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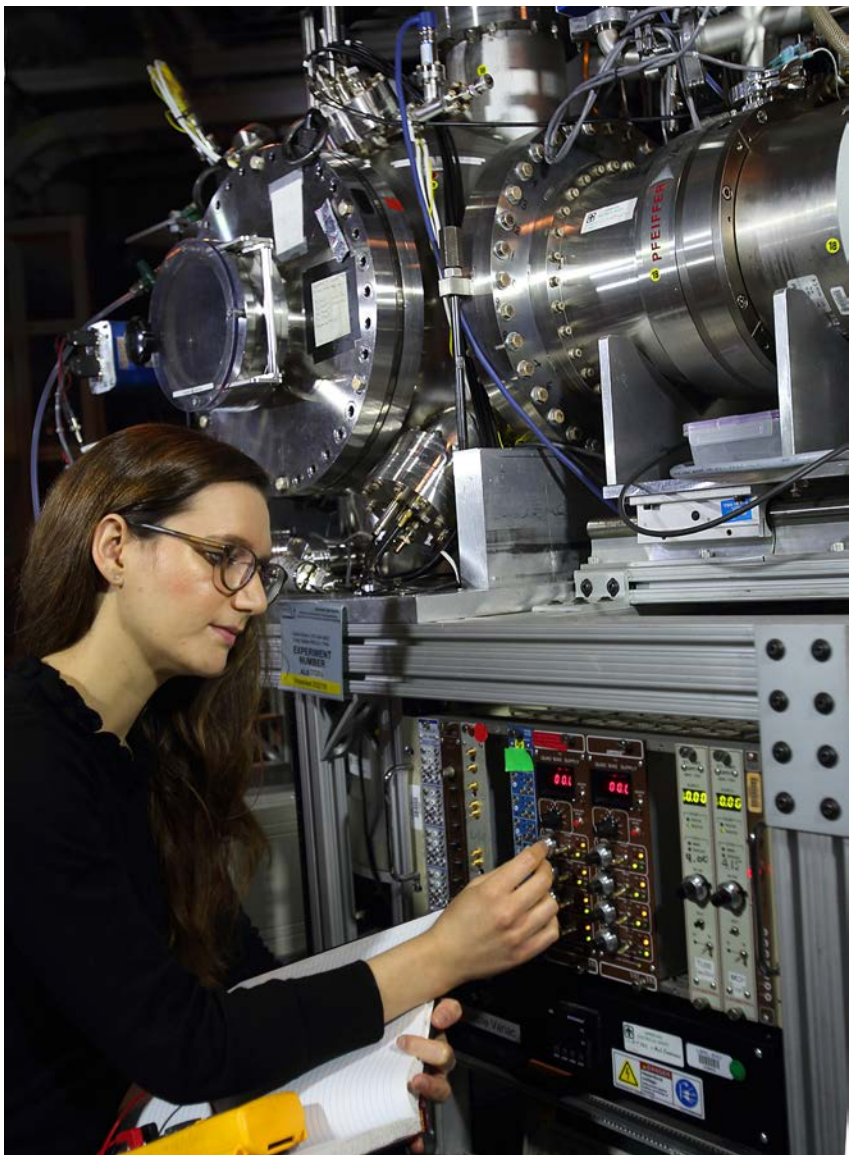
THREE SANDIA RESEARCHERS RECEIVE TOP HONORS PAGE 8





**INVESTIGATING ORGANIC REACTIONS** — Sandia postdoctoral appointee Rebecca Caravan adjusts the Sandia Multiplexed Photoionization Mass Spectrometer at the Combustions Research Facilty that was used to conduct research on chemical reactions in volatile organic compounds. **Photo by Dino Vournas**

# Digesting hydrocarbons

## *Sandia research investigates how organic reactions affect Earth's atmosphere*

*By* ***Michael Padilla***

Volatile organic compounds can be found in the air — everywhere. A wide range of sources, including plants, cooking fuels and household cleaners, emit these compounds directly. They are also formed in the atmosphere through a complex network of photochemical reactions.

Sandia researchers and colleagues from other institutions investigated the reactions of hydroxyl and methylperoxy radicals to understand their impact on the atmosphere's ability to process pollutants.

The work, which was published in Nature Communications, showed that the reactions can impact levels of a key chemical marker used to assess the understanding of the processing and abundances of pollutants. This ultimately improves the understanding of how both nature and human activity impact the chemical composition of the atmosphere.

Recent studies in this area had indicated that the reaction of methylperoxy with the hydroxyl radical occurs more rapidly than previously thought, and so this reaction could impact our current understanding of chemistry in low-temperature combustion and in the Earth's atmosphere.

The hydroxyl radical, an important molecule in combustion and atmospheric chemistry, initiates the oxidation, or processing, of fuel and pollutant molecules. When this radical reacts with fuel molecules in the presence of oxygen, a new class known as peroxy radicals is formed. In the Earth's atmosphere, when the hydroxyl radical reacts with methane — which is both a greenhouse gas and the most abundant hydrocarbon — methylperoxy is created.

### Impacts to combustion

Rebecca Caravan, a Sandia postdoctoral appointee and lead researcher of the collaborative new effort, said investigating the subsequent reactions of peroxy radicals is critical to understanding low-temperature combustion because the peroxy radical's fate determines to what extent fuel will undergo

— CONTINUED ON PAGE 4

# International Year of the Periodic Table

Mike Brock polishes the entry tiles that are laid out in the pattern of the periodic table of the elements at the National Museum of Nuclear Science & History. Proclaimed the "International Year of the Periodic Table" by the United Nations General Assembly and UNESCO, 2019 marks the 150th anniversary of Dimitri Mendeleev's publication of a periodic table that arranged the elements by atomic mass.

National Periodic Table Day is observed annually on Feb. 7 to commemorate John Newlands' 1863 publication of a table that grouped the 56 known elements following his Law of Octaves, which asserted that when the elements were arranged by increasing atomic weight, those with similar characteristics would occur after every seventh element.

