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## Sandia's economic impact soars to \$5.2 billion in 2024

By **Kim Vallez Quintana**

Sandia achieved a record-breaking economic impact of \$5.2 billion in fiscal year 2024, according to the latest economic impact report released last week. That surpasses the previous fiscal year's figure by \$400 million.

This total includes the salaries of the total people employed by Sandia in FY 2024, including 1,900 student interns, as well as the \$1.08 billion paid to small-business suppliers and the \$133 million in gross receipts taxes paid to the state of New Mexico.

FY 2024 was a significant year for Sandia, not only in its economic impact but also in its history, marking its 75th anniversary.

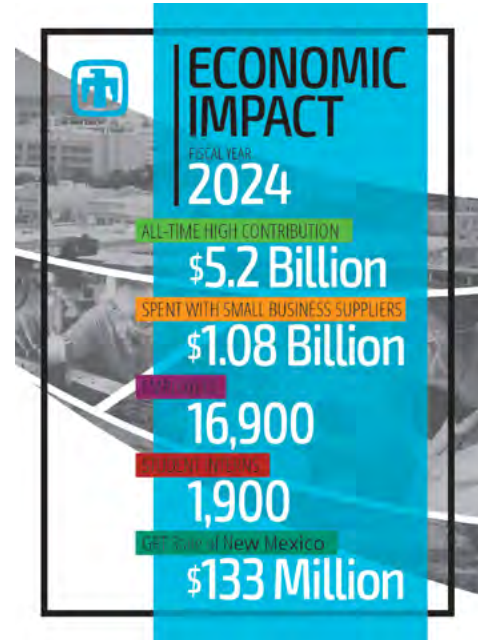
"For 75 years, Sandia National

Laboratories has been a leader in strengthening national security and advancing technology," Labs Director James Peery said. "Our success relies on strong partnerships with diverse suppliers, particularly small businesses, our missions. We remain committed to collaborating with these vital enterprises, driving economic growth and cutting-edge science and engineering that benefit both New Mexico and the nation."

### Supporting small businesses

One of the biggest success stories over the past year is Sandia's contribution to small businesses. Out of the more than \$1.7 billion spent on subcontracts, \$1.08 billion went to small businesses

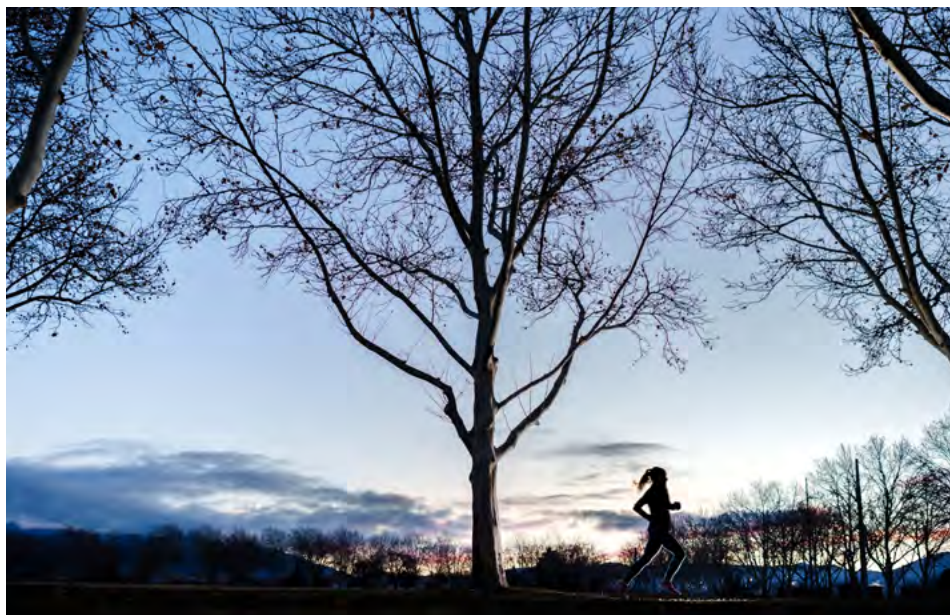
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**GROWING IMPACT** — Sandia made its biggest financial impact ever in FY 2024, contributing \$5.2 billion to the economy.

Graphic by Lloyd Wilson

## Running toward your goals



**COLD RUN** — Rebecca Schmitt runs laps around Hardin field before work, not letting the low 20 degree temperatures that morning bother her too much.

Photo by Craig Fritz

*For one Sandia engineer, it's about being better than you were yesterday*

By **Magdalena Krajewski**

Most of us have something, buried in the back of our minds, something we've set out to do but never finished, or something we wanted to do but never started. An unfinished dream that periodically comes to the surface, reminds us that they're still there, waiting to cross the threshold from dream to reality.

For Sandia electronics engineer Rebecca Schmitt, that something was about running.

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**EDITOR'S NOTE:** Please send your comments and suggestions for stories or for improving the paper. If you have a column (500-800 words) or an idea to submit, contact the Lab News editor at [labnews@sandia.gov](mailto:labnews@sandia.gov).

