Reducing power plants’ freshwater consumption with Sandia’s new silica filter

By Kristen Meub

Power plants draw more freshwater than any other consumer in the United States, accounting for more than half the nation’s freshwater use at about 500 billion gallons daily.

To help reduce this demand, Sandia researchers have developed a new silica filter for power plant cooling waters that decreases the amount of freshwater power plants consume by increasing the number of times cooling tower water can be reused and recycled.

“We have a limited amount of water in this country to use for everything from drinking water to raising livestock, and global population and demand is growing,” geochemist Pat Brady says. “If you can recycle the water being used at power plants, it frees up a lot more water for domestic and personal use.”

While power plants already recycle freshwater, the number of times a batch of water can be reused is limited by the amount of silica that builds up with each cycle. Silica is a common, naturally occurring substance in freshwater with limited solubility, and is prone to forming scales on turbines, boilers, heat exchangers, transfer pipes, and other equipment. Homeowners in the Southwest are familiar with the problem: Silica scale buildup on their evaporative coolers significantly reduces the efficiency of the units.

This buildup is problematic both for homeowners and industry because it can disrupt equipment function and is costly to prevent. The cost to treat and recycle water used at power plants is estimated to be 1.5 to 2 times the cost of freshwater, often because of the high price of current silica removal methods.

“When you have silica buildup, heat transfer is a problem, clogging is a problem, and corrosion is a problem,” chemist Tina Nenoff says. “So, our project focused on finding an energy- and cost-efficient material and process to remove silica from industrial water.”

FILTERING FOR SILICA Tina Nenoff, Pat Brady, and former post-doc student Koroush Sasan researched how hydrotalcite can filter silica out of cooling tower water at power plants.

(Continued on page 4)
The Facebook post called his “the hero in the red hat.” The post was from the husband of a woman who was at the Jason Aldean concert in Las Vegas, which turned out to be an Albuquerque native and a one-time employee at Sandia.

I learned about Anthony from a former colleague of his, Enrique Duran, who started at the Labs about the same time as Anthony. They worked together as custodians for several years until Anthony left in 2013. Enrique helped me track down Anthony in Las Vegas, where he now works in it. “He’s an all-around good guy,” Enrique told me, “and I think his friends here at Sandia would agree (and know) how heroic he was.”

I called Anthony, and Enrique was right — it was clear to me right away that Anthony is the real deal, a straight up guy, very gracious, forthcoming, and humble about what he did on the night of the shooting. Although he’d already spoken to several members of the media — the “red hat hero” name had gone viral — he never made me feel I was intruding on his time or personal space.

Anthony told me he and his girlfriend were very near the front of the stage, a location he called both “a good spot and a bad spot.” Bad because it was right in the area considered to have been in the worst part of the so-called “kill zone.” But good because the particular location they were in was protected by a giant display screen on stage.

At first, Anthony says, he heard a single shot and then a few more and thought it was fireworks — big-time concerts use a lot of pyrotechnics, after all. He pretty quickly became clear, though, that the audience in the enclosed concert space was under fire from automatic weapons.

“I crouched down, listened to the gunfire; it seemed to be coming from my 2 o’clock. He and his girlfriend worked their way toward what looked to be the best escape route — over a barrier and out of the venue. “There were four or five women behind me; all I did was help them get over the barrier,” he says. At one point, incredibly, a security guard told him to keep Anthony and the women from getting out; Anthony warmed him off in stern language. After they got out to the street and safety, Anthony asked his girlfriend to go out for him at their nearby car, telling her he’d be along shortly. He ended up staying on the street for another hour.

First-responders had set up an ad hoc triage station nearby and Anthony was directing those who were clearly hurt toward the station and others, those who appeared reasonably unhurt, to continue down the street and away from the venue.

“I kept yelling, trying to direct them,” he says. Knowing that many people at the concert were from out of town, Anthony says he felt many of them were lost in a strange town in the chaos of the shooting. “I felt I needed to stay there and help people find a way to get safe,” he says.

The time went by in a blur, he says, but a few incidents stand out. He recounted a story about how he saw a woman leaning against a pillar, distraught, frightened, and confused. He approached her, offered calming words, and told her “We’re not going to die today.” She was able to move on.

Another woman ran up to him and showed him a bloodied, wrenched tooth. “I don’t have my pants,” she choked out. Anthony says he hadn’t noticed but then realized, that, indeed, she was wearing only a top. He took off his shirt and wrapped it around her, soothing her.

“She gathered herself together and moved away. “By the time he rejoined his girlfriend at their car, Anthony says, his voice was gone. He was exhausted as they headed for home.

There were many acts of heroism that terrible night. Many lost their lives saving others. Many others lived because of the fast thinking and courage of the many others who stepped forward to help.

The response was overwhelming, demonstrating the power and reach of Sandia. I’m proud to know he once worked here.

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**Bill Murphy (NS 1468, 505-845-0845, wmurphy@sandia.gov)**

**Retiree club invites new members**

The Coronado Thunderbirds is a retiree organization open to retirees 50 years or older who have retired from Sandia, Los Alamos, DOD/NNSA, other federal agencies, or the military. The Thunderbirds, a social club offering monthly programs (nominally on the second Friday), plus activities such as brunch with dancing, and tours. Membership in the Kirtland Air Force Base Mountain View Club is required, and Thunderbird membership includes KAFB access, and access to Mountain View Club's Force Morale, Welfare, and Recreation facilities. For more information, see www.coronadothunderbirds.com.

