SANDIA LABNEWS
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A spotlight on invisible disabilities **Page 7**

Sandia tests heat shields for space

WHAT'S SMOKIN' — Watch a video of smoke billowing off NASA's heat shield material during a recent test at Sandia's National Solar Thermal Test Facility. **Photo by Craig Fritz**

Solar tower subjects materials to extraterrestrial reentry conditions

By **Mollie Rappe**

In support of two NASA missions, Sandia's National Solar Thermal Test Facility harnessed the power of the sun to expose aerospace materials to intense heat, replicating the harsh conditions of faster-than-sound flight and atmospheric reentry to ensure the material's ability to protect the rest of the vehicle.

The Mars Sample Return campaign, which is under a complete program review, is a NASA and European Space

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Study asks: Can cellphone signals help land a plane?

Sandia Labs, Ohio State look to the skies to protect aircraft against GPS outages

By **Troy Rummler**

Dangling from a weather balloon 80,000 feet above New Mexico, a pair of antennas sticks out from a Styrofoam cooler. From that height, the blackness of space presses against Earth's blue skies. But the antennas are not captivated by the breathtaking view. Instead, they listen for signals that could make air travel safer.

Researchers from Sandia and Ohio State University are taking experimental navigation technology to the skies, pioneering a backup system to keep an airplane on course when it cannot rely on global positioning system satellites.

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ALOFT — Summer Czarnowski, a geosciences intern at Sandia, holds a line tethered between a scientific payload and a weather balloon prior to launch at Moriarty Airport in New Mexico in July. **Photo by Craig Fritz**

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Sandia's Thunderbird: Then and now

A look at the evolution of an icon

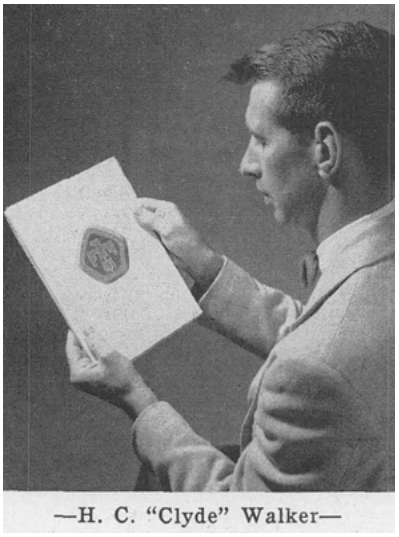
By **Kenny Vigil**

Sandia's blue Thunderbird has been around longer than most of us can remember. As Sandia celebrates its 75th anniversary, the blue Thunderbird logo has become a beacon of the Labs' enduring legacy. But how did this iconic emblem come to be? Lab News delved into the archives and spoke with Labs Historian Rebecca Ullrich to uncover the story of the Thunderbird logo's origins and its journey through the years.

Two quick facts: First, an employee designed the Thunderbird logo. Second, it wasn't originally created to be Sandia's official logo.

Early history

The story of the Thunderbird logo begins in 1955, when the Labs held a contest to choose a design for five-and 10-year service pins. As part of the submission criteria, the entries could not include a mushroom cloud, which was part of Sandia's



ENDURING DESIGN — A photo published in Lab News in 1955 shows Clyde Walker looking at the winning design he submitted for a service pin contest, featuring the Thunderbird. During his career, Walker saw that design eventually morph into Sandia's logo. The Thunderbird has only undergone one major redesign, which was in the early 1970s. **Photo from the Lab News Archives**

1949-2024
SANDIA NATIONAL LABORATORIES
Making History, Shaping the Future

original logo. That mushroom cloud logo was used starting in 1948 when the Z Division, originally part of Los Alamos National Laboratory, started being referred to as Sandia Laboratory. It was no longer used after Nov. 1, 1949, reflecting the Labs' shift to an engineering focus when Sandia Corporation took over the contract to manage and operate Sandia.

"Sandia doesn't do the physics package. It's an engineering lab, and they wanted to emphasize that in their service pin design," Rebecca said. "Employees submitted more than 200 entries and a committee narrowed it down to four."

Voting time

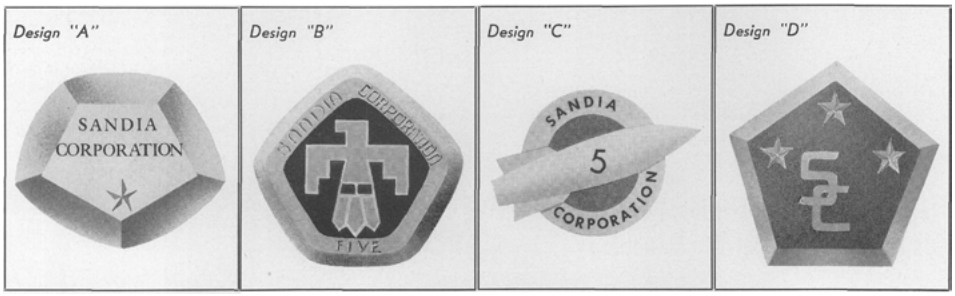
The Technical Art Division, known today as Creative Services, helped prepare the final artwork before the designs were unveiled in the Aug. 12, 1955, edition of Lab News. Employees had one week to vote for their favorite.

The Thunderbird logo received the most votes, 532.