# Sandians receive top NNSA awards



*James Peery and Tina Nenoff recognized for excellence in leadership and scientific innovation*

By **Nancy Salem**

**T**wo Sandia leaders have been honored by NNSA for their pivotal contributions to national security. Labs Director James Peery received the Administrator's Gold Award and Sandia Fellow Tina Nenoff the Administrator's Silver Award. The awards presented by NNSA Administrator Jill Hruby recognize exemplary service and transformative accomplishments.

James, who has led Sandia since January 2020, received NNSA's highest honor for, among other achievements, his leadership during one of the most

**LABS VISIONARY** — NNSA gave Labs Director James Peery its highest honorary award, saying he has led with vision and purpose, ensuring Sandia remains a leader in addressing the most pressing national security challenges of our time.

Photo by **Craig Fritz**



**EXCEPTIONAL SERVICE** — Sandia Fellow Tina Nenoff was recognized by NNSA for helping to shape national science policy and driving advancements in critical areas such as microelectronics and materials chemistry.

Photo by Lonnie Anderson

challenging periods in modern history. His citation singled out that he steered Sandia through the COVID-19 pandemic without missing a major deliverable, ensuring the Labs' essential contributions

to maintaining a safe, secure, reliable and credible nuclear deterrent amidst evolving geopolitical threats.

Beyond nuclear deterrence, James was recognized for driving advances in national security including hypersonics, artificial intelligence, advanced manufacturing, cyber defense and next-generation radar systems.


NNSA said James exemplifies values of integrity, professionalism and service, and has led with vision and purpose, ensuring Sandia remains a pillar of the nuclear security enterprise and a leader in addressing the most pressing national security challenges of our time.

"This recognition is a testament to the achievements of the entire Sandia workforce," James said. "Together we've overcome immense challenges and continued to push the boundaries of science and engineering to serve the nation. I'm honored to be part of NNSA."

Tina was recognized for her scientific contributions and leadership as NNSA's chief science adviser. The Silver Award acknowledges exceptional service, and her work has shaped national science policy and driven advancements in critical areas such as microelectronics and materials chemistry.

During her tenure as science adviser, Tina played a vital role in integrating artificial intelligence and large language models across DOE laboratories and advancing the CHIPS Act to strengthen U.S. semiconductor and microelectronics capabilities. She also provided expert guidance on topics ranging from explosive formulations to international science and technology collaborations.

A Sandia Fellow — an honor bestowed on only 21 people in Sandia's history — Tina is a renowned materials chemist with over 190 peer-reviewed publications and 17 U.S. patents. She was elected to the National Academy of Engineering in 2024 and has received numerous accolades, including the Society of Women Engineers Achievement Award and fellow status with the National Academy of Inventors, the American Association for the Advancement of Science and the American Chemical Society.

"I'm humbled by this recognition and grateful for the opportunity to contribute to Sandia's legacy of innovation and national security," Tina said. "Science is a team effort, and I'm proud of the impact this laboratory has had." 

# Materials scientist elected to National Academy of Inventors

By **Mollie Rappe**

**S**andia Fellow Tina Nenoff has been elected a fellow of the **National Academy of Inventors**, the academy announced on Dec. 10.

The National Academy of Inventors is an organization comprising universities, governmental and nonprofit research institutes, with over 2,000 fellows, including Sandia engineer **Babu Chalamala** and former **Sandia Fellow Jeff Brinker**. According to the academy, election as a fellow is the highest professional distinction accorded solely to

academic inventors. Founded in 2010, the academy recognizes and encourages inventors with patents issued by the Patent and Trademark Office, enhances the visibility of foundational and applied technology and innovation and translates members' inventions to benefit society.

"I am very honored and humbled by being recognized as a Fellow of NAI," Tina said. "I have had a long career moving between Technology Readiness Levels: using fundamental science knowledge in mission programs or optimizing applied projects by going back to the atomic-scale fundamental science.

This has allowed me to build a strong IP portfolio, resulting in the licensing of patents and even some commercial products."

Tina's recognition stems from her innovative research on nano-scale sponges and sieves, called metal-organic frameworks and crystalline silico-titanate. Her work spans from understanding their fundamental properties to applying them to critical challenges such as cleaning up more than **40 million gallons** of radioactive water from Japan's Fukushima Daiichi nuclear power plant following the 2011 earthquake and tsunami and



reducing the water demands of conventional power plants.

Her research record includes publishing more than 190 peer-reviewed articles and four book chapters as well as being awarded 17 U.S. patents. Tina has received many other professional recognitions including being elected a member of the [National Academy of Engineering](#),

a fellow of the [American Association for the Advancement of Science](#), a fellow of the American Chemical Society and receiving the [Society of Women Engineers' highest honor, the Achievement Award](#).

Recognizing the value of Tina's technical expertise and counsel, she was appointed deputy and science adviser to NNSA Administrator and DOE Under

Secretary for Nuclear Security Jill Hruby. This two-year appointment began in March 2023.

Tina and the other 169 innovative inventors from 12 countries will be presented their medals by a senior official of the U.S. Patent and Trademark Office at the [NAI Annual Meeting](#) on June 26 in Atlanta, Georgia. [📍](#)

# Sandia cofounds microelectronics research center

By **Troy Rummler**

**S**andia is collaborating with other research institutions to head off a potential future energy crisis that could be driven in part by artificial intelligence.