The Coronado Thunderbirds’ November meeting will be Wednesday, Nov. 15, in the ballroom at the Mountain View Club. Note that although it normally meets the second Thursday, there was a conflict with another air event, so the November meeting will be on a Wednesday. The program will be the Rio Grande Players, which reenacts vintage radio shows. We hope you will join us for social time beginning at 11 a.m. when you can purchase lunch. The business meeting is at noon, and the program begins after the business meeting.

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Tech transfer on track:  
Tips for going from scientist to CEO  

Story by Jules Bernstein

Sandstone Diagnostics Chief Scientific Officer Greg Sommer has the following advice for aspiring entrepreneurs: “Whatever you think it’s going to take, multiply that by four or more, and see if it still makes sense for you to do it.” Sommer was referring not only to the money and time it takes to bring a product to market, but also to the grind and persistence required to get a start-up off the ground.

Fresh off receiving their Federal Laboratory Consortium award for outstanding commercialization success, Sommer and Sandstone co-founder Ulrich Schaff were featured speakers at a Sept. 20 event in Pleasanton, California.

The former Sandia scientists discussed market analysis, fundraising, legal permissions, and other aspects of turning technology they helped develop into a top new fertility product currently being sold on Amazon.

Sandstone manufactures a device called Trak, which they describe as the world’s first system allowing men to measure and track their sperm count at home. The system includes a website with tips to increase counts and an app, as well as the diagnostic device. Trak is based on Sandia’s SpinDx, a four-pound spinning lab-on-a-disk system originally developed for disease and biological threat detection. As Schaff describes it, “SpinDx can do lots of stuff. It can count cells and analyze nucleic acids and proteins.” Part of the early challenge for Sandstone was to narrow its focus to one specific product.

Market analysis

Sommer said Sandstone started building its product in an order that isn’t necessarily optimal. They licensed the SpinDx technology from Sandia and formed Sandstone before settling on a direction. They looked at different applications, ideas, markets, and competitors before realizing that male fertility held the greatest promise for a potential business.

During this period, Schaff and his wife were expecting a child, which helped direct their thinking. Initially they considered making pregnancy tests, but that market is already saturated and those devices don’t require centrifuge technology.

Then Sommer said they discovered that men’s sperm counts have been on the decline for decades, and that the only device on the market for men didn’t quantify the sperm count or help the consumer improve their numbers.

“When we talked about the usefulness of other products out there, we used the analogy of trying to lose weight with a bathroom scale that only says, ‘overweight’ or ‘not overweight,’” Sommer said. “You want to see that you lost five pounds since last week and set your new weight with a bathroom scale that only says, ‘overweight’ or ‘not overweight’.” Sommer said. “You want to see that you lost five pounds since last week and set your new weight with a bathroom scale that only says, ‘overweight’ or ‘not overweight’.” Sommer said.

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Fundraising

Once settled on a product, raising money and setting up clinical trials were the next hurdles for the company. Sandstone got its start-up money after knocking on a lot of doors that didn’t open for them — a task requiring tenacity because of intense competition for capital.

“Have you to have a really good story and be flexible. Take all the ‘no’ answers, get better with your next pitch, and early on talk to anyone who will talk to you. Try to get as many introductions as you can and find the right people,” Sommer advised.

He said the very first money finally came as the result of a pitch competition. One of the other presenters heard Sommer speak and introduced him to some well-heeled investors. After a 15-minute meeting at a Starbucks, Sommer says they were told that money then helped raise a formal funding round with a bigger syndicate of local angel investors.

“You have to keep your smiles up and hopefully things like that will happen,” he said. Just as critical, Sommer says, is for entrepreneurs to set near-term, achievable milestones for fundraising. As of today, the company has raised approximately $5 million between private investments and grants.

Clinical trials and FDA approvals

Getting the right endorsements from the medical community is vital to establishing credibility for any consumer health product. Just as important is getting approval from the Food and Drug Administration. A large portion of the early budget has to be set aside for this, Sommer said.

Schaff explained that clinical trials required for FDA approval are costly because “you need lots of experts to figure out the intricacies of federal law and regulations on medical devices. It’s not that the FDA shows up at your door and charges you a million dollars,” he joked.

In addition, trials require the investment of time to recruit hundreds of men to test the device and then the time to confirm in-home results in a laboratory. There are considerations like documentation, training, and flights to meet with doctors who run the fertility clinics they partnered with in multiple states.

Many companies fail at this stage, so Schaff says Sandstone is really proud of having overcome this hurdle.

As far as in-home diagnostic devices go, the Trak system is now the proverbial talk of the town. It has earned national media attention from publications like Popular Science, Bloomberg Businessweek, Men’s Health, and TechCrunch.

“It’s really impressive how quickly they were able to take it from the garage to the company down the street, to FDA approvals, clinical trials, having partnerships with manufacturers, doctors in New York and LA, putting all that together, and now having a commercial product and being featured in Newsweek,” Sandia virologist Brooke Harmon said at the end of the evening.

The result of all this rapid growth is more than professional success. Schaff says that founding a company has been personally enriching as well.

“‘It’s both the highest and lowest level job you’ll ever have at the same time because you’re responsible for everything from company vision to garbage collection,’” Schaff said. “When I started Sandstone I was a scientist. As we progressed, I’ve learned manufacturing, engineering, how to run clinical trials, and manage a team. I’m a different person now than I was five years ago.’”
Sunny side up

New fractal-like concentrating solar power receivers are better at absorbing sunlight

By Kristen Meub

Sandia engineers have developed new fractal-like concentrating solar power receivers for small- to medium-scale use that are up to 20 percent more effective at collecting sunlight than current technology.

The receivers were designed and studied as part of a Laboratory Directed Research and Development project and are also being applied to Sandia’s work for the Solar Energy Research Institute for India and the United States (SERIIUS).

