully bind with targets that large proteins and traditional antibodies can't reach.

By searching for the inhibitor in a variety of ways, the team hopes to increase the likelihood of finding ones with no side effects that can be manufactured and used in mice and human clinical trials. Currently, these tests can only be performed in vitro, in test tubes. One day, the team hopes the inhibitors will be found in doctor's offices worldwide, alongside simple treatments for conditions once thought to be irreversible.

# 'Take a deep breath, slow down'

By Michael Padilla

**B**renda Kiba understands what it means to be a multitasker. As an office management assistant, she supports various groups — all while balancing being new and uncleared to Sandia/California.

Recently, Brenda used her mindfulness training to avoid a tripping hazard as she was walking to her office near the cafe.

As she was hurrying to Building 915, she recalled the walking meditation portion of her mindfulness training and decided to practice using all her senses as she walked. She listened for birds, tried smelling the blooming flowers and looked at the ground in front of her. That was when she noticed something she hadn't seen before: concrete bike stands. Although the bike stands don't stand out, they posed a tripping hazard on her route.



SLOW DOWN — Brenda Kiba talks candidly about her safety journey at Sandia. (Photo by Michael Padilla)

Just seconds later, she witnessed someone carrying laptops almost trip at that same spot. At that moment, Brenda knew she had to tell someone about the potential dangers posed by the concrete stands.

She brought up the safety concern during her department's tier board meeting. The concern was escalated to the Facilities department, which quickly responded by placing an orange cone near the concrete bike stands to alert those walking by. Because of

Brenda's mindfulness, there are now plans to paint the area to highlight the concrete grooves.

"If I had been in my normal train of thought, it could have ended differently," Brenda says. "I am fortunate that I caught myself before tripping."

Brenda says the tier board meetings have been effective for raising concerns, especially about safety. Her manager, Karim Mahrous, said he is grateful that Brenda pointed out the potential tripping hazard.

"We've had several Labs employees bring up safety concerns on the California site," says Karim. "I'm appreciative whenever someone — like Brenda — takes time out of their day to keep themselves and those around them safe. The Tier process has been a great tool to help us bring up those safety issues and escalate them as needed expediently. I appreciate that we've seen Facilities provide appropriately scaled responses in a timely manner to issues like this one."

Brenda can relate to Sandia staff who feel like they have too much on their plates to walk mindfully or slow down. Arriving each day at 6:30 a.m., she is usually one of the first in her office area.

She starts the day by checking email, reviewing the calendars for her and her manager, organizing the office and sorting any deliveries that arrived late the previous day. She does all this as an uncleared employee stationed at two desks — one in the limited area and one in the open area. Brenda also serves as the backup to the senior management assistant for the director of the homeland security and defense center.

"I'm my own worst critic," she says. "I come from a military family, and I hold myself to a higher standard. I'm very driven to do my absolute best and work extremely hard, which makes slowing down that much more important."

Brenda's main advice, especially to time-strapped people like herself, is to slow down and relax.

"Take a deep breath, and slow down," she says. "There is nowhere you have to be that can't wait a couple of minutes. That extra minute or two you lose when you walk mindfully can help you avoid a trip or fall."

To Brenda, tripping is a very real danger. She knows people who have tripped and fallen because of something as small as a squirrel hole.

"Sometimes we go from one end of the campus to another, oftentimes carrying items when there aren't any available carts," she says. "The best thing to do is to stay on the path and pay attention to where you are walking. I would rather slow down out of choice than because I have an ankle or leg injury."

Brenda practices mindfulness through meditation and yoga. She recommends taking mindfulness courses at Sandia and says the mindful walking activity from the course was especially valuable.

She said she didn't just learn how to walk. The activity also taught her how to remain calm in stressful situations and decide which battles to fight and which to let go. The course inspired her path to become certified as a mindfulness teacher.

"Be safe out there," Brenda says. "At the end of the day, we'll all be back tomorrow."

## Safety and mindfulness resources at Sandia

To learn more about mindfulness and reaping the benefits of increased awareness, focus, productivity and stress management, visit TEDS and search for the keyword "mindfulness." Contact Joy MacPherson, Preventive Health program coordinator at Sandia/California, for more information. For safety information and resources, visit LiveSafe.