Of the table's 118 elements, 22 have been discovered by Department of Energy scientists.

**Photo by Randy Montoya**



Forbes | 2019
THE BEST EMPLOYERS for DIVERSITY
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# Sandia named one of America's Best Employers for Diversity

*By* ***Melissae Fellet***

*Forbes Media has recognized Sandia as one of America's Best Employers for Diversity in 2019. Sandia is the only national lab on the list of 500 companies and research labs.*

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LABNEWS Notes

# Can systems help us achieve our goals?

*By* ***Gabe Martinez***


**BOOKWORM** — Gabe Martinez explores the Sandia technical library. **Photo by Randy Montoya**

With the new year 2019 now in full swing, I have been thinking a lot about resolutions, and about my personal and professional goals, as I'm sure many others must be going through the same process. I decided to write something and I do hope that some may find it beneficial.

I have been reading a lot about the hows and whys of goal setting and such related topics as creating good habits, setting up systems for success and personal growth in general. Perhaps because it's somewhat of a fad and I keep seeing articles on these topics, or perhaps because I have been immersed in the subject, my interest has been piqued, and I've followed various leads to many different sources. Whatever the reason, I have learned some things from my reading that have helped me gain traction on setting my own personal goals, but I've also learned from some recent experiences.

One important thing about goal setting is that it seems to be much of a skill that needs to be learned and developed than a simple task like writing a note on a to-do list. Goal setting skills aren't taught in school, but there are many experts and books available on the subject.

Maybe you've heard of people like James Clear, Michael Hyatt or Brian Tracy, or have read some of their books or blog posts. These subject matter experts, among others, have written extensively on the proper way to set goals and build good habits. With all the material out there, I've learned that not all methods work for everyone, but it's valuable to identify one that sounds right for you and give it a solid try.

Like most people, I used to set very vague and generic New Year's resolutions: eating healthier, reading more, exercising consistently, being more patient with colleagues and friends. Probably not surprisingly, I failed to keep all of them. Now that February has rolled around, I imagine that a lot of people are facing the same problem keeping their resolutions.

The reason for my failure was that I lacked a system to help me achieve those goals. One solution that has helped me a great deal is to focus on building a single small, sustainable habit. Then, I find it easier to build upon that one, and then another, one at a time. Over time, the compounding of a small habit leads to lasting change.

I had lost my love of reading shortly after graduating college. I went into the workforce as a design engineer for a private firm, started a family and just plain got busy. "I'll get around to it," I told myself many times. Or, "I'm going all in and will read one hour a day, starting today!" I think that lasted one day. Then I started thinking about some advice I had read on Clear's website: focus on systems rather than on generic goals. Start with a small habit, something simple and easy to do every day.

So I started reading five minutes a day. That's all, just five minutes. I'm proud to say it worked. For 70 days, I read just five minutes every day. I was quite surprised at how many books I read just by committing to the short amount of time, but eventually I increased my reading time while reestablishing my love of reading. Still, there are days when I don't have time to read even 30 minutes a day, but I always fall back on my initial habit: read five minutes a day. It's a small task, easy to stick with and easy to fall back on.

I've started to apply this principle to other aspects of my life and have been seeing good results. I'm beginning to see the value in putting an easy-to-follow system in place and mastering that system, which helps me to do something consistently every day that gets me closer to achieving my goals. It applies to my current role as a mechanical systems engineer at Sandia. I've been able to break down long-term tasks, such as writing strategic plans, into manageable, short-term tasks and work on a little bit daily. It has saved me from rushing to complete large projects at the last minute.

Goal setting is a fascinating subject, one that has been studied by many people over the centuries. New data comes out all the time about the best way to set and achieve goals. But the simple fact is the key to success is using a system that works best for your goals, your situation and your life.

Here's to a productive 2019!


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**LAB NEWS ONLINE:** sandia.gov/LabNews

**TRIAGE LIST** — Michelle Tamaru of medical runs through a checklist during triage.

# EXERCISE:

## Drone attack, pipe bomb put Sandia to the test

*Story and Photos by* ***Michael Padilla***

A sunny winter day at Sandia/California turned into mayhem when seven employees were injured by a pipe bomb dropped from a small unmanned aircraft system — a drone.

The bomb created significant blast injuries, head trauma and lacerations. The drone malfunctioned and crashed into the fence line to the west.

The Alameda County Fire Department was unable to respond immediately due to multiple concurrent bombing attacks at Lawrence Livermore National Laboratory.

That was the exercise scenario presented to Sandia/California's medical staff and Protective Force last month. The exercise also tested the emergency alert system used to notify members of the workforce.

Once on the scene, Dr. Dan Azar and Michelle Tamaru of the medical team acted quickly to determine the extent of the injuries and began immediate triage for transportation to local hospitals. Meanwhile, incident commander Lt. Jeremiah Johnston ordered a sitewide shelter-in-place order to ensure that workforce members weren't in harm's way.

Exercise planner Anthony Trimble said the Sandia/California Emergency Response Organization trains constantly to be self-sufficient in a disaster.

Anthony said the drone crashing into the fence line added a security threat to the scenario, which affected how quickly the Protective Force could respond to the medical staff and stressed the resources of the medical team.

"To accomplish our goal of being self-sufficient, we train and exercise our response capabilities as though help was not just across the street," Anthony said. "In a large-scale regional disaster where county resources are unable to respond, the Emergency Response Organization needs to be able to protect members of the workforce and respond to those impacted."

The exercise ended once all critically injured personnel were transported to hospitals in the region.

"The increased availability of drones makes it plausible that first responders could encounter them on site in numerous scenarios, whether malicious or not," Anthony said.