SERIIUS is a five-year project co-led by the Indian Institute of Science and the National Renewable Energy Laboratory, sponsored by DOE and the government of India, that aims to develop and improve cost-effective solar technology for both countries by addressing the barriers and challenges of each market. Sandia has led the group’s research in concentrating solar power, focusing on scalable systems.

While most concentrating solar power facilities throughout the world are large in size, Sandia engineer Cliff Ho says India is interested in developing 1 megawatt or smaller facilities that could provide the appropriate amount of power for a small village or community. Improving the efficiency of these smaller receiver designs is a key step toward making that goal a reality.

Trapping and absorbing reflected light

Sandia engineers developed and tested the new receivers at the National Solar Thermal Test Facility, studying their ability to withstand high temperatures and pressures while absorbing sunlight as heat that can be stored or transferred to a power cycle to generate electricity.

At Sandia’s facility, rows of mirror-like heliostats are aimed at a 200-foot-tall tower with a central receiver that traps the sunlight on the receiver, which absorbs the sunlight and the potential lifetime for the solar receiver to reach.

The research team designed the fractal-like receiver designs with increased solar absorption efficiency without the need for special coatings. Cliff and the research team developed and tested multiple prototype fractal-like receiver designs scaled in size to work at small- and medium-scale concentrating solar facilities and found the designs that work best for each application.

“India has different market drivers than the US,” Cliff says. “The competition for renewable energy there is diesel generators, which create a lot of pollution and are extremely expensive. It gives us a little more flexibility to create smaller concentrating solar power systems that will work for their needs.”

Testing first 3-D ‘printed’ solar receivers

The team pioneered the use of an additive manufacturing technique called powder-bed fusion to print their small-scale receiver designs from Inconel 718, a high-temperature nickel alloy. Cliff says this novel printing technology enables the possibility of small-scale (1–10 megawatt) supercritical carbon dioxide Brayton cycles. The term “supercritical” describes the semi-liquid state of carbon dioxide when it is heated above its normal critical temperature and pressure, and a Brayton cycle function by using the hot, pressurized CO2 to spin a turbine, much like a jet engine, which spins a generator for electricity production.

Cliff says both the US and India are interested in pursuing supercritical carbon dioxide to develop the next generation of concentrating solar power technology because it can reach greater efficiencies with smaller footprints.

“The goal of concentrating solar power and SERIIUS is to develop efficient, cost-effective solar-driven electricity production with energy storage,” Cliff says. “The use of a solarized supercritical carbon dioxide Brayton cycle would increase efficiencies, reduce space requirements, and reduce costs associated with current large-scale concentrating solar power systems.”

The smaller footprint and cost would help enable the possibility of small-scale (1–10 megawatt) supercritical carbon dioxide Brayton cycle-based concentrating solar power plants. Cliff says, making concentrating solar power more competitive with other types of renewable energy.

Silica removal

(Continued from page 1)

“Envision pellets of hydrotalcite or a powder like the kind found in a drinking water filter,” Tina says. “The water flows through or over the material during the filtration process, and the silica from the water crystalizes and remains in the filter while cleaner water flows out.”

The research team designed the hydrotalcite material to be used to filter cooling tower water at power plants. During the cooling process, some of the water evaporates and the minerals in the water, including silica, build up with each cycle.

“When you heat the water up and some of it evaporates, the silica tends to build up and the water becomes more concentrated,” Pat says. “Right now, you may be able to use the water for a few cycles before it becomes too concentrated, but we are aiming for 10 or more cycles so that power plants can cut down on water use.”

From the lab to real-world application

In addition to studying the material and its effectiveness, the team wanted to determine how to best scale up the new filtration material so that it would be viable for large-scale operations at power plants. Students in the University of New Mexico’s civil engineering department are working under the direction of professor Kerry Howe, performed a scale-up analysis on the material, and researchers at Sandia/California performed a techno-economic analysis to estimate cost and energy savings for real-world applications.

“The measurements we do here are in beakers that size of a coffee cup, but when you’re at a facility like a power plant that uses a million gallons a day, you want to know if hydrotalcite will be effective at that level,” Pat says.

The research team used the multidisciplinary approach and analyses to guide their experiments to find the best treatment of hydrotalcite for cost- and energy-efficient industrial use.

“A lot of the industry will already have a silica removal process that works, but it may not work well,” Tina says. “As a result of this project, we’ll be able to give them an estimated cost and energy savings, and even a projected lifetime savings that hydrotalcite could provide over their current method. That sort of modeling and analysis provides more incentive to take the risk of implementing a new method.”

The team has published three journal articles and filed a provisional patent application for their filter.

"New SOLAR RECEIVERS Year-round Sandia intern Jesus Ortega inspects one of the new bladed receivers at the National Solar Thermal Testing Facility. (Photo by Randy Montoya)"
Three Sandia engineers recognized by SWE for contributions to advancing women in STEM

By Lindsey Kibler

Three Sandia engineers have been recognized by the Society of Women Engineers (SWE) as part of its annual awards program for their support in the enrichment and advancement of women in engineering.

• Janet Williams won the Distinguished Service Award, which recognizes members who have made significant contributions to SWE for at least 20 years, especially at the local and regional levels or on society-level committees.
• Kelly Hahn, Emerging Leader Award, which honors individuals “who have been actively engaged in an engineering or technology profession, and have demonstrated outstanding technical excellence as an individual resulting in significant accomplishments.”
• Leslie Phinney, Prism Award, honors “a woman who has charted her own path throughout her career, providing leadership in technology fields and professional organizations along the way.”

