



S A N D I A

LAB NEWS

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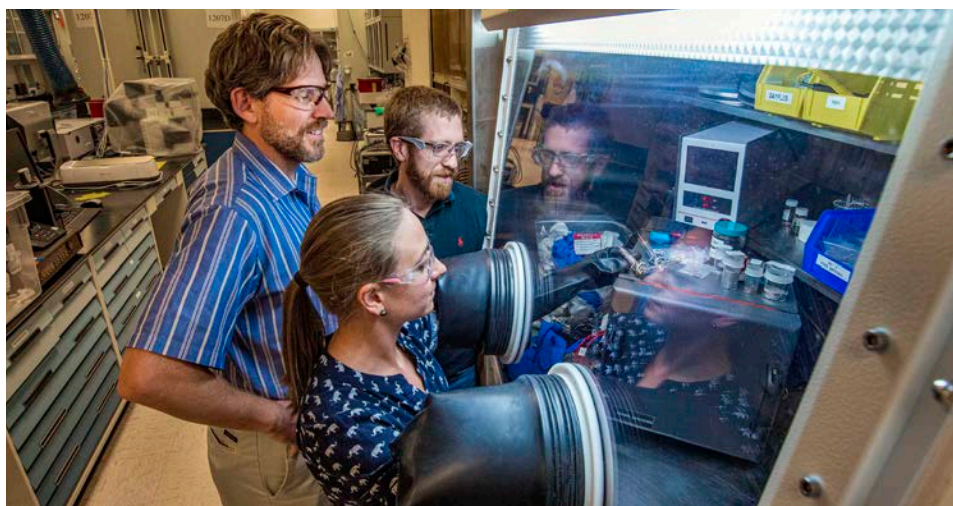
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cybersecurity
experts
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EMPLOYEE RECOGNITION AWARDS

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BUILDING A BETTER BATTERY — Leo Small (back right) and Erik Spoerke (back left) observe as Martha Gross (front) works in an argon glovebox on their lab-scale sodium iodide battery. This new kind of molten sodium battery could prove to be a lower-temperature, lower-cost battery for grid-scale energy storage.

Photo by Randy Montoya

Better batteries for grid-scale energy storage

Despite pandemic, Sandia develops new sodium batteries that operate at lower temperatures, using low-cost materials

By Mollie Rappe

Sandia researchers have designed a new class of molten sodium batteries for grid-scale energy storage. The new battery design was shared in a paper published on July 21 in the scientific journal Cell Reports Physical Science.

Molten sodium batteries have been used for many years to store energy from renewable sources, such as solar panels and wind turbines. However, commercially available molten sodium batteries, called sodium-sulfur batteries, typically

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Sandia engineer turns error detection into 'secret language' for enhanced data security

By Michael Ellis Langley

Research into software error detection has led one Sandia engineer to develop a method to enhance the protection of digital content like email and social media messaging.

Celestino Corral is an electrical engineer who began working on error detection in digital code in 2018. Error detection is used in every electronic message sent between people, embedded in the code for that transmission.

"Let's say I want to send a message to someone. I want to make sure everything in that message is received exactly by that person," Celestino explained. "A bit of code is generated for that message

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ERROR USER — Electrical engineer Celestino Corral invented a way to use error-checking computer code to add a layer of security to email and digital messages.

Photo by Randy Wong



HRUBY SWORN IN

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U.S. Senate confirms former Labs Director Jill Hruby as NNSA Administrator

By **Nancy Salem**

NEW NNSA ADMINISTRATOR — Jill Hruby, joined by her husband Stewart Griffiths, was sworn in at home as the DOE Under Secretary for Nuclear Security and NNSA Administrator on Monday, July 26. Jill started her career as a member of Sandia's technical staff in 1983, and in 2015 became the first woman to head a national security laboratory.

Photo by **Randy Montoya**

Former Sandia President and Laboratories Director Jill Hruby on Monday took the oath of office as the DOE's new Under Secretary for Nuclear Security and NNSA Administrator. U.S. Secretary of Energy Jennifer M. Granholm administered the oath from Washington, D.C., to Jill in her Albuquerque home, following U.S. Senate confirmation of her nomination on Thursday, July 22.

"Jill is one of DOE's very best success stories — rising through the ranks at Sandia National Labs to become the first woman to lead a national security lab, and now she'll lead our efforts to maintain a safe and reliable nuclear deterrent and protect our national security," Granholm said in a statement. "She is a brilliant leader, a model public servant, and an inspiration to engineers and rising stars everywhere. I am thrilled to have her back at DOE to help keep our nation and our world safe."

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Sandia brings best cybersecurity minds to bear in national policy talks

By **Michael Ellis Langley**

In a world where open conflict is evolving and adversaries are using cyberwarfare to attack United States institutions, Sandia is poised to play a key role in helping to secure the nation in this new theater.

Sandia hosted a series of virtual cybersecurity events called Meetings of the Minds, to pull together the best thinking on how the nation should respond to changing threats. [The first one](#), held Dec. 6, 2020, and [the second on May 26](#). The first event brought together experts from Sandia; Bob Kolasky, the head of the National Risk Management Center at the Cybersecurity and Infrastructure Security Agency; retired Rear Admiral Mark Montgomery of the Cyberspace Solarium Commission; and other groups on the front lines of cybersecurity to discuss a national policy to confront the threats we face.

In the May session, following several high-profile national cyberattacks, Sandia brought together panelists from CISA, Google, Microsoft and other institutions to talk about emergent research and development. Sandia cybersecurity researcher Eva Uribe highlighted the complex nature of cyber conflict and competition.

“Severity of attack has been used as a guiding principle for how to respond. We are trying to protect against a Pearl Harbor,” she said. “But an overwhelming number of smaller attacks can potentially target the things that are important to us — power, transportation, wireless networks and, as we saw, the Colonial Pipeline.”

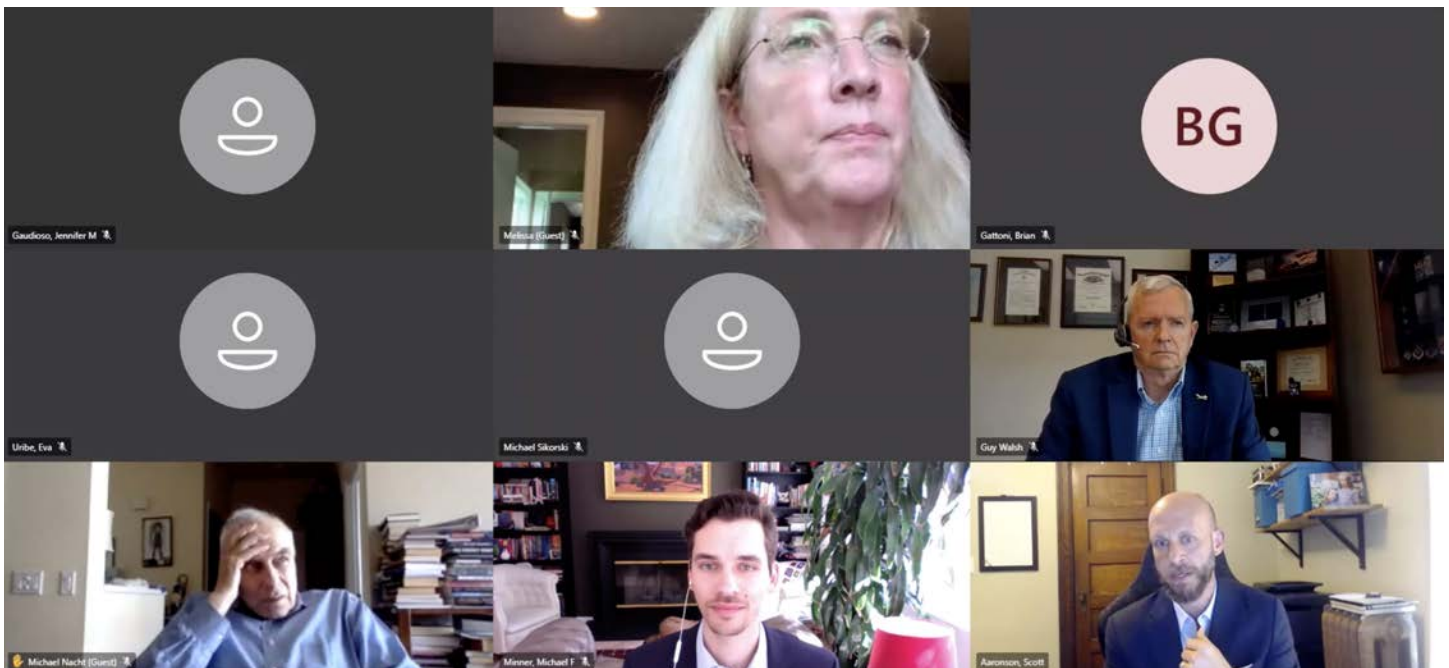
In May, the operator of the Colonial Pipeline paid \$4.4 million to hackers who successfully attacked the system that transports gasoline from the south to the northeast corridor. Meeting participants in December learned that 85% of the nation’s water, electricity and natural gas infrastructure are managed by local and

regional agencies that lack budgets to pay for high-end cybersecurity. Data shows that ransomware attacks increased by 41% in 2019, with successful penetrations in more than 205,000 business and local entities and attacks are still coming.

