



# California & Beyond Edition

## Expanding testing capacity for Sandia weapons modernization programs

*New facility at Livermore campus meets growing mission demands*



**COMMAND PERFORMANCE** — Customizable for different nuclear weapons stockpile programs, the SPEAR facility at Sandia in Livermore, California, enables experiments to help weapon systems engineers deeply understand hardware system performance.

By **Paul Rhien and Danielle Martin**

**S**andia is making a significant investment in the weapons systems engineering capability at its California site. Mike Hardwick, systems engineering director at Sandia's California site, was joined on July 7 by Associate Labs Director for Integrated Security Solutions Andy McIlroy and other senior leaders in introducing the Sandia Programs Engineering and Assembly Research facility, the newest facility in nuclear weapons systems engineering at Sandia's California site.

The SPEAR facility, which opened this summer, is the first of its kind at the California campus and expands Sandia's capacity to assemble and

electrically test nuclear weapons components and systems for the nation's nuclear weapons stockpile.

Experiments performed at the facility will help weapons systems engineers deeply understand hardware systems performance to ensure the safety and reliability of the nation's nuclear deterrent. Sandia is the design and engineering lab for non-nuclear components of the U.S. nuclear weapons stockpile.

"We wanted to both increase capacity and continue the high level of rigor with which we assemble our nuclear weapons systems, and that required an investment in a new facility," Mike said. "The nuclear weapons modernization programs have a large workload for development tests and qualification tests. In partnership with

our test assembly facility in New Mexico, the SPEAR facility will enable us to handle the growing demands of these programs."

The 10,000-square-foot facility includes a laboratory for functional electrical testing of weapons assemblies. The lab is equipped with thermal chambers that enable Sandia engineers to perform electrical tests at simulated environment temperatures. Comprehensive data from tests performed at the SPEAR facility will allow systems engineers to determine whether weapons systems meet U.S. Department of Defense requirements and refine the hardware accordingly.

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## Experiments at solar thermal test facility break new ground

*Facility to test world's first particle-to-supercritical CO2 heat-exchanger system and on-sun falling particle receiver connected to a supercritical CO2 loop*

By **Kelly Sullivan**

**S**andia's National Solar Thermal Test Facility will host a number of "firsts" in 2020, including testing a particle-to-supercritical carbon dioxide heat-exchanger system, and the world's first on-sun falling particle receiver connected to a supercritical CO2 loop.

"Sandia has been building and using supercritical CO2 loops for about a decade," said Paul Gauche, concentrating solar power program manager. "There are several supercritical CO2 loops at the Brayton Laboratory, including one of the first three ever built, which are used for customer testing and research." These loops demonstrated the first near-critical supercritical CO2 compression, recompression Brayton cycle power generation, and trans-critical and mixed gas cycle variations, he said.

In fiscal year 2015, Sandia applied to DOE's Solar Energy Technologies Office to fund a SunShot

National Laboratory Multiyear Partnership, or SuNLaMP, project in FY2016-18. The goal of the project — a precursor to the much larger Generation 3 Particle Pilot Plant concentrating solar power project — was to build a falling particle receiver system with an integrated supercritical CO2 loop to demonstrate the ability to heat supercritical CO2 using particles heated by concentrated sunlight to temperatures above 700 degrees Celsius.

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**SPEAR OPENING** — Sandia technologist Zach Jacob and colleagues prepare for the opening of the Sandia Programs Engineering and Assembly Research facility earlier this summer.

Photos by David Nagel



**CONCENTRATED SUNLIGHT** — Mechanical engineer Kevin Albrecht stands next to a particle-supercritical CO2 heat exchanger at Sandia's National Solar Thermal Test Facility.

Photo by Cliff Ho

 LABNEWS Notes

# Town hall presents options for working parents

By **Valerie Alba**

The Integrated Security Solutions division held a town hall on Aug. 11 for parents who are balancing work and childcare responsibilities during the COVID-19 pandemic. Approximately 475 employees participated in the Skype event hosted by Deputy Associate Labs Director Marcey Hoover and Human Resources Director Rob Nelson. Florencia Prada, manager of California's communications department, facilitated the discussion, which also included Mary Romero Hart, senior manager of Sandia's Total Rewards benefits program.

The town hall centered around several topics affecting working parents, including schedule flexibility, the temporary vacation donation program, expanded open enrollment options and support for caregivers. The presenters answered questions from employees throughout the session.

"We recognize, as the school year approaches — and has even started for some — that there's a lot of questions and concerns for our parent population. Rob's team has been doing a lot to help us look at and address some of the questions and concerns," Marcey said. She thanked the Sandia Parents Group, both in California and New Mexico, for developing creative solutions for working parents.

In his opening remarks, Rob said, "I reflect most on what (Labs Director) James Peery has reiterated in his messaging, which is that we need ultimate flexibility in this time, and let's deploy tools wherever possible to make sure that

we can keep people productive and effectively balancing their work and their life obligations."

## Flexible schedules

"The current feeling is that we will continue maximum flexibility until we're through the pandemic," Rob said, "and so we have made commitments to offering and increasing flexibility around work hours and available options for people to switch back and forth their schedules, and we intend to keep that going as long as we can during the pandemic."

"The laboratory is very committed to continuing flexible options as we go into the next year," he said. Options for employees include adjusting their work start and stop times or opting into the vacation donation program.

## Expanded vacation donation

Employees who need to take time off work to care for children can opt into the vacation donation program, to which Sandia employees have donated thousands of hours to colleagues who need them.

"The intention is to fill in for those hours when it's not possible to work out the work/life balance," Rob said. "We have plenty of hours available currently, thanks to everyone who has donated very generously."

The salary cap for eligible employees also was increased, and Mary said, "We're continuing to explore what we can change within the provisions of the IRS guidance in order to maintain the status that we want to have in this space."

## Midyear open enrollment

Sandia is offering a midyear open enrollment program through Sept. 15 for employees to increase, reduce or discontinue their participation in the Dependent Care Flexible Spending Account to help with new or deferred childcare costs due to the pandemic. The FSA allows employees to use pretax dollars on dependent care needs, which also now includes caring for a parent. Employees also can change their contributions to their Health Care Spending Account through Sept. 15.

## Support for caregivers

Employees are encouraged to talk with their team members and management about workloads and flexibility, Rob said. "We're going to get through this together, and it

IF THEY CAN DO IT,  
WE CAN DO IT!



**Sandia KIDS**  
keeping the nation safe from COVID-19

**WORK SAFE, PLAY SAFE** — Systems research analyst Eva Uribe designed this poster for a contest hosted by Sandia's Homeland Security and Defense Center. Employees submitted lighthearted images of ways to conduct work safely at home and on-site during the pandemic. **Image by Eva Uribe**

requires understanding what our coworkers need and thinking about how we can adjust our schedules as well, if we're not in that situation, to help out people who are juggling lots of demands on their own schedules."

The panelists encouraged parents and caregivers to connect with the Sandia Parents Group for resources and up-to-date information. Details about vacation donation, FSAs and flexible schedules, including 12 scenarios for parents balancing work and childcare, are available to employees at [hr.sandia.gov](http://hr.sandia.gov).

A recording of the "Addressing the Challenges of Working Parents" town hall is available on the Integrated Security Solutions Division website, as well as a transcript of the Skype chat and timestamps for the topics covered in the presentation. 