“The men and women recognized this year have made significant contributions to the engineering community,” said Society of Women Engineers (SWE) President Jonna Gerken. “They are leaders, inspiring the current and future generation of STEM professionals and paving the way to empowerment for women engineers everywhere.”

Janet Williams: 30 years of service, commitment

Janet joined Sandia in 1985 and served in management in corporate construction, facilities planning and project development, and infrastructure programs. In 2006, she was selected to be the site strategy manager at the Atomic Weapons Establishment in the United Kingdom. Following the two-year assignment, Janet returned to New Mexico to manage the weapons integration department before she was selected to be a senior infrastructure consultant for the National Nuclear Security Administration, or NNSA, in Washington, D.C. In this position, Janet led efforts to develop an integrated, capability-focused strategic infrastructure framework across the nuclear weapons enterprise.

Now, Janet is responsible for infrastructure and capability analysis and weapons data analysis for nuclear weapons program planning, providing support for NNSA strategic infrastructure initiatives and the congressionally mandated Stockpile Stewardship and Management Plan. It was in her last year of undergraduate school that Janet became involved with SWE. When a position with Sandia brought her to Albuquerque, she found herself without a local society section, so she joined forces with other women engineers whose efforts led to the 1988 charter of the SWE-Central New Mexico section. In 1994 she received the Distinguished New Engineer Award and the year later, in 2004, she received the SWE-Central New Mexico Distinguished Service Award.

Janet says she deeply appreciates the recognition of her contributions to the Society by her peers. “When I reflect on my career and my SWE experiences over the years, I feel that giving my time and knowledge to SWE’s goals of helping women find rewarding careers in engineering also helped me develop skills that furthered my contributions to Sandia,” she says. “The dual opportunities to encourage women engineers and to serve the nation made my Sandia and SWE experiences doubly gratifying.”

Kelly Hahn: An emerging leader in neutron diagnostic field

After joining Sandia in 2001 as a student intern, Kelly held a number of research positions working on intense electron beam-driven radiography sources until she began working in 2010 in the neutron and particle diagnostics department, where she primarily fields several nuclear activation diagnostic to support Inertial Confinement Fusion experiments on the Z Machine.

As an expert on measuring neutron yield, Kelly was the primary scientist supporting the measurement capabilities associated with a Laboratory Directed Research and Development project to develop new physical simulation capabilities to qualify new nuclear weapons components in radiation environments. With others across the Labs, Kelly’s expertise helped make possible new experiments to boost Z Machine’s neutron and energy output.

Kelly has a doctorate in electrical engineering from the University of New Mexico and has co-authored more than 70 peer-reviewed and conference articles, of which she is first author on 15.

She is an active and engaged member of the American Physical Society and serves on the Electrical and Computer Engineering advisory board at the University of New Mexico. Through her membership and other associates in the engineering department, Kelly learned the importance of encouraging female students of all ages, especially those in elementary and middle school, to consider engineering fields.

“I think that particularly, girls, seem intimidated by engineering fields because they are afraid to make mistakes,” Kelly says. “Everyone makes mistakes — myself included. Mistakes are an integral part of the research and development environment. By working with a team, mistakes can be remedied more quickly and that benefits the entire team.”

In her mentorship role, Kelly encourages students to be actively involved in technical areas outside of their disciplines so they can be exposed to different aspects of the research and development field.

“As an emerging leader in neutron diagnostics field, and has over the course of 14 years, conducted research in the fields of heat transfer and microsystems, and advanced the knowledge in areas of thermal analysis to support national security applications, thermal property measurements, microscale heat transfer, thermal microstructures, and diagnostic techniques for microsystems.

In 2009, Sandia’s Advanced Science Technology Division looked at improving workplace experiences by creating the Workplace Enhancement Council, a liaison group between employees and division leadership. Leslie was a founding member and its first chair. In her role, she led the conception and implementation of new hire and mentoring initiatives. She has also organized professional society engagement, external assignments and opportunities, and speed networking and mentoring sessions.

Leslie accepted an assignment in the Office of the Chief Technology Officer (CTO) in 2010. The Office of the CTO, together with the Research Leadership Team, is responsible for the governance and leadership of research strategy and stewardship of capabilities at the laboratories. “Passion for providing the best research environment for colleagues to thrive and succeed in” is what motivated her to accept the position. During the 16-month assignment, Leslie provided a foundation for improvement initiatives by analyzing and documenting research environment findings, activities and recommendations. Her work led to the adoption of an aspirational ideal Research Environment description, outlined in the State of the Research Environment 2013.

Today, Leslie is a thermal analyst working in thermal sciences and engineering. Thermal analysis supplement experimenteration and testing to ensure nuclear weapons will operate reliably, and not fail, if exposed to extreme environments.

After receiving her doctorate in mechanical engineering from the University of California at Berkeley in 1997, Leslie was an assistant professor at the University of Illinois at Urbana-Champaign’s Department of Mechanical and Industrial Engineering, where she developed a new graduate course on microscale thermophysics of solids. In addition, she has co-authored two books, 49 peer-reviewed journal articles and 53 papers presented at national and international conferences.

She is a Fellow of the American Society of Mechanical Engineers, or ASME, and was an associate editor for the Transactions of the ASME Journal of Heat Transfer. She was an industrial advisory board member for Purdue University’s Cooling Technologies Research Center, chairing it in 2010.

Leslie says her belief that the community broadly encompasses everyone who works and lives is a driving force for her commitment to improving it. She has supported the United Way’s Women in Philanthropy for more than a decade. Her volunteer efforts have supported the Society of Women Engineers – Central New Mexico section, Sandia Women’s Action Network, New Mexico Engineering Foundation, Junior League of Albuquerque, and the Albuquerque Rose Society.