"We face an unprecedented microelectronics energy efficiency challenge," Sandia's Jeffrey Nelson said. "Computing alone is projected to consume a significant portion of the total planetary energy production within a decade."

To meet future needs, the DOE Office of Science recently announced the creation of three new Microelectronics Science Research Centers. One center, the Microelectronics Energy Efficiency Research Center for Advanced Technologies, or MEERCAT, will focus on energy efficiency, exploring solutions that bridge sensing, edge processing, AI and high-performance computing. Sandia will be a founding member of MEERCAT and will lead one of the eight energy efficiency-related research projects within the center.

The other two centers will work on resilience in extreme environments, including high-radiation, cryogenic and high magnetic field environments.

"Our center will provide industry with new, higher performance options for energy-efficient computing," said Jeffrey, the principal investigator for the Sandia-led project.

Sandia is also partnering on two projects led by other laboratories: one on energy efficiency with Lawrence Berkeley National Laboratory and another on extreme environments with Los Alamos National Laboratory.

AI is a major factor in rising energy demand because it uses more energy than conventional computer algorithms and has seen a surge in popularity within homes and workplaces. Along with the growth of other energy-intensive technologies like quantum computing and



**ONE FOR ALL** — The Center for Integrated Nanotechnologies is one of five DOE Nanoscale Science Research Centers teaming up to help make computer chips more energy efficient. **Photo by Randy Montoya**

advanced sensors, this has created an urgent need for more efficient technologies.

The three new research centers will provide a total of \$179 million for 16 multidisciplinary, fundamental research projects lasting up to four years. They are funded through DOE's Office of Science and authorized by the Micro Act, passed in the CHIPS and Science Act of 2022. This legislation has invested billions of dollars through multiple agencies to help companies build new plants for advanced semiconductors in the U.S. It also funds fundamental research to advance the technologies these future factories will produce.

"We are working with companies to understand their problems and pulling experts together from across the DOE to solve these problems quickly," Jeffrey said.

## Project seeks to unleash potential of new materials

When the department announced its plan to form Microelectronics Science Research Centers in May 2024, Jeffrey reached out to a familiar team.

Two years earlier, a group of directors and experts from DOE's five scientific user facilities, the Nanoscale Science Research Centers, had started holding regular, collaborative discussions.

"We met every two weeks for two years," Jeffrey said. "We

discussed our collective resources and how we can work together to achieve national priorities.”

Jeffrey is the director of one of these Office of Science user facilities, the Center for Integrated Nanotechnologies, which is jointly operated by Sandia and Los Alamos national laboratories. The other four user facilities: the Center for Nanoscale Materials, the Center for Functional Nanomaterials, the Molecular Foundry and the Center for Nanophase Materials Sciences are spread across the country, each co-located at a national lab.

The team agreed that by working together they could advance new materials to make computing more powerful and energy efficient.

Researchers had already found that materials like molybdenum disulfide, gallium arsenide and even diamond may be better than silicon for certain aspects of computing. In theory, computer chips made from one of these alternative materials

might be far more energy efficient and could solve the looming energy crisis.

“They’re very promising,” Jeffrey said.

But the task of taking any of these materials, perfecting them in a lab, learning how to mass produce them and then building a factory to make chips from them while competing against an established silicon industry and supply chain, the team agreed, felt daunting at best.


Taking a different route, the group of lab leads and other collaborators proposed a project entitled “Nano-Scale Research Center for Heterogeneous Integration Platforms.” This project would aim to leverage the existing infrastructure and expertise of the DOE user facilities and partnering institutions and develop ways to insert new materials into standard silicon fabrication processes.

Now greenlit with DOE’s recent announcement, the project will bring together resources from all five Nanoscale Science Research Centers. It will also

include researchers from Fermi National Accelerator Laboratory, the Massachusetts Institute of Technology and MIT Lincoln Laboratory.

They will build on previous research in what scientists call heterogeneous integration. This means using many kinds of materials to make computer chips, all monolithically integrated into a silicon backbone. The tricky part is to ensure electrons and information flow seamlessly between different materials.

Sandia and its collaborators are aiming for breakthroughs that could help industry create much more energy-efficient computer chips.

“By collaborating across multiple national laboratories and universities, our goal is really to accelerate the innovation discovery process and make a positive impact on economic and national security,” Jeffrey said. 

## HPC Report showcases innovations in computing

By **Ariana Stern**

With its world-class high-performance computing capabilities, Sandia continues to pioneer innovative solutions to some of the most pressing national challenges. The **HPC Report** showcases how Labs scientists, engineers and researchers harness supercomputers to tackle these challenges.

The 2024 publication highlights various dimensions of work, all focused on strengthening national security. It covers topics that span advanced simulations, data analytics and machine learning, demonstrating Sandia’s dedication to tackling complex challenges at the convergence of science, technology and national security.

One project quantifies the impact of

weather on **solar array tracking** system output across the U.S. Additionally, Sandia enhances **nuclear detonation detection sensors** by employing high-performance computing resources to evaluate the next-generation optical sensor SIGHTS, which will monitor Earth for nuclear detonations from GPS satellites. In materials science, the Materials Learning Algorithms framework utilizes **machine learning to predict electronic structures** at previously unattainable scales, addressing critical national security needs.