# Operation Backpack expands reach to Moffett Air National Guard



PACKING — Division 8000 Associate Laboratories Director Dori Ellis (second from left) talks to Operation Backpack volunteers before loading the backpacks. (Photos by Dino Vournas)

**By Madeline Burchard**

**For the fifth year, Sandia/California has rallied to give children of local military families a stellar start to the school year.**

The Operation Backpack team initially aimed to collect 150 backpacks filled with school supplies. At the end of the campaign, Sandia had far surpassed that number with a total of 202 children adopted. Excitement for the program was so high that Sandians donated 28 extra backpacks that can be used by local military bases for students that transfer in the middle of the school year. The backpacks were delivered to the Family Centers at Camp Parks Reserve Forces Training Area, Travis Air Force Base and Moffett Federal Airfield.

Division 8000 Associate Laboratories Director Dori Ellis was impressed with the turnout from the division.

“This year’s Operation Backpack has been stunningly successful,” Dori said. “The generosity of the whole division, including Carlsbad and Albuquerque, has been beyond anyone’s wildest imagination.”

Operation Backpack was born as a giving drive in the weapons systems center. It expanded to encompass all of Sandia/California after employees from all corners of the site asked how they could be involved. Since then it has grown to encompass all of Division 8000, including Carlsbad and Albuquerque, and the California Laboratory. The program also receives significant support from the Lawrence Livermore National Laboratory Veterans in Energy, Technology and Science (VETS).

Its mission then and now is to thank military families for their sacrifice in service to the nation. The back-to-school season can be stressful and costly for any family, but can be especially trying for military families with a deployed family member or single-earner households. By providing school supplies, the Operation Backpack planning committee hopes to alleviate the stress and let military families know that they are supported by Sandia.

Operation Backpack is led by Rachel Sowell with the support of the following generous people: Kathy Boyan, Adina Eliassian, Dori Ellis, David Gibson, Rachael Gupta, Judi Marquez, Michele Morris (LLNL), Tara Olsen, Terri Spraggins and Adrian Valenzuela (LLNL).



GLITTERY BACK-TO-SCHOOL — A Camp Parks child can hardly contain her excitement for her new backpack. Back to school season represents a financial burden for Bay Area military families with the region’s high cost of living.



THE LOAD OUT — Division 8000 Associate Laboratories Director Dori Ellis and Rachael Gupta help load a van with backpacks donated by Sandians.



OVERFLOW — Adina Eliassian loads a van bound for one of three Bay Area military bases.



MILITARY THUMBS UP — Staff from the Airman Family and Readiness Program at the Moffett Federal Airfield show their appreciation for this year’s donations. This is the first year the California Air National Guard students have been recipients of Operation Backpack.

# Mileposts



New Mexico photos by Michelle Fleming  
California photos by Randy Wong



Mario Ramirez 40



Thomas Clark 30



Charles Haney 30



Linda Carillo 25



Jon Custer 25



Noel Nachtigal 25



Peter Swift 25



Bob Waters 25



Roger Billau 20



Jim Fernandez 20



Rudy Garcia 20



Judy Lau 20



Timothy MacAlpine 20



David Wackerbarth 20



Steve Anderson 15



Aaron Hamburger 15



Gloria Hill 15



Jason Jarosz 15



Joseph Kenny 15



Jesse Lai 15



Karmen Lappo 15



Jim Locklin 15



Eric Lopez 15



Pamm Martinez 15



Jeffrey McCasland 15



Scott McDonald 15



Jerry Mills 15



Dave Rigsby 15



Jeff Schultz 15



Loren Updegraff 15

# Recent Retirees




Margaret Quinn 12

## Sit, stay, relax Therapy dog program a hit at California lab

By Madeline Burchard

Four months after its debut, the therapy dog program at the California Laboratory is a hit with all involved, whether two-legged or four-legged.

More than 100 members of the workforce and friends, on average, spend time with the dogs every other week at the California medical clinic. The dogs are official volunteers with the Valley Humane Society's Canine Comfort team and have passed a series of behavioral tests so they will maintain a cool and calm demeanor when exposed to varying scents, sounds and surroundings.

Employee Assistance Programming counselor Dr. Tamara Cagney is not sur-

prised by the success of the program.

"Dogs are nonjudgmental and can tell when you are stressed," Tamara said. "It is this sensitivity to someone's emotional state that makes dogs such effective therapy tools."

The idea to bring therapy dogs to the California Lab as a benefit to all employees was inspired by the proven mental impact that canine therapy has on people.

Not only the medical staff have noticed the impact. Kim Stange-Herlihy, Valley Humane Society's development director has seen the power the dogs

have to bring out the kid in the Sandia staff who come to the therapy program.