**EMERGENCY TRIAGE** — Sandia/California's medical team begins immediate triage for transportation to local hospitals.

**DRONE CRASH** — Protective Force Officer Tammy Matteri shows where the drone "crashed" into the fence west of the Lab.

**STABILIZING FACTOR** — Dr. Dan Azar stabilizes Sandia/California employee Piper Johnson as part of the exercise to test Sandia/California's medical team and Protective Force.

**COORDINATION** — Anthony Trimble, exercise planner, helps keep everything running smoothly.

**MONITOR AND PROTECT** — Protective Force officers Sal Graziano (left) and Emil Pasion monitor the situation.

**AND IT'S A WRAP** — Sandia/California Emergency Response Organization thanks participants.

# Sandia named one of America's Best Employers for Diversity

CONTINUED FROM PAGE 1


Esther Hernandez

The honor is based an independent survey of employees at companies with more than 1,000 employees across all industry sectors.

"An award like this only happens if we're all working to understand diversity and inclusion, as well advance the initiatives in our own spaces," said Esther Hernandez, chief diversity officer. "This accomplishment belongs to every Sandian who is championing inclusion and diversity in our day-to-day work."

Diversity and inclusion is a strategic objective for the Labs, she said, which keeps the topic at the forefront of daily operations. With a strong commitment from the laboratory leadership, inclusion and diversity are part of weekly tier meetings, she said.

Esther also pointed to the Labswide focus on understanding unconscious bias and its potential impact on diversity progress. Last year, all managers actively participated in unconscious bias learning and awareness.

"Strong collaboration with employee resource groups, talent acquisition and talent management to pay attention and take action in the areas of inclusion and diversity in recruiting, interviewing, hiring, developing talent and many other areas are moving us in the right direction," she said. "Executive decisions such as scanning all job postings for language that might discourage women and minorities from applying are also playing a key role in advancing our efforts."

Esher added, "Our leadership understands that inclusion and diversity are business imperatives that give Sandia a competitive advantage. Additionally, we all agree that it's just the right thing to do."

# Digesting hydrocarbons

CONTINUED FROM PAGE 1

autoignition. The researchers wanted to understand how the reaction of hydroxyl and methylperoxy radicals could impact this — for example, whether autoignition could be inhibited due to the removal of reactive radicals and the production of relatively unreactive chemicals.

"Determining the impact of any specific reaction within any given environment requires knowing both how fast the reaction occurs and the products of the reaction," Rebecca said. "Carefully quantifying the products is often the more difficult task. A relatively small change in these reactions can significantly change the magnitude and even the direction of the impact a reaction has in a given environment."

Recent theoretical work indicated that possible products of the hydroxyl radical and methylperoxy reaction could be methanol and oxygen. These products would have significant impact on our understanding of the chemistry in Earth's troposphere, or the atmosphere up to about six miles, which contains around 75 percent of the atmosphere's mass.

Rebecca said that methanol has long been significantly underpredicted in the troposphere by atmospheric modelers. Because methanol can be formed from multiple sequences of oxidation reactions in the troposphere, understanding how chemical reactions contribute to the levels of methanol in the atmosphere sheds light on how the atmosphere processes hydrocarbons emitted by both nature and human activity, therefore helping us understand the influence of both on the chemical composition of the atmosphere.

Sandia combustion chemist Craig Taatjes, the principal investigator of this research effort, said, "We recognized that our fundamental measurements of methanol yield from the hydroxyl radical and methylperoxy reaction could have an impact on modeled atmospheric methanol abundance, so we brought in modeler colleagues who could focus on those consequences of our investigations."

## International collaboration

The discrepancy between modeled and measured methanol is particularly significant in the remote troposphere, regions with relatively limited influence from human activity.

Dwayne Heard, professor of atmospheric chemistry at the University of Leeds in the U.K., said an understanding of these regions is needed before human impacts can be understood.

"We know that changes in man-made emissions are leading to a warming of the atmosphere and a deterioration in the quality of the air that we breathe," Heard said. "However, set against this are natural, dominant processes that occur everywhere — for example, over the oceans where there is relatively little influence from humans."

Studies of radical-radical chemistry are complicated; the multiple side reactions need to be understood along with the reaction of interest. To tackle this, researchers from Sandia and NASA's Jet Propulsion Laboratory used Sandia's Combustion Research Facility and the Advanced Light Source at Lawrence Berkeley National Laboratory.

The researchers relied on the Sandia Multiplexed Photoionization Mass Spectrometer instruments developed by Sandia researchers David Osborn and Lenny Sheps. The team also used the tunable vacuum ultraviolet ionizing radiation from the Chemical Dynamics beamline at the Advanced Light Source to observe and characterize the chemistry and reaction products.

The researchers then worked to interpret their experimental observations via models and calculations. They examined the role of longer timescale chemistry on the reaction products by collaborating with partners at the University of Lille in France, who used their atmospheric simulation chamber. Additional team members at the University of Bristol in the United Kingdom used a global chemical model to assess the impact of the experimental results on the troposphere.

"It was a highly collaborative, international project with each party bringing their own world-class capabilities," Rebecca said.

The Sandia team was funded by the Department of Energy's Basic Energy Sciences Office. The co-authors of the paper were supported by NASA and British and French agencies.

## Impact on the atmosphere

Because of this collaborative effort, it is now understood that around 25 percent of methylperoxy radicals in the troposphere are removed by the fast reaction with the hydroxyl radical, meaning that fewer peroxy radicals undergo other reactions known to lead to methanol. To counterbalance that, the methanol yield from the reaction of hydroxyl radicals with methylperoxy would need to be about 15 percent, but the authors measured yields of 6-9 percent.

The implications of this result on the understanding of tropospheric methanol are significant. The hydroxyl radical and methylperoxy reaction fails to resolve the discrepancy between higher measured and lower modeled methanol abundances; in fact, the findings exacerbate the discrepancy. Methanol in remote regions is now underpredicted by around a factor of 1.5 in global models of the atmosphere.