Explore this innovative report and experience its insights firsthand, and download the SNLSimMagic app, an augmented reality iOS application developed at Sandia, which brings the report’s pages to life. SNLSimMagic offers an opportunity to visualize real-time



Cover design by **Johanna Pearman**

simulations that propel Labs researchers forward in this rapidly evolving field.

To request a hard copy of the report or to be added to the distribution list, email

[hpcreport@sandia.gov](mailto:hpcreport@sandia.gov). 



## Economic impact

CONTINUED FROM PAGE 1

including woman-owned, veteran-owned, service-disabled veteran-owned, small disadvantaged and HUBZone businesses.

“Sandia National Laboratories has a long and distinguished history of partnering with highly qualified, diverse small business suppliers who help us achieve our national security missions,” Director of Integrated Supply Chain Management Louis Griego said. “Our commitment to these collaborations makes our supply chain stronger and more versatile, furthering the economic health of our local, state and national communities.”

To better engage with the small-business community and create a better understanding about doing business with Sandia, the small-business team ramped up its outreach efforts this year. This included holding two in-person small-business forums that attracted 570 companies.

Sandia’s team also attended 33 local, state, and national virtual small-business events helping bring on 381 new small businesses to support Sandia’s mission.

“Sandia’s small-business forums are truly a one-stop shop for local, regional, and national small-business suppliers interested in working with the Department of Energy,” Small Business Program Manager Zach Mikelson said. “The events are free and feature information sessions and booths hosted by Sandia subcontracting professionals, other DOE labs,

plants and sites as well as many local and national small business resources. If businesses are interested in working with Sandia or within the DOE, our small business forum is the place to be.”

Small businesses also benefited from Sandia’s vast expertise and state-of-the-art equipment and facilities at no cost to them through the New Mexico Small Business

Assistance Program and the Technology Readiness Initiative, known as TRGR.

Sandia supported 133 businesses through the NMSBA program, investing \$2.3 million in 12 projects through the TRGR program.

### Remote Well Solutions project

One of the NMSBA projects partnered Sandia with Cloudcroft-based company Remote Well Solutions. The collaboration aimed to better provide water to livestock in remote areas of the Navajo Nation.

Traditionally, ranchers on the Navajo Nation relied on windmills to fill their tanks. With Sandia’s help, Remote Well Solutions paired its technology with solar power and a network of piping to move water to additional tanks as far as five miles away and ensure those tanks stay full. This solution reduces the distance livestock must travel for water, prevents overgrazing and eliminates the need to haul water by vehicle, reducing the carbon footprint.



**NMSBA AT WORK** — Sandia geotechnology systems engineer Brian Dwyer collects a water sample from a cattle drinker on the Navajo Nation as part of an New Mexico Small Business Assistance Program project with Remote Well Solutions. **Photo courtesy of Brian Dwyer**

water challenges firsthand,” Remote Well Solutions owner Mike Lisk said. “We felt very motivated to solve this problem, not just for ourselves but for others facing the same struggles. No one needed it more than our Navajo neighbors.”

Learn more about the [Remote Well Solutions project](#).

### mPower’s Dragon Scales

Another success story resulting from the TRGR program involves mPower Technology, a solar cell and power company that licensed technology from Sandia to develop DragonSCALES. These photovoltaic arrays are interconnected cells of highly efficient silicon that can be meshed into any shape. DragonSCALES have multiple applications, with mPower initially focused on the space and aerospace markets.

mPower’s products are already in use on low-Earth orbit satellites, and through two TRGR projects, mPower has made further improvements and refinements to their next-generation solar technology which will support two large satellite constellations currently in the planning stages.

### Patents and licenses

In FY 2024, Sandia also saw growth in the number of patents and licenses filed, all of which involve new technologies developed at the Labs.

Sandia obtained 123 new patents, submitted 202 patent applications, and holds 507 active commercial licenses for its technology.



**MASSIVE IMPACT** — Labs Director James Peery, right, and Zach Mikelson, Sandia’s supply chain manager, answer reporter questions during a press conference about Sandia’s 2024 economic impact.

**Photo by Craig Fritz**

For ranchers on the Navajo Nation, the project has been life-changing. “We own a ranch in Lincoln County and know

## Helping the community

Although it is not quantified in Sandia's economic impact report, employees also contribute to the community in other ways, including donating their time and skills to help those in need.

In FY 2024, Sandia staff volunteered 1,167 hours at Roadrunner Food Bank, surpassing any other organization or group in New Mexico. Sandians also participated in many service projects including building beds for children in partnership with the organization Sleep in Heavenly Peace near Sandia's Livermore, California location.

Through the annual Sandia Gives campaign, employees generously donated more than \$4 million to the United Way

of North Central New Mexico, \$20,000 to Roadrunner Food Bank and \$20,000 to a program providing shoes for children in the community.

Volunteering also extends to leading STEM education initiatives in the community. In FY 2024, Sandia staff introduced 10,000 children to STEM careers.