David White, director of Sandia’s Information Operations Center, emphasized the need for preparedness, starting with these kinds of meetings to coordinate the best and brightest in cybersecurity.

“I don’t think we can ever fully deter our adversaries. Resilience is really the core interest of the nation,” David said, adding that Sandia is already helping confront these threats. “It’s an insidious problem. I think it requires a national response. Sandia can certainly advise about new threats and opportunities, but the best role for our brilliant people is solving the hardest technological problems.”

The first session in December is available to view on the Labs’ [Systems Seminars website](#). [📺](#)



MEETINGS OF THE MINDS — Participants in the Emergent Cyber R&D Priorities Beyond 2020 conference, organized by Sandia on May 26, discuss how research institutions can contribute to national cybersecurity.



SODIUM BATTERIES FOR THE GRID — Postdoctoral researcher Martha Gross works in an argon glovebox with a test battery cell illustrating a lab-scale sodium iodide battery. The Sandia research team developed a new sodium iodide catholyte solution (purple liquid) and a special ceramic separator to allow the molten sodium battery to operate at 230 degrees Fahrenheit or 110 degrees Celsius.

Photo by Randy Montoya

Sodium batteries

CONTINUED FROM PAGE 1

operate at 520-660 degrees Fahrenheit or 270-350 degrees Celsius. Sandia's new molten sodium battery operates at a much cooler 230 degrees Fahrenheit or 110 degrees Celsius instead.

"We've been working to bring the operating temperature of molten sodium batteries down as low as physically possible," said Leo Small, the lead researcher on the project. "There's a whole cascading cost savings that comes along with lowering the battery temperature. You can use less expensive materials. The batteries need less insulation and the wiring that connects all the batteries can be a lot thinner."

However, the battery chemistry that works at 550 degrees Fahrenheit doesn't work at 230 degrees Fahrenheit, he added. Among the major innovations that allowed this lower operating temperature was the development of what he calls a

catholyte. A catholyte is a liquid mixture of two salts, in this case, sodium iodide and gallium chloride.

Basics of building better batteries

A basic lead-acid battery, commonly used as a car ignition battery, has a lead plate and a lead dioxide plate with a sulfuric acid electrolyte in the middle. As energy is discharged from the battery, the lead plate reacts with sulfuric acid to form lead sulfate and electrons. These electrons start the car and return to the other side of the battery, where the lead dioxide plate uses the electrons and sulfuric acid to form lead sulfate and water. For the new molten sodium battery, the lead plate is replaced by liquid sodium metal, and the lead dioxide plate is replaced by a liquid mixture of sodium iodide and a small amount of gallium chloride, said Erik Spoerke, a materials scientist who has been working on molten sodium batteries for more than a decade.

When energy is discharged from the new battery, the sodium metal produces sodium ions and electrons. On the other side, the electrons turn iodine into iodide ions. The sodium ions move across a special ceramic separator to the other side where they react with the iodide ions, to form molten sodium iodide salt. Instead of a sulfuric acid electrolyte, the middle of the battery is a special ceramic separator that allows only sodium ions to move from side to side, nothing else.

"In our system, unlike a lithium ion battery, everything is liquid on the two sides," Erik said. "That means we don't have to deal with issues like the material undergoing complex phase changes or falling apart; it's all liquid. Basically, these liquid-based batteries don't have as limited a lifetime as many other batteries."

In fact, commercial molten sodium batteries have lifetimes of 10-15 years, significantly longer than standard lead-acid batteries or lithium ion batteries.

Long-lasting batteries that are safer

Sandia's small, lab-scale sodium iodide battery was tested for eight months inside an oven. Martha Gross, a postdoctoral researcher who has worked on the laboratory tests for the past two years, conducted experiments charging and discharging the battery more than 400 times over those eight months.

Because of the COVID-19 pandemic, they had to pause the experiment for a month and let the molten sodium and the catholyte cool down to room temperature and freeze, she said. Martha was pleased that after warming the battery up, it still worked.

"We probably wouldn't have done the experiment if it weren't for COVID-19, because we wouldn't have wanted to risk accidentally breaking the battery," said Martha. "You could say learning that the battery can be restarted after freezing is a small silver lining to the pandemic. We expected this result, but we were pleased that we were correct."

This means that if a large-scale energy disruption were to occur, like what occurred in Texas in February, the sodium iodide batteries could be used, and then allowed to cool until frozen. Once the disruption was over, they could be warmed up, recharged and returned to normal operation without a lengthy or costly start-up process, and without degradation of the battery's internal chemistry, Erik added.

Sodium iodide batteries are also safer. Erik said, "A lithium ion battery catches on fire when there is a failure inside the battery, leading to runaway overheating of the battery. We've proven that cannot happen with our battery chemistry. Our battery, if you were to take the ceramic separator out, and allow the sodium metal to mix with the salts, nothing happens. Certainly, the battery stops working, but there's no violent chemical reaction or fire."

If an outside fire engulfs a sodium iodide battery, it is likely the battery will crack and fail, but it shouldn't add fuel to the fire or cause a sodium fire, Leo added.

Additionally, at 3.6 volts, the new sodium iodide battery has a 40% higher operating voltage than a commercial molten sodium battery. This higher voltage leads to higher energy density, and that means that potential future batteries made with this chemistry would need fewer cells, fewer connections between cells and an overall lower unit cost to store the same amount of electricity, Leo said.

"We were really excited about how much energy we could potentially cram into the system because of the new catholyte we're reporting in this paper," Martha added. "Molten sodium batteries have existed for decades, and they're all over the globe, but no one ever talks about them. So, being able to lower the temperature and come back with some numbers and say, 'this is a really, really viable system' is pretty neat."


Sodium iodide batteries future

The next step for the sodium iodide battery project is to continue to tune and refine the catholyte chemistry to replace the gallium chloride component, Leo said. Gallium chloride is very expensive, more than 100 times as expensive as table salt.

The team is also working on various engineering tweaks to get the battery to charge and discharge faster and more fully, Erik added. One previously identified modification to speed up the battery charging was to coat the molten sodium side of the ceramic separator with a thin layer of tin.

Spoerke added that it would likely take five to 10 years to get sodium iodide batteries to market, with most of the remaining challenges being commercialization challenges, rather than technical challenges.

"This is the first demonstration of long-term, stable cycling of a low-temperature molten-sodium battery," Erik said. "The magic of what we've put together is that we've identified salt chemistry and electrochemistry that allow us to operate effectively at 230 degrees Fahrenheit. This low-temperature sodium iodide configuration is sort of a re-invention of what it means to have a molten sodium battery."

The development of the new sodium battery was supported by the Department of Energy's [Office of Electricity](#) Energy Storage Program. 

Math

CONTINUED FROM PAGE 1

from the content of that specific message, which travels with the content to the recipient."

If the code behind the message seen by the receiver isn't the same one generated by the sender, there is at least one error.

Celestino said errors are "more common than most people think, however, there are limits to even the most robust form of error checking.


"So, I began to ask where the weaknesses are," Celestino said. "I thought about giving the system a fault and trying to figure out when we miss it. My original goal was to look at how can we reduce the risk of undetected errors."

But Celestino discovered something else along the way.

"If someone is 'listening in' on my data, you can use different error-detection methods for each piece of content," he said. "The 'listener' will have to spend more time trying to figure out each way the error detection is used. I can also introduce intentional (or artificial) errors into the message that result in the same code. Eavesdroppers won't know about them and will be unable to read the message without fixing those specific errors."

Celestino says manipulating error detection is a known practice that hasn't been used in this way to provide another layer of obfuscation to keep others from reading and using data.

"Think of it like two friends who decide to use a secret meaning behind common words only they know and others don't," he explained. "The content is authentic and relevant to them, but gibberish and useless to others. Adding the wrinkle of introducing artificial errors may be considered a type of key during the error-detection process, and this would be the secret shared only between the source and recipient."

He says the method isn't encryption — which is deliberately scrambling the message or encoding it — but can be useful to prevent unauthorized persons from learning anything useful from online data. Basically, the method allows one to benefit from error detection and improved security at the same time. 

Inspiring future nuclear engineers

Sandians share their paths to the Labs, technical expertise with Gallup students

By **Myles Copeland**
and **Amy Tapia**

Danielle Redhouse had an abandoned shopping cart and lots of time.

Danielle's parents sent her to spend summer vacation with her grandparents in Tohatchi, a community on the Navajo Reservation about 150 miles northwest of their Albuquerque home.

"There's not a lot to do," Danielle reminisced, "and that resulted in a lot of tinkering."

She remade the grocery aisle vehicle as a tool of recreation, turning it into a kind of sled.

"It's kind of a small engineering project," she said. "So, with engineering projects later in life, it's kind of like, 'I've done this before.'"

Danielle shared this story, and her overall journey to becoming a nuclear engineer, with students from Gallup and Miyamura High Schools as part of a career speaker series arranged by Sandia's Community Involvement and American Indian Outreach Committee.