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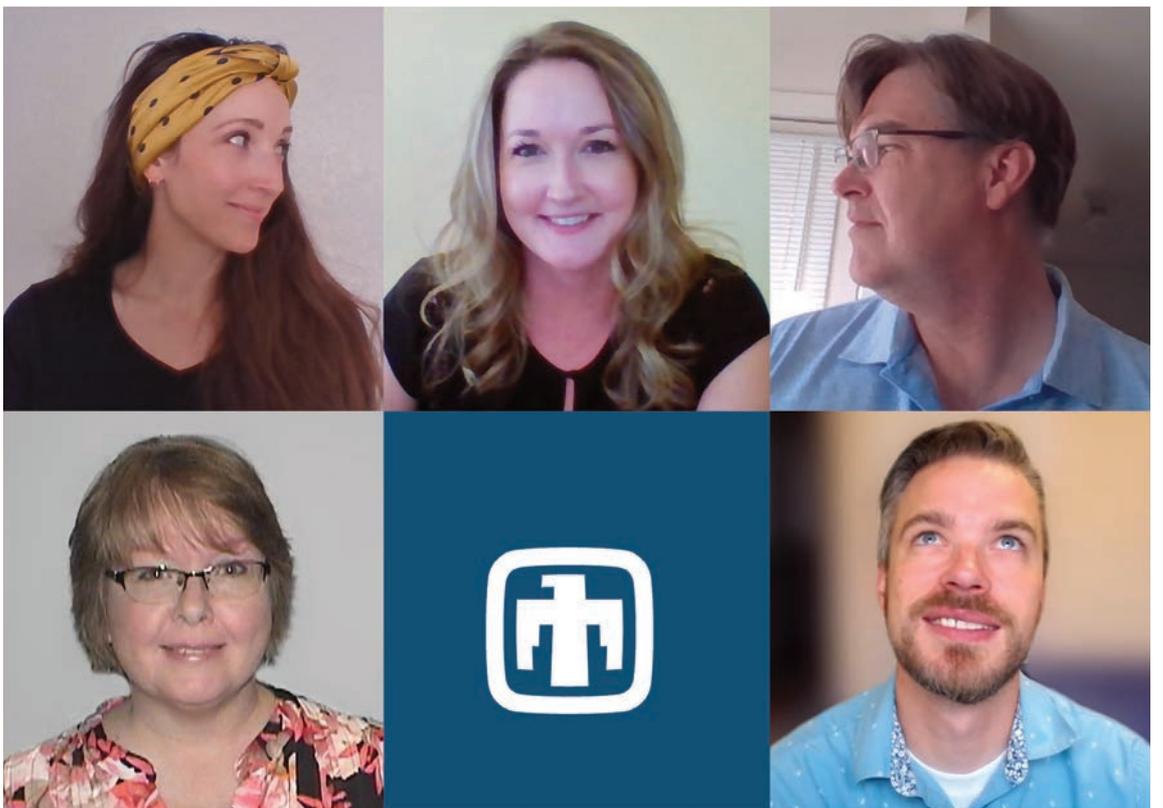
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 LABNEWS Notes

**EDITOR'S NOTE:** Lab News welcomes guest columnists who wish to tell their own "Sandia story" or offer their observations on life at the Labs or on science and technology in the news. If you have a column (500-800 words) or an idea to submit, contact Lab News editor Tim Deshler at [tadeshl@sandia.gov](mailto:tadeshl@sandia.gov).



**CA & BEYOND BUNCH** — The team for this year's CA & Beyond issue and authors of Integrated Security Solutions content throughout the year are, clockwise from top left, Sarah Jewel Johnson, Valerie Alba, Michael Ellis Langley, Paul Rhien and Kelly Sullivan.

# A year of change

Associate Labs Director Andy McIlroy reflects on how 2020 has affected Sandia

By Lab News staff

Lab News sat down for a conversation with Associate Labs Director Andy McIlroy, head of the Integrated Security Solutions Division, as he starts his second year in that role following a year permanently marked by a new reality for Sandia and the nation. Andy talked about the immense lift of suddenly having to enable everyone to work from home, space planning at the California campus in the world of social distancing and how long he expects remote work to last.

**Lab News:** First, thinking back to the end of 2019, what did you imagine 2020 would look like for us?

**Andy McIlroy:** (chuckles) You'll have to give me a second to put myself back in that mindset. I imagined that we would be extremely busy with the weapons program — working hard on the W80-4 and charting a path to success — and that we would continue to evolve our energy programs and increase our focus on resilience and security.

At the time, I was preparing to connect with important stakeholders in Washington, D.C. I had a trip to NREL (National Renewable Energy Laboratory) planned, as well as a couple of big energy conferences on the docket — multiple opportunities in 2020 for getting Sandia's message out in the public, especially about our energy and homeland security work. It was a really exciting plan, and it started off great!

It's funny, but I have to add this anecdote: James Peery (Labs Director) and I spoke recently, and we both agreed that managing a pandemic response was not in the job description that either of us had applied for! (laughs) So, yes, this — what's happened since March — was definitely not on my mind a year ago.

**LN:** What was your first thought about how to respond to the COVID-19 pandemic and what was most important for the division workforce at that moment?

**AM:** I think it was how do we keep everybody whole, in all senses of that word: how to keep people safe and how to keep paying them. We were worried about how quickly the virus was spreading. Initially, going home certainly played a large role in keeping people safe. However, in the mad scramble of that first week, we weren't sure who could work from home or how we would pay people if they couldn't work from home.

After realizing fairly quickly that we had enough tools to make telework happen and cover our people, we turned to the next big questions: how to keep people engaged and how to work in this new environment. I think we're still figuring some of that out. This was all a pretty big jolt.

**LN:** And probably a huge lift in terms of partnering with Industrial Hygiene, Facilities, Procurement and some of the centers that were needed to do this work. Can you talk about your assessment of that effort and how safe people are on campus today?

**AM:** "A huge lift" is an excellent description of where we were. Because when the time came to bring people back, the big discussion among the directors and myself — and extending out to SLT (senior leadership team) — was how to do that as safely as possible. This was a very different safety question than the ones we typically work on. The problem with a virus outbreak is that the safety issues extend beyond the laboratory. So we had to define what is "safe enough."

When discussing initial benchmarks, we thought, "Well, people have to go and buy groceries. How can we be safer than a grocery store?" That may sound a bit trivial, but we felt like we had to have some kind of benchmark. Because short of living in a completely isolated bubble with filtered air and nutrients poured into you, there really is no risk-free environment during a viral outbreak.

**LN:** So, what was the most important thing during these conversations?

**AM:** My discussions with Pam McKeever (director of California Site Operations) came down to needing two things: our security force and our custodial staff. If we can't clean, we can't work. At that time, only our most mission-critical personnel were on-site. But we wondered, "Can our custodians come on-site? Are they willing to come on-site?" So, we started working with Facilities to make the environment safer.

The first lift was asking Procurement to adjust our custodians' contracts so we could pay them to come and clean more often. We then identified a need to provide cleaning supplies, hand sanitizer and personal protective equipment for those coming on-site. Procurement began looking for those relatively rare supplies, and Facilities started thinking about the logistics of storing and distributing these supplies.

Next, we tackled social distancing. After determining the optimal occupancies within buildings and labs, our Facilities staff showed us how to maintain social distancing, for example, by either reducing the number of chairs or using tape to block chairs in conference rooms. Overall, setting up the California site so that people could return to work safely was a huge lift. The New Mexico situation was a little bit more fluid but faced some of the same issues.

Then of course there was the other side: with so many people connecting from home, our IT staff had to work nonstop to provide the needed resources. Despite the hiccups we experienced early on, when I talk with colleagues at other national laboratories, I realize that Sandia's IT experience has been much smoother than at the other labs. This says a lot about the dedication and foresight of our IT staff; they were ready and able to rise to the challenge so that we could collectively make a quick transition to working off-site.