For additional details, refer to Sandia's 2024 Economic Impact Brochure. [📄](#)



**FLEXING POWER** — Murat Okanden, chief technology officer and founder of mPower Technology, demonstrates the flexibility of the company's DragonSCALES photovoltaic arrays. **Photo by Bret Lattner**

## Achieving goals

CONTINUED FROM PAGE 1

Rebecca grew up running. During summer breaks in elementary school, Rebecca and her siblings had a choice to ride bikes alongside their mom on her morning run or run one of her laps. Rebecca chose the latter.

"It was just fun and instilled a love of running early on," Rebecca said.

Rebecca continued running through middle school, was state champion for the 3,200 meters in high school and would attend Colorado State University on a cross country scholarship. But not long after starting school, Rebecca would have to put her life as a competitive runner on the back burner.

"It was my first time living on my own and I was struggling to adapt to the changes, juggling schoolwork while also managing the demands of being a college athlete," Rebecca said. "It was just too much."

## Reprioritizing goals

Rebecca decided to put her running goals aside and focus on her academic goals. She would go on to earn two Bachelor of Science degrees, one from Colorado State University and another from the University of New Mexico. In 2020, while working at Sandia, she earned her master's degree, also from University of New Mexico, in chemical engineering.

"I was so focused on school and my career that slowly, over time, I had slipped into some unhealthy habits," Rebecca said. "I was eating fast food almost every day, I had gained weight and just wasn't feeling my best."

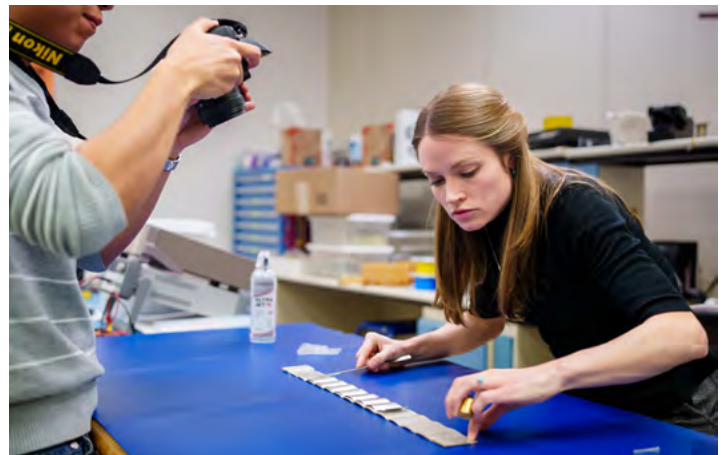
Rebecca was about to turn 30 and decided it was time for a change, and so a little more than 10 years after she ran her last race, she signed up to run the Duke City Half Marathon.

"I still had these unfinished dreams with running, but I felt like maybe that part of my life was over. I thought I was too old and too busy to run competitively," Rebecca said. "And then I met Sofie."

## Meet Sofie

Sofie Schunk is a fellow runner and Sandia engineer. In 2023, Sofie, who has Type 1 diabetes, [qualified for the Olympic trials](#) after running a marathon in 2 hours, 36 minutes and 22 seconds.

Rebecca first saw Sofie's name in 2022 after seeing her time in the DOE mile. Sofie had won the DOE Mile's Fastest Woman title in 2020 and 2021 and shaved



**FROM LOOP TO LAB** — Electronics engineer Rebecca Schmitt, right, and Simon Yang perform a destructive physical analysis of a capacitor in a lab at Sandia. **Photo by Craig Fritz**

three seconds off her own record in 2022, running a 5:11 mile.

"I was so inspired by Sofie," Rebecca said. "Here she was, this incredible runner who was also working at the Labs, and it helped me see that, 'hey maybe I can do that too.'"

Rebecca had just finished running the Duke City half and was about to sign up for her first full marathon when she sent Sofie an email to congratulate her on her DOE mile time and connect, both as a fellow runner and engineer.

The two hit it off and a couple months later Sofie was coaching Rebecca ahead of the Mesa Marathon. She would finish the Mesa race in 3:13:19, 17 minutes faster than her initial goal. For context, that's an average pace of 7 minutes and 22 seconds



per mile. The following year Rebecca ran the Boston Marathon in 2:55:59 and placed within the top 100 women.

“I was ecstatic. Seeing my improvement between the two races was so rewarding, and I couldn’t help but wonder if I could go faster,” Rebecca said.

Spoiler alert: She could.

Rebecca continued to work with Sofie, who put together a training schedule to help build her mileage per week as she trained for the California International Marathon.

“Sofie built this entire schedule including long runs, easy runs, cross training and strength training,” Rebecca said. “Before Boston I was averaging about 40 miles per week and in the months leading up to California I was averaging around 70 miles per week.”

### Better than yesterday

On Dec. 8, Rebecca ate her signature prerace fuel, a bowl of Honey Bunches of

Oats, laced up her Nike racing shoes and went faster.

Rebecca would shave another twenty minutes off her time, running a 2:35:08, two minutes under the 2024 Olympic trial qualification standard. And in case you don’t want to do the math, that means Rebecca ran an average pace of 5:55 per mile.

The next trial window opens sometime before the 2028 Olympics and that’s where Rebecca has her sights set now: not necessarily to make it to the Olympics but to compete with the best of the best on their way there.


“Just making it to the trials and being at the starting line with some of the best runners in the country, that alone would be a dream come true,” Rebecca said. “But ultimately, my goal is to be better than I was yesterday, last week, last month.”