Despite needing to meet virtually during the pandemic, Danielle successfully connected with the Gallup students who live just 30 miles from her grandparents in Tohatchi. Their interaction stretched two and a half hours as students asked one question after another.

"Because the meeting was running way beyond the one hour that we planned because of all the students' questions, I finally had to end it for poor Danielle," said Eric Schieldrop, the Gallup students' science and engineering teacher. "The students were so into it."

Eric credited interactions with Sandians for helping keep his students engaged through the pandemic. He said that seeing fellow New Mexicans working for a national laboratory in research, engineering, cybersecurity and more made careers that might have seemed distant feel more attainable.

"Just before the pandemic hit, we brought students to Sandia," he said,

describing a STEM Day at the Lab event that brought his students to the Albuquerque campus in early March of 2020. "They got to meet the whole range of people, and that hooked them in a way that drove them through this whole year. A lot of the textbooks can feel like a different universe. To go to Sandia and see that, 'people where I'm from are here,' I think that was the key. When we went to visit, [our students] saw a diverse population and people who grew up around here."

Danielle appreciated the Gallup students' candid questions and the opportunity to encourage them through her experience.

"One student asked me, basically, 'what if you don't do that well in school,'" she said. "The [students] that resonated with me were basically those that felt like they couldn't do it, because I felt that a lot. I failed chemistry for the first time in college because I didn't understand how college worked. The point is just to keep trying."

This STEM pathway program introduced students to new technical challenges. Graduating seniors built their own 3D printers as part of a capstone project offered in partnership with **R4 Creating**, a nonprofit organization that provides robotics and STEM opportunities for kids.

These students also participated in a summer program for six weeks after graduation. **Growth Sector**, a nonprofit that connects underserved students to high wage jobs, and Navajo Technical University taught a pre-calculus class.



PRINTING HER FUTURE — Alanna Belone works on a 3D printer as part of the STEM pathways program, a collaboration between R4 Creating, Sandia and the Gallup McKinley County Schools. **Photo by Eric Schieldrop**

Sandia, Los Alamos and Lawrence Livermore national laboratories facilitated career exploration projects. The program culminated in a seven-day cybersecurity incident simulation called Tracer FIRE. Typically offered by Sandia cybersecurity staff to college students and professionals, the Tracer FIRE event introduced the recent graduates to cybersecurity tools and processes, then presented them with a cybersecurity incident to investigate, determining who was behind it and what data had been compromised.

"It was challenging," said Summer Sorrell, one of the recent Gallup grads who participated. "With my teammates, we were working together, learning the programs. It drove me to be more observant, more focused."

Eric described Summer as taking a vocal role during the Tracer FIRE event.

"Summer was in a group of three," said Eric. "Teammates would get stuck pretty frequently. She pushed her computer aside,



VIRTUAL SCHOOL SUPPLY DRIVE

JULY 26 – AUGUST 13

School is about to start and our local students need supplies to succeed.

Sandia's long-standing back to school supply drive is all virtual –
let's stuff the bus with cash!

VISIT THE COMMUNITY INVOLVEMENT WEBSITE TO MAKE A DONATION.

went to the others and said, 'Did you try this? Did you try that?' That cybersecurity unit was difficult. It took persistence to stick with it, and Summer did it."

Summer plans to attend Navajo Technical University and said she is now considering a cybersecurity career and the opportunities it might provide to "make the internet safer."


Summer's reaction seems to be exactly the response Tracer FIRE team members hope to inspire.

"I think [Tracer FIRE] opens your eyes to different opportunities in cybersecurity," said Tyler Morris, who eventually found his way to Sandia's cybersecurity initiatives group after his Junior ROTC instructor "volun-told" him to participate in a high school cybersecurity competition. "Even if you grew up in a small town and don't have these opportunities immediately available, they are still a possibility, and you can do them."

Sandia technologist John Bailon delivered the opening remarks for the Tracer FIRE event. After growing up on the Navajo Reservation and serving in the Marines, John discovered his passion for cybersecurity late in business school and began working in information operations nine years ago, an experience he describes as "learning with Jedis." John said he sees potential for Tracer FIRE events like the one in Gallup to attract members of the Navajo community he grew up in.

"Like the warrior ethos that inspired the Code Talkers to go off and do their work in the Pacific [during World War II], I think there's the same kind of mindset in cyber," he said. "They will come, we've just got to keep doing these kinds of programs."

As they transition from high school to college, the Gallup students will continue to receive support from Growth Sector. In August, the cyber team will conduct a Tracer FIRE event for Growth Sector students who are entering Central New Mexico Community College.

Eric described Tracer FIRE and the other STEM experiences of the past year as making careers in science, engineering, cybersecurity and more seem attainable. "Now there's something in their head that this might be something they would do in the future," Eric said. 

Mileposts



William Wampler 45



Muhammad El 30



Dan Schell 30



Lynne Starkweather 30



Mike Baker 20



Nathan Brannon 20



Colette Bristol 20



Michael Busse 20



Thomas Duran 20



Mike Flores 20



Tony King 20



Andrew Lopez 20



James McCloskey 20



Steven Spinhirne 20



Melody Teixeira 20



Jason Verley 20



Keith Vigil 20



Vicki Chavez 15



Peter Schwindt 15

Recent Retirees



Steve Lautenschlager 40



The 2021 Employee Recognition Awards were held in New Mexico and California this week. Sandia celebrated employees who “have gone far above and beyond their described job duties and have been peer-nominated for their accomplishments,” HR Director Rob Nelson said.

Celebrating the victors:

Employee Recognition Awards winners feted

By [Shelley Kleinschmidt](#)

At awards ceremonies held Tuesday in New Mexico and Thursday in California, Sandia celebrated the winners of the 2021 Employee Recognition Awards and their significant achievements.

Employee Recognition Awards recognize the accomplishments of the top individuals and teams whose efforts over the past year made the most significant contributions to the Labs’ success.

The socially distanced hybrid event in New Mexico and outdoor event in California followed local COVID-19 guidelines.

Human Resources Director Rob Nelson said, “This is the one time each year when we celebrate the Labs’ most significant accomplishments. Taking time to do that is so important.”

The six Employee Recognition Awards categories, revised over the past year and with safety and security integral to each, are: innovation; technical excellence; leadership; operational excellence; collaboration; and inclusion and diversity.

The [list of winners](#) includes descriptions of achievements between Oct. 1, 2019 and Sept. 30, 2020.

“Please join me in congratulating those who received an Employee Recognition Award,” Rob said.

Annually, following the nomination process, each division selects and advances two of its ERA winners for consideration for the Labs Director Awards, which further distinguish Sandians whose work had

the greatest impact on the Labs’ overall success. Following the Labs Director’s in-depth evaluation and selection, the winners were announced during the Employee Recognition Awards celebrations. Winners receive a one-of-a-kind award along with a numbered coin redesigned for each year’s honors.

The honor of receiving an Employee Recognition Awards represents a long tradition across mission delivery and mission enabling organizations.

“These Sandians have gone far above and beyond their described job duties and have been peer-nominated for their accomplishments,” Rob said. “As a peer-to-peer award, this highlights that individuals at Sandia notice each other’s great work and take the initiative to acknowledge it.”

“The peer-to-peer aspect of the Employee Recognition Awards award has always made it highly meaningful,” Rob said, adding that the program is built on the assumption that those who work most closely with their colleagues know best who has made the greatest contribution during the preceding year.

Employee Recognition Awards nominees and winners have come up with novel improvements to processes or created innovations that have made a difference to their work and execution of the Labs’ mission.

“I’m inspired by the sheer breadth of nominations for so many types of accomplishments, across so many different areas,” Rob said. “It takes all of these to accomplish Sandia’s important mission.”

More information is available in the official [ERA Program Guide](#).

INDIVIDUAL HONOREES



William Bachman 1000



Katharine Harrison 1000



Derek Lamppa 1000



Kelly Seals 1000



Curt Dundas 2000



Shuyue Guo 2000



Thomas Oakes 2000



Angela Scherbarth 2000



Nicholas Spinhirne 2000



Kelsey Wilson 2000



Edward Winrow 2000



Robert Wright 4000



Marcos C de Baca 5000



Janice Leach 5000



Sarah Marzulli 5000



Eugene Tenorio 5000



Monear Makvandi 6000



Benito Martinez 6000



Laura Powledge 6000



Brett Sternecker 8000



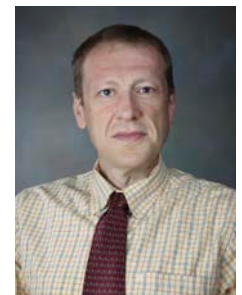
Marylou Brazee 9000



Han Lin 9000



Matthew Martinez 9000



Mikhail Wolf 9000



Kathryn Bach 10000



Ryann Washburn EXEC



TEAM HONOREES

EXECUTIVE SUPPORT DIVISION



ES&H COVID-19 Disinfection Response Team

Sandia National Labs COVID-19 Pandemic Team - Executive Office, GR, Comms, and COOP

The COVID-19 Pandemic Team worked over a year to ensure the workforce is safe while executing Sandia's national security mission. The executive office's team members contributed on the Pandemic Team to minimize on-site spread of COVID-19, helping lower Sandians infection rates (compared to public), and support meeting all mission deliverables.