And so it took a huge range of people to get us to where we are today — a safe environment for those who need to work on-site during this pandemic and a successful virtual experience for those who can work from home.

**LN:** Can you talk to us about your current priorities, given the conversations around space planning and the lease space?

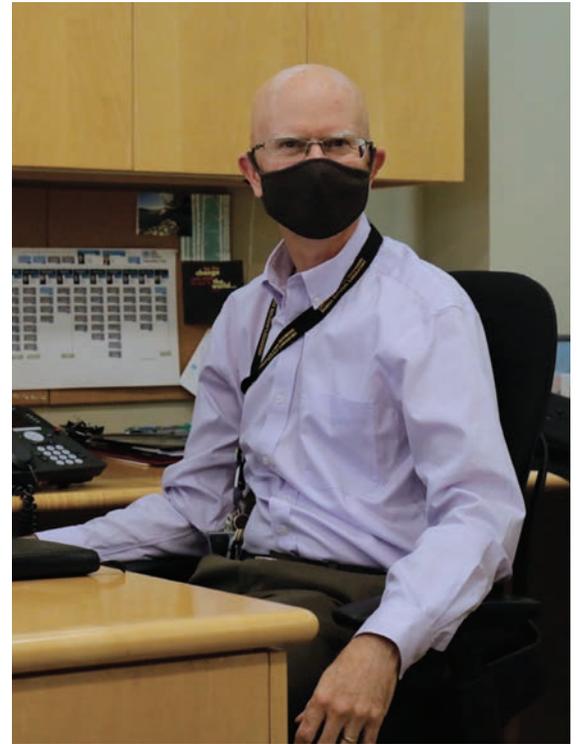
**AM:** This goes back to your initial question. One of our big plans at the beginning of this year was how to roll out densification so that our burgeoning workforce could all fit on campus. You know, it was like bunkbeds in some of the offices. Talk about an effort totally incompatible with the pandemic!

We had to make a huge pivot on how we thought about space so we could move from densification to what I will call "rarefaction" — spreading people out. And we really needed to rethink how to use the off-site lease. We quickly realized that we needed more space, not less.

The off-site lease suddenly transformed from being an opportunity to pack people in a given space to a way to spread out the fewer total people who would be coming on-site. Our facility planners did almost a complete 180 to make sure that everybody on-site will be socially distanced and in a safe place. I was really impressed with the space planning team. Even though they'd invested a lot in the densification plan, they were willing to essentially tear that plan up and start over almost overnight because they knew it was what Sandia needed.

**LN:** That begs the question: What do the next 12 months look like to you?

**AM:** Many of the issues I talked about as I started this job are still relevant. We have managed to keep good momentum on the W80-4. That continues to be a challenging program, but I've been impressed by the team; they have successfully innovated when



**THE LONG VIEW** — Associate Labs Director Andy McIlroy of the Integrated Security Solutions Division works at his desk at Sandia/California.

Photo by Michael Ellis Langley

confronted with significant obstacles to the schedule. I think we're on a solid path, and I'm looking forward to the continued success of the W80-4 program as we drive into the next year.

One big challenge will be how to keep this momentum going since our virtual work environment is likely to continue for another year. At first, we thought it would be temporary — maybe four to six weeks and then perhaps eight weeks. Now that five months have passed, we're starting to wrap our heads around the need to make our virtual environment sustainable.

We recognize that we'll have to connect with each other remotely over a long period of time, and we absolutely must survive — and even thrive — in this environment. This means we have to continue thinking innovatively about our virtual work environments: how to selectively meet and socially distance, as well as when and how to travel. We also need to make plans so that we're ready to come out of this stronger and better when it's safe to do so.

The pandemic has shown us that we can adapt and overcome. We will get through this. We've made it this far; we're going to make it all the way. So, it'll be a challenging year for us, not quite the year any of us expected. But it'll certainly be one that we tell our children about. 

## SPEAR facility

CONTINUED FROM PAGE 1

Additionally, in the facility's large activity bay, systems engineers will have the space and equipment for building hardware models and securely storing components, equipment and assembled test units. The new facility also includes a portable weapons-system simulator, soldering benches with fume extraction hoods for spot repair, as well as test instrumentation, power supplies, wave-form generators and additional equipment to help ensure the parts are reliable and safe. Visitor workspaces and video teleconference rooms will facilitate close collaboration with Sandia systems engineers and their nuclear security partners.

After 18 months of work to renovate and certify the high-bay facility, the opening of SPEAR represents the newest chapter in the long history of the facility. Built in the early 1990s, the complex was originally designed for laser research to support the Strategic Defense Initiative. When the complex was rebranded as the Micro and Nano Technologies Laboratories in 2002, multiple laboratories were established to support a range of missions, from materials science to satellite engineering. 

# Confronting COVID-19 and getting back to work — together

Story and photos by  
**Michael Ellis Langley**

The novel approach of Integrated Service Delivery being practiced in several centers within Sandia's Integrated Security Solutions Division was tested to its utmost this year, as departments had to suddenly figure out how to accommodate a remote workforce and then just as suddenly overcome dozens of challenges to bring people back to work safely on-site.

The outbreak of COVID-19 brought broad changes of life, and no one was left untouched. All of the Labs' sites were affected by stay-at-home orders to some extent. In California, where a large part of the division is located, the governor mandated a statewide quarantine on March 19. That order was in force for more than eight weeks before it was eased. Sandia at first sent most workforce members home but quickly needed to figure out a new normal for on-site operations once NNSA issued a return-to-work order a few weeks later.

## National security in the balance

The division is home to key centers focused on nuclear deterrence, energy, cybersecurity and bio-threats. COVID-19 threatened the nation, including those at Sandia working to keep our country safe.

"We have some responsibilities that are 24/7 operations, where we have to be present at all times. These are really critical to national security," Associate Labs Director Andy McIlroy said of the division he leads. "We monitor and maintain systems that are out in the field. Those systems must be on regardless of whether there's a pandemic or not. And so we have responsibilities that are very key to the nation's security — not in a theoretical way but in a truly operational way, ultimately. I think that was a big driver for us to try to get our critical functions back to work as soon as we could."

This was especially important, he said, for those who had to be on campus and could not work from the safety of home: security personnel, custodial staff and other mission-critical workers.

Thus, new issues of safety — making sure no one contracts COVID-19 while at work — had to be thought through, a complex process that no one person had all the answers for in an unprecedented outbreak that was emerging quickly.

## First things first

The Chemistry, Combustion and Materials Science Center is one of eight centers within the division, performing critical experiments and supporting classified nuclear deterrence research.

"We prioritized the activities that directly support the nuclear weapons program because we support them in a lot of materials analysis work," said Sarah Allendorf, center director.

Sarah and her leadership team, including Chris Moen, head of the engineering and transportation sciences group, began to think about how to make sure their buildings and labs were as safe as possible.

"First thing we had to do was figure out what are the hazards and what are effective ways of controlling those hazards?" Chris said, adding that this was no easy task because there were so many unknowns about the novel coronavirus, such as how long it lived on surfaces and how close you needed to be to another person to contract it.

"We decided to use an engineered-safety approach," he said. "Because our center has so many diverse types of equipment and spaces, we had to review each of our safety cases and write an addendum on how to mitigate for COVID-19."

But chemical and materials scientists are not necessarily well-versed in biological threats. They needed help to understand the risks. So they leveraged Integrated Service Delivery, a system they helped pioneer, to draw in experts from across multiple centers and use their expertise and connections to help tackle challenges.