"This work highlights our incomplete understanding of key tropospheric chemical reactivity. We are missing significant reactions, opening the door to further investigation," Rebecca said.

Cambridge University professor Alexander Archibald, an expert in the field, said the experiments that Rebecca led demonstrate that methanol has additional secrets to reveal.

"While the reaction between methylperoxy radicals and hydroxyl radicals may not be a major source of methanol, models still underestimate the amount of methanol," said Archibald. "The exciting work that Caravan and co-workers have performed closes one chapter in the story, but the book remains unfinished. Further work is required to help complete our understanding of this important compound in the atmosphere."


**COLLABORATIVE COLLEAGUES** — Professor of Atmospheric Chemistry at the University of Leeds Dwayne Heard, third from left, recently visited Sandia's Combustion Research Center. From left, Craig Taatjes, Rebecca Caravan, Heard, Lenny Sheps, David Osborn and Judit Zador. **Photo by Dino Vournas**

# LABNEWS Notes

**EDITOR'S NOTE:** Lab News welcomes guest columnists who wish to write about "Why I work at Sandia" or offer their observations on life at the Labs or on science and technology in the news. If you have a column (500-800 words) or an idea to submit, contact Jim Danneskiold, the acting editor, at jddanne@sandia.gov.

# 'Agile Manifesto' co-author launches clean code training at Sandia


**UNCLE BOB PREACHES** — Robert C. Martin enthusiastically talks to a rapt audience of Sandia programmers about the importance of clean code and how software affects daily life. Martin, known as Uncle Bob, is co-author of groundbreaking books about creating better software. Martin recently gave nine talks over two days at Sandia.

**WRANGLING WITH ROT** — Martin told Sandia, "We rule the world," because programmers "write the rules that run in the machines that govern everything."

*By* ***Julie Hall***
*Photos by* ***Randy Montoya***

Brittle code. Code rigidity. Code fragility.

Such is the potential fate of programming code when it is too complex, too inflexible or too fragile to withstand changes or upgrades, at least not without investing significant time and effort.

In contrast, "clean code" is software code that is simple, easy to read and understand and easy to change, both by the author or someone else. Code, like the design and architecture of a system, should improve with time. Code should not "rot" — slowly degrade in performance, said well-known software developer, author and instructor Robert C. Martin at Sandia's recent Clean Code Kickoff.

"There's only one thing that stops rot and that's you doing a good job," Martin said. "The code doesn't rot by itself."

Speaking to an audience at the Steve Schiff Auditorium and other Sandia sites via videostream, Martin gave nine talks over two days to launch the availability through the TEDS training site of Clean Code training videos.

Known in the industry as Uncle Bob, Martin is one of the co-authors of The Agile Manifesto, written in 2001 by a group of thought leaders seeking to encourage better ways of developing software. The manifesto is the foundation of the agile movement, which has spread to numerous areas beyond software because of its ability to help organizations cope with continuous change.

Martin has written numerous articles and books, including "Clean Code: A Handbook of Agile Software Craftsmanship," which focuses on the best practice of cleaning code "on the fly." The topics of his talks at Sandia ranged from "The Three Laws of Test Driven Development" and "The S.O.L.I.D. Principles of OO and Agile Design" to "Object Oriented Design Quality Metrics" and "The Programmer's Oath."

## With great power comes great responsibility

In his opening talk, "Demanding Technical Excellence and Professionalism," Martin made the case that software developers have tremendous responsibility because of how pervasive and critical software is in our daily lives. He recounted several examples where problems with software had catastrophic consequences.

In the recent Volkswagen emissions scandal, the company developed and installed software in millions of so-called "clean diesel" cars that was designed to cheat U.S. emissions tests. The exhaust control equipment had been programmed to shut off once the cars left regulators' test beds, releasing pollutants into the atmosphere that exceeded legal limits. Some former employees are now in prison, and Volkswagen has agreed to pay back more than $20 billion to states, dealers, regulators and car owners.

In another example, a software glitch in trading firm Knight Capital's computers caused it to rapidly buy and sell millions of shares in minutes rather than over what was supposed to be a period of days. The company lost about $440 million in less than an hour.

"What I'm trying to impress upon you is this: Little did we know how important software was going to be. We did not realize that software would be everywhere," said Martin, who has been a programmer since 1970. "We rule the world. Other people think they rule the world but then they hand those rules to us, and we write the rules that run in the machines that govern everything."

## Software exists to control hardware

The purpose of software is so the behavior of machines (hardware) can be easily changed, he said. "If your software makes the behavior hard to change, your software thwarts the very reason that software exists."

Making software easy to change is dependent on following design and testing principles, Martin said. "When software gets hard to change, it's because principles have been abandoned," he said. Code should improve with time, not degrade.

Martin outlined a list of expectations for the programmer audience, including a steady release of features that work at the end of each cycle, honest estimates of time required for projects, consistent turnaround times, inexpensive adaptability and continuous learning.

## Importance of clean code to Sandia

In his introductory remarks, director John Zepper said he's seen Sandia teams get bogged down with "legacy ball-and-chain code." Since code is rarely written once and forgotten, writing clean code from the outset is vital, especially when team members change. Code that is easy to understand and change makes it easier for a new person to step in.

"When developers write clean code, they're helping their future selves and co-workers," John said.

## Clean code also reduces the cost of maintenance

At Sandia, some software teams spend half of their time on maintenance, said manager Manoj Bhardwaj. By applying Martin's principles, one team, using clean code principles over the past few years, has reduced maintenance costs to less than 10 percent, which translates to savings of millions of dollars over many years just for one team.

"As more and more teams apply these principles and deliver sustainable code, the potential savings Labswide could be in the tens of millions," Manoj said.