ES&H COVID-19 Disinfection Response Team

Sandia ES&H led a multidisciplinary team to respond to the COVID-19 global pandemic by establishing disinfection procedures, leading disinfection teams in the decontamination of affected buildings and Sandia COVID-19 testing sites, managing infectious waste, and mitigating the impact COVID-19 placed on Sandia mission objectives.

DIVISION 1000



Securing Top Academic Research and Talent at Historically Black Colleges and Universities

Mk21Firing Set Interface Module (FSIM) Radiation Test Team

The multi-divisional Mk21 FSIM radiation test team successfully executed three weeklong experiments associated with the Respin effort at HERMES, Saturn and the WSMR Fast Burst Reactor during June 2020. These were the first radiation experiments performed on a major nuclear deterrence component at each facility during the COVID-19 pandemic.

Code development for ElectroMagnetic Plasmas in Realistic Environments (EMPIRE)

This multidisciplinary team quickly developed a code base to be able to demonstrate proof-of-concept simulations on DOE's fastest computers of hostile radiation environments on HERMES, SPHINX and Z from pulse power through to radiation effects.

Securing Top Academic Research and Talent at Historically Black Colleges and Universities

The START HBCU team worked diligently over a one-year timeframe to establish a collaborative research, recruiting, and professional development program to build strong institutional relationships between Sandia and HBCUs to attract, retain and develop a diverse talent pipeline in STEM and cultivate an inclusive and diverse workforce.

Astra Supercomputer ATDM Level-1 Milestone Team

The Astra Supercomputer Team provided outstanding support in the successful completion of a Tri-Lab Level-1 Milestone under the Advanced Simulation and Computing ATDM program. Despite Astra's initial deployment as a prototype system, the team persevered through technical challenges, a compressed schedule and pandemic to deliver with excellence.

DOE COVID-19 Epidemiology Modeling Team

The DOE COVID-19 Epidemiology Modeling Team developed modeling and analysis capabilities to aid U.S. policy-makers in responding to the COVID-19 pandemic. Sandia's team was part of a national DOE effort that improved understanding of COVID-19 impacts and heightened situational awareness to government leaders.

SPARC

Sandia's SPARC code development team has successfully completed work leading up to a capstone FY20 L1 milestone that paves the way for understanding and prediction of reentry environments at unprecedented resolution on future DOE exascale systems.

Cable Pulldown Calibration Test Support Team

A calibration cable pulldown test was conducted at Sandia's Aerial Cable Facility. The support team prepared the site, developed safety documentation, tracked financials and fielded equipment for test execution. The test was executed safely and successfully, and data from the test informed future surveillance test design and planning.

Modeling and Simulation Support for Mobile Guardian Transporter (MGT) Testing and Development

A powerful simulation strategy that realized more than a 2x decrease in run time from a close collaboration between Center 1500 SIERRA code developers and analysts enabled timely pretest simulations of the Mobile Guardian Transporter Prototype 1 full-scale side-on crash test, a high-priority NNSA deliverable completed under challenging COVID-19 restrictions.

COVID-19 Rapid Response Research, Technology Partnerships and Deployment, and Communication Team

As COVID-19 hit Sandia, a team formed to rapidly employ existing research and technology deployment programs, create new programs and create a communications/collaboration environment for employees who were told to work from home. This enabled Sandia to apply its R&D capabilities across the nation in time to make a difference.

DIVISION 2000



COTS Production Support Team

COTS Production Support Team

This team partnered across Sandia, Kansas City Nuclear Security Campus, and a manufacturer to develop a production screen for a commercial part. They worked with next-level assembly designers, component engineers and quality engineers to understand failure modes, evaluate screen parameters and implement the first Sandia-performed screen of war reserve quality production parts.

B-52H Comprehensive Test Team

The B-52H Comprehensive Aircraft Monitoring and Control (AMAC) test team successfully completed a long overdue test.

W88 ALT 370 WETL Tester Product Realization Team

The ALT 370 Weapon Evaluation Test Laboratory (WETL) Tester Product Realization Team completed surveillance tester qualification activities and pioneered and matured numerous technical and programmatic advancements that set the precedent for all future WETL testers.

ISA Production Capability: ALT940 and MTAD

During the pandemic, ALT940 and MTAD production teams rapidly developed new production capabilities to successfully complete their first development and PPI builds. This was accomplished while maintaining and exceeding CDC best practices and minimizing risk of exposure to the team.

SEDC Implementation Team

The Source End Diode Conversion implementation team worked across organizations to change neutron tube testing procedures and reduce the yearly scrap rate of about 70 neutron tubes, saving \$3 million per year. The team utilized scientific research to initiate the process change and demonstrated the power of collaboration between organizations.

Mk21 Arming and Fuzing Assembly Product Realization Team

Through outstanding collaboration, planning and innovative solutions, the Mk21 AFA PRT completed a virtual Final Design Review by the original baseline date, creatively working through COVID-19 restrictions, and earned a Pass with No Conditions rating for a major nuclear weapons product.

B61-12 Anomaly Resolution Team

The ART-18 successfully investigated and determined root cause for a significant anomaly observed during a B61-12 final qualification flight test. The team demonstrated excellence in science, engineering and testing to identify the highest probability root causes and verify their conclusion after test unit recovery.

SEDS Agile Development Team

The Stockpile Evaluation Data System Agile Development Team executed a successful timeline to first production for the data repository enabling modern analytics practices while still providing a history of legacy test data migrated from ISS. The first production timeline aligned with modernization program data coming online in FY21.

MGT Design Team

The MGT design Team successfully delivered for P1 and P2 procurement, assembly and test activities despite resource shortages, overlapping activities and tight time constraints.

DIVISION 3000



COVID-19 Communications Response

Promotion Through Post and Bid Core Team

Sandia's Executive Management commissioned a team to explore options of allowing promotions through post and bid. A cross-divisional team championed by director Ann Campbell was developed from Talent Acquisition (NM/CA); Compensation; Human Resource Business Partners; Inclusion, Diversity, EEO and AA; and Data Analytics. The team collaborated on options to execute in alignment with DOE guidance.

COVID-19 Communications Response

Communicating effectively about complex health and safety issues during a year-long pandemic was unprecedented. Employees' lives were at stake. From March 2 the Communications team ensured employees got information needed to work effectively and safely. Communications also promoted Sandia's pandemic response, raising national and local awareness of the Labs' leadership.

3300/8519 COVID-19 Response Team

In February of 2020, Sandia was faced with how to respond to the COVID-19 pandemic. The magnitude of this pandemic was unimaginable, and as the months went on Employee Health Services acted with urgency and implemented initiatives to keep the spread of COVID-19 as low as possible.

DIVISION 4000



FY20 Facilities Information Management System Validation Team

FY20 Facilities Information Management System (FIMS) Validation Team

In April 2020, this team was the first in the NNSA complex to conduct a successful virtual FIMS validation, five weeks after the COVID-19 pandemic lockdown started. The validation set the standard for other NNSA sites to follow in completing remaining FY20 FIMS validations across NNSA.

Sandia Infrastructure Investment Planning Process Team

The SIIP team utilized benchmarking and Program Management Institute best practices to define a new Labs process for the identification of facilities investments that improves strategy alignment, funding stream determination and prioritization of needs. SIIP is now Sandia's repository for facilities and infrastructure needs.

Vehicle Maintenance Facility Support to MGT

The proactive approach of the VMF team to collaborate with the Mobile Guardian Transporter program has positively impacted the program design, logistics, problem solving and performance assessment of the trailer. The VMF team provided instrumental collaboration in the achievement of milestones on the NNSA/NA-15 FY20 watchlist.

Classification

In an effort to protect national security information and support mission programs, the classification office radically transformed their approach to training and deployment of classification awareness briefings for staff, resulting in reduced incidents of security concern in specified areas and enablement of mission essential programs.

20th St. & G Ave. Intersection Relocation Project

The multiyear collaboration between Sandia, NNSA, Kirtland Air Force Base, and the City of Albuquerque led to the completion of a \$15 million, 12-month road construction project at KAFB's Eubank gate two months ahead of schedule and over \$1 million under budget, resulting in strengthened security and improved traffic flow.

DIVISION 5000



WeaselBoard Production Team

Wind Tunnel A4H LDRD Design and Test Team

The A4H LDRD Team is developing a dynamic controls ground-test capability in Sandia's Hypersonic Wind Tunnel in order to understand and characterize performance in various hypersonic flight conditions. The ability to fly a controlled hypersonic test article in a wind tunnel exists nowhere else in the world.

WeaselBoard Production Team

The Weaselboard Production Team successfully completed production readiness review for multiple hardware security devices destined for afloat U.S. Navy surface combatant ships. Through a collaborative effort across Sandia, Kansas City National Security Campus and the Navy, the team was able to transition an innovative LDRD concept despite the COVID-19 pandemic.

Olympus

The Olympus team demonstrated technical excellence by developing new tools and completing two high-priority vulnerability assessments on complex information systems in less than a year. They achieved these mission critical results in a phenomenally short time by successfully collaborating with two other teams at Sandia.