## Turning to the experts

The Chemical, Biological, Radiological, and Nuclear Defense and Energy Technologies Center within the division is home to medical doctors,



**SAFE SPACES** — Sandia manager Dawn Skala talks about how her team worked with members of the environment, safety & health department to make spaces like this chemistry lab as safe as possible to work in.

virologists and other biological scientists who were already hard at work trying to understand the novel coronavirus and what was making it spread so rapidly across the planet.

When Craig Tewell, the center's acting director at that time, was asked by Sarah if he had anything that could help inform her team's thinking, there was little to draw from.

"In the early days, there was not much guidance to lean on. There was one OSHA (Operational Safety and Health Administration) document," Craig said. "For example, there was not a lot that was agreed on at that time about how the virus was transmitted."

But the center Craig was leading had an advantage — it is home to a biosafety lab, classified as a BSL-2, where researchers can work with "moderate-risk" agents associated with human disease. Drawing on advice from BSL-2 manager Cathy Branda and biochemist Joe Schoeniger, Craig and his team developed guidelines for "treating the world like a BSL-2."

"My center was at the forefront of this," Craig said. "Sarah and I, in particular, were talking about an engineered-safety approach. Our goal is to prevent an on-site transmission, and we had to trust our level 1 managers and senior managers to develop a safety system."

He shared some rough biological guidance with Sarah and her team. They also turned to another Sandia group with experience in pandemic response.

## Engineering safety in every room

Mike Roth works as part of Sandia's industrial hygiene team at the California campus. He is trained in pandemic response.

"The first thing we had to do was make sure everyone felt safe about being on campus," Mike, who worked on each safety case as the site slowly reopened, said.

Mike's 20-plus-year career as an industrial hygienist has taught him a very valuable lesson.

"Public health — it's a battlefield. You're fighting a crisis," he said, adding that Sandia's industrial hygiene team applied past lessons to mitigate the unknowns of COVID-19. "There's a lot of guidance about communicable diseases. Even with this new novel coronavirus, it follows similar patterns."

Mike worked directly with front-line managers, like Dawn Skala, in the Chemistry, Combustion and Materials Science Center. Dawn, who manages 10–12 labs, had to take the policies being developed by Sarah, Chris and the rest of the center's management team and apply them.

"We had to look at the guidance and determine how it would work in a particular lab with specific hazards," she said. "Sometimes we decided to limit the number of people in the lab. Other times the solution was to wear gloves or disinfect equipment. We conducted virtual walkthroughs of each lab with Mike and his team and developed five safety cases to cover those labs."

Dawn said that the level of teamwork and collaboration was incredibly helpful.

"They (the industrial hygiene team) added to our safety steps and understanding," she said. "They thought through the process with us from an end-to-end perspective."

Chris agreed. "It was hugely impactful," he said of the contributions from the environment, safety &



**CLEAN CREATION** — Sandia industrial hygienist Mike Roth holds a bottle of disinfectant made at Sandia/California and distributed to labs across the campus.

**SIGN OF THE TIMES** — A sign outside a chemistry lab is part of the prevention measures in place to keep people from contracting COVID-19 while at work.

health department and the industrial hygiene team.

"While we could come up with a safety approach for our labs, there were things we hadn't even considered. For example, we have a lot of PPE (personal protective equipment) because we work with lasers, but the team would warn us not to use particular chemicals (on the PPE) so that our PPE wouldn't be ruined. Or they'd say, 'Okay, you wiped the surface clean, but how are you disposing of the wipe?'"

## Supply-side issues

After Sarah, Chris and their center staff collaborated with Craig's and Mike's teams on an engineered-safety plan for resuming critical activities to support Sandia's national safety missions, Sandia/California faced a new issue — one felt by almost every American citizen in March and April.

"The supply chain was always the most critical part of the pandemic," Mike said. "Things like spray bottles — that you wouldn't think would be in short supply — were gone. Cleaning supplies and PPE like eyewear and gloves. No one had any. Fortunately, we were able to get a supply of disinfectants from New Mexico very early on."

Mike said the ES&H team became creative and innovative.

"Our team has been making disinfectant solutions, and we work with our partners in the logistics department to distribute disinfectant wherever it is needed," he said, adding that the mixtures are being created in a bathtub.

He applauded the entire ES&H department for devising new solutions when faced with supply challenges, as well as having enough people on campus to safeguard the facilities. He also credits the collaborations with the various centers, which he said have been "adaptable and resilient" throughout this pandemic crisis.

## Teaming for success

Chris said what happened on-site as people started coming back to work was as impressive as the effort to get back to work.

"It was a site effort, not just something in our center," he said. "The Energy and Homeland Security Program Management Center handled all the logistics of how to bring everyone together safely and how to order supplies. They helped take that logistical load off our managers so they could focus on keeping our people safe and getting them back to work."

That was exactly the kind of relationships and collaboration envisioned as the goal of Integrated Service Delivery — providing solutions for operational issues that are seamless and readily integrated. It was an approach mirrored throughout the division as people needed to continue to protect the national interest.

For Dawn, the impact was profound on the highest scale.

"I think the best part about going through that process is that it helped calm many people's concerns about going back to work," she said. "I was extremely impressed by the assistance we received from the biological researchers and the industrial hygiene team, because the potential consequence was someone falling sick and even dying. They really were available whenever we needed them and gave consistent advice. Through their efforts, our center staff heard the message that Sandia wants to keep us safe." 

# California site expands footprint

## COVID-19 leads to space plan changes for worker safety



**DISCOVER @ VINEYARD** — Sandia has signed a lease for additional office space to expand the footprint of the Livermore campus due to the growing demand of the Labs’ nuclear deterrence program. This approach is similar to actions recently taken in Albuquerque, managing growing space demands by moving staff to the Buena Vista office. **Images by Loren Stacks**

By **Paul Rhien**

Over the past few years, Sandia has experienced an unprecedented increase in hiring so that we can achieve our mission goals. This has resulted in a growing demand for offices and lab space, including at the Labs’ California site. Coupled with the need during the COVID-19 pandemic to maintain social distancing and other precautions, Facilities planners are left dealing with the challenges of ensuring the safety and security of the workforce.

“A lot of things are changing all around us,” said Andy McIlroy, associate labs director for Integrated Security Solutions. “One of the things that has been very clear to us going forward is that we are now dealing with the new realities of the COVID-19 pandemic. And we’re going to be dealing with these issues for a while — worrying about things like social distancing and other measures to keep our employees safe. In order for us to work successfully in this environment, we have had to rethink how we are using space on our campuses.”

### Growth at the California campus

To accommodate current and future growth, leaders at the Livermore site have taken a multi-pronged approach in recent months. This approach includes leveraging continued telecommuting where possible, creating flexible “kiosk hubs,” building new facilities and temporarily leasing office space near the California campus.

Rachael Gutierrez-Stabler is a strategic planner at Sandia/California. Her work focuses on developing the division’s overall space strategy.

“Growth is typically seen as a good thing,” Rachael said. “But it certainly poses some challenges when it comes to managing space capacity.”

According to Rachael, the California site is on a trajectory to double its staff population from 2012. This growth curve has become much steeper in recent years.

### Changing approach to space planning

As a result of the COVID-19 pandemic, Rachael and her colleagues have reassessed their

overall space plan. Specifically, they have adapted their approach to support a gradual return to normal operations.

“One of our main strategies up until this year was ‘densification,’” Rachael said.