> ***"Clean code is code that has been taken care of. Someone has taken the time to keep it simple and orderly. They have paid appropriate attention to details. They have cared."***
>
> **— Robert C. Martin**

# Three earn national honors

CONTINUED FROM PAGE 8

**TRAILBLAZER** — Olivia Underwood, who oversees the production of long-lasting, specialized electrical connectors at Sandia Labs, has been selected to receive a 2019 Science Spectrum Trailblazer Award for "actively creating new paths for others in science, research, technology and development," according to the award citation. **Photo by Stephanie Blackwell**

## This trailblazer inspires African American youth to pursue STEM careers

In 2015, Olivia was one of 312 black women in the United States who earned doctoral degrees in science, technology, engineering or mathematics. Together, they represented a mere 1.1 percent of all such degrees. Now, Olivia leads a team of engineers and is creating pathways for others to follow.

Her motivation in part is to change the picture she has seen throughout her groundbreaking career.

"There are very few minority women in STEM fields," said Olivia, the first African American to receive a doctoral degree in materials science at The University of Alabama in Huntsville.

Prior to joining Sandia, Olivia voraciously sought out opportunities to work on a vast range of mechanical systems, reporting back to her school which opportunities were best for students in her metallurgical and materials engineering program.

She performed analyses on minivan components for a subsidiary of Honda Motor Co. Ltd. and on military helicopters for a subsidiary of CGI Group at Redstone Arsenal, home to the U.S. Army's Aviation and Missile Research Development Center. She worked at a Chevron Corp. oil refinery and developed a cost-saving strategy for American Cast Iron Pipe Co. She has also worked with three national laboratories, including Sandia, which hired Olivia as a postdoctoral researcher in 2015.

After joining Sandia, she moved from her postdoctoral role to a principal member of technical staff. She began her career in the Advanced Science and Technology Division and has successfully transitioned to support Sandia's core mission of nuclear deterrence.

Now Olivia oversees the development of specialized components. Her experience in metallurgy gives her team an advantage diagnosing defects in materials, so products work reliably for decades.

Her work has been recognized internationally. In 2017, Olivia was selected as one of the two USA Early Career Scholars to attend the European Microbeam Analysis Society 2017 conference in Konstanz, Germany, where she presented her research on abnormal grain growth in a nickel alloy.

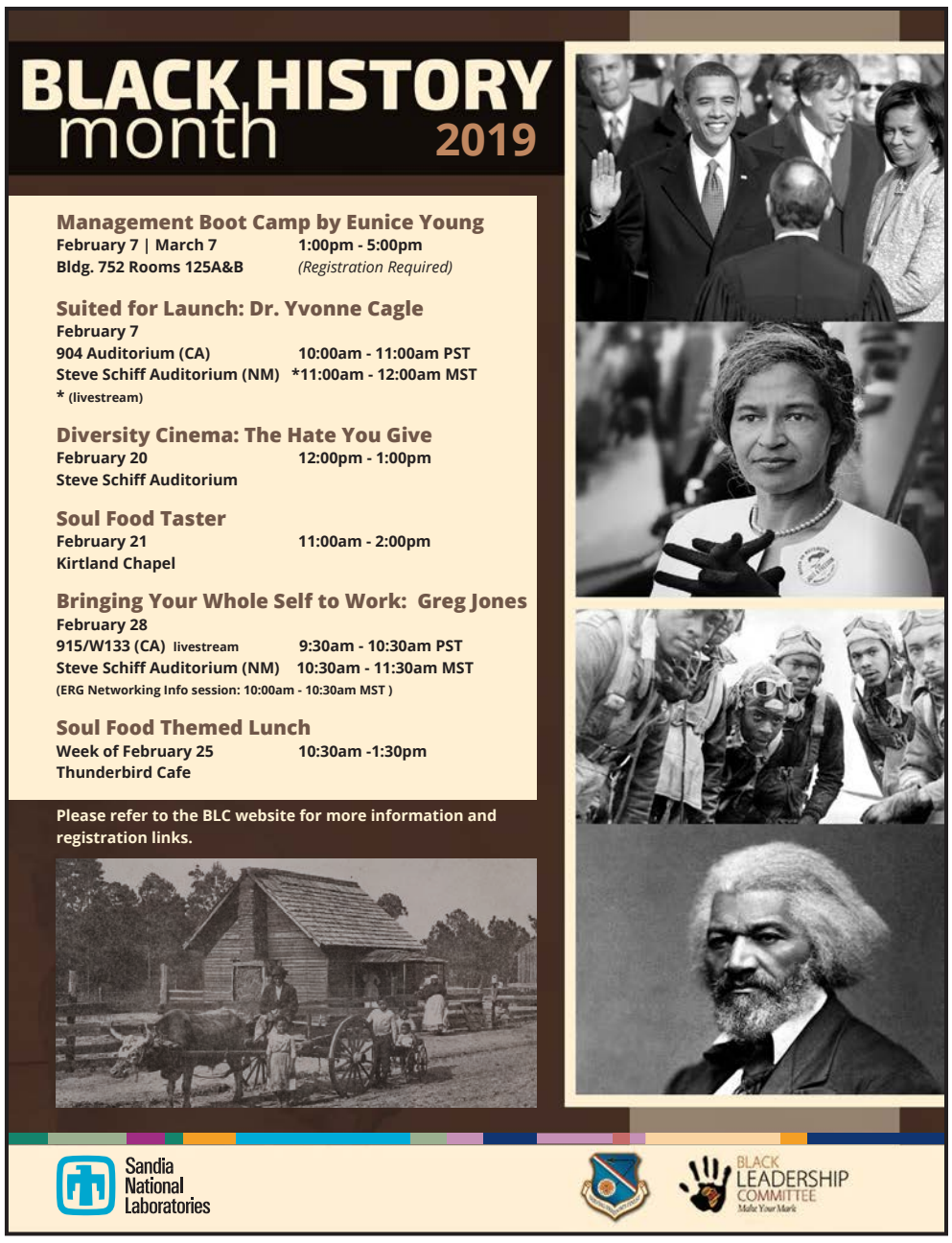
Her focus on professional growth has been matched by a determination to create pipelines of talent for the future. She teaches "What is Materials Science?" — a Sandia-sponsored summer class for middle school and high school students.