In the Aug. 26 edition of Lab News, the headline read, "Thunderbird Pin is Winner of Service Contest."

Its designer, Clyde Walker, received a $75 U.S. Savings Bond for submitting the winning entry. Walker, an electrical engineer who worked at the Albuquerque and Livermore sites during his career, had been working at Sandia for a mere five years when he submitted the winning entry for the pin contest.

KICKER — Clyde Walker, left, accepted a $75 savings bond from Sandia President James McRae in 1955 for submitting the winning entry for a service pin contest. The Thunderbird that Walker designed for the pin has been used as Sandia's logo for nearly 70 years. **Photo from the Lab News Archives**



THE FINAL FOUR — A committee whittled down the designs for service pins to the four pictured above. They were published in Lab News in 1955 for employees to vote for their favorite one. Design B, with a turquoise Thunderbird, submitted by Clyde Walker, got the most votes. **Photo from the Lab News Archives**

Sandia's early culture

Rebecca said the contest showed something important about Sandia's culture in the early days.

"They were asking for the voice of Sandia. There was a very strong sense of community," she said. As for participation in the contest, "It tells us there was a fair amount of engagement. The contest was important for underlining how the Lab was defining itself."

An enduring design

The original turquoise Thunderbird had three distinct tail feathers and was set on a pentagon shape on a copper background.

"It was a very eye-catching and crisp design," Rebecca said. "It was a very popular design that got picked up quickly by the graphic designers."

By January 1956, Lab News was using the Thunderbird in its masthead. "By 1959, the design was used more generally as Sandia's logo, not just on service mementos," Rebecca said.

The logo has undergone only one major redesign, more than 50 years ago at the direction of then-President John Hornbeck, to align with AT&T's branding overhaul. This modernized Thunderbird, with its sleek lines and bold posture, is the version recognized today.

"By 1971, the new Thunderbird was in use on publications and everywhere else, looking pretty much as it does today," Rebecca said. "The Thunderbird is a very defined statement that this is Sandia."

CELEBRATING 75 YEARS
A LOOK AT THE EVOLUTION OF SANDIA'S LOGO. Animation by Andrew Dormody

A legacy cemented

Today, the Thunderbird is synonymous with Sandia. It adorns the Thunderbird Café where employees gather, and it's the emblem of the Thunderbird Kudos Award, which celebrates those who go above and beyond.

For many current Sandians, like Laura Hatfield, who remember seeing the blue Thunderbird logo at home because one or more of their family members worked at Sandia, it serves as a reminder of generations of service. Laura works in Creative Services and oversees Sandia's brand. She said there are no plans to update or change the logo.

"The Thunderbird logo has so much history with the communities and customers we serve. People identify the Thunderbird with Sandia," Laura said. "From an internal perspective, the Thunderbird cements that we're one lab with one mission. Having one logo we can connect to is important."

Heat shields

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Agency mission that seeks to deliver Martian rocks to Earth-bound scientists. These samples could provide clues as to whether the Red Planet ever hosted life and help prepare for human exploration of Mars. If selected, the Sample Retrieval Lander segment of this mission would land the heaviest payload ever on Mars, including a rocket designed to launch a container of carefully selected samples into Mars orbit. Recently, NASA engineers tested heat shield materials for the Mars Lander at Sandia.

"This would be the first mission to return rocks from Mars to Earth; it's got a bigger payload," said Ken Armijo, a Sandia engineer and test director for the NASA tests. "The heavier the payload and the bigger the entry vehicle, the hotter the vehicle gets during atmospheric entry, and the better the heat shield needs to be."

What makes Sandia's solar testing facility special is its ability to test samples of material up to 3 feet wide with different gases blowing over the samples to mimic the atmosphere of different worlds, Ken said. This is done using sunlight focused by hundreds of mirror-like heliostats — rather than using energy-guzzling arc jets or lasers, which are two other methods for testing materials for reentry. This could save between 15 to 60,000 kilowatts per test, the equivalent of running 5 to 20,000 clothes dryers for the length of the test.

Sandia's singular facilities

Sandia's solar testing facility includes a 200-foot-tall power tower with a field of 212 mirrored heliostats.

"We have high flux and high-flux distribution on the solar tower," Ken said. "We can basically fit whole pieces of planes up there if we wanted to and blast them with concentrated sun beams. The high flux you experience during reentry and hypersonic flight is only part of what we can simulate."

Flux represents the amount of light or energy hitting a certain area, often compared to the amount of sunlight that would hit a beach towel on a sunny day. Acting like a massive magnifying glass, Sandia's solar test facility can focus sunlight up to 3,500 times this amount of light.

Arc jet testing costs up to $100,000 per day, while laser testing is similar at approximately $150,000 per day, while testing on the solar tower costs about $25,000 per day, Ken said. Another benefit is the ability to focus more heliostats upon the test material, changing the intensity of sunlight to mimic the stages of reentry or even the conditions of reentry on different celestial bodies, he added.

"Typically, NASA missions test their heat shield materials at several different facilities with different capabilities before certifying the material for flight," said Brandon Smith, the lead engineer for heat shield materials for the Sample Retrieval Lander at NASA Jet Propulsion Laboratory. "Sandia's ability to test at this size nicely complements our other test facilities."