ARCHER Design Team

The team successfully completed testing characterization for ARCHER Shuttle #1 parts and successfully designed and completed tape outs ahead of schedule for Shuttle #2 and Shuttle #3.

SiGe Tool Installation and Development Team

The Silicon-germanium tool installation team was confronted with the daunting challenge of installing one of MESA's potentially most hazardous tools, supporting one of Sandia's top programs. The team holistically worked together to meet an extremely compressed schedule during a world pandemic through proactive planning and dedicated commitment.

Chemical Inventory Management Operations Team

The pandemic presented the MESA workforce with the unique challenge of finding safe ways to work without disrupting our mission.

Sensors Development Team

The sensors team designs sensor microsystems, which are fabricated by an external vendor. The second production lot experienced problems. The team, working through COVID-19 across state lines, uncovered subtle changes in the vendor's process, corrected the problem, and delivered a corrected lot before the need date.

FE-2 Project Team

The Conventional Prompt Strike FE-2 Project Team conducted a flight test on March 19, 2020. The flight system launched from the Kauai Test Facility, Kauai, Hawaii. The successful test provided data on hypersonic boost-glide technologies and long-range atmospheric flight.

Copycat

The Copycat Team consistently overcame technical and operational hurdles to deliver high-quality products to a wide variety of internal and external customers. The high level of operation displayed by the team has attracted new customers and caused the capability to grow and expand.

Virtual Reality Implementation and Training Team

Spanning nine different organizations in Divisions 5000 and 6000, our multidisciplinary team demonstrated exceptional teamwork and collaboration in the area of virtual reality. The team quadrupled the number of classified virtual reality stations in use at Sandia and provided VR-based, national-security training to over 100 internal and external users.

BlueJay

The BlueJay team developed a navigation sensor payload containing over 10 sensor technologies to provide GPS-denied navigation capabilities for small unmanned aerial vehicles. A four hour UAV flight demonstration was achieved in three months. This has enhanced Sandia's reputation in GPS-denied navigation and resulted in ~10x increase in budget and scope.

DIVISION 6000



MGT Prototype 1 Sled Track Crash Test Team

LAB DIRECTOR'S AWARD WINNER

MGT Prototype 1 Sled Track Crash Test Team

The MGT P1 crash sled track test was the first full-scale transportation crash test in 20 years for NA-15. A coordinated effort from the MGT team, the test execution team, Weapons Systems and Los Alamos National Laboratory, the successful test generated spectacular results in support of NNSA's secure transportation mission.

Aerosol Sciences COVID-19 Response Team

During the early stages of the COVID-19 pandemic, the nation experienced a critical shortage of N-95 masks and other personal protective equipment. The Aerosol Sciences COVID-19 Response Team worked with several local businesses partnered with the Sandia NM Small Business Assistance program to test and evaluate novel materials for alternative PPE solutions.

Global Security Virtual Showcase Team

The Global Security Virtual Showcase Team pivoted from an in-person poster session to a virtual, interactive poster session to fulfill a commitment to increase the understanding of Global Security's diverse portfolio among members of the division while adhering to Sandia's maximum telecommuting posture.

Dagger Payload Development Team

The Dagger team demonstrated exceptional dedication and skill in planning, designing, assembling and testing an innovative space payload for the U.S. Space Force on a short development timeline despite multiple challenges. Upon delivery, the customer expressed extreme satisfaction for the team's ability to finish on schedule despite the pandemic.

PGMM Cueing Application

The initial version of the PGMM Cueing Application was delivered to Operations in October 2020 and had a successful Acceptance Review on February 5, 2021. This capability provided the first constellation-level real-time retasking capability to the PGMM/OPGA architecture and provides the basis to immediately extend the constellation.

DIVISION 8000

CA Health & Employee Services Clinic Team

CA Medical overcame staffing, supply chain, rapidly changing information and personal challenges to provide guidance and critically needed resources keeping MOWs, their households and leadership informed, healthy and productive. Their

responsiveness, work ethic and willingness to put themselves at risk enabled our site to maintain critical mission work.

Inclusion and Diversity Vetting Team

The I&D Vetting Team reviewed a wide variety of I&D materials for compliance with the Executive Order that came into effect in September 2020. Working quickly, the team was able to return over two thirds of the materials to use by Sandia by the end of 2020.

Telecommuting Study Team

This cross-divisional team was brought together during the pandemic to collect and synthesize large volumes of telecommuting data from employees, academic literature and industry best practices. The team provided data-driven recommendations to Senior Leadership Team, which served as the basis for ongoing efforts to develop telecommuting policies and implement flexible work options.

Joint Technology Demonstrator, Workstream 2, Ground Test Unit Full-System Superfuge

Sandia engineers designed and executed the first ever 'Superfuge' ballistic reentry environmental test on a nuclear deterrence system demonstrator, leveraging the underground 29' radius centrifuge to produce simultaneous acceleration, spin and vibration environments on a full Mk21 aeroshell system, resulting in the highest-fidelity ballistic reentry simulation to date.

W87-1 Model Based Systems Engineering (MBSE) Team

This ERA recognizes the collaboration with our MBSE mission realization partner advanced systems and transformation and the W87-1 system team. Together a W87-1 MBSE model was created and successfully leveraged for the identification, derivation, trace and validation of initial requirements from customer to system to components.

Dual Miniature Mechanical Transfer Optical Assembly Yield Improvement

The DMMTOA is a critical sub-component of the B61-12 and W88 Alt370 JTAs. FY20 DMMTOA yield at the National Security Campus was 0% due to ceramic cracking, putting all future B61-12/W88 JTA flights at risk. This team found the root cause of the cracking and FY21 yield has subsequently been 100%.

Supercritical CO2 Brayton System Recovery Team

The Team returned the Supercritical CO2 Brayton Loop to service in a timely manner (two months) to resume customer testing with minimal impact to schedule.

Integrated Videoconference Team

The videoconference team worked tirelessly at the start and through the pandemic to ensure staff had an effective way to communicate while remote and more options to maintain social distancing when returning to work. They helped transition to more modern videoconference tools for improved experience and expanded on-site classified options.

Brine Availability Test in Salt

The launch of the world's only active underground heater test in salt is advancing the science supporting deep geologic disposal of heat-generating nuclear waste. The accomplishment benefits the DOE, which bears responsibility for disposition of commercial spent nuclear fuel, and engages scientists and influences disposal programs around the world.

N95 Sterilization COVID-19 LDRD Team

This cross-center partnership examined the efficacy of supercritical carbon dioxide in sterilizing 3M 1860 N95 masks that were in short supply at the beginning of the COVID-19 pandemic. They procured masks, built and operated multiple pressure vessels to generate sCO2 safely and worked with National Institute of Occupational Safety and Health.

Strategic Petroleum Reserve Team Executes Presidentially Directed Fill Action

In response to a presidential directive, the team led short-turn development and integration of an oil quality characterization program. The assessment provided actionable recommendations to DOE on inbound crude compatibility with current SPR inventory and requirements for both near-term volatility upon redelivery and long-term integrity of the reserve.

High-Temperature, High-Pressure, Particle-to-Supercritical CO2 Heat Exchanger Team

This team developed the world's first high-temperature, high-pressure, particle-to-supercritical CO2 heat exchanger and tested it on-sun at the National Solar Thermal Test Facility, overcoming significant technical and ES&H challenges. This advanced heat exchanger enables carbon-free electricity production using next-generation power cycles with higher efficiencies and lower costs.

Fortifying Strategic Collaborations with LLNL in COVID-19 Research and Development

This team strengthened strategic collaborations with Lawrence Livermore National Laboratory for therapeutic discovery combining synergistic capabilities in computational and experimental biology. The team went above and beyond the normal call of duty to make significant contributions in COVID-19 research by delivering exceptional results that created new opportunities to expand pandemic research throughout DOE.

COVID-19 Future Scenarios

Sandia assembled a COVID-19 Future Scenarios Team to inform/advise Sandia's senior leadership team on potential long-term implications of COVID-19 on the Labs. The Future Scenarios Team engaged expertise and people across the Labs to generate insight on the rapidly developing pandemic and its potential long-term impacts.

DIVISION 9000



Virtual Private Network Team

Pandemic Team - IT/Cyber Subteam

The COVID-19 Pandemic Team has worked over a year to ensure the workforce is safe while executing Sandia's national security mission. Because of the team's efforts, potential on-site spread of COVID-19 has been minimal, Sandians have experienced lower infection rates than the public and all mission deliverables have been met.

5522A Calibration Team

Electrical Standards Lab members were assigned the challenging task of developing an in-house automated program of Fluke 5522A multi-product calibrator, reducing the number of assets being sent off-site for calibration and improving customer support. Completion of this task involved five team members, seven months and over 17,000 lines of code.

Frequency Domain Thermoreflectance Team

A unique thermo-optical microscope addressed thermo-mechanical metrology needs mission applications such as additive manufacturing, spray coatings and microelectronic heterogeneous integration ecosystems. The system impact has been documented in peer-reviewed journals and contributed to eight LDRD projects and four nanotechnology proposals.