"When I am with the dogs I will hear them say that they 'need their fix' with a big smile on their face," Kim said. "I've watched people who have never met become friends over their shared love of animals. I guess you could say dogs teach us to see ourselves as part of a pack."

You can get your fix of dog therapy at the California Medical Clinic every other Tuesday.



TAKE FIVE — Gigi deCastro takes a break from her work in the Combustion Research Facility to hang out with a dog from the Canine Comfort team. (Photo by Michael Padilla)

## SANDIA CLASSIFIED ADS

## MISCELLANEOUS

ENTERTAINMENT CENTER, solid wood, for great room, 6'H x 8-1/2'W x 20"D. Morris, 480-2808.

AUTOMATIC PLANT WATERING TUBES, 2, 4"L x 1"W, Blumat of Austria, never used, \$10. Wagner, 505-504-8783.

HI POT TESTER, Hipotronics HD 100, AC/DC measurements, good condition, fully functional, w/original manual & leads, \$1,595. Dramer, 821-8107.

YOUNG AT HEART CHOIR, annual breakfast, Aug. 18, 8:30-11:30 a.m., Nazarene church on Paseo, \$12. Martin, 858-3009.

DINING SET, solid oak, 7-pc., w/2 leaves, 42" x 60", extends to 42" x 95", similar to <https://tinyurl.com/ydz8yag9>, \$900. Armstrong, 505-453-6277.

DALLAS COWBOYS TICKETS, 2 pair, sec. 327 mezzanine (1st pair), sec. 410, 20-yd. line (2nd pair), \$450/pair; parking lot 10, \$160. Carrasco, 505-803-3831.

SQUARE DANCE LESSONS, benefits nonprofit, beginning Sept. 20, see [dukecitysquare.org](http://dukecitysquare.org), \$5/per person, ea. night. Partridge, 505-730-2840.

TREADMILL, NordicTrack, like new, text for photos, \$500 OBO; LED Smart TV, 60-in., Vizio, \$450. Rankin, 505-239-6308.

WOOD STOVE, w/pipe, small footprint, \$275; roll-top desk, lockable, \$175 OBO. Lopez, 505-440-3761, text or call.

BARBELL SET, one 7-ft., 45-lb. bar, two 10-lb. weight disks, new condition, photo available, \$100. Wagner, 858-922-9471.

LADIES EMERALD & DIAMOND PLATINUM RING, size 7, appraised for \$16,775 (2014), asking \$8,200. Ruffner, 505-220-1274.

## TRANSPORTATION

'06 TOYOTA COROLLA S, 124K miles, great condition, \$4,000 OBO. Sena, 505-315-0474.

'16 SUBARU WRX MT, clean, lots of mods, 10K on built motor, 36K miles, \$28,500 OBO. Martin, 806-206-1739, ask for Steve.

'13 MAZDA CX-5, AWD, touring, navigation, roof rack, only 22K miles, excellent condition, KBB \$18,000, asking \$15,500 OBO. Martin, 623-687-7673.

'08 TOYOTA CAMRY HYBRID, white w/grey interior, 1 owner, 84K miles, new tires, dependable car, great condition, \$6,000 OBO. Houston, 505-898-7062.

'11 HYUNDAI SONATA LIMITED, black, navigation, Bluetooth, leather, backup camera, 89K miles, great condition, \$9,950 OBO. Kunzler, 505-750-4696.

'10 FORD FUSION SE, 4-cyl., 2.5L, 6-spd., AT, beige, front/side airbags, alloy wheels, 129K miles, \$5,200. Hunt, 681-9960.

## RECREATION

MOUNTAIN BIKE, ProFlex 957, full suspension, 18-in. SPD pedals, carbon fiber swing arm, excellent condition, photos available, \$350. Hanks, 249-1931.

'17 CAN AM COMMANDER UTV, 4-seater, red, roof, stereo, half windshield, 45-hrs., like new, \$16,000. Vallejos, 505-328-2081.

'09 ROKON TRAIL CYCLE, 2WD, w/receiver hitch carrier, other extras, \$4,900. Madsen, 505-294-3235.

'80 FRENCH ROAD BIKE, Andre Bertin, model C-132 w/Rolf Vector wheels, \$250. Walkington, 505-831-6974.

'85 UHAUL CT13 CAMPING TRAILER, \$2,900; 2 kid's electric power wheels, ATV & car, \$75 & \$100. Graham, 293-7302.

## REAL ESTATE

4-BDR. HOME, 2-1/2 baths, 2,555-sq. ft., NE Heights, North Star Elementary, La Cueva high, \$399,000. Chavez, 720-339-3544.