AIR FLOW NOMINAL — NASA materials engineer Milad Mahzari, front, and NASA project lead Keith Peterson examine the gas flow around their heat shield during a test at Sandia. **Photo by Craig Fritz**

Materials testing for Mars and beyond

During NASA's tests in the fall and winter of 2023, engineers tested 2-foot-wide samples of a material developed at NASA's Ames Research Center. The heat shields for both the Mars Sample Retrieval Lander and a Titan-bound mission, Dragonfly, are designed to be made from this material, called Phenolic Impregnated Carbon Ablator. This material has been successfully used as heat shields for NASA's missions Stardust, Mars Science Laboratory, Mars 2020 and OSIRIS-REx.

The tests were led by Keith Peterson, a materials scientist at NASA Ames Research Center. He said that other methods of testing materials for reentry are limited to smaller samples, only 8 inches in diameter. Since the solar test facility can test larger samples of material, NASA could test material samples that were slightly bent to simulate the physical strain a spacecraft would feel entering the atmosphere, and study mechanisms that show up only at larger length scales, Peterson added.

Dragonfly is a helicopter-like robot bound for Saturn's largest moon, Titan, in development at the Johns Hopkins Applied Physics Laboratory. The rotorcraft is designed to fly multiple sorties once it reaches Titan, searching for chemical processes common to both Titan and very early Earth, prior to the formation of life. Titan could hold clues to how life may have arisen on our planet. However, with an atmosphere four times as dense as Earth, Titan poses its own challenges especially when it comes to designing a heat shield for the spacecraft to fly through the methane-rich atmosphere and deliver the rotorcraft.

To mimic the thermal processes of atmospheric entry in the oxygen-less atmospheres of Mars and Titan, the researchers blow nitrogen gas across the heat shield sample. Recently, Sandia added a gas line from the base of the power tower to the top, Ken said. A gas line is somewhat like a garden hose, providing high-pressure gas where materials testing occurs.

Sandia mechanical technologist Daniel Ray was responsible for installing the gas line and for fixing problems on the tests as they arise. He is the main welder and fabricator for the solar testing facility.

"My role on every project is to make it work," Daniel said. "During their first test, NASA had an issue with the protective carbon felt catching fire. The following morning, I made some ceramic shields to better channel the nitrogen and protect the test system, and it worked."

Scorching solar slingshot

In 2022, researchers from the Applied Physics Laboratory tested a heat exchanger prototype designed to propel a rocket around the sun. They subjected the prototype to high solar flux on the solar tower.

The purpose of these new types of aerospace heat exchanger heat shields is to protect and propel future Voyager-type spacecraft as they slingshot around the sun to zip out into interstellar space, Ken said. By flying closer to the sun, spacecraft could reach speeds three or four times those of Voyager 1, said Jessica Harsono, an Applied Physics Laboratory mechanical engineer and leader of this project.

The researchers were able to test their heat exchanger prototype under the light of 2,000 suns for 10 minutes. During the test, the prototype reached over 3,100 degrees Fahrenheit and remained intact and operational, demonstrating the ability of the heat exchanger to survive its intended use, Harsono said. The researchers also tested several possible coatings for heat shield materials.

This was not the first time that Applied Physics Laboratory researchers tested aerospace subsystems at Sandia's solar test facility, Ken said. The first test for the lab started in May 1979, when the solar test facility — designed and commissioned for energy research — was less than a year old.

Applied Physics Laboratory researchers came back in 2000 to test radar protection domes called radomes. Previously, NASA researchers have tested space shuttle tiles, sensors and communication systems to see if they would work during reentry. The facility has also been involved in testing nose cones for space shuttles and Air Force planes, and aerospace materials' resilience to rapid temperature changes.

"This has blossomed into a lot of neat projects because, fundamentally, we have figured out a way to adjust our ability to focus heliostats on and off and adjust the spread of focused beams so we can tailor the flux profile over time to mimic real-world flight conditions," Ken said. "Because we can dial in the profiles, we have more confidence that it's going to survive and function well during a mission. Having confidence that it will make it to Mars, land and pick up the rocks safely is important."

PREPARE FOR IGNITION — Jessica Harsono, right, a mechanical engineer at the Johns Hopkins Applied Physics Laboratory, sets up the test article for mounting to Sandia's solar tower fixture during a September 2022 test. **Photo by Craig Fritz**

GPS backup

CONTINUED FROM PAGE 1

More than 15 miles below the floating cooler, cell phone towers emit a steady hum of radio frequency waves. Hundreds of miles above, non-GPS communications satellites do the same.

The idea is to use these alternative signals to calculate a vehicle's position and velocity.

"We're not trying to replace GPS," Sandia lead researcher Jennifer Sanderson said. "We're just trying to assist it in situations where it's degraded or compromised," which can lead to dangerous situations for pilots and passengers.

The team presented its preliminary data at the Institute of Navigation GNSS+ conference, held from Sept. 16-20 in Baltimore. The research is supported by Sandia's Laboratory Directed Research and Development program.

FINAL CHECKS — From left to right, Sandia electrical engineer Prabodh Jhaveri, intern Will Barrett, technologist Michael Fleigle and intern Summer Czarnowski prepare a payload for a weather balloon launch. **Photo by Craig Fritz**

The case for a GPS backup

There is no question GPS is still the gold standard for navigation. It's fast, precise and reliable. Which might raise the question: Why are researchers developing new navigation methods?