"I wasn't exposed to the field of materials science until I went off to college. I want students to be aware of this amazing field early on in life," she said.

In 2018, she established the Dr. Olivia D. Underwood Scholarship at her alma mater, Bibb County High School, and presented it to a female, African American graduating senior. Through her outreach co-chair role in SWAN, the Sandia Women's Action Network, she advances the organization's stated purpose to "engage members of the workforce and the local community to support activities for local youth in math, science and engineering" and "promote opportunities to improve visibility of women in science and act as a force for good in Sandia's local community." She is also a member of Delta Sigma Theta sorority where she continuously serves her community.

Olivia was honored with a Science Spectrum Trailblazer Award, given to "men and women actively creating new paths for others in science, research, technology, and development," according to the award citation.

She's going to need to expand her trophy case, as Olivia also will receive the 2019 Frank Crossley Diversity Award from The Minerals, Metals & Materials Society, which will be presented March 13 at the group's annual meeting in San Antonio, Texas.

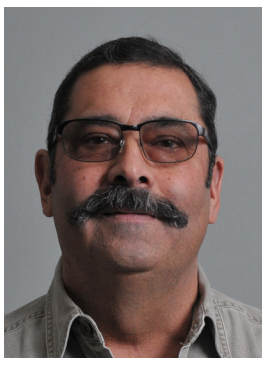



# NNSA administrator visits Sandia, Jan. 29

**SPARKING CONVERSATION** — Lisa Gordon-Hagerty (right), DOE under secretary for nuclear security, Mike Cuneo (left), pulsed power accelerator science and technology senior manager, and Susan Seestrom (center), chief research officer and associate labs director for Advanced Science and Technology, describe the Z machine's role in nuclear security while touring Sandia New Mexico on January 29. During the visit Gordon-Hagerty also met with early career staff members to discuss the role of the national labs' next-generation researchers. **Photo by Randy Montoya**

# Mileposts

*New Mexico photos by Michelle Fleming*
*California photos by Randy Wong*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**Brian Griego 25**


**Angela Guerin 25**


**Jason Krein 20**


**Chris O'Malley 20**


**Staci Dorsey 15**


**Gerald Garcia 15**


**Stephanie Holinka 15**

# Droves of deals now at SERP

*By* ***Stephanie Holinka***

The Jewish Community Center of Albuquerque is now operating the Sandia Employee Recreation Program office. All members of the workforce can get access to SERP discounts from their desktop, by phone or by visiting SERP.

SERP office manager Karen Susztar said SERP has expanded its partnerships to include more than 80 vendors, including 23 fitness facilities, eight ski resorts and the Sandia Peak Tramway. The partnership also includes six sports leagues, however these are only open to employees and eligible dependents.

"SERP is one office, in one tiny sliver of the Labs. By using our online platform, everyone can access SERP offers, not just those who are able to make it to the office," Karen said.

To access SERP discounts from a desktop or phone, create an account on the SERP website at clients.mindbodyonline.com (search SERP). At the site, staff can peruse the latest deals and events, Sandia logo merchandise, join a SERP-Sponsored Sports Association or make friends through a social group. A small number of discounts are available only to employees.

Contact SERP at 844-8486 or serp@sandia.gov, or stop by Bldg. 832 Rm. 75, on the southeast side of the Sandia Medical clinic building, 9 a.m.-2 p.m., Monday-Friday. There are two "SERP 15-minute Parking" spaces on the south side of Bldg. 832.

# SANDIA CLASSIFIED ADS

## MISCELLANEOUS

FIREWOOD, ~1-1/2 cords, cedar/pinon, can text photos, $300. Chavez, 505-366-4000.

UPRIGHT PIANO, Yamaha, model U5, early 1970s, middle pedal mutes, buyer arranges professional piano movers, $3,000 OBO. Xavier, 505-480-4334.

TV TRAY SET, 6-pc., rectangular, oak, $50; 110-W generator, used twice, $700; in East Mountains. Willmas, djwillmas@gmail.com.

COUCH, suede-like, taupe, $125; high-back Queen Anne chair, melon color, $175; foldable metal chair, $30; roll-top desk; photos available, can negotiate. Brewster, 505-238-4704, ask for Julie.

ELECTRIC CAR CHARGING STATION, Siemens VersiCharge Gen 2, 220-V, like new, $400 OBO. Jacques, 505-340-7089.

KITCHEN/DINING SETS, 2: dark wood table w/4 chairs, $75 OBO; oak table w/6 chairs, $100 OBO; text for dimensions & photos. Ghanbari, 505-400-4360.

COFFEE TABLE, 40" x 40", wood, mahogany finish, Queen Anne legs, very sturdy, lightly used, $150. Durkee, 505-255-4211.

TV STAND, smoked glass, $75; black lacquer cabinet, $100; Swarovski crystal chandelier, $150. Grossman, 505-350-5982.

FILE CABINET, lateral, 4-drawer, locking but needs key made, good condition, $150. Rawlinson, 505-764-8540.

MOTORIZED WHEELCHAIR, Quantum Edge Q6, adjustable seat, front & rear joysticks, 14-in. solid drive tires, weight capacity 300-lbs., like new, $3,500 OBO. Mann, 505-401-0988.

FABULOUS FELINES WILD LOVE CELEBRATION, give your Valentine something special, details at http://fabulousfelines.org. Stubblefield, 505-263-3468.

MULTIFUNCTION PRINTER/COPIER/SCANNER, HP Color LaserJet, model CM1415fnw, toner-low page count, $300 OBO. Bennett, 505-298-1142.