“I focus my charitable giving primarily on organizations that empower women, expand educational opportunities, and protect the environment, and preserve important historical and cultural sites,” she says.

SWE WILL RECOGNIZE Janet, Kelly, and Leslie at its annual event — the world’s largest conference and career fair for women engineers — Oct. 26-28, in Austin, Texas. The not-for-profit SWE was founded in 1950 and, according to its website, is the world’s largest advocate and catalyst for change for women in engineering and technology.
Sandia Gives Campaign
our annual opportunity to help strangers and each other

By Katrina Wagner

New Mexico Sandia Gives Campaign
Oct. 2-20
California Sandia G ives Campaign
Oct. 2-27

Albuquerque Heading Home is a United Way of Central New Mexico-Community Fund grant recipient. The organization is a Housing-First collaboration of public, private, and nonprofit organizations that united in 2011 to end homelessness for individuals who have been mentally homeless and are medically vulnerable. More than 700 individuals and their family members have been placed in permanent supportive housing since the initiative started in 2011.

Having spent most of her life in Albuquerque, Yvonne wants to see her city provide more services for those in need.


The United Way helped me when I was in need

by Madeline Burchard

I feel privileged to be the Sandia/California project lead for Sandia G ives and work with the inspiring Sandia G ives committee to make our communities better places for everyone. However, I am passionate about this program for another reason — I personally benefited from programs funded by the United Way in 2014.

Before I was Sandia, I worked for an educational nonprofit that provided after-school programs in Richmond and Oakland high schools. While the work was meaningful, I learned a modest income. Between that and my wife’s part-time job, we found it difficult to pay the bills at times.

When tax time came, we were hard-pressed for money and were looking forward to the relief our tax refund would provide. However, the mixture of health care costs, job changes, freelance income, and the legal limits of our same-sex domestic partnership made our taxes too complicated for simple, low-cost computer preparation software and free filing.

The United Way’s line to the rescue

We needed professional tax help, but we couldn’t afford to forfeit up to a third of our refund to pay for it. That money would help us pay rent, buy groceries, and keep up with student loan payments. So we overcame our pride and asked the United Way Bay Area (UWBA) for help.

The UWBA representative to her center at Sandia, Yvonne says she knows firsthand how important Sandia’s United Way campaign is to the community. She chose to attend an agency tour of Albuquerque Heading Home, a local nonprofit that focuses on ending homelessness.

Before I met him, I didn’t think it was possible, but now, with his data and success stories, I realized it wasn’t wrong and that his contribution and message made a difference.”

BY ANDRES ADAM MIERA

Ronald McDonald House Charities provides temporary homes to families of seriously ill and injured infants and children who must receive critical medical care from area medical facilities. The nonprofit’s annual report states, RMHC provided 2,422,765 overnight stays for families with sick children in 2016.

— Tanya Jinzo

After a loved one dies, the Children’s Grief Center provides support to children and their families.

“You never think you’ll be in a situation where you will need this type of support.”

In May 2015, Kalina Jinzo and her boyfriend were on their way to Ruidoso, New Mexico, on a motorcycle when the unimaginable happened. Lightning struck and hit Kalina in the head as she was a passenger on the bike.

After several days in the hospital in Lubbock, Texas, Kalina died, leaving behind three children, her parents, a sister, and many other family members.

Kalina worked as a medical assistant at San dia for eight years. During her time at the Lab, she co-workers and Calle lovers, Yvonne Jinzo. “It took a long time for us to get over it. We’re a family here. You don’t just come and go like other companies. People were here for a lifetime so this loss hit the medical clinic very hard.”

Kalina’s sister, Tanya Jinzo, is an information systems security technologist and has been at San dia for 15 years. She and her parents have guardianship of Kalina’s two youngest daughters, ages 16 and 11. Following the sudden and tragic loss of Kalina, the girls began attending counseling sessions at the Children’s Grief Center in Albuquerque, which is a recipient of a United Way of Central New Mexico’s Community Fund grant.

The Center offers free support programs for bereaved children and provides a safe place to share experiences and feelings while growing in death.

Tanya says, “You never know how amazing an agency this is until you’re experiencing it. They [us], gave as free counseling and support, and around the holidays, local artisans donated handmade gifts to comfort the kids.”

Tanya says the agency helped her family live through a tragic loss.

Kalina’s 25-year-old son and his wife are expecting their first child in February.

“It’s a bittersweet moment for me and my family. Kalina won’t meet her grandchild,” says Tanya. “My family is extremely excited about the new baby arriving in February. It’s a girl and my nephew and his wife have decided to name her Kalina to honor her mom.”

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Before I met him, I didn’t think it was possible, but now, with his data and success stories, I realized it wasn’t wrong and that his contribution and message made a difference.”

By ANDRES ADAM MIERA

Ronald McDonald House Charities provides temporary homes to families of seriously ill and injured infants and children who must receive critical medical care from area medical facilities. The nonprofit’s annual report states, RMHC provided 2,422,765 overnight stays for families with sick children in 2016.

— Tanya Jinzo

After a loved one dies, the Children’s Grief Center provides support to children and their families.

“You never think you’ll be in a situation where you will need this type of support.”

In May 2015, Kalina Jinzo and her boyfriend were on their way to Ruidoso, New Mexico, on a motorcycle when the unimaginable happened. Lightning struck and hit Kalina in the head as she was a passenger on the bike.

After several days in the hospital in Lubbock, Texas, Kalina died, leaving behind three children, her parents, a sister, and many other family members.