"I worry about relying too heavily on it without a backup," said Jennifer, an expert in navigation algorithms.

GPS, she said, has become part of the fabric of our modern, technological world. As a society, we are constantly plugged into it, whether we are landing a plane, driving through town, mapping crop yields or timing transactions in stock markets. This reliance has researchers like Jennifer concerned about the consequences if the connection is disrupted.

"The impacts of losing GPS could be felt throughout society," she said.

Disruptions to GPS are not uncommon. Pilots flying near conflict areas are increasingly likely to lose GPS or discover it is unreliable. The longer they fly without GPS, the higher the risk of accidents.

"Commercial GPS receivers are susceptible to a couple different threats, one being jamming," Jennifer said. Jammers, devices that overwhelm receivers with meaningless signals on GPS frequencies, are illegal but commercially available.

Another problem, she said, is spoofing, which involves using a fake signal to mislead receivers into believing they are in a different location. The technique is no secret, as gaming communities use it to cheat in location-based games like Pokémon Go.

"There are actual apps you can download that allow you to spoof your location, and entire subreddits dedicated to showing you how to use it for various games," Jennifer said.

While spoofing a game may be relatively harmless, Jennifer emphasized it can have real-world consequences when directed at a vehicle. Pilots might not be able to tell if a signal is spoofed or genuine, leading them in the wrong direction.

Project studies signals-of-opportunity at high altitude

Jennifer's idea of navigating using non-GPS signals that happen to be nearby is not entirely new. Scientists refer to it as "signals of opportunity" but have primarily studied it on and near the ground. It has been proposed as a way for autonomous vehicles to navigate through urban canyons, where GPS signals are blocked by towering buildings.

However, it is not a simple task. Instead of extracting time and location information from a GPS signal, receivers of signals-of-opportunity sometimes measure the physical characteristics of radio frequency waves instead.

For example, they can use what's called the Doppler effect. Radio waves from a satellite moving toward a receiver become compressed as they travel, while radio waves from a satellite moving away become stretched out. With some advanced mathematics and enough signals, scientists can determine the source of the signals and calculate the receiver's position.

Jennifer and her team are studying signals-of-opportunity navigation at high altitudes. If they can collect signal data from the stratosphere, they may be able to develop a way to guide vehicles, such as aircraft, using a network of atmospheric radio frequency waves.

"So, we strap our payloads to these weather balloons and launch them into the air," she said.

The payloads, which consist of electronic packages attached to a pair of antennas and bundled into an insulated foam cooler, hold the key to understanding signals high above the clouds. Satellite signals are expected to be strong, but there may be dead zones due to the cone-shaped transmission pattern that narrows closer to the source. Satellite coverage over rural areas, like much of New Mexico, may be too sporadic to be useful. The strength of cell tower signals can be calculated theoretically, but it needs to be characterized to be useful in a real-world situation.

"So far, the highest altitude we've reached is about 80,000 feet. In comparison, other studies we've seen have focused on 5,000 to 7,000 feet."

Processing data is the next step of team's scientific journey

As researchers continue to process their first batch of data, they look forward to new milestones and new challenges.

"The not-sexy but very important side of navigation is understanding all your error sources," Jennifer said. "My goal is to have a robust dataset to develop algorithms for real-time systems, enabling hardware tests using actual live-sky data."

Eventually, a functional navigation system will need to match signals to their transmitters in real-time and then calculate position and velocity relative to those sources. However, in this early stage of the research, her team is manually matching received signals to nearby satellites using reference data.

"It can be quite tedious. So, one big aspect we need to address is automating this process," she said.

Despite the challenges, she remains optimistic.

"While we are still processing the flight data, we believe our preliminary findings indicate that we detected cell tower signal beacons at our peak altitude of about 82,000 feet. If these signals are clean enough for navigation, it will significantly change what we thought was possible for alternative navigation," Jennifer said.

PACKING — Sandia intern Will Barrett prepares the payload for launch. The payload records GPS and non-GPS signals. After the flight, researchers compare their calculations from non-GPS signals to the actual positions.

Photo by Craig Fritz

The disabilities we cannot see

By **Magdalena Krajewski**

When I applied to Sandia, I struggled with how to answer the section asking if I had a disability. Being deaf or hard of hearing was listed right there, along with neurodivergence, traumatic brain injuries, physical impairments and a host of others.

I was deaf, but just in one ear, and my right ear, the good one, has got me this far without any trouble. So, do I consider myself to have a disability? I don't. But do I have one? I do. And so, I checked the box.

My story

I was 17 when I lost the hearing in my left ear. It happened suddenly on Nov. 7, 2000. I remember the date because it was election day. It was also my mom's birthday. The doctors, at the time, believed that an arachnoid cyst found in my brain had burst and caused me to lose the hearing in my left ear and develop a severe, albeit temporary, facial paralysis on the same side.

My ability to smile, raise my eyebrow and scrunch my nose eventually came back. My hearing, however, did not. But if I'm being honest, I didn't care about the hearing loss, so long as it meant my face, the part of me that people could see, would return to normal.

So that is perhaps why, even now, my hearing loss seems like the least bad thing that could have happened.