TWO ACRES, Edgewood, 3 miles north, all utilities at property line, natural gas, \$45,000. Huppertz, 573-7916.

4-BDR. HOME, 3 baths, 1,911-sq. ft., single story, central air, updated, RV space, NE Heights, \$249,690. Sanchez, 505-410-2876.

## WANTED

ROOMMATE, 3-bdr. home, to share w/UNM graduate student. NE Heights, \$400/mo., utilities included, Roche, 366-3884. SCOOTER/MOPED, 50 cc, good working condition, <\$500. Mason, 505-307-6017, send text.

## 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](mailto: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.

## One number to fix them all

Who you gonna call?  
925-294-6400

Story and photos by Michael Padilla

It's a scenario we all dread. You're in the middle of a home improvement project and the electricity goes out. All progress stops while you locate the problem. A simple reset of the circuit breaker usually brings the electricity back on in seconds, and the project continues.

But what should you do if you encounter a facilities issue when you are in the middle of a project at Sandia's California campus? The answer: call 925-294-6400.

Eva Clark, Customer Operations at Sandia/California, operates and maintains all site buildings and utilities. The broader group, Facilities Management, also provides Project & Construction Management (Howard Royer), Partnership & Planning (Devon Powers), and Logistics / Transports & Assets (Patrice Sanchez).

Led by Craig Taylor, senior manager, Facilities Management oversees the California site's day-to-day requests to ensure mission success. Currently, the group is focused on improving communications and customer service and making progress toward their goal of a seamless experience for customers and reduced costs for Sandia.

"Our priorities include providing end-to-end operations solutions for mission delivery," Craig said. "We are deploying Integrated Physical Operations Teams to each center. These teams will work on all things operational for their customers."

This customer-focused, integrated team approach was modeled after the Facilities Management System model in New Mexico.

Craig emphasizes that the most efficient way to resolve a facilities issue in California — or any Sandia site — is by submitting a request through Maximo, the online ticket system preferred for non-emergency requests, or by calling the Facilities Management hotline at 4-6400. Either method will achieve faster results than reaching out to Craig or his team directly.

"I once received a call from a researcher in a lab telling me that their pump had gone out," Craig said. "There was nothing I could do at the moment, so I asked the researcher to submit a ticket. Once the ticket was submitted, the problem with the pump was addressed soon after."

## Safety, people first

The most important priority for Facilities Management is a well-maintained and safe site for all of Sandia's employees.

Eva said Facilities Management aims to meet all maintenance requests in a safe, quick and efficient manner.

"We have a close partnership with ES&H to address and prioritize safety issues," she said. "By partnering on quickly addressing safety issues, we are one step closer to our goal of a seamless, integrated approach for all operational issues."



PLUMBING NEEDS — Gerald Vincent, John Rocha and Casey Collins check a water line on a recently installed water tank in the Combustion Research Facility.



BEAT THE HEAT — Richard Sequeira makes an adjustment to the cooling system on the roof of building 903 at Sandia California.

In the past fiscal year, ES&H and Customer Operations have partnered to repair exterior stair handrails and upgrade fire alarm systems. These projects touch multiple departments and were jointly addressed, thanks to the new operations construct.

Depending on how your request is categorized — by either maintenance or new project — you should hear from a project lead or maintenance planner within a week after submitting your request.

Sandia/California receives approximately 4,000 maintenance service requests per year. These calls include custodial, HVAC, plumbing, electrical, landscaping, furniture lock/key, maintenance, nameplates, pest control and other structural requests.

## Too hot, too cold?

One of the most commonly submitted requests is for Facilities Management to adjust the temperature of an office space. If your building's temperature is not between 70° F and 76° F from 6 a.m. to 6 p.m., you can submit a facilities service request to check the function of your building's HVAC system.

Workforce members can also request a temperature sensor to record a building's indoor temperatures for a few weeks. Personal temperature devices — space heaters (corporate-approved models only) or fans — are allowed only on a temporary basis if the building mechanical system cannot provide the set temperature range or if there is an approved medical need.

# Florida gator savors watermelon

## A story of finding, leaving and returning to Sandia

By Jules Bernstein

**S**andia is Spanish for watermelon, which is the same color as the alluring pink mountains in New Mexico our laboratories are named after. Sandia as a company has its own allure, especially for manager and University of Florida alumnus Marie Kane.

The national security mission, engaging work, friendly culture and excellent work/life balance are all factors that brought Kane not once but twice to Sandia's door.