GARAGE SALE, Sat., March 2, hand tools, power tools, table saws, power saws, beer cabinet, better than a flea market, 729 Monroe NE. Barnaby, bbarnaby@juno.com.

## TRANSPORTATION

'06 LEXUS RX330, fully loaded, black, no structural damage, clean, engine runs great, 132K miles, $11,500 OBO. Baca, 505-385-0137.

'03 TOYOTA CAMRY LE, V6, sedan, PL, power driver's seat, CD, cloth seats, 138K miles, good condition, $3,500 OBO. Atkins, 505-934-5636.

'02 LINCOLN LS, 125,500 miles, runs well, dependable car, $1,750 OBO. Stanton, 505-918-0806, call or text.

'88 FIERRO, V6, all options, <100 original miles, new fuel pump, battery, immaculate, $10,000 OBO. Hanks, 505-249-1931, send text.

'07 CAMRY LE, AC, CD, cruise, new struts, oil pan gasket, w/2 additional snow tires, clean, nonsmoker, 55K miles, $6,500. Young, 214-458-1580, ask for Nancy.

'17 RAM 2500 POWER WAGON, loaded, lots of extras, 17K miles, $47,500 OBO. Gibson, 505-400-9821.

'15 VOLKSWAGEN GOLF GTI AUTOBAHN, performance pkg., white, 4-dr., AT, 38K miles, showroom condition, $19,900. Baca, 505-322-8999.

'07 HONDA CRV EX-L, single owner, 117K miles, good condition. Norman, 575-838-7419, ask for Mary.

## RECREATION

'10 BMW F650GS, 800 cc, antilock brakes, extras, excellent condition, $5,500, open to trades. Amon, 505-280-2167.

## REAL ESTATE

10 ACRES, Tijeras property, beautiful, wooded, off Zuzax, w/vast open mountain views, 131 Rattlesnake Ridge, $100,000. Romero, 505-280-8223.

3-BDR. HOME, 2 baths, 1,410-sq. ft., Encanto Village, gated community, beautiful, MLS#935137, www.r1newmexico.com, $164,900. Gonzales, 505-450-8508.

## AD SUBMISSION GUIDELINES

**AD SUBMISSION DEADLINE:** Friday noon before the week of publication unless changed by holiday.
**Questions to Michelle Fleming at 505-844-4902. Submit by one of the following methods:**

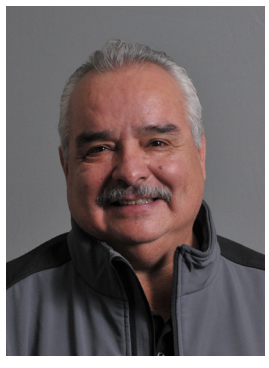
- **EMAIL:** Michelle Fleming (classads@sandia.gov)
- **FAX:** 505-844-0645
- **MAIL:** MS1468 (Dept. 3651)
- **INTERNAL WEB:** Click on the News Tab at the top of the Techweb homepage. At the bottom of the NewsCenter page, click the **"Submit a Classified Ad"** button and complete the form.

*Due to space constraints, ads will be printed on a first-come, first-served basis.*