I'm 41 now and have been deaf in my left ear longer than I could hear in both. I've learned how to navigate the world, as much as possible, with my hearing ear out. When I go out to eat with family or friends, I consider which seat will allow me to hear as many people as possible, but I often still need to ask someone to switch seats so I can be on my hearing ear. I avoid circular tables because someone inevitably ends up on my bad ear. When I go to the movies, a conference, a concert or my kid's soccer game, I try to find a seat on the farthest left end. When I'm in a group, I constantly need to adjust where I'm standing so I can hear whoever I'm talking to. I still don't always hear what people are saying, sometimes I'll ask folks to repeat themselves, other times I just smile and nod, pretending I heard. There have been so many times where my husband, mom or son whisper something in my left ear, and I have to remind them, "wrong side."

I know there are times I've come off as rude or people have thought I was ignoring them, when in reality I just couldn't hear them. My husband jokes that he's my good ear, and he is, although I know it drives him a little bonkers that I never hear my alarm clock.

I'm generally comfortable telling people that I'm half deaf, especially if they're talking into my bad ear. For the most part people are receptive, but the funny thing is, they often keep talking, sometimes a little louder, but still into my left ear, not seeming to understand that that ear is 100% out of order.

GOOD EARS — Laura Sowko, left, who is deaf in her right ear and writer Magdalena Krajewski, who is deaf in her left, are highly aware of their seating arrangements whether it be in Steve Schiff Auditorium or at the dinner table. **Photo by Craig Fritz**

Laura Sowko

Laura, a technical writer, is also deaf in one ear. She lost her hearing in her right ear when she was 40.

Doctors have told Laura that her hearing loss is of an unknown etiology, which she says is just a fancy way of saying they don't know what caused it. When she first lost her hearing, she wrote a long letter to her friends explaining the situation.

"Some of them remember which ear is my good one, some don't. I just have to remind them," Laura said, reflecting my own experience.

"When I meet new people, I tell them I'm profoundly deaf in my right ear. I phrase it that way so they understand I'm not just saying I can't hear well," Laura said. "When I simply say, 'I can't hear,' people will add that they can't hear well either. But it's not the same."

Like me, Laura pays careful attention to her seating arrangements. For example, in Steve Schiff Auditorium, she sits all the way to the right to minimize sound coming from that side. Laura's daughters are strong advocates for her as well; as my husband might say, they're her good ears.

"When we go to the store and I'm trying to interact with a clerk, they help a lot as I often can't understand what the clerk is saying," Laura said. "They'll lean forward and say, 'She's deaf.'"

"I struggle when people talk too fast," Laura said. "It's helpful when people can slow down, face me and pronounce their consonants clearly."

Laura's biggest challenge, which I believe many people with hearing disabilities can relate to, is navigating crowds and socializing in groups.

"It can be isolating; I find myself reluctant to participate in social situations. At parties, for example, I can't just join a conversation because I struggle to hear what people are saying, even with hearing aids. I also mistakenly interrupt others because I can't always tell when someone is speaking," Laura said. "It can be embarrassing."

When I asked Laura if she identifies as someone with a disability, she expressed the same reluctance I have felt.

"I think my hearing loss is a disadvantage, yes, and it can make some things more difficult," Laura said. "But I don't necessarily think of myself as disabled."

Keith Morris

Unlike Laura and me, Keith has no issues identifying as disabled; he sees autism as a core part of who he is.

"I am a disabled person; I'm not a person with disabilities," Keith, an electrical engineer with Sandia, said. "I am autistic, I'm a musician, I'm a recovering alcoholic, I'm a dad."

Keith was 54 when he was officially diagnosed with autism.

"I was working with my therapist on my anxiety in social situations and stumbled across an online forum where a group of autistic people were discussing the difficulties they had with small talk," Keith said. "They were describing my exact experience."

From there, Keith took a self-assessment and then a formal one. The process took several months, but when the results came in, he said he didn't need to see them; he already knew.

For most of his life, Keith assumed everyone felt the way he did and that no one was getting their needs met. As a child who excelled in school, he learned not to ask for help because when he did, teachers would tell him, "You're smart. You can figure it out." Early on, he realized that help wasn't coming.

And so, he did.

"I got really good at what we call masking and compensating," Keith said. "I found a way to get by — by faking it, suffering in silence or some combination of those."

For a time, Keith would self-medicate to quiet the chaos and discomfort he felt.

"Of course, that became problematic," he said. "Self-medicating can be common for those diagnosed with autism later in life."

Keith has since found healthier support systems since his diagnosis and adds he's better at predicting and managing his needs. This involves limiting his social interactions, especially when it comes to small talk.

"For people who are not autistic — we call them allistic — small talk is used to form connections. But for those of us with autism, it's the reverse. We need to form a connection before we feel comfortable making small talk," Keith said. "I'm not trying to be rude. I just don't know how to fake feeling a connection."

Keith points to the social model of disability to explain how most of our social structures are organized so that only some people, usually able-bodied, fit in naturally while others are excluded.

"Someone who can't walk up the stairs isn't doing it wrong," Keith said. "And it's the same for someone with autism. We're not doing small talk wrong or making eye contact wrong; we just have different needs."