Manzano High Performance Computing Cluster: Procurement, Integration and Performance Team

Sandia's latest HPC cluster, Manzano, was delivered on September 21, 2020, offering 1,488 additional compute nodes to Sandia's HPC environment. This team, made up of personnel from multiple departments, worked together to ensure this work was completed with the health, safety and security of all as priority.

Health Check Development Team

The Team developed and supported the Health Check survey, which aids in screening members of the workforce for COVID-19 symptoms prior to arriving on Sandia premises. Results of the survey are used to allow or deny access to Sandia premises.

Virtual Private Network Team

When COVID-19 sent the workforce home, Sandia's VPN usage exploded, going from 1,400 to more than 10,000 connections daily. Emergency actions increased VPN traffic by tenfold, and a new solution was critical. In six months, the Team evaluated, acquired, configured and delivered a new VPN and moved the workforce to it.

DIVISION 10000



Third-Party Telecommunications and IT Support Services Subcontract Award Team

FY20 Reduce the Manager Burden Team

Leaders who were committed to continuous improvement worked outside of their normal roles to measurably reduce the manager burden. The Team embraced experimentation to deliver 11 improvements with many still in work to "Lighten the Load" for managers.

Inventory Using Network Identification

An innovative property inventory process was developed to seamlessly and unobtrusively scan Sandia's Restricted Network for connected property. Results proved 1,031 records were received/processed in 17 minutes. This will significantly reduce inventory labor resources and increase the efficient management of trackable property, resulting in a three-year cost avoidance of \$919,000.

Third-Party Telecommunications and IT Support Services Subcontract Award Team

The Team awarded Sandia's largest agreement (\$700 million) to a New Mexico small business. This agreement covers the support and provisioning of specific telecommunications and IT services for the Labs. The agreement will improve category management/delivery response, increase operational security, enhance technical agility/partnership and create administrative efficiency.

10400/10600 Organizational Design Core Team

The 10400/10600 Organizational Design Core Team navigated the complex task of splitting the 10600 center by competency and then designing two new centers with distinct service delivery models and updated job descriptions. This team also led the coordination of communication and change management.

Sandia's Indirect Planning, Programming, Budgeting, and Execution Process Team

The Team developed and deployed the SI-PPBE process to ensure optimization of Labs resources to best deliver the mission. The process utilizes enhanced frameworks and concepts requiring a heightened level of discipline to work planning, accountability, consistency and transparency across several key stakeholders.

Architecture for Partnering with Excellence

The Team was recognized for exceptional dedication to operational excellence by designing and implementing a new business service delivery model.

COVID-19 Pandemic Team, Division 10000


The COVID-19 Pandemic Team has worked for almost a year to ensure the workforce is safe while executing Sandia's national security mission. Because of the team's effort, potential on-site spread of COVID-19 has been minimal, Sandians have experienced lower infection rates than the public, and full operations were maintained.

DIVISION 11000



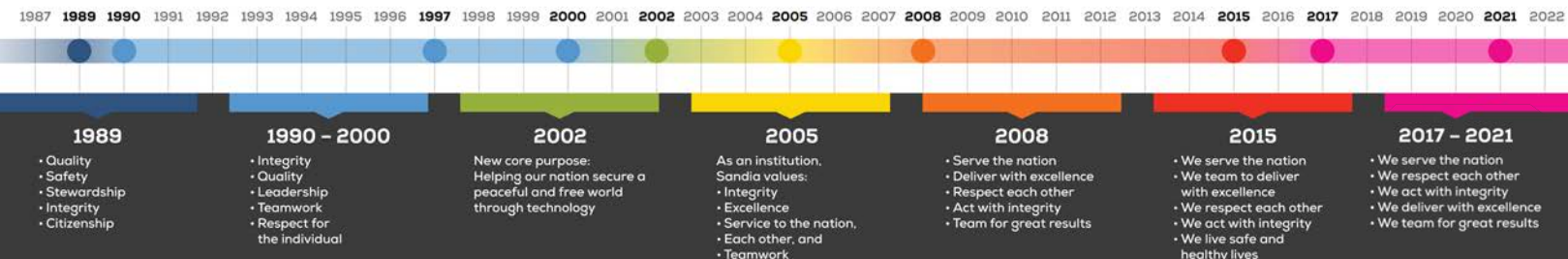
Legal and Prime Contract Pandemic Support Team

Legal and Prime Contract Pandemic Support Team

The Team provided outstanding support in multiple areas to support management's response to the pandemic ensuring safety of personnel while enabling mission execution during this unprecedented time. 



Sandia Core Values define culture and mission



TIME FOR CHANGE — Sandia's Core Values have evolved since they were initially drafted in 1989.

By **Lucy Long**

Sandia's core purpose for the past 72 years has been to render exceptional service in the national interest, but what does that look like each day?

Values through time

In 1989, members of the Small Staff – what is now called the Senior Leadership Team – participated in a facilitated strategic planning process that defined the Core Values. Former Vice President Dennis Roth proposed five corporate values for Sandia: Quality, Safety, Stewardship, Integrity, and Citizenship.

The Core Values were further refined to Teamwork, Integrity, Quality, Leadership, and Respect for the Individual. These were first published in the 1990 Sandia Strategic Plan and did not change until 2001. The Sandia Institutional Plan for 2001-2006 states, "Sandia's corporate values, first identified in Strategic Plan 1990, remain valid today. In fact, experience continues to confirm their relevance and utility."

Following 9/11, former Sandia President Paul Robinson and the leadership team introduced a new core purpose statement: helping

our nation secure a peaceful and free world through technology. Paul explained the reasoning behind this shift in the 2002 Sandia Institutional Plan's introductory letter, which identified the Core Values as integrity, excellence, service to the nation, our people, and teamwork:

"This statement highlights that 1) we work for the United States in providing our assistance to achieve a peaceful and free world—

not only for our citizens but for all citizens of the world; 2) we are increasingly taking a global view as we carry out our work; and 3) Sandia's advanced technologies are the primary tools we bring to the table.

"The goal of our core purpose and the hopes and dreams for a better world suffered a major setback in the tragic terrorist attacks of September 11, 2001. For the first time since Pearl Harbor, our nation suffered a deadly attack with thousands of deaths. There is

no doubt that we will rise up as a people and as a nation to avenge these cowardly acts.

"Many parts of our government have called on Sandia to provide help in waging the war against the terrorists now under way and to help keep future destructive acts from succeeding. We take pride in adding these missions to our other national security responsibilities.

"Our fledgling and newly articulated core purpose has been bloodied, but the importance of achieving success in this important task has never been clearer."

Former Sandia President Tom Hunter affirmed previous Sandia leaders' work identifying the Core Values in 2008.

"Sandia's mission and its people are bound together by the Labs core values — integrity,

"The Sandia Values are important because they define us as a laboratory and govern everything that we do. The culture that we build around these values is very important. It distinguishes us and it makes us successful."

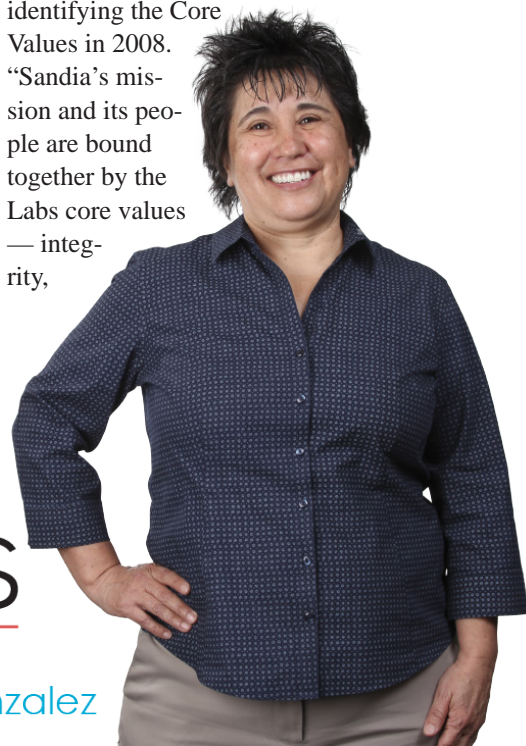
— Basil Hassan



SANDIA VALUES

Exceptional service starts with you.

Rita Gonzalez



excellence, service to the nation, each other, and teamwork,” Tom said to the Lab News. “If Sandia remains true to those values, [we] can continue to provide exceptional service to the nation regardless of the challenges [we face].”

When the Labs’ leadership unveiled a new strategic plan in 2015, they revisited the Core Values to ensure they continued to reflect Sandia’s culture. SLT aligned the value of “teaming for great results” with the value “delivering with excellence” to recognize that these two concepts must both be present to achieve greatest success. Notably, SLT added a new value to reflect Sandia’s ongoing commitment to safety and health: We live safe and healthy lives.

Sandia’s Management and Operations contract transition to NTESS in 2017 did not change the Sandia Core Values. In 2020, they were revised to their current state:


- We serve the nation
- We respect each other
- We act with integrity
- We deliver with excellence
- We team for great results

Embracing values in everyday life

Sandia Labs’ purpose is enabled through the Core Values, which are used to inform daily decisions, shape performance, and enable us to achieve success as one Lab with one national security mission. The Core Values are an integral part of Sandia culture.