“But it quickly became apparent that fitting more staff in workspaces across our site is no longer a wise strategy in light of COVID-19. So, we went back and reevaluated our strategy, identifying several areas where we could make some appropriate changes.”

Those changes included converting several buildings over the summer to create more Limited Area facilities for classified activities. Space planners also helped develop kiosk hubs — flexible workspaces located across the California site. Kiosk hubs in the Limited Area can be reserved for a day at a time by anyone with the appropriate clearance level, providing more physical space to conduct classified work.

“Our kiosk hubs provide folks in some of our more densely packed work areas with flexible workspaces,” Rachael said. “If a staff member needs to be on site at the same time as an office or lab mate, the staff member can reserve a kiosk hub, gaining an opportunity to perform classified work while adhering to safety guidelines.”

The California site planners also have focused on bringing together groups that were previously scattered across multiple on-site workspaces.

“Our current efforts aim to co-locate teams wherever possible,” Rachael said. “In the past, the site population was growing so quickly that we had to fill office seats as soon as we created them. So we weren’t always able to seat folks with their teammates. We are working to remedy that.”

All along, the planners also have been pursuing new construction of additional facilities on the Livermore site, she said.

“New construction is certainly a more enduring solution, but it just so happens to be the option that takes the longest to achieve. There are a number of priority projects across our California site that we

are moving forward on in order to accommodate a larger workforce.”

### Lease space for expanded footprint

To further relieve some of the pressure on space and ease crowding on site, planners signed a lease this summer for additional office space to expand the footprint and serve as an extension of Sandia’s California campus. The move is expected to make available more Limited Area space on site for the growing nuclear deterrence programs being led in California. This approach is similar to actions recently taken by Sandia in Albuquerque, managing increasing space demands by moving staff to the Buena Vista office.

The lease site, which provides 27,000 square feet of additional office space, is located in the Vineyard Business Park, about three miles from the main site. The term of the lease is planned for five to seven years.

Dave Hopman manages a cross-functional team that is developing and executing the lease plan.

“The COVID-19 pandemic has made it more critical than ever to obtain and use additional space so that we can meet new distancing requirements for all members of the workforce,” Dave said. “As we’ve taken a step back and reevaluated the use of the lease facility, we have limited occupancy at the lease to roughly 60% of capacity.”

Occupants of the lease have participated in naming the complex, which will be called the Data and Information Science Center of Livermore or DISCOVER @ Vineyard. The name reflects the incoming cohort of around 80 computational data science researchers, who will have expanded opportunities for collaboration at their new facility.

“Fundamentally, these changes are driven by the nation’s growing need for Sandia to address critical national security challenges,” Andy said. “Transition and change can be difficult in the best of times. The current stressful environment is an added challenge. I thank our staff for their resilience, patience and flexibility.” 



**EXPERIENTIAL DESIGN** — Creative designers have designed a branded experience throughout the DISCOVER lease site. The experiential design creates a modern and engaging experience for staff and visitors using many of the same design elements as the main Livermore site. Creative elements reflect the research of the cohort of computational data scientists who will have expanded opportunities for collaboration at the leased facility.

# California students win 2020 DOE National Science Bowl

## National champions emerge from Sandia-sponsored regional competition

By **Paul Rhien**

A team of students from Dougherty Valley High School in San Ramon, California, won the 2020 DOE National Science Bowl in June. Due to COVID-19, this year's national competition was held virtually to ensure the health and safety of the participating students.

National Science Bowl, a Jeopardy-like competition for U.S. high school and middle school students, tests their knowledge and academic ability in all areas of science and mathematics.

Before facing a field of more than 60 teams in the national tournament, the San Ramon students emerged victorious at the Sandia-sponsored Bay Area Regional High School Science Bowl, held at Las Positas College in Livermore in the spring.

For nearly 30 years, Sandia/California has coordinated and sponsored regional high school and middle school competitions, bringing together science bowl teams from across northern California. These regional contests are funded through an Educational Success Grant awarded by Sandia to the Las Positas College Foundation.

The members of the winning DVHS team are Risha Chakraborty, Anugrah Chemparathy, Kenneth Moon, Venkat Ranjan and Daniel Shen. Coached by Katherine Huang, a science teacher at DVHS, the students were elated to receive \$2,500 for their school's science department. As the 2020 national champions, the students also will be invited to attend the 2021 national finals in Washington, D.C., as special guests and will be recognized for their achievements in the 2021 awards ceremony.

"Dougherty Valley is historically a very strong team and has won our regional high school competition for the past seven years," said Tim Shepodd, a senior manager at Sandia and lead of the Sandia/California Science Bowl Committee. "They have consistently done well nationally. With multiple returning members experienced in the Science Bowl competition, to walk away as national champions was a nice going-away present for those seniors."

### Rigorous study, complex topics

The DVHS team defeated Mira Loma High School students from Sacramento by answering the following energy question: "Scientists at Ames Lab are studying twisted bilayer graphene. Identify all of the following three statements that are true of this material: (1) It can act as an insulator. (2) It can act as a superconductor. (3) It demonstrates a Moiré pattern." (The correct answer is "All.")

By the time a team reaches the final rounds of the National Science Bowl, the students are often dealing with graduate-school-level topics, Tim said.

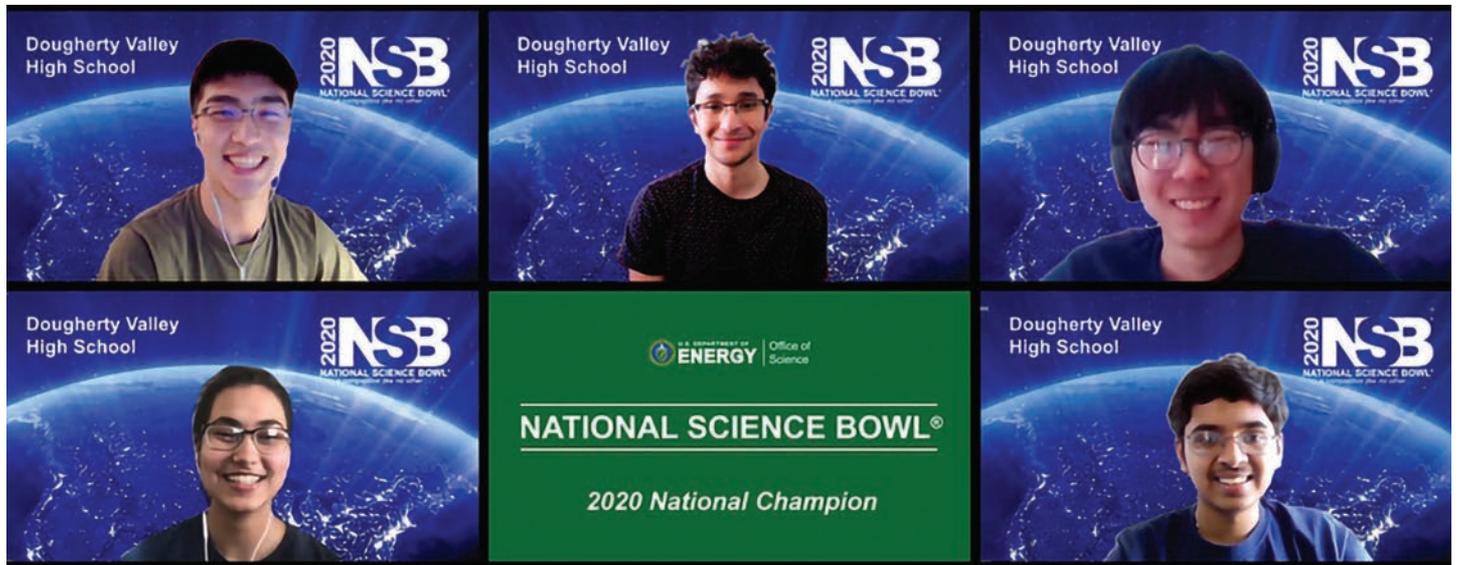
"To compete and win at the national level, teams must prepare all year. They undergo a rigorous study process so that they are ready to answer questions in a wide range of topics, including biology, chemistry, Earth science, physics, energy and math."