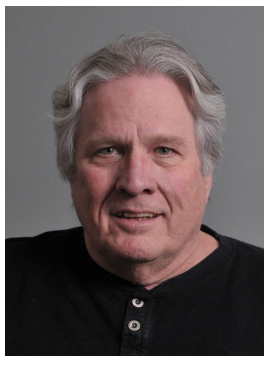
# Recent Retirees

*NM photos by Michelle Fleming*
*CA photos by Randy Wong*


**Steve Hurd 40**


**Robert L. Martinez 40**


**Frank Bouchier 36**


**Tom Brewer 35**


**Tom Wubbels 31**


**Mary Lou Garcia 25**


**Karen Haskell 20**

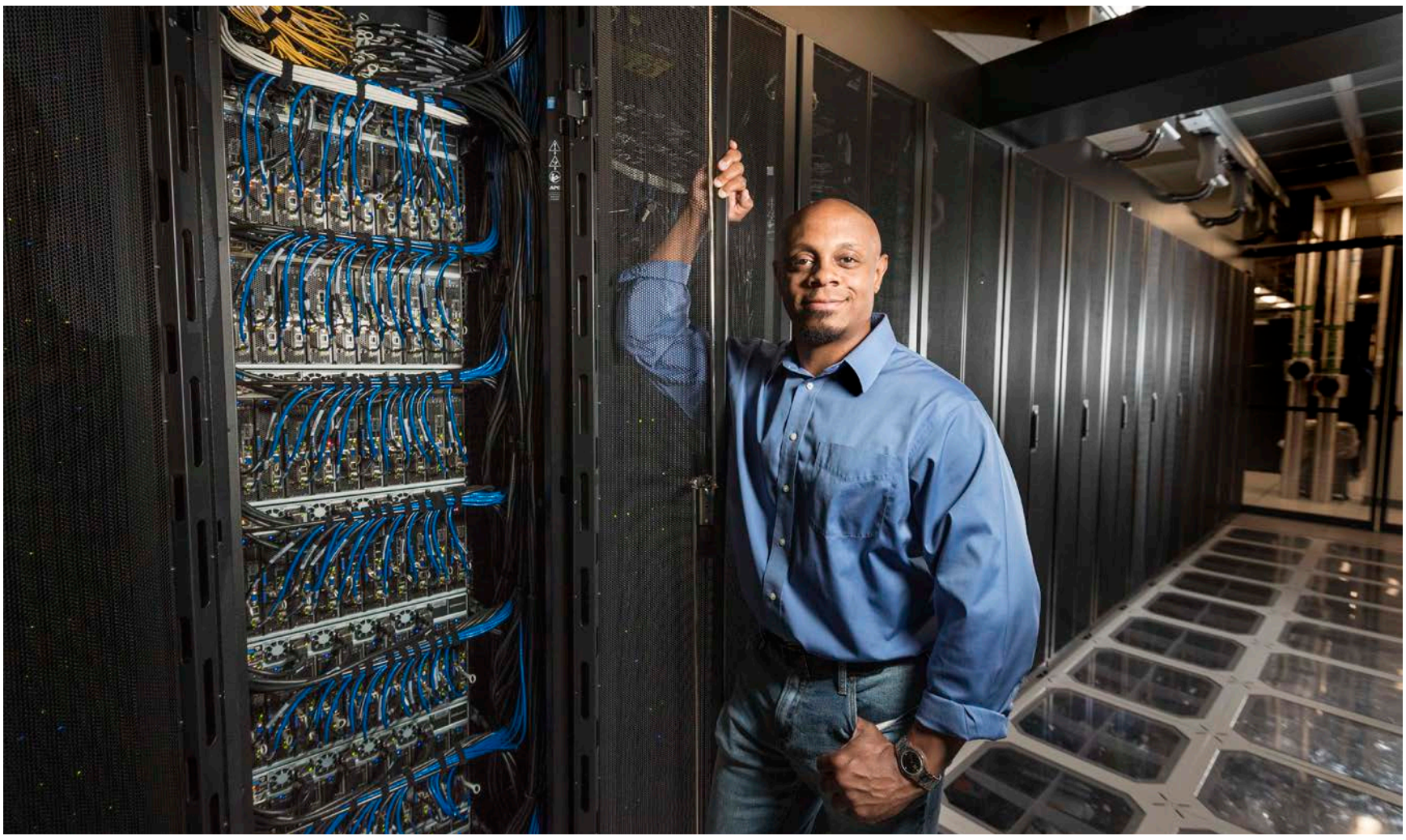

**Kathy Pierson 20**


**Terry Spraggins 17**


**Caren Garcia 15**


**Bruce Hamilton 15**

# Three Sandia Labs researchers earn national honors in leadership and technology



**CONSISTENT LEADER** — Sandia National Laboratories' Warren Davis, an expert in machine learning, has been selected to receive the 2019 Research Leadership Award for being "a consistent leader in discovering, developing and implementing new technologies," according to the award citation. **Photo by Randy Montoya**

*By* ***Troy Rummler***

Three Sandia researchers were honored for their leadership and technical achievements at the Black Engineer of the Year STEM Global Competitiveness Conference this week.

Warren Davis, Quincy Johnson and Olivia Underwood received their awards during the conference in Washington, D.C. The annual meeting recognizes black scientists and engineers and is a program of the national Career Communications Group, which advocates for corporate diversity.

Lab News profiled the trio, their careers and achievements.

## This scientist wants to help you see like a computer

If you saw all the aquariums that fill Warren's home, you might think he was a pet lover. But you'd be wrong.

Warren just has a passion for recreating things.

"I've got a sand bed that does denitrification in a certain layer," mimicking a natural aquatic ecosystem, Warren said. "I've got animals that sift the sand bed so it doesn't become anoxic. I have things that eat uneaten food particles that get trapped under the rocks." It's not a perfect model, he said, but it's close.

Warren is also adept at recreating natural, mechanical processes to solve problems in engineering. In these cases, he takes natural phenomena — such as air flowing over a surface or a person taking a step — and uses machine learning to explain them mathematically by way of an equation, also called a function.

Machine learning can approximate complex processes much faster than they can be solved numerically, which saves companies time and resources, for example, if the goal is to predict how well a proposed aircraft design would hold up in flight. The savings compound when designers use machine learning to simulate multiple iterations.

"That's what I do. I try to learn the functions that we care about," Warren said.

He also has taken a leadership role helping Sandia and its business partners incorporate machine learning into their own research and development programs. On multiple occasions, he said, the addition of machine learning has transformed the way they work, making their research more efficient and agile long after his project with them has ended.

The technique sometimes delivers unexpected solutions.

"When I'm able to take a data set and come up with something people haven't seen before or some underlying function it is truly an amazing, almost magical feeling," he said.

Warren's work earned him a Research Leadership award.

> ***"When I'm able to take a data set and come up with something people haven't seen before or some underlying function it is truly an amazing, almost magical feeling."***
>
> **—Warren Davis**

## This leader lifts from both ends of Sandia's supplier partnerships

As a product engineer, Quincy is a master of bringing together the worlds of design and manufacturing. He serves as the liaison for several companies that produce components for Sandia, leading from both sides of these partnerships and by so doing enabling Sandia to deliver on its national security mission.

Quincy entrenches himself into the supply chain to ensure partner companies succeed. He engages in planning, manufacturing, troubleshooting, quality control and documentation to improve and increase production. He has helped companies that have never made components for Sandia become qualified suppliers. He also investigates production issues and observes and evaluates supplier processes to make sure output is consistent.

"Sometimes you need to understand the little nuances in the way one person performs a task," he said. "You need to make sure that's documented in the work instructions and written in a way anyone can understand in case that person ever changes."

**SHAPING THE FUTURE** — Quincy Johnson, a production engineer at Sandia Labs, has been selected to receive a 2019 Modern-Day Technology Leader Award for "shaping the future of engineering, science and technology," according to the award citation. **Photo by Stacey Long**

For example, something seemingly as minor as the way a worker cleans out equipment could ultimately have an impact on product performance, he said.

Quincy doesn't spend all his time with suppliers, though.

At Sandia, he provides leadership as the voice of production from the beginning of a product's development through the end of its life. Quincy supported multiple teams simultaneously as their components went through the transition into production to ensure their designs implemented the proper production standards so they ultimately would be manufacturable. In this role, Quincy took the initiative to guide certain teams that were lacking considerable production experience, effectively filling the void.

Called "an experienced product engineer with unquestioned judgment" by his manager, Tom Pfeifle, Quincy received a Modern-Day Technology Leader award.

— CONTINUED ON PAGE 6