Kalina worked as a medical assistant at San dia for eight years. During her time at the Lab, she co-workers and Calle lovers, Yvonne Jinzo. “It took a long time for us to get over it. We’re a family here. You don’t just come and go like other companies. People were here for a lifetime so this loss hit the medical clinic very hard.”

Kalina’s sister, Tanya Jinzo, is an information systems security technologist and has been at San dia for 15 years. She and her parents have guardianship of Kalina’s two youngest daughters, ages 16 and 11. Following the sudden and tragic loss of Kalina, the girls began attending counseling sessions at the Children’s Grief Center in Albuquerque, which is a recipient of a United Way of Central New Mexico’s Community Fund grant.

The Center offers free support programs for bereaved children and provides a safe place to share experiences and feelings while growing in death.

Tanya says, “You never know how amazing an agency this is until you’re experiencing it. They [us], gave as free counseling and support, and around the holidays, local artisans donated handmade gifts to comfort the kids.”

Tanya says the agency helped her family live through a tragic loss.

Kalina’s 25-year-old son and his wife are expecting their first child in February.

“It’s a bittersweet moment for me and my family. Kalina won’t meet her grandchild,” says Tanya. “My family is extremely excited about the new baby arriving in February. It’s a girl and my nephew and his wife have decided to name her Kalina to honor her mom.”

Albuquerque Heading Home is a United Way of Central New Mexico-Community Fund grant recipient. The organization is a Housing-First collaboration of public, private, and nonprofit organizations that united in 2011 to end homelessness for individuals who have been mentally homeless and are medically vulnerable. More than 700 individuals and their family members have been placed in permanent supportive housing since the initiative started in 2011.

Having spent most of her life in Albuquerque, Yvonne wants to see her city provide more services for those in need.


The United Way helped me when I was in need

by Madeline Burchard

I feel privileged to be the Sandia/California project lead for Sandia G ives and work with the inspiring Sandia G ives committee to make our communities better places for everyone. However, I am passionate about this program for another reason — I personally benefited from programs funded by the United Way in 2014.

Before I was Sandia, I worked for an educational nonprofit that provided after-school programs in Richmond and Oakland high schools. While the work was meaningful, I learned a modest income. Between that and my wife’s part-time job, we found it difficult to pay the bills at times.

When tax time came, we were hard-pressed for money and were looking forward to the relief our tax refund would provide. However, the mixture of health care costs, job changes, freelance income, and the legal limits of our same-sex domestic partnership made our taxes too complicated for simple, low-cost computer preparation software and free filing.

The United Way’s line to the rescue

We needed professional tax help, but we couldn’t afford to forfeit up to a third of our refund to pay for it. That money would help us pay rent, buy groceries, and keep up with student loan payments. So we overcame our pride and asked the United Way Bay Area (UWBA) for help.

The UWBA representative to her center at Sandia, Yvonne says she knows firsthand how important Sandia’s United Way campaign is to the community. She chose to attend an agency tour of Albuquerque Heading Home, a local nonprofit that focuses on ending homelessness.

Before I met him, I didn’t think it was possible, but now, with his data and success stories, I realized it wasn’t wrong and that his contribution and message made a difference.”
Impactful Times: the story of decades of Sandia’s shock physics research

By Sue Major Holmes

Sandia physicists Mark Boslough and Dave Crawford predicted the Hubble telescope could see a rising plume as comet Shoemaker-Levy 9 crashed into Jupiter in 1994. Their prediction, however, went against the prevailing thought that the impact would be a visual fizzle since it would happen on the planet’s far side.

Putting money on their prediction, Mark and Dave bought 8-inch telescopes and tickets to Hawaii, where Jupiter would be high in the night sky at impact. Mark recounts in Impactful Times: Memories of 60 Years of Shock Wave Research at Sandia National Laboratories. His story is among reminiscences by 45 researchers in shock physics, most from Sandia, in the new book by former Sandia researchers Jim Asay, Lalit Chhabildas, and Jeffery Lawrence, and current Sandia researcher Mary Ann Sweeny.

Mark, now retired, and Dave, who researches computational shock physics, were correct about the plume but didn’t see it. “It just wasn’t bright enough to see with our little telescopes … but we saw the remarkable aftermath firsthand as the dark spot from the collapsed plume rotated into our view,” Mark wrote. The cloud plume produced by the impact matched Sandia’s computational analysis.

Impactful Times describes shock physics research at Sandia from its early history to today. Speeding bullets practically stand still compared to impact velocities achieved in shock physics studies, which deal with what solid materials — condensed matter is the scientific term — experience when objects collide with them at tremendous velocities, forming a shock that rapidly spreads and can change some of the material to a liquid, gas, or plasma.

The interdisciplinary field brings together experimentalists, code development, and theory to understand what happens to materials subjected to incredible forces. It’s used in work on nuclear and conventional weapons, astrophysics, planetary science, material synthesis, and space, among other areas. Jeff says the technology developed for high-pressure applications also can analyze what happens at lower shock pressures.

The book discusses, for example, Sandia’s analysis of a 1989 turret explosion on the USS Iowa that killed 47 sailors. The first half of the 700-page book, released this spring by scientific publisher Springer as an e-book and in hardback, presents Sandia’s major research goals and accomplishments in shock compression science over six decades.

“We tried to bring out the major technical developments and breakthroughs, including what worked and what didn’t, and the torturous paths involved in achieving the final results,” Jim says. Among those, he says, were the first gas gun-driven impact launcher, developed in 1958 for precision material property studies and now ubiquitous in shock wave facilities around the world; development of ultra-high-velocity impact launchers, including Sandia’s Z machine that provides material data at pressures previously achieved in underground nuclear tests; and Sandia’s patented quartz gauge, which allowed the first precision measurements of material properties at low pressures.