Michael DeAntonio

Michael, a physicist at Sandia, was diagnosed with chronic sarcoidosis at the age of 29. This rare disease affects between 150,000 and 200,000 people in the United States. It's a long-term inflammatory condition that occurs when tiny clumps of immune cells form in the organs, most commonly the lungs and lymph nodes, leading to symptoms such as fatigue, shortness of breath and a persistent cough.

Michael has an advanced condition affecting his lungs and joints, which, on his good days, makes him feel as though he has the flu. "On a bad day, I feel like my bones are broken," Michael said. "Doctors call it a flare-up, but I've talked to other patients, and we agree it feels more like a crash. When this happens, I feel nauseous, dizzy, overheated, breathless and extremely fatigued."

For Michael, these crashes can occur every two to three weeks and last anywhere from one to five hours.

Before his diagnosis in 1991, he described himself as the kind of person who would ride his bike 10 miles to play soccer, then ride back and feel fine. "I can't ride a

bike at all anymore, and I can't run more than 50 feet without getting winded," he said.

The daily fatigue has had the most significant impact on his life. "People who don't know often assume I'm lazy when I'm unable to do things that most people can," Michael said. "This is usually what prompts me to explain my condition so they understand why I can't lift heavy items to help someone move, play games or go on a long hike."

While Michael is comfortable discussing his condition today, that hasn't always been the case. "I had a group of friends who knew, but other than that, I hid it from people," he said. "I would force myself to push through a crash and engage in strenuous exercise just to appear normal. But then I would go home and completely collapse."

Today, Michael has adjusted to what he calls his new normal. He understands what he can manage, what he cannot and who to inform when he feels a crash coming on. "I tell you it feels like the flu, but I'm used to the flu," he said. "Just by looking at me, most people have no idea how much I suffer, and I think that's true for many people with invisible disabilities or illnesses."

"You just never know what someone is going through, and people aren't always going to tell you," Michael said. "We're not trying to be mean or evasive; we're just trying to manage our way through life the best we can."

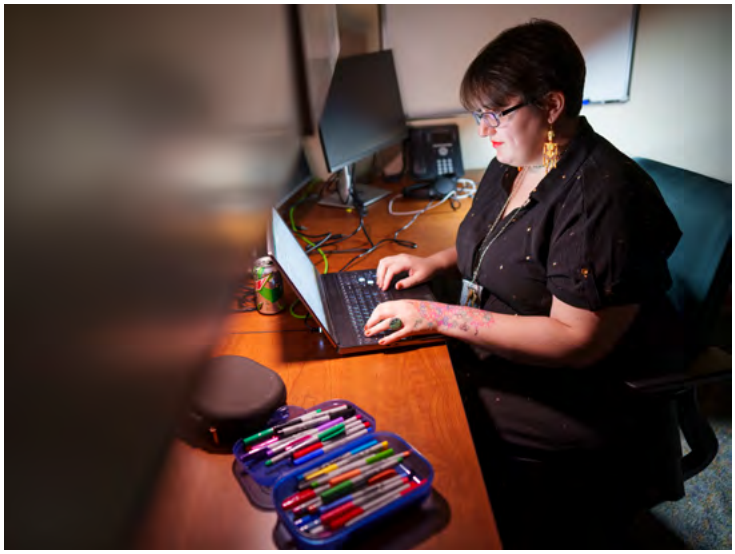
Amelia Henriksen

Amelia, a data scientist with Sandia, remembers how her sister would blast music in her room when they were growing up.

"It was the only way she could get homework done," Amelia said. "So, she'd be listening to music on full blast, and I would be freaking out because I was completely overstimulated from all the sound."

Amelia said she was often accused of being dramatic or overly sensitive for her reactions, like the ones she had about her sister's music, but she'd later learn that she had auditory and tactical hypersensitivities. Both of which are common for those, who like Amelia, have an anxiety disorder.

Amelia went 23 years without knowing why she felt the way she did. Sometimes she assumed everyone felt the panic she did. Other times she believed it was her fault that she didn't have the control she should have over her emotions.



DOODLING — Amelia Henriksen, who has been diagnosed with anxiety and depression, keeps colorful pens on hand for doodling, a grounding technique she uses to help with her anxiety. **Photo by Craig Fritz**

"As a child I had severe testing anxiety, but at that time I just thought everyone would hyperventilate, cry and basically have a full-blown anxiety attack before tests," Amelia said. "I look at my younger self today with a lot of compassion because the societal messages I had back then was that I was in charge of my response and my reaction to things, which meant I didn't have enough control over myself and my emotions, so it was my fault. It was really frustrating."

Like Keith described, Amelia excelled in school but struggled to get the help she needed.

"I thought as long as I was doing well and getting A's that I didn't need help," Amelia said. "But I did."

Today Amelia has the language she needs to ask for help and communicate how she's feeling. She was also diagnosed with depression and has found that while antidepressants don't stop her from having anxiety, they do interrupt a spiral.

"It gives me just enough breathing room to implement a coping strategy, instead of completely spiraling into a panic or anxiety attack," Amelia said.

Making lists is one of Amelia's primary coping strategies, which aligns well with her job as a data scientist. Noise-canceling headphones help with her auditory hypersensitivity, especially at work. And she keeps Sharpie fine-tip pens on hand to doodle.