For Rebecca those little improvements along the way have been key as she works

toward making her own dream a reality.

“There are so many reasons we can talk ourselves out of working toward those little dreams we have in the back of our mind, be it life circumstances or we think we’re too old, not smart enough, not good enough.

Maybe you’ve submitted a research proposal that’s already been rejected twice, so you don’t want to submit one again this year. Maybe you want to go back to school but think you’re too old. Maybe you want to get healthier but think you’re too busy. Maybe you want to do a triathlon.

“Whatever the goal is, why not take a step today toward reaching that goal?” Rebecca said. “And maybe you’ll fail along the way. That’s OK too, because if taking those baby steps toward reaching your goals makes you a little bit better than you were yesterday, it’s worth it.” 

# Honoring excellence

## NNSA recognizes Sandians for national security contributions

By **Kenny Vigil**

**N**NSA honored one Sandia employee and six Sandia teams with the prestigious Defense Programs Award of Excellence. The teams include more than 275 employees from Sandia, the U.S. national security enterprise and the United Kingdom’s AWE.

Each year since the early 1980s, when the award was established, defense programs recognize significant achievements including quality, productivity, cost savings, safety and creativity that support stockpile stewardship.

During a ceremony at Sandia on Dec. 19, NNSA Acting Deputy Administrator for Defense Programs David Hoagland said both the application and review process for the award are rigorous.



**PROUD MOMENT** — Sandia’s Eric Neuman displays the NNSA Defense Programs Award of Excellence he accepted on behalf of his teammates at an awards ceremony on Dec. 19. Eric and his team received one of seven awards at Sandia for significant achievements supporting stockpile stewardship. **Photo by Craig Fritz**



“I feel privileged to serve with all of you at this time,” Hoagland said. “The stakes are so incredibly high,” he added, referring to the current state of geopolitics.

Sandia’s Laura McGill asked the 2023 award recipients to take the opportunity to appreciate their own accomplishments.

“The work you do helps secure the entire nation,” Laura said. “Most people won’t know your contributions, but we do.”

## Drew Hollowell



Drew Hollowell was recognized for his significant contributions to the DOD Nuclear Weapons Innovation Process. Drew helped coordinate NNSA efforts to execute the pilot Nuclear Weapons Innovation Process in record time. The goal is for the DOD and DOE to jointly identify advanced technology concepts that are deemed useful to accomplish Combatant Command mission objectives. Tight integration aligns DOE Research and Development with DOD needs and allows for rapid assessment of concept viability. Drew works in nuclear deterrence at Sandia and is currently on assignment with the NNSA Office of Engineering and Technology Maturation.

## Active Ceramics Manufacturing Team



The Active Ceramics Manufacturing team at Sandia completed a five-year multimillion-dollar modernization effort to produce ceramic used in parts for nuclear deterrence missions. Prior to establishing this capability, external vendors provided the ceramic needed to produce the parts. The team established a culture of quality, instituting regular process checks throughout production, increasing product yields from about 50% to about 75%, and improving lot-to-lot consistency. The team accomplished these activities during the COVID-19 pandemic while meeting ongoing production commitments. The effort resulted in enhanced understanding of processing and properties of ferro-electric materials and nuclear deterrence components, and better-defined material and component requirements.

## Anomaly Resolution Team-21



The Anomaly Resolution Team-21 responded urgently to a technical challenge related to the B61-12 — ultimately meeting national security mission needs. The ART-21 team successfully implemented an immediate mitigation for the technical challenge, methodically determined root cause and developed and qualified a war-reserve component upgrade for the B61-12 in just six months.

The ART-21 team includes experts across a wide variety of disciplines including systems and component engineering, production, reliability, radiation modeling, effects and testing, and statistics. The team persevered under extreme pressure and provided technical excellence via a large collaborative effort across multiple Sandia organizations, Los Alamos National Laboratory, the Kansas City National Security Complex and Pantex.

## Electronics Assembly A Delivery Team



The Electronics Assembly A team and its subcomponent product realization teams delivered fully functional development build hardware nine months ahead of schedule to support earlier-than-planned flight tests on the W80-4 Life Extension Program. The team received an Exceptional Achievement Award for its work.

The product realization teams overcame schedule challenges by delivering hardware significantly faster than is typical and integrating the mature major component hardware into ongoing system integration tests.

The team’s collaboration resulted in delivering Application Specific Integrated Circuits to the accelerated schedule; the Electronic Assembly product realization team delivering multiple fully functional assemblies to system tests; and systems completing regression testing to gain confidence in the hardware’s insertion into system test benches. These successes resulted in a significant reduction in the risk associated with a major design change which came late in the program.

### Enhanced Nuclear Safety Team



Credible and innovative component designs to bolster nuclear safety have been matured for the future thanks to the work of the Enhanced Nuclear Safety Team. For more than four years, the diverse multidisciplinary team used resources at Sandia and the U.K. AWE to develop components that can help achieve multipoint safety in future weapon systems. Multipoint safety would represent significant improvement in overall weapon safety for both countries.