The title was chosen for the double meaning of impactful, he says. Impact techniques are the principal way to study materials respond to shock waves. In addition, landmark accomplishments in Sandia’s shock wave research had a major impact on scientific and engineering applications and the scientific community. Accomplishments include computer simulations of Shoemaker-Levy 9’s impact on Jupiter.

The second half compiles researchers’ recollections. The invitation to contribute deliberately refrained from suggesting how to write them. “Some recollections were written as a flow of consciousness, while others were more structured, and some were an annotated list of key publications,” Jim says. “Each added important details about shock wave work in different time periods.”

Mary Ann was surprised by the complications of book publishing. “For example, copy editors didn’t understand the word fuzes, changing it to fuses through-out. She changed it back. ‘It’s not a household fuse,’ she says. ‘That was a glaring error for those in the know.’”

The authors say they hope to inspire experts, non-experts, and early-career material-sciences and to interest students of materials science to work at Sandia or its sister national labs, Lawrence Livermore and Los Alamos. They also want to show the public what a researcher experiences — the challenges, frustrations, personal struggles, and ultimately the gratification of making a pioneering discovery or solving a problem.

“The opportunities we had were directly a result of the strong foundations laid out by our predecessors. It is their vision and all the pioneering work they had done that allowed us to proceed and accomplish what we had done,” Lalit says. “I wish I were 20 years younger because there is so much more relevant shock physics we could still be doing. I think the technology computa-tionally, theoretically, and experimentally in shock physics has advanced so much we can now tackle problems we once could just dream about.”
### Agile space for software team improves collaboration, productivity

By Julie Hall • Photos by Norm Johnson

A RIBBON CUTTING AND OPEN HOUSE will be held Wednesday, Oct. 18, at Center 6300’s Collaboration Corridor, Buildings T37, T50, and T51.

All Sandians are welcome.

10:30 a.m.  Welcome and networking
11 a.m.  Ribbon-cutting ceremony  
- Mike Boralli, NNSA/DO Deputy Field Office Manager
- David Douglass, Deputy Labs Director
- John Clymo, Associate Labs Director, Infrastructure Operations
- John Zepper, Director, System Mission Engineering
Post ribbon cutting to 3 p.m.
- Building tours and refreshments

A “t” partition is part of T37’s Star Trek Next Generation theme.

Why ‘agile’ workspaces?

Workspaces based on “agile” principles are flexible, space-efficient, and designed to encourage interaction, collaboration, and innovation. Agile workspaces are based on key principles from The Agile Manifesto, written in 2001 by a group of thought leaders seeking to encourage better ways of developing software. The manifesto is the foundation of the agile movement, which has spread to numerous areas beyond software because of its ability to help organizations cope with continuous change.

Center 6300’s project incorporated the following agile principles:

1. The most effective and efficient method of conveying information to and within a development team is face-to-face conversation.
2. The best architectures, requirements, and designs emerge from self-organizing teams.
3. Build projects around motivated individuals, give them the environment and support they need, and trust them to get the job done.
4. “Everything the team needs is within their collaborative work space,” says Alfred Lorber. Putting everything and everyone in the same space reduces the cycle time to solve problems.” Alfred helped create and shape the Collaboration Corridor as part of his responsibility for facilitating execution and improvement of 6300’s agile process.

A key aspect of agile spaces is common areas that are purposefully structured to create what Steve Jobs called “unplanned collaborations.” Incidental interactions occur when people cross paths as part of their normal routines, such as in stairwells or on their way to a breakroom. The idea is that chance encounters may lead to a novel idea or solution to a problem.

For example, Google’s New York City office is structured so that no employee is more than 150 feet from food. The idea is that as employees get up to get a snack they may accidentally bump into coworkers from different teams. Research has shown that chance encounters and conversations are not only conducive to sparking innovation and fresh ideas, they also improve employee satisfaction.

Agile spaces differ from collaborative workspaces. Collaborative workspaces are tailored to a specific purpose and are where workers spend part of their time in addition to their regular office. Alfred says, “An agile workspace supports all of the potential work types the employees housed there may perform and is where they spend most of their work time.”
Agile workspace

(Continued from preceding page)

"Everyone agrees it's been fantastic," says computer scientist Stephen Rowe, who participated on the team that developed the building requirements. Locating all the team members in one place and creating an environment that enables the team to successfully implement agile development has "improved our code, algorithms, and speed of development."

Says Jeff Brooks, manager of Next Generation System Architectures: "Getting people co-located has been a significant factor in our ability to increase productivity across the teams and the program."

Creating a productive, inclusive environment

New hires start working with their teams in the space from their first day, allowing them to quickly make meaningful contributions, Jeff says. He cited one example of a new hire who started on a Monday and was making contributions to code by Friday, progress that typically would take a few months. New hires are more inclined to ask questions when they're in close proximity to their mentors, he adds.

"Bringing new hires together with their team is also a very inclusive aspect of this building," adds Stephen, who came to Sandia two years ago after graduating from Texas A&M.

Prize to moving to the Collaboration Corridor, the Tumbo/Micro team had a "nomadic" existence as its collaborative space moved from one vacant space to another. Their first effort was in M0303. Stephen was working on an LDRD project with an intern housed in M0303 with other summer students. When he discovered the building was vacant the rest of the year, he proposed moving the team there to his manager. Some of the 6300 managers had a similar idea about the same time, including Roy Fitzgerald, who preceded Dorothy as 6300 Engineering Operations Manager, and Alfred Lorber. Roy and Alfred saw the project's vision.