"Doodling is a big one," Amelia said. "I'll draw on paper, my arms, legs and hands to help calm me down. It's a grounding technique I use to help connect me to my body, which helps me connect with my breath." Amelia says that most people don't know she has anxiety or depression unless she tells them, and typically they're quite surprised.

"People often assume that if their colleague or loved ones were depressed, they would notice, they'd pick up on it and be able to respond and help," Amelia said. "But the fact is people don't always notice, it can be hard to spot and tends to be associated with feelings of shame. Someone may 'seem' fine at work but that doesn't mean they didn't spend an hour trying to get out of bed that morning."

Contrary to what society told her as a child, she knows now that happiness isn't always a choice. As she explains, for some, their brain chemistry just doesn't work that way.

Listening to Amelia, I thought of the many times I had echoed that same message to people close to me, "You're in charge of your own emotions." Talking to Keith, I thought of conversations I have had where small talk failed, and I just assumed whoever I was talking to was rude. I think Michael summed it up best, when he said that we can never assume we have all the details.

Not all disabilities are visible and not everyone is going to be comfortable disclosing or even talking about them, so perhaps the best thing any of us can do is to assume less and give each other a little more grace.

Open Enrollment for 2025 benefits

Employees to review and select benefits by Oct. 28

By **Greg Archuleta**

Open Enrollment began Oct. 14 and closes Oct. 28.

"Open Enrollment is your chance to take charge of your health benefits for 2025," Executive Director and Chief Human Resources Officer Brian Carter said. "At Sandia, we understand how crucial your benefits are and the importance of having choices that fit your evolving needs.

"Don't wait. Seize this opportunity to review and select the best plans for you and your family. Explore all the options Sandia provides, and make sure to confirm your choices for the upcoming year. Whether you're opting for new plans, sticking with your current ones or deciding to waive coverage, act now to ensure you have the coverage you need for a healthy and secure 2025."

What's new

Sandia will continue to offer two medical plans: the Health Savings Plan and the Total Health PPO Plan, as well as continue to offer three dental plans and three vision plans from which to choose. Additionally, employees will see the following new benefits.

For both the Health Savings Plan and the Total Health PPO Plan, the lifetime maximum benefit for infertility treatment will increase from $30,000 to $45,000. Employees will also see changes to their Health Savings Plan, depending on their coverages, and can review the comparison chart for 2025 amounts.

The Health Savings Account, available with the Health Savings Plan, has also changed. Per the IRS, in 2025, employees can contribute more to their Health Savings Account, up to $4,300 if they have individual coverage and $8,550 if coverage includes dependents. These maximums include Sandia's matching contributions.

The Health Savings Account monthly maintenance fee and monthly investment fee will now be waived. Employees will no longer be charged for either. In response to inflation, Sandia has made adjustments to the salary tiers that are used to determine premium rates for 2025. View the 2025 monthly premiums.

How to enroll

To enroll from a Sandia computer or mobile device, employees should visit HR Self Service and navigate to Benefits and Retirement, then Benefit Detail, then Benefit Enrollment. The elections employees make during Open Enrollment are effective from Jan. 1 to Dec. 31, 2025.

PLANNING AHEAD — Business operations analyst Rebecca Sanchez helps Emilio, 11, and Natalia, 9, with their homework. Families like the Sanchezes count on benefits offered through the Labs. During Open Enrollment, Sandians can choose medical, dental and vision plan options for 2025. Open Enrollment continues through Oct. 28. **Photo by Craig Fritz**

Voluntary benefits

Sandia offers a variety of voluntary benefits that make life easier and can save employees money. Some of these extras are available year-round; others such as hospital indemnity insurance, accident insurance, critical illness insurance, short-term disability insurance and legal services can be elected only during Open Enrollment. Legal insurance group ARAG will provide expanded coverage to support Diversity, Equity and Inclusion and expanded family services offered to Sandia members. Visit Sandia Extras to learn more about the voluntary benefits and enroll.

Post-Employment Health Plans Open Enrollment

Open Enrollment dates for Pre-Medicare and Medicare retirees, surviving spouses and long-term disability terminees are Oct. 15 to Dec. 6.

Businessolver will partner with Sandia to provide eligibility and enrollment services for those eligible for post-employment benefits.

Information can be found in the Post-Employment Benefits Portal, including virtual presentations on Oct. 23 and Oct. 30. Call 833-SANDIA1 (726-3421) for questions.

Resources to help employees choose

The 2025 Sandia Benefits Guide provides a comprehensive summary of benefit options.

The interactive Medical Plan Comparison Tool asks questions to help determine which medical plan is the right fit.

Medical, dental and vision plan comparison charts detail the coverage available under each plan option.

A table of monthly premiums for 2025 shows monthly rates for medical, dental and vision options.

The Understanding Your Sandia Medical Plan Options video compares the Health Savings Plan and the Total Health PPO Plan.

Additional information about benefit options can be found on the Open Enrollment Benefits website.

The big drop

3D-printed torpedo anchor tested for impact data

By **Spring Booth**

Beside a 50-meter-deep pool, a 300-foot metal tower rises into the air at Sandia New Mexico. Cables and a vertical guided trolley attached to the tower allow personnel to hoist objects to varying heights so they can watch them fall at Sandia's **Drop Tower and Water Impact test facility**. Built in late '50s and early '60s, the site has been used for impact testing on containers that transport hazardous materials, weapons testing and underwater impact testing. Last month, the facility dropped anchor — torpedo anchors.