The new Sandia Values Video series features Sandia leaders sharing how the Core Values help inform their decisions and experiences. As teams watch the videos together, they are encouraged to use the [Sandia Values Videos Discussion Guide](#) as a tool to help define

the Core Values and related behaviors that are important to each organization. Managers are also encouraged to share their own leadership stories demonstrating the Values.

As the year-end performance management cycle approaches for non-represented employees, it’s important to understand how the Sandia Core Values inform decisions, as well as how they define Sandia culture. This fall, Sandia managers will use the Core Values to evaluate year-end performance for regular, non-represented employees. By using Core Values and companion behaviors as standards for employee evaluations, Sandia seeks to align individual success with Labs-wide performance goals. For more information about performance management, resources, and associated key dates, see hr.sandia.gov. 



Internship program paves successful path for American Indian and Alaska Native students

By Sarah Jewel Johnson

American Indian and Alaska Native science, technology, engineering, and math students face extraordinary odds when pursuing higher education. As the most underrepresented group in STEM education, AI and AN students often enter the workforce as a significant minority with little support. According to a 2015 National Action Council for Minorities in Engineering report, AI and AN students represented only 0.4% of all engineering bachelor’s degree recipients, 0.3% of the engineering workforce, and 0.1% of all engineering faculty. AI and AN students can intern at Sandia through the DOE’s Office of Indian Energy Policy and Programs internship program.



BRIGHT FUTURES — Sandra Begay, center, talks with interns about how a photovoltaic panel works to generate electricity. The DOE has offered the internship program through Sandia since 2002. Picture taken at the Mission San Esteban Rey in the Pueblo of Acoma. **Photo by Randy Montoya**

The program, implemented through Sandia, offers unique interactions with professional connections to tribal leaders and staff based on personal rapport. Interns also gain access to seminars and conferences that showcase tribal energy projects as well as meet-and-greet opportunities with energy leaders and staff.

DOE Indian Energy interns leverage their experiences at Sandia and beyond to complete a diverse set of research work. Since its inception, the program has hosted 44 undergraduate and graduate students, 60% female, from 13 tribal affiliations. On average, approximately 20% of the interns convert to year-round status, while 15% were hired as Sandia employees.

After their internships, former interns have focused their work: 50% of students pursue research directly related to tribal energy work, 36% seek research in STEM and 4% seek nonprofit work.

Where are they now?

Program graduates have greatly impacted STEM research, education and access for future generations. Three former interns share where they are now and how they use their internship experience daily.

Tommy Jones

Tommy Jones was a DOE Indian Energy intern at Sandia from 2014 to 2016 and is now the Deployment Specialist for the Office of Indian Energy where he helps to execute the office's deployment program. His current role includes coordination of financial and technical assistance education and outreach to tribal communities across the United States. He is a member of the Naknek Native Village of Alaska and a Native shareholder of Bristol Bay Native Corporation as well as a citizen of the Cherokee Nation of Oklahoma.

Tommy's **current work** emphasizes the need for local community and tribal support by investing and educating youth about energy resiliency and reliability.

Suzanne Singer

Suzanne Singer was a DOE Indian Energy intern in 2008 and 2009 and is a member of the Navajo Nation. After her internship at Sandia, Suzanne cofounded Native Renewables, a nonprofit organization that brings solar installation,

maintenance, education and support to native communities across the country. In 2019, Suzanne received the **U.S. Clean Energy Education and Empowerment Entrepreneurship Award**.

Lani Marina Tsinnajinnie

Lani Marina Tsinnajinnie was a DOE Indian Energy intern at Sandia in 2006 and is a member of the Navajo Nation. She is currently a hydrologist and an assistant professor in the Community and Regional Planning Department at the University of New Mexico. In her role, she teaches students about environmental issues due to climate change impacts, particularly how water resource issues affect native communities.

Lani's passion is leveraging her research to partner with the Navajo Nation to collect and analyze water data. She also enjoys giving back to her community by teaching students about tribal water management and research as a professor. Lani recently shared **her story** with the Explora Science Center.

Sandia mentorship

Along with personalized support from subject matter experts and an introduction into the work of STEM careers, interns have access to many Sandia facilities including the **National Solar Thermal Test Facility**, the **Distributed Energy Testing Lab** and the **Photovoltaics Systems Evaluation Lab**.

The success of the program is made evident by relationships formed among the interns and their mentors, particularly Sandian **Sandra Begay**, who has led the internship program for the DOE Office of Indian Energy, and its predecessor program, for 16 years. Sandra is a member of the Navajo Nation.

"Her lifelong tireless work to ensure that current and future generations of Native Americans have positive and productive impacts through STEM is unparalleled. Sandra has changed countless lives for the better, mine included," says Tommy.

Sandra Begay was recently recognized for her decades-long mentorship and technical accomplishments related to the program. In 2020, Sandra received the **AISES Indigenous Excellence Award** for her technical work and mentorship of 42 AI and AN college students.

"Twelve years ago, I had the fortune of working with Sandra as a graduate student intern. I truly credit her for launching my career in tribal energy and renewable energy — it was the first time I realized I could use my expertise to help tribes. I doubt that I would be the entrepreneur I am today without Sandra's guidance," says Suzanne.

Future of the program

The future of DOE Indian Energy interns at Sandia is bright. Sandia plans to hire two year-round graduate interns in the fall of 2021 and five summer interns in 2022. 

Hruby confirmed


CONTINUED FROM PAGE 2

Jill began at Sandia in 1983 as a member of the technical staff and was named by the Labs board as President and Laboratories Director in 2015, making history as the first woman to head a national security laboratory. In recognition of her groundbreaking work, Sandia created the Jill Hruby Fellowship in 2017 to encourage women to consider leadership in national security science and engineering.

Labs Director James Peery congratulated Jill and, in a statement, said, "I was fortunate to work closely with Jill during her tenure as Laboratories Director and look forward to continuing our collaboration in her role as NNSA Administrator."

A long career at Sandia

Jill served as Sandia's director from July 2015 through April 2017. She worked for Sandia for 34 years, beginning at the California site. Her career included research and leading teams focused on thermal and fluid sciences, analytical chemistry, solar thermal energy, nuclear weapons materials and components and materials management for advanced energy storage devices. In 2010 she was named vice president at the New Mexico site overseeing counterterrorism, homeland security, energy security and nuclear, biological and chemical security.

She earned her bachelor's from Purdue University and her master's from the University of California at Berkeley, both in mechanical engineering. She has authored many publications and reports, holds three patents and received numerous awards. 

Recent Patents

April – June 2021

- **David W. Raymond:** Ball transfer mechanism with polycrystalline diamond bearing support. Patent #10968700
- **Stephen Neidigk and Zachary Medaris Wilson:** Tamper-resistant fastener. Patent #10968942
- **Stephen D. Bond, Carlton F. Brooks, Oksana Guba, Martin Nemer and Bart G. van Bloemen Waanders:** Remote vibration sensing through opaque media using permanent magnets. Patent #10969269
- **Patrick Sean Finnegan:** Planar electrode arrays and fabrication methods thereof. Patent #10969359
- **James Bradley Aimone, Jonathon W. Donaldson and John H. Naegle:** Neuromorphic computing architecture with dynamically accessible contexts. Patent #10970630
- **Jeffrey P. Koplow:** Belt structures for rotary electrical contact device. Patent #10971876
- **Gabriel Carlisle Birch, Camron G Kouhestani, Jaclynn Javonna Stubbs and Bryana Lynn Woo:** Unmanned aircraft system (UAS) detection and assessment via temporal intensity aliasing. Patent #10977772
- **Scott F. Rose:** System and method for consolidating used nuclear fuel. Patent #10978212
- **Matt Eichenfield, Christopher Nordquist and Aleem Siddiqui:** Focusing transformers/filters in isotropic/anisotropic piezoelectrics. Patent #10979018
- **Robert W. Brocato:** Dual frequency transceiver device. Patent #10984300
- **Matthew G. Blain and Christopher Nordquist:** Microfabricated ion trap chip with an integrated microwave antenna. Patent #10984976
- **Jason C. Neely and Sigifredo Gonzalez:** Systems and methods using collaborative controls to maintain anti-islanding standards. Patent #10985568
- **Stephen Buerger and David K. Novick:** Neural interface methods and apparatus to provide artificial sensory capabilities to a subject. Patent #10993665
- **Brad Boyce and Bradley Salzbrenner:** Apparatus for high-throughput sequential tensile testing and methods thereof. Patent #11002649

Note: Patents listed here include the names of active Sandians only; former Sandians and non-Sandia inventors are not included.

Following the listing for each patent is a patent number, searchable at the U.S. Patent and Trademark Office website ([uspto.gov](https://www.uspto.gov)).