The move to M0303 was "a game-changing improvement," says Stephen.

"As a team we found it was a lot more productive if we involved everybody," says Jeff. When new occupants moved into M0303, the Tumbo/Micro team set up temporary spaces in Bldg. 894 and then 890. When the T37/T50/T51 space became available, 6300 pitched the redesign project to Facilities, which embraced the vision.

"We have been looking at collaborative space for a long time," says Lynne Schluter. "It's hard in our security culture to get people thinking outside the traditional individual offices." In 2016, Lynne and other participants in the National Security Leadership Development Program (NSLDP) team toured Stanford University's d.school, a teaching institute for design and experiential learning, and IDEO, an international design and consulting firm in Palo Alto, California, and came away excited to try something similar at Sandia.

Facilities worked closely with Center 6300 throughout the design process, incorporating lessons learned from the M0303 and 894 experiences, such as including a private meeting area.

Efficient use of space

Through its open concept and use of glass walls and partitions, the Collaboration Corridor houses nearly three times as many people as when the buildings contained private offices. Each building is designed around a different theme — Nature, Euro Discos, and Star Trek Next Generation — which is carried out through the choice of color, floor coverings, and other design features. Furniture and whiteboards are mobile so they can be easily moved for impromptu meetings. Lighting is dimmable. It's a great space," says Jeff. "For a large collaborative project, it really works well.

Alfred says it's been interesting to see the attitudinal shift toward agile work-space among some developers. "Typically, there is a subset who initially say 'hell no, I can't work that way,'" he says. "But then you get them in there and you can't pry them out."
Since returning to New Mexico, John’s six horses, and his great-aunt Lena’s 1930 Ford Model A now call Edge-wood home. “I’ve always wanted to live here and I’m planning to stay this time,” he says.

Back in the Saddle

Now that he’s back, John is ready to roll up his sleeves and put his world-renowned facilities management skills to work at Sandia.

“Since the transition began in January, I’ve been able to identify areas where we can apply the experience I gained from my work at three national laboratories and NNSA to optimize Sandia’s facilities services,” says John. “It turns out, in all my travel and various roles I’ve already been handling very fast-paced by Sandia (New Mexico, California, and Tuscon), as well as those sites where we perform activities. Coming into this role, it’s provided a helpful insight into what we do and that the Infrastructure Operations Division offers.

“There are a lot of good things that the Division 4000 workforce has been doing to keep things running smoothly, but there is much more we can do to bolster the consistency and quality of our infrastructure and our services,” says John. “And I’m excited to help lead this initiative.”

Since returning to New Mexico, John, his six horses, and his great-aunt Lena’s 1930 Ford Model A now call Edge-wood home. “I’ve always wanted to live here and I’m planning to stay this time,” he says.
**Saddling up to tackle some big initiatives**

by Karli Massey

John Clymo, Associate Labs Director for Infrastructure Operations Div. 4000, talks about how his background can help ensure a stable and secure platform for the future of Sandia's facilities.

Starting when he was five years old, John Clymo spent part of his childhood summers at his aunt and uncle’s ranch near Pie Town, New Mexico. Since then and after years of globetrotting, he’s been eager to settle down in the Land of Enchantment. When John got the call about joining the NTSS contract team, not only was he looking forward to bringing his expertise in facilities management to the table, he was excited about the opportunity to call New Mexico home again.

John’s career has taken him across the world, managing site construction and operations in 14 countries. His first job out of school was with Pan Am World Services for the Washington state-based Trident Support Project, where he was a maintenance worker in the electrical shop. “When I first started, I thought I had the best job I’d ever have,” he says. “I was working in cathodic protection at the delta pier at the submarine base. I’d take my small boat out under the piers to perform corrosion inspections and replace sacrificial anodes. Cruising up and down the Hood Canal on those beautiful sunny days in July, the water was like glass. That’s when I thought I’d found my perfect job. Then, it got to be November. The best job in the world turned out as one of the worst jobs in the world — winter in Washington state on the Hood Canal can be brutal.”

John says he now has the best job in the world as ALD for Sandia's Infrastructure Operations Division, which, he jokes, is less weather dependent than those sunny days in July, the water was like glass. That’s when I thought I’d found my perfect job. Then, it got to be November. The best job in the world turned out as one of the worst jobs in the world — winter in Washington state on the Hood Canal can be brutal.”

JOHN CLYM O, Associate Labs Director for Infrastructure O perations Div. 4 000, says, “There are a lot of good things that impact on my career so far,” he says. “Our team was able to change the way the lab did business and we demonstrated numerous improvements to our capital expenditure procurement process.”

In 2004, John was asked to come back to NNS for the site operations manager. “It was an honor to be asked to return. I guess I was doing some things right,” he says. “Shortly thereafter is when I started working with Dr. Younger.”

Bridging his previous time at NNS, John spent eight years in management at that site, where he had a chance to work with many Sandians, which brought him to New Mexico numerous times. The next stop in John’s DOE-complex journey was just across the street from the Sandia/California site. From 2009-2011, he was Lawrence Livermore National Laboratory’s senior manager of business and operations, responsible for site sustainability planning, utilities management, and environmental compliance.

Sunny Side Track and Horsing Around

While in California, I was presented with an interesting opportunity to participate in the development of a utility-scale solar project,” says John. “It left my position at LLNL and focused on developing this project. We had fun learning about that industry.”

John’s other role was the company pilot. In addition to learning to scuba dive in college, John took flight training and has become a multi-engine instrument-rated pilot.

“After the solar project took flight, I decided to take some downtime,” John says. Although, “downtime for John typically involves a (Continued on page 11)