Core goals were accomplished in fewer builds than projected, allowing time and resources to integrate components into a subsystem test series. The team also achieved a stretch goal to evaluate impacts of the subsystem on system power sources, remarkably finding negligible impact. Hardware was delivered in 2023, and the component designs are backed by more than 1,000 pages of documentation available to engineers at Sandia and the AWE.

### The Heterojunction Bipolar Transistor Team



In 2023, the Heterojunction Bipolar Transistor Subcomponent Product Realization Team set the record for the largest single diamond-stamped delivery from Sandia to Kansas City National Security Campus with 25,269 parts. The NNSA Field Office diamond stamps the parts to show that they meet all requirements.


The integrated team within the Microsystems Engineering Science and Applications Center is responsible for semiconductor design, epitaxy, fabrication, packaging, test, qualification and product acceptance preparation.

The team also successfully completed life-of-program deliveries of compound semiconductors for three major programs in 2023. The team delivered more than 185,000 heterojunction bipolar transistor parts in 41 diamond-stamped-deliveries across eight different products with zero rejections and zero specification exceptions over a multiyear period.

Due to yield above target throughout production, the team proactively revised schedules to complete production nearly two years ahead of schedule and returned \$5.8 million to the customer.

### Improved plutonium and uranium experiments



A diverse team of physicists, engineers, safety professionals and technologists from the Sandia, Lawrence Livermore and Los Alamos national laboratories collaborated to deliver high-demand dynamic material property data for plutonium and uranium using Sandia’s Z machine. The achievements capped years of work by the team toward authorization and safe execution of new capabilities enabling twice the number of samples for double the data return along with improved quality and reproducibility of the experiments. In all, five experiments supporting nuclear weapon design, certification and assessment were conducted using the improved capabilities in 2023. 

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# Breakthroughs Favor the Bold

*Sandians to hear what colleagues learned on projects that didn't go as planned*

By **Myles Copeland**

Ihab El-Kady had made magic happen. And it wasn't enough.

"It was almost a black magic request," said Ihab, describing the problem presented by government sponsors. "They wanted a solution to channel power and data between two sealed containers without running a wire or punching a hole. The containers are completely sealed."

Ihab and his collaborators answered this daunting challenge with an elegant solution. After initially viewing the containers as a barrier, Ihab's team ultimately used the containers as the means

of transmission, like tapping Morse code on the wall between two sealed rooms.

As product designs progressed and options were weighed, Ihab's technology didn't make the cut. Brilliant as it was, the solution hadn't been rigorously tested in the field.

Ihab was disappointed but he understood.

"It's OK for people to be skeptical," said Ihab, a physicist whose teams won R&D 100 Awards for different technologies in 2019 and 2023. "You should welcome that skepticism because that allows your technology to climb the technology readiness level so that it can be employed safely and rigorously."

Ihab will join other Sandians in sharing what they learned on projects that didn't go as planned at the Labwide event Breakthroughs Favor the Bold on Tuesday, Feb. 4, 10-11 a.m. MT in

Albuquerque's Steve Schiff Auditorium and online. The event aims to further the Labs' culture of innovation and the goals of the Labwide strategy, to accelerate innovation and lead in modern engineering. Labs Director James Peery will host and Maj. Gen. Jeannie Leavitt, who blazed trails as the U.S. Air Force's first female fighter pilot and first woman to command a combat fighter wing, will make closing remarks.




**WORKING MAGIC** — Sandia physicist Ihab El-Kady will speak at Breakthroughs Favor the Bold, a Labwide event featuring lessons learned on projects that didn't go as planned.

Photo from video  
**R&D 100 Winner 2023: Meta Optics Studio**

Since the initial letdown, Ihab's technology has found a host of applications and been proven in the field, including on the International Space Station, where it transmitted data and power between Faraday cages, enclosures that block some electromagnetic fields.



Ihab identified several lessons from this experience. Among them, to share developments with Sandia colleagues.


"There are lots of excellent engineers at Sandia," Ihab said. "After you create the technology and improve the concept, you need to set it free. Hand it over to them. Team with them for rigorous evaluation and for catering to a specific application. Then you pivot to the next potential application." 

## Mark your calendars

Tuesday, Feb. 4, 10-11 a.m. MT

Check Sandia Daily News for location information and a Teams link.



## HEARTS & SOLES


SHOES FOR KIDS DONATION DRIVE

**FEBRUARY 3-14**


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Your **\$25** contribution will provide a student with a **quality pair of shoes.**