- **Dorina F. Sava Gallis:** Tunable metal-organic framework compositions and methods thereof. Patent #11007516
- **Chester J. Weiss:** Methods and computer program products for locating and characterizing clutter in large spaces. Patent #11010513
- **Bryan James Kaehr:** Optically configurable charge-transfer materials and methods thereof. Patent #11010651
- **Clifford K. Ho:** Bladed solar thermal receivers for concentrating solar power. Patent #11015838
- **Igal Brener, David Bruce Burckel, Salvatore Campione, Michael David Goldflam and Michael B. Sinclair:** Optical devices enabled by vertical dielectric mie resonators. Patent #11017186
- **Matthew W. Moorman and Joshua J. Whiting:** Seizure detection device. Patent #11020042
- **James Bradley Aimone, Conrad D. James, Tu-Thach Quach, Arun F. Rodrigues and Jason W. Wheeler:** Malicious activity detection in a memory. Patent #11023579
- **Timothy J. Boyle and Bernadette A. Hernandez-Sanchez:** Proppant compositions and methods of use. Patent #11028318
- **Jeffrey P. Koplow:** Belt structures for rotary electrical contact device. Patent #11031744
- **Jaxon Morgan Gittinger, Edward Steven Jimenez Jr. and Andrew C. Wantuch:** Boundary detection evaluation. Patent #11042988
- **Oscar Negrete:** Lipid-coated particles for treating viral infections. Patent #11045554
- **Timothy Briggs and Brian T. Werner:** Selective modifiers for composite material property enhancement. Patent #11046048
- **Myra L. Blaylock, Brent C Houchens, David Charles Maniaci and David Vaughn Marian:** Methods, systems, and devices to optimize a fluid harvester. Patent #11047360
- **Felipe Wilches Bernal, Raymond H. Byrne, Ryan Thomas Elliott, Jason C. Neely, Brian Joseph Pierre and David Alan Schoenwald:** Systems and methods for controlling electrical grid resources. Patent #11050262
- **Jason Hamlet, Ryan Halinski and William A. Zortman:** Integrated circuit authentication from a die material measurement. Patent #10942215
- **Ann Speed:** Central alarm station interface for situation awareness. Patent #10943467
- **Hongyou Fan:** Method to synthesize nanoparticle supercrystals. Patent #10947116
- **Bryan James Kaehr:** Shape-preserving polymeric replication of biological matter. Patent #10947349
- **Ryan Wesley Davis and John Michael Gladden:** Terpene syntheses for biofuel production and methods thereof. Patent #10947563
- **Sapan Agarwal and Matthew Marinella:** Two-terminal electronic charge resistance switching device. Patent #10950790
- **Douglas G. Brown, Dahlon D. Chu, Dominic A. Perea, Kevin Robbins, John L. Russell and David A. Wiegandt:** Ultra-high reliability wireless communication systems and methods. Patent #10952123
- **Brad Boyce, Ross L. Burchard and Kristopher R. Kingler:** Inspection workcell. Patent #10955429

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Lessons in nuclear history

Historians speaker series kicks off with discussion of nuclear weapons development and testing



UNDERGROUND TESTING — Sandians Dan Bozman, Mike Burke and Jerry Chael, now retired, work nearly a thousand feet below ground at the Nevada National Security Site underground test complex, formerly the Nevada Test Site. **Photo by Randy Montoya from Lab News archives**

By Stephanie Holinka

Los Alamos National Laboratory Senior Historian Alan Carr kicked off a new speaker series tailored to staff at the Nuclear Security Enterprise and Atomic Weapons Establishment. The first presentation, hosted and recorded by AWE, drew more than 900 participants. Carr discussed the history of nuclear weapons development and testing in the U.S. and U.K. His presentation focused on above-ground, atmospheric testing and underground testing, from the Trinity test of July 16, 1945, in New Mexico, to

Julin-Divider, the nation's most recent test, in Nevada. Sandians can view a recording of the presentation.

Carr's presentation was inspired by an article that he recently authored: "Of Clouds and Craters: The Incredible Story of U.S. Nuclear Weapons Testing." It was published in the last fall in the U.S. Army's Countering WMD Journal.

Carr used historical knowledge and humor to describe nuclear development through decades of atmospheric and below-ground testing with a focus on why, where and how the U.S. performed each test. Peter Kuran contributed photos and

videos from the archives on the [Atom Central website](#).

Many NSE and AWE employees were born a generation after the Cold War ended, so sharing this information is important education for staff at all sites and provides context for their work in nuclear history.

Rebecca said that NSE and AWE sites rarely discuss their unique history and contributions with each other.

"The origins of all of these places and their various activities is just sort of falling away. I think you can easily work at one of the U.S. sites and not even be aware that the other sites exist," she said.

Next lesson

“We historians have been planning since last fall. We were hoping to meet in person last year, but that got squashed, of course. So, someone floated the idea of online talks, and it evolved into this

series of UUR talks on various topics, made available to all the Nuclear Security Enterprise and AWE sites,” said Rebecca. “It took some time to get the technology sorted, as not all sites use the same online communication tools. Plus, we wanted to allow for large viewership.”

The series will continue in September, when historian Katie Braughton discusses cell and bay testing at Pantex during the 1950s and 1960s. Future talks feature Tom Ramos of Lawrence Livermore National Laboratory, AWE’s Richard Moore and Savannah River Site’s Geoff Netzley. [i](#)

Eight Sandians mentor high school students in virtual quantum science program

By **Katherine Beherec**

For two weeks in July, eight Sandians mentored high school students from across the country who participated in a virtual quantum information science program. Sandians Megan Ivory, Mohan Sarovar, Roger Ding, Lisa Hackett, Daniel Dominguez, Ashlyn Burch, Bethany Little, Will Kindel and Mekena Metcalf, from Lawrence Berkeley National Laboratory, volunteered their talent to the Joint Science and Technology Institute to inspire an interest in STEM careers among high schoolers.

Mentors assisted students with hands-on projects that were modeled after real-world quantum information problems and tools. Students spent the first week doing various exercises and lab experiments to learn the relevant background material necessary for understanding quantum computing. During the second week, students created and demonstrated circuits on IBM’s open access quantum computers. Researchers typically don’t gain this type of exposure to quantum information until late in undergraduate or graduate school, due to the common practice of requiring advanced mathematics and physics courses as a prerequisite. Mentor Megan Ivory hopes that exposing women and underrepresented students to quantum information as early as high school will help to improve representation in the field.

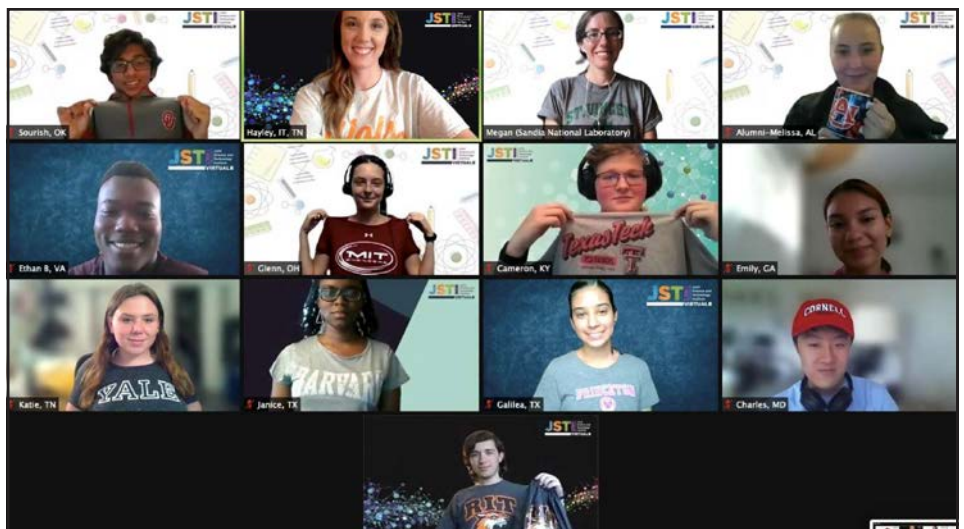
Students dedicated 49 hours to their projects, practicing research techniques,

the scientific method and data collection. Mentors contributed their time, from one to 25 hours during the two-week period, and their expertise to support the students as they worked on their project. Mentors each gave an hour-long career talk to expose students to varied career paths and to share survival tips along the way. At the end of their project, students created both a poster and video presentation, which they presented to all JSTI Virtual participants.

“Our particular project, quantum computing and technology, is a topic that most students aren’t exposed to until late in their undergraduate or graduate studies due to the advanced mathematics and physics

prerequisites,” Megan said. “We hope that by getting high schoolers excited about quantum computing will increase representation, bring in new ideas, and revolutionize the field in the future.”

The Joint Science and Technology Institute was launched in 2012 to teach students about STEM and encourage future careers in STEM fields. The program is sponsored by the Defense Threat Reduction Agency and targets students who can benefit from additional exposure to STEM topics. The program is available to all but encourages participation from underrepresented students and those with ties to the military. [i](#)



QUANTUM SCIENCE STARS — Participants in the Quantum Computing and Technology project at JSTI Virtual show off their college gear. The program attracted 90 students from across the U.S., divided into teams of 8-10 students. Volunteers from Sandia mentored one team as they completed their quantum information project.

Photo courtesy of JSTI Virtual