### On course to California

Kane's path to the labs started in Orlando. Growing up she took after her father, a Disney World electrical engineer, and was attracted to aspects of his career path. "I knew I didn't really enjoy taking apart the toaster, but I liked the application focus and problem solving associated with engineering," she said. She also excelled in her high school chemistry courses, making a bachelor's degree in chemical engineering a natural choice.

But as a clarinet player, she was torn between science and music. Luckily, the University of Florida allowed her to immerse herself in both passions. Kane minored in music performance, and got to study one-on-one with a clarinet professor who quit the New York Philharmonic Orchestra and traded the big city for gator country. "I lucked out," she said. "These days his clarinet studio is so full they don't accept music minors anymore."

After college, Kane says she wasn't immediately planning on going to graduate school, but her job interviews were underwhelming. One of her post-college offers was at a paper mill in Florida. "The scent of the chemicals they use is so strong you can smell it from miles away," Kane said. "So... not appealing."

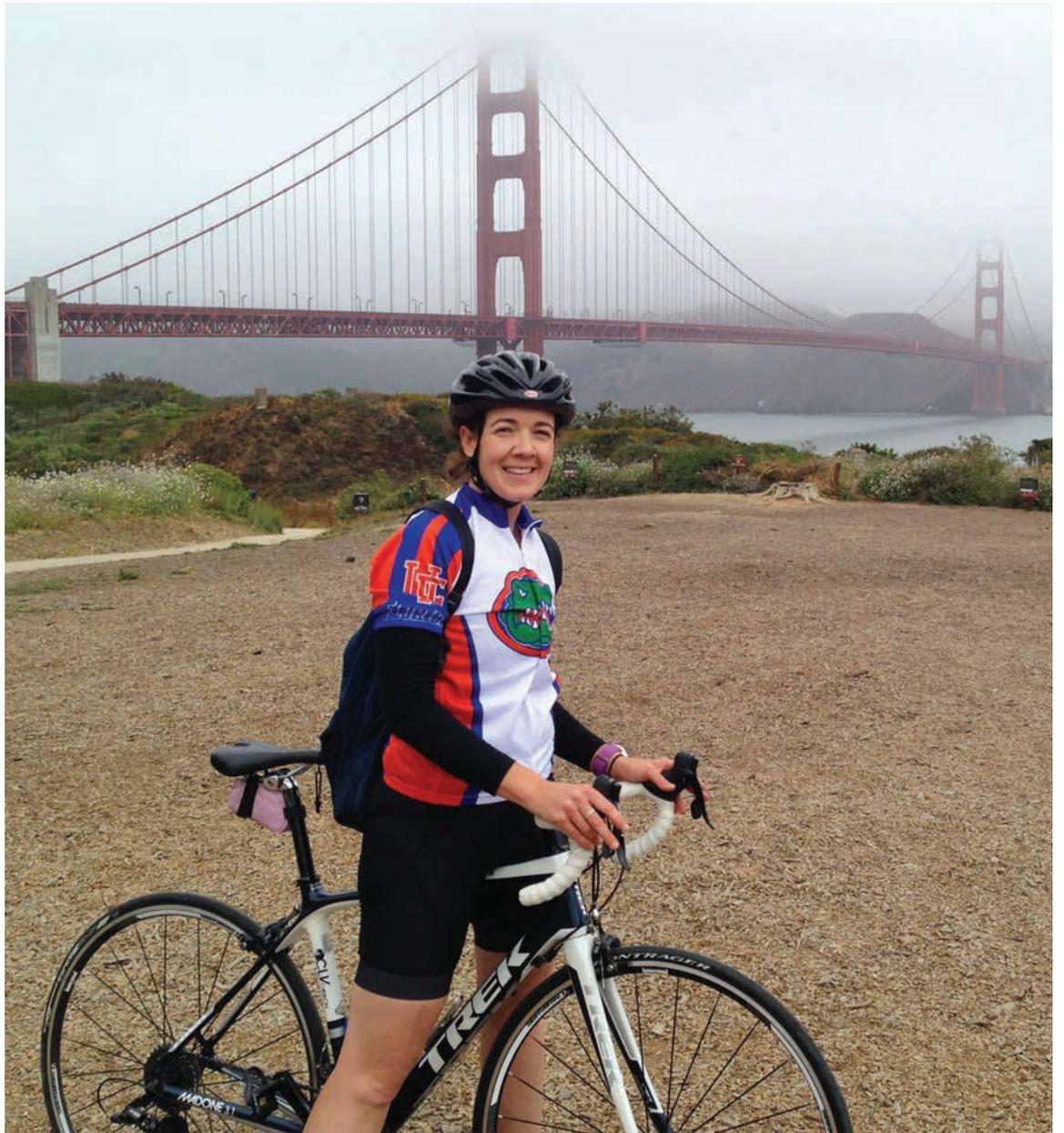
The scarcity of options made it easy for her to decide to return to school. After graduating with her PhD in materials science, her next stop was Savannah River National Laboratory, where she spent three years as a staff scientist working on nuclear materials and battery technologies — some of her biggest research interests.