Given the uncertainty of the COVID-19 pandemic, organizers for the 2021 regional and national Science Bowl events are again preparing to hold the competitions virtually, if necessary. The potential for the online format means that more volunteers will be needed.

"Volunteers are essential for a meaningful and fair competition," Tim said. "They help bring the excitement of science to the next generation of scientists. Whether as moderators,

scorekeepers, time-keepers or other roles, our volunteers will only become more important next year."

To learn more about DOE Regional Science Bowls in New Mexico and California, as well as other educational programs that are inspiring the next generation of scientists and engineers, visit the [Community Involvement](#) section of Sandia's external website, [sandia.gov](http://sandia.gov). 



**2020 NATIONAL SCIENCE BOWL CHAMPS** — A Sandia-sponsored team of students from Dougherty Valley High School in San Ramon, California, won the 2020 DOE National Science Bowl. **Photo courtesy of DOE**



**REPEAT REGIONAL CHAMPIONS** — Pictured last year, students from Dougherty Valley High School won the 2019 Sandia/California High School Regional Science Bowl. The same team won the regional competition in 2020 and continued on to become the national champions. Team members are, from left, Daniel Shen, Risha Chakraborty (team captain), Kenneth Moon, Venkat Ranjan, Anugrah Chemparathy and Katherine Huang (coach). **Photo by Ray Ng**

## SANDIA CLASSIFIED ADS

**NOTE: The classified ad deadline for the Sept. 11 Lab News is noon Thursday, Sept. 3. This deadline change applies to this issue only.**

### AD SUBMISSION GUIDELINES

**AD SUBMISSION DEADLINE:** Friday noon before the week of publication unless changed by holiday.

**Questions to Michelle Fleming at 505-844-4902.**

**Submit by one of the following methods:**

- EMAIL:** Michelle Fleming ([classads@sandia.gov](mailto:classads@sandia.gov))

- FAX:** 505-844-0645

- MAIL:** MS1468 (Dept. 3651)

- INTERNAL WEB:** Click on the News tab at the top of the TechWeb homepage to visit the News Center, then select Announcements >> Submit Announcement.

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

### MISCELLANEOUS

**INSULATED GLASS,** 1-in., unbroken, removed to install low E, 43" x 35" & 43" x 15", some fogged, most not, you haul, free. Phipps, 505-312-9254, [gshipps05@comcast.net](mailto:gshipps05@comcast.net).

**BARBIE DOLLS,** 5, in box: '00 Millennial Princess, '02 Holiday, '03 Winter Fantasy, '04 Holiday, 40th anniv., \$160 OBO; antique B&W photo, FP Clatworthy (signed), 'Grand View', \$60 OBO. Morning, 505-463-3241.

**MATTRESS,** Beautyrest, plush, new, 76" x 76", Ashley, slept on twice, too soft, no return, \$300 OBO. Zapotocky, [zapotockyc@gmail.com](mailto:zapotockyc@gmail.com).

**SNOWTHROWER,** \$650; Champion inverter generator, model 3100-W, portable, \$650; both excellent condition, in East Mountains. Willmas, [djwillmas@gmail.com](mailto:djwillmas@gmail.com).

**DRESSER,** Thomasville Cordova, marble top, \$200 OBO; home gym, Marcy Pro, \$175 OBO. To, 505-553-1611.

**LADDERS:** Werner, construction grade, 10-ft., 14-ft., & 16-ft. step ladders; 8-ft. tripod step ladders, 2 ea.; 32-ft. extension ladder; like new condition, call for pricing. Gutierrez, 505-410-1647.

**BDR. SET,** 3-pc., queen, solid cherry wood, \$350; Stetson, shaped, brand new, 7-1/2, \$75; photos upon request. Kilbane, 505-715-7681.

**ALLOY RIMS,** Toyota, 17-in., came off new 4Runner, like new, \$300/set. Torres, 505-508-6795.

### TRANSPORTATION

'18 **WHEELCHAIR CONVERTED DODGE GRAND CARACAN SE,** BraunAbility lowered floor, wheelchair accessible, excellent condition. Evans, 505-280-2452, ask for Lynette.

'07 **SATURN RELAY MINIVAN,** PW, PL, PS, cruise, AM/FM/CD, cold AC, 1 owner, 68K original miles, excellent condition, \$3,500 OBO. Harrison, 505-897-0658.

'10 **BMW 328i xDRIVE SEDAN,** bronze, tan leather, 81K miles, great condition, photos/info on Craigslist, \$10,995. Bell, 505-240-6840.

### REAL ESTATE

4-BDR. HOME, 2-1/2 bath, 2,744-sq. ft., updates throughout, LVP flooring, North Star Elementary, La Cueva High, MLS#973477, \$435,000. Sorensen, 505-980-4871.

### WANTED

**GOOD HOME,** abandoned canine sisters, sweet, 1 yr. old, cattle dog/Shepherd mix, at Watermelon Ranch, call for more info. Zelnio, 505-877-1465.

### AD RULES

- Limit 18 words, including last name and home phone (web or email address counts as two or three words, depending on length).
- Include organization and full name with ad submission.
- Submit ad in writing. No phone-ins.
- Type or print ad legibly; use accepted abbreviations.
- One ad per issue.
- The same ad may not run more than twice.
- No "for rent" ads except for employees on temporary assignment.
- No commercial ads.
- For active Sandia members of the workforce and retired Sandians only.
- Housing listed for sale is available without regard to race, creed, color or national origin.
- Work wanted ads are limited to student-aged children of employees.
- We reserve the right not to publish any ad that may be considered offensive or in poor taste.

# Marshaling resources to fight COVID-19

By Lab News staff

As Sandia and the nation came to terms with a new, socially distanced reality, researchers within the Labs' Integrated Security Solutions Division were working to understand the biology of the novel coronavirus, learn how the human body responds to infection by SARS CoV-2 and model how COVID-19 spreads in a population.

Labs Director James S. Peery and the senior leadership team tapped Anup Singh, director of the Chemical, Biological, Radiological, Nuclear Defense & Energy Technologies Center, to lead the research effort for conducting a biological analysis of the coronavirus and developing innovative solutions. Anup and his team, which included dozens of scientists and doctors, were responsible for breakthroughs that helped inform scientific knowledge about COVID-19 and how to combat it.

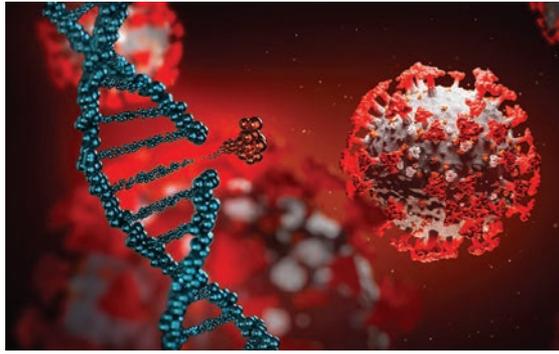
Below are just a few of the more than 50 projects related to the new virus that Sandia has engaged in to make our communities and the nation better able to respond to this and other pandemics.