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## Recent Patents

July-September 2024

*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](#).*

- **Brooke Nicole Harmon and Yooli Kim Light:** Coronavirus neutralizing humanized antibodies and uses thereof. Patent #12024551
- **Wei Pan:** Systems and methods for resolving a number of incident RF-range photons. Patent #12029141
- **Jerry W. Rouse:** Geolocating sources of acoustic signals with a balloon-borne aeroseismometer. Patent #11876398
- **Giovanni Esteves and Travis Ryan Young:** CMOS compatible low-resistivity Al-Sc metal etch stop. Patent #12034050
- **Isaac C. Avina, Fred Patrick Doty and Bryant R. Morgan:** Enhanced electronic sensors. Patent #12034422
- **Jongmin Lee:** Hybrid inertial navigation system and method. Patent #12038285
- **Brett Bagwell:** Systems and methods for optical measurement of cross-wind. Patent #12038507
- **Darren W. Branch:** Time reversal acoustics method and apparatus for detecting changes in environments. Patent #12039226
- **Heidi A. Smartt:** Augmented reality for reflective particle tag alignment. Patent #12039676
- **David Gerald Wilson:** Wind turbine power phase control with DC collection bus for onshore/offshore windfarms. Patent #12051906
- **Ryan Wesley Davis:** Coupling high yield biochemical intermediates for fuel production. Patent #12054685
- **Yuan-Yu Jau:** Detection and imaging of electric fields, using polarized neutrons. Patent #12055500
- **Emmett Jason Gurule, Hung Loui and Brianna N. Maio:** Radar transmit bandwidth augmentation. Patent #12061249
- **Paul C. Galambos, Gwendolyn Hummel, Robin B. Jacobs-Gedrim, Brent T. Meyer, Keith Ortiz and Sean Yen:** Solid-state information pattern discriminating switch. Patent #12063461
- **Brad Howard Jones and Samuel Carlos Leguizamon:** Method of tuning physical properties of thermosets. Patent #12065562
- **Shahed Reza:** Multichannel transistor with improved gate conformation. Patent #12068216
- **James S. Brennan, Mark Richard Claudnic and Daniel J. Throckmorton:** Apparatus and methods for sample analysis with multi-gradient microfluidics. Patent #12070751
- **Erik Nathan Hurd and Jeffrey Kolski:** Two-terminator RF adapter for background/environment noise measurement. Patent #12078656
- **Sapan Agarwal and Christopher Michael:** Heterogeneous radiation-hardened computing system. Patent #12079159
- **Albert Alec Talin:** Ionogel-based batteries and ionogel liquid exchange. Patent #12080849
- **Darren W. Branch and DeAnna Marie Campbell:** Acoustic wave resonator with active shunt capacitance cancellation and systems thereof. Patent #12084708
- **Edward Steven Jimenez Jr. and Cody Michael Washburn:** Computed tomography approach to edge reconstruction. Patent #12086909
- **Brooke Nicole Harmon, Yooli Kim Light and Le Thanh Mei Pham:** SARS-CoV-2 variant nanobodies and constructs comprising such nanobodies. Patent #12091446
- **Judith Maria Lavin, Alfred John Thibodeaux and Andrew T. Wilson:** Part position recognition for printing electrical or optical interconnects. Patent #12094173
- **Michael Joseph Kim Abere, Dale L. Huber and Jamin Ryan Pillars:** Self-insulating metal vias in magnetic micro-devices. Patent #12094629
- **Travis Forbes:** Miniature ultra-low-power LNA employing current reuse and bias sharing. Patent #12095424
- **Brooke Nicole Harmon, Yooli Kim Light and Le Thanh Mai Pham:** Multivalent anti-SARS-CoV-2 nanobodies. Patent #12098186
- **Brooke Nicole Harmon, Yooli Kim Light, Catherine Margaret Mageeney, Jennifer Schwedler and Christopher Aaron Sumner:** Brain-targeting nanobodies and purification methods. Patent #12098200

**KEEP UP WITH THE LABS**

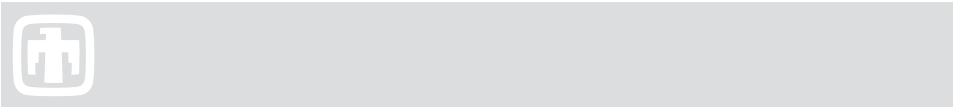
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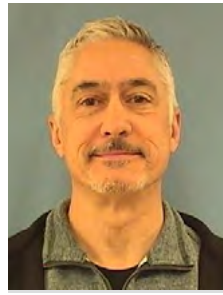
# Mileposts



Philip Fajardo 40



Jeffrey Gruda 35



Adam Slavin 35



Anita Reiser 30



Jon Salton 30



Todd Dunivan 25



Aaron Hall 25



Marcu Knudson 25



Tom Nelson 25



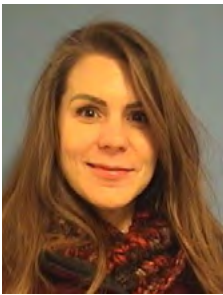
Patricia Sena 25



Tommy Ao 20



Bridget Clevenger 20



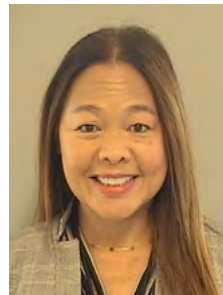
Annie Kazmierczak 20



Eileen Snyder 20



Jeff Stevens 20



Jeni Turgeon 20



Lourdes Valdez 20



Greg Weirs 20



Heather Clark 15



Sonya Mahler 15



Bruce Nguyen 15



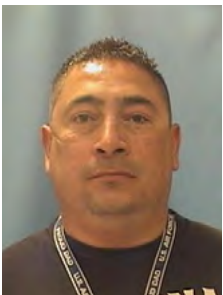
Germaine Almager-Laughlin 15



Candle Martinez 15



Eric Miller 15



Steven Nunez 15



Scott Roberts 15



Jieru Yu 15

## Recent Retirees



Michael Dugger 35



Tracy Jones 35