HAVING RETURNED TO SANDIA, Marie now has time to volunteer in her daughter's elementary school science classes on her 9/80 Fridays off.



THE KANE FAMILY — Husband Kevin and daughters Madelyn (9) and Charlotte (5) pose with Marie at a California winery.



MARIE out cycling — one of her favorite activities. (All images courtesy of Marie Kane)

### Watermelon to Apple

Ultimately, Kane felt that South Carolina was not where she wanted to raise her growing family. So, when the opportunity to continue working on similar technologies for Sandia in California presented itself in 2010, she jumped.

Hired into the Materials Chemistry department as a staff member, Kane soon found herself managing that department, and then moved into managing the Remote Sensing group. Though she enjoyed the work, she continued to feel a pull toward energy work. "I drive an electric car. I really love electric vehicles, and the batteries that power those vehicles. And a lot of the battery technologies can be leveraged and used for other applications that we care about at Sandia," she said.

When she described her passion for energy storage to a Sandia colleague, they offered to shoot her resume to a recruiter for Apple. She said she didn't expect much to come of it, but sent her resume anyway, and it turned out Apple — all of whose products contain batteries — was very interested. "It's not every day the largest tech company in the world asks you to come work for them. And in my technical area of passion — I felt like I couldn't pass it up."

### Not enough energy stored

In February of 2017 Kane left Sandia for Apple. It only took her six months to decide to return to Sandia. When asked why she came back, she says, "I tell people that Apple is everything Sandia isn't."

Some of the differences just seemed strange after so many years with the national laboratories. "The guy behind me had this little mini fridge under his desk. I asked if he kept his lunch in there. He said, 'No, it's the beer fridge.' People openly had bottles of wine out on their desk. I even saw a director crack a beer after a meeting — inside the building — in the middle of the day. I asked him, 'Good day or bad day?' And he responded, 'Does it matter?' I suppose it didn't."

Other differences were less amusing to her. Whereas most Sandians leaving the office around 5 p.m. and leaving work behind until the next morning is perfectly acceptable, Apple employees work all hours of the day and night. "I got text messages at midnight and I was expected to respond even if I was in bed already."

A typical day would see Kane through three-plus hours of commuting to and from the office, coming

home to make dinner and take care of her two daughters, and then get back on her computer to do a second shift, working until she went to bed.

It often felt to Kane like her department at Apple was constantly in crisis mode. She would start most days wondering, "What fire are we putting out now? What thing is someone going to ask for that has to be done an hour ago?" This kind of stress took its toll.

The turning point was Kane's husband telling her point blank, "I don't like the person you've become." She wasn't offended, because she agreed with him. She had been shorter with her kids, constantly feeling guilty about spending less time with them, living in a constant state of exhaustion, unable to do a lot of the things she loves.

She realized too that while it was cool to tell her friends she was working on the battery for the next iPhone or iPad, she missed the sense of pride she felt doing work that affects our nation's security.

### Sanity returns

Now that she's back, Kane is managing people in multiple different nuclear weapons programs, and she loves it. "It's been great. I have project managers in anything from components to stock-pile systems. It gives me the opportunity to poke my nose into all these different areas, some of which I haven't been as exposed to during my career as a staff member in NW programs. It's been super interesting," she said.

One thing she really wants to impress on Sandians who look out on the tech world with curiosity or even envy is how impressed her Apple colleagues were with the laboratories' work.

"I think people here, especially ones that have spent their entire career at Sandia, look out onto Silicon Valley tech companies and think what they're doing is so fast paced and cool. But you have to realize there are a lot of people at those companies looking in on us going 'Man, what they have, all these great, smart people working on a super important national security mission.' Going to Apple gave me that reverse perspective."

Kane succinctly explained the net effect on her life of returning to Sandia. "Sanity returned," she said. She now has the time to play her clarinet, ride her bike, take a ballet class, volunteer in her kid's elementary science classes, or just sit in her backyard, savoring watermelon.