## COVID-19 infection-testing protocol

To protect mission-essential functions, keep the workforce safe and help reduce the spread of COVID-19 at facilities, Sandia became the first DOE lab on April 7 to start testing its workforce for COVID-19 infection. By converting several biological research labs, Sandia now has the capacity to test hundreds of samples each day.

## Tailorable antiviral

Researchers are conducting trials to create a deployable antiviral countermeasure for COVID-19 using CRISPR-based technology. The goal of this research is to find viral-outbreak countermeasures that are "reloadable," meaning they do not have to be reinvented each time an outbreak occurs. Once the research is complete, the new antiviral will have a customization component, enabling it to respond to many different viruses, including coronavirus. This project is funded by the U.S. Department of Defense through the Defense Advanced Research Projects Agency.



**GENE INVESTIGATION** — A Sandia team is working with CRISPR-based technology to examine the genetic sequence of SARS CoV-2 and find out whether it is possible to deploy a countermeasure within the body to reject the virus.

Image by Loren Stacks

## Sterilizing masks with supercritical carbon dioxide

Sandia testing is underway to see if supercritical carbon dioxide can safely and reliably sterilize N95 masks and other essential medical supplies for reuse by health care workers on the front lines of the COVID-19 pandemic. Many conventional sterilization methods cannot be used because they degrade mask performance. Supercritical CO<sub>2</sub> is a solvent that can penetrate microporous materials without leaving residue, alleviating the need to use harsher, more hazardous chemicals for sterilization. If deemed an appropriate and effective solution, supercritical CO<sub>2</sub> could be deployed rapidly, at a wide scale.

## Forecasting COVID 19

A team at Sandia/California developed a statistical method to characterize partially observed epidemics in real time. Observations consist of daily counts — culled from open-source Centers for Disease Control and Prevention data — of symptomatic patients diagnosed with COVID-19. The data are then used to estimate epidemiological model parameters for short-term forecasts of the ongoing pandemic, as well as to provide information for the time-dependent infection rate. Such forecasts are helping to assess the demand for medical resources and other governmental needs.

## Rapid point-of-care serological tests

Researchers are developing a panel of immunoassays to enable the detection of viral antigens and



**WORKFORCE TESTING** — Sandia Medical tests employees and contractors for novel coronavirus disease in New Mexico and California.

Photo by Michael Ellis Langley

anti-SARS-CoV-2 antibodies produced by hosts in response to infection. These immunoassays will be implemented through Sandia's portable SpinDx platform, which offers rapid detection capabilities without requiring sample preparation. The SpinDx immunoassays will be complemented by a method for directly detecting viral RNA by coupling the quenching of unincorporated amplification signal reporters technique with reverse-transcription loop-mediated isothermal amplification. The combination of SpinDx immunoassays with QUASR RT-LAMP will provide a powerful method for diagnosing COVID-19 at all stages of disease. Moreover, researchers will be able to positively identify SARS-CoV-2 while ruling out influenza or other coronaviruses.

## Sequencing the coronavirus

This project makes it easier for researchers to catalog the more than 150 variations of the SARS2 genome that is responsible for COVID-19. For SARS2 proteins, such as the spike protein that makes contact with mammalian cells, these sequence variants can be tracked so that biologists can adapt countermeasures to deal with the changes. Sandia is also investigating whether sequence changes may affect the diagnostic tests used by the Centers for Disease Control and Prevention and others.

## Supercritical CO<sub>2</sub>

CONTINUED FROM PAGE 1

Sandia Senior Scientist Cliff Ho, the principal investigator leading these projects, said the first test of the integrated test system will include the following components:

- Falling particle receiver
- Particle-to-supercritical CO<sub>2</sub> primary heat exchanger
- Supercritical CO<sub>2</sub> loop (to represent a closed-loop recompression supercritical CO<sub>2</sub> Brayton cycle)
- Indirect air-cooling system for the supercritical CO<sub>2</sub> loop

Although Sandia houses a megawatt-scale supercritical CO<sub>2</sub> loop, the loop that will be used for the SuNLaMP project is 150 kilowatts to fit within the envelope of the facility's elevator and accommodate operation above 700 C. Ground-based testing of this system with electrical heating has exceeded 500 hours, surpassing any other loop of its size.

"The integrated system is unique because it heats the particles up to approximately 800 C using concentrated sunlight and then transfers that heat to a working fluid through a primary heat exchanger," Cliff said. "The heat exchanger is the world's first to transfer heat from particles in a moving packed bed to supercritical carbon dioxide at design temperatures and pressures greater than 700 C and 20 megapascals."

Ultimately, the high-temperature supercritical CO<sub>2</sub> can be used in next-generation, high-efficiency supercritical CO<sub>2</sub> closed-loop Brayton cycles being pursued by DOE to decrease the cost to produce electricity.

"This is a ground-breaking experiment where we plan to use concentrated sunlight to transfer

heat from falling particles in the receiver and into the supercritical CO<sub>2</sub> loop," Paul said.

The Sandia researchers are partnering with Vacuum Processing Engineering and Solex Thermal Science on the projects. Testing will take place at Sandia's National Solar Thermal Testing Facility using the country's first concentrating solar tower built in 1978. The tower's 800,000-pound-capacity elevator allows researchers to build large experiments like the SuNLaMP test and raise them to the top of the tower, which is unique in the concentrating solar power industry.

The NSTTF also will incorporate work from its Gen 3 projects by testing falling particle receiver and supercritical CO<sub>2</sub> loop control improvements.

Related Gen 3 activities will include three projects:

- The Gen 3 Particle Pilot Plant, where researchers are working on ways to reduce heat loss and

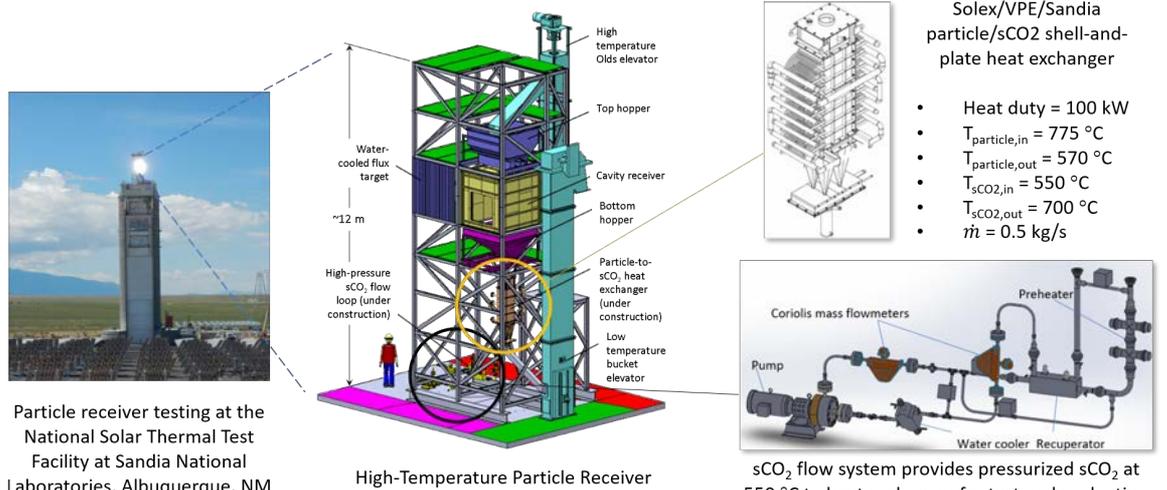
improve efficiencies in various components of the falling particle receiver system.