Torpedo anchors, heavy arrow-shaped weights, are completely embedded in the seafloor. Traditionally made of steel or other metals, the anchors are fiscally and environmentally expensive. **Sperra**, a clean-tech company specializing in automated construction for marine energy, is seeking to lower both of those costs by developing anchors that meet performance requirements but also minimize environmental impact. Sponsored by DOE testing program **TEAMER**, Sperra sought the assistance of Sandia's Budi Gunawan, a mechanical engineer with water power technologies, to test 3D-printed concrete torpedo anchors. Budi and mechanical environments engineer Rich Jepsen and test operations engineer Luis Abeyta oversaw the testing.

READY TO DROP — Technologist Jamie Meza guides a torpedo anchor prototype as it is lifted over a test bed at the Drop Tower facility. The anchor is being tested for use with offshore wind turbines. **Photo by Craig Fritz**

Currently, steel torpedo anchors are used primarily to anchor offshore oil & gas platforms off the coast of Brazil. Sperra is developing a patented scalable concrete torpedo anchor which can be used to anchor marine energy devices like wave energy converters, floating photovoltaics, and floating offshore wind. 3D-printed concrete is an ideal material for torpedo anchors due to its weight and durability, and unlike traditional metal anchors, they are more resistant to corrosion. Also, cement anchors have a smaller carbon footprint than metal anchors and are cheaper to produce. Cost is a barrier to wide-scale commercial deployment of offshore energy fields, especially wave-energy converters and floating photovoltaics. As part of the TEAMER network, Sandia personnel assist commercial developers, such as Sperra, with testing wave energy technology. With facilities like the Drop Tower and Water Impact facility already in place, Sandia has the capability to conduct the kind of tests most commercial developers lack the resources to carry out.

Last month's tests involved a crane hoisting three, approximately 500-pound concrete torpedo anchor prototypes 10-30 feet into the air. A fourth steel anchor was also included in the drop tests for comparison purposes. The test required each anchor to be dropped from different heights into a 12-foot-tall metal culvert with a 10-foot diameter. The pipe was

STICKS THE LANDING — Sandia technologist Jamie Meza takes photos of a torpedo anchor prototype after testing. **Photo by Craig Fritz**

DROP DEBRIEF — Sandia mechanical engineer Budi Gunawan, left, and Sperra engineer Mason Bell review data following a drop test of torpedo anchor prototypes. **Photo by Craig Fritz**

filled with sand and water to mimic the seabed off the coast of Oregon, home to the PacWave test facility for marine energy devices. The sand, which came from a local supplier, was passed through a sieve to verify that its grain distribution matches that at the PacWave. The drop test was designed to evaluate the structural integrity of the prototypes, verify how much force it will take to pull the anchors out of the seabed and provide numerical models for design improvement.

Despite pausing work due to rain and lightning, the test team was able to complete all testing scenarios. Each of the three concrete prototypes are reinforced with steel and have a hollow center where a bullet-shaped metal weight, called a booster, is placed during deployment. The anchors are designed to be dropped from a ship with mooring lines that can be attached to a renewable energy device or floating platform. The booster adds additional mass to the anchors which helps them embed deeper into the seafloor. This makes them less likely to be dislodged by high waves or winds buffeting the surface devices to which they are attached. Once placed, the booster is removed and reused for additional anchor deployments, a cost savings.

The three prototypes had different fin shapes that impacted embedment depth. The anchors didn't break when dropped, maintaining structural integrity, a concern with using concrete over metal. Preliminary conclusions found anchor capacity, the pull force needed to remove the anchor, was highly dependent on embedment depth, whereas the embedment depth itself is affected by torpedo fin width and angle, seabed composition, and speed and angle of the anchor on impact. Armed with new knowledge about their torpedo anchor designs, Sperra will refine their designs and continue next-stage testing.

The future of renewable energy is anchored in innovation, and with each test, it moves closer to realizing its full potential.

Then and now: Saturn from above

AERIAL SHOT — The Saturn accelerator, shown in the 1987 photo on the left, is a modular, high-power, variable-spectrum, X-ray simulation source. Its major function has been to produce X-rays to test the effectiveness of countermeasures used to protect electronics and other materials against X-ray radiation from nuclear weapons. **Left photo from the Lab News archives; Right photo by Joel Ortiz**

ANGLE collects pet supplies

PLAYING HARD — Wesson, left, and Pip from Animal Humane of New Mexico play during a Homeward Bound Drive event hosted by Sandia's Advancing the Next Generation of Leadership Excellence in September. The group collected 1,040 supplies for dogs and cats that were donated to seven local nonprofits. **Photo by Craig Fritz**

Mileposts


Tim Meisenheimer 35


Mark Reece 30


Bryant Sterling 30


Steve Artho 20


Scott Brooks 20


David Godsey 20

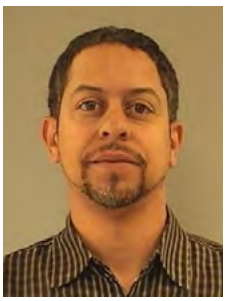

Gina Tafoya 20


Kelly Westlake 20


Robert M. Garcia 15


Madge McDonald 15


Jessica Pacheco 15


Charles Reinke 15