- A Gen 3 concentrating solar power supercritical CO<sub>2</sub> coolant loop to simulate a 1-megawatt power cycle for the Gen 3 CSP pilot plant.
- A Gen 3 lab call, where researchers from Sandia and the University of New Mexico measure particle and heat loss from the receiver aperture using novel imaging techniques.

Activities for SuNLaMP and the Gen 3 projects will continue through 2020, with the on-sun test campaign running through the summer.

Visit the National Solar Thermal Test Facility's website at [csp.sandia.gov](http://csp.sandia.gov) to learn more about concentrating solar power.

Visit the [Gen 2 Particle Pilot Plant](#) website to learn more about the SuNLaMP project and G3P3, and the [Brayton Lab](#) website to learn more about the facility.



Particle receiver testing at the National Solar Thermal Test Facility at Sandia National Laboratories, Albuquerque, NM

High-Temperature Particle Receiver

Solex/VPE/Sandia particle/sCO<sub>2</sub> shell-and-plate heat exchanger

- Heat duty = 100 kW
- $T_{\text{particle,in}} = 775\text{ }^{\circ}\text{C}$
- $T_{\text{particle,out}} = 570\text{ }^{\circ}\text{C}$
- $T_{\text{sCO}_2,\text{in}} = 550\text{ }^{\circ}\text{C}$
- $T_{\text{sCO}_2,\text{out}} = 700\text{ }^{\circ}\text{C}$
- $\dot{m} = 0.5\text{ kg/s}$

sCO<sub>2</sub> flow system provides pressurized sCO<sub>2</sub> at 550 °C to heat exchanger for test and evaluation

Images courtesy of Sandia National Laboratories

**ON-SUN TESTING** — This set of images illustrates the integrated falling particle receiver, heat exchanger and supercritical CO<sub>2</sub> flow system.



**CHART TOPPER** — Dr. Dan Azar, California site physician, works in his office at the Sandia/California campus.

## 'Confounding' pandemic brings California doctor to the fore

*Dr. Dan Azar brings training, transparency to COVID-19 response*

Story and photos by  
**Michael Ellis Langley**

One of the most consistent voices heard this year during our new reality shaped by the COVID-19 pandemic has been that of Dr. Dan Azar, Sandia's California site physician.

In the early part of 2020, Dan was part of a panel of medical and scientific experts explaining what little was then known about COVID-19 to members of the Sandia workforce. Then days later, just one week before Alameda County issued shelter-in-place orders, he participated in a panel discussion hosted by Labs Director James S. Peery.

Dan also has been "on call" for almost every coronavirus briefing held by Associate Labs Director Andy McIlroy for the California site and the Integrated Security Solutions Division and has been providing guidance to management and workers on how to safely resume operations. Dan's understanding of public health and passion for preventive medicine have served him and Sandia well during this pandemic — at a time when keeping people healthy and fulfilling our mission remain our highest priorities.

"I am a naturalized American citizen," Dan said. "I was born in Israel and brought to the U.S. by my parents when I was 3. My citizenship certificate is framed and proudly hung alongside my medical degree in my Sandia/California office. I was raised in the New York metropolitan area, including Great Neck, Long Island, where I had the privilege of attending an outstanding public high school, which, in addition to my U.S. citizenship, provided me with a lifetime of opportunities."

These opportunities include dual undergraduate degrees in biology and the biological basis of behavior from the University of Pennsylvania.

"I have always been fascinated by the brain and human behavior, and I'm eager to learn how to help keep people moving in a positive direction," Dan said. "I came back to New York and attended the Mount Sinai School of Medicine in Manhattan, where I worked as a server and bartender in Greenwich Village until I graduated in 1988."

Dan then headed back to the West Coast.

"I spent two years at Stanford University Hospital training in anesthesiology," he said. "But it wasn't a good match. I wanted to connect with my patients and help them achieve their personal goals."

Leaving that, Dan began a long career in occupational medicine.

### Communication is key

"I saw the injured worker as an occupational athlete who needed my medical skills to get back

into the game and my interpersonal skills to help them navigate a complex system," he said. "I learned to communicate effectively with patients and their employers to address obstacles to recovery, which often included strained relationships between the two. Being a sincere communicator with the intention of serving both parties with integrity and respect turned out to be a place where I really fit in well."

Dan ultimately earned a master's degree in public health and became board-certified in occupational medicine. He spent 20 years in private practice in Silicon Valley before joining Lockheed Martin Corp. in Sunnyvale, California, in 2011. In 2017, he was approached by Sandia.

"What appealed to me about both workplaces was the appreciation that lifestyle and prevention are critical to sustaining wellness and resiliency," Dan said. "Sandia takes this to the next level by providing workers and medical providers with on-site resources, including a health educator, exercise specialist and registered dietitian. On-site Employee Assistance Program counseling and physical therapy round out the nicest clinic staff I have ever worked with."

Dan had to draw upon all of his expertise and experience in providing medical care and guidance to workers, management and leadership during the COVID-19 pandemic.

"At the onset, we were all caught off guard by how contagious this illness turned out to be," he said. "We were also confounded by the tremendous variability in severity of illness — with some individuals remaining entirely asymptomatic while others rapidly decompensated and perished."

### Behavioral connection

Dan's behavioral training has given him a perspective that other physicians may lack.

"Some people found warnings about COVID-19 implausible because a month earlier, they heard we should be more worried about influenza, and now they're hearing that everyone needs to wear masks all the time," he said.

"Changing messages can sometimes be perceived as, 'You don't know what you're talking about.' So, I felt that transparency was really important; we needed to remind people that this disease is something entirely new. In fact, we would be doing a disservice if we didn't update our message, even though doing so seemed to contradict earlier guidance."

Dan knew that communication was going to be vital not just in internal messaging but in helping Sandia confront the virus on behalf of the nation.



**TOOL OF THE TRADE** — Dr. Dan Azar, California site physician, holds a nasal pharyngeal swab used to test members of the Sandia workforce for COVID-19.

"As a physician in an organization that's not centered on health care, it's important to serve our patients and our customers, including NNSA, the Department of Energy, and the U.S.," he said. "Our foes are looking at this pandemic as an opportunity."

Dan was part of a broad multicenter team that established Sandia's on-site clinical collection and analysis of nasopharyngeal specimens to accurately test for the presence of SARS CoV-2, the virus responsible for COVID-19. Dan credits Renee Holland, director of Employee Health Services, and the other team members with developing the testing capability that enabled Sandia to contribute to the national labs complex being able to process more than 1,000 tests per day. That effort recently was submitted for consideration for a DOE Secretary's Honor Award.

"For Sandia, I wanted to bring — along with Dr. Rick Sauerman, the site occupational medical director in New Mexico — our medical and public health knowledge to leadership meetings so that, as Sandia leaders considered how to safely meet ongoing mission commitments, we could share best practices for preserving the health of our workforce and communities," he said.

### Ensuring a safe return

Dan helped advise Sandia and division leadership on medical messaging, safe return-to-work policies, social distancing and resources needed on campus. Now he and his team are busy with daily coronavirus screenings in the hopes of keeping people from contracting the virus while at work.

Dan said he was struck most this year by how quickly things can change and how resilient his peers across the Sandia worksites have been in the face of these unprecedented events.

"None of us were having this conversation at the end of 2019," he said. "Our ability to reset when faced with these kinds of challenges is so important. There is no benefit to wishing this thing away. If we work together to expand our knowledge and abilities and make decisions in a way that is transparent to those we serve, we will have the best possible outcome." 