

'The secret sauce'

DOE deputy secretary says Sandia helps make America great



By Nancy Salem

The work being done at Sandia is vital to the strategic goals of the DOE and is helping define what the United States can become in the future, says the deputy US secretary of Energy.

"Your efforts help expand our knowledge of the

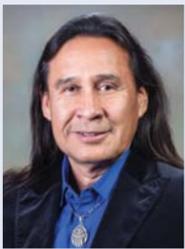
"Your efforts help expand our knowledge of the world and the stuff of which it is made."

— Deputy Energy Secretary Elizabeth Sherwood-Randall

world and the stuff of which it is made," Elizabeth Sherwood-Randall told a packed house July 1 in the Steve Schiff Auditorium. "Your research helps lay the foundation for more resilient and sustainable energy systems and you make our nation stronger and safer against
(Continued on page 5)

JILL HRUBY, right, incoming Sandia president and Laboratories director, joined Deputy Energy Secretary Elizabeth Sherwood-Randall in fielding questions from the audience at an all-hands meeting in the Steve Schiff Auditorium. Sherwood-Randall said she looks forward to working closely with Jill. "How exciting to have you become the next director," she said. (Photo by Randy Montoya)

Meet 68 distinguished Sandians



Sandia's special appointments represent employees from all areas of the Labs' operations. This year, 68 Sandians have been honored with special appointments, including Laurence Brown (163), left, who has been promoted to the distinguished level of his job family. See all the 2015 special appointments on pages 6-7.

Sandia LabNews

Vol. 66, No. 13

July 10, 2015

Managed by Sandia Corporation for the National Nuclear Security Administration



Testing heats up at Sandia's Solar Tower with high-temperature falling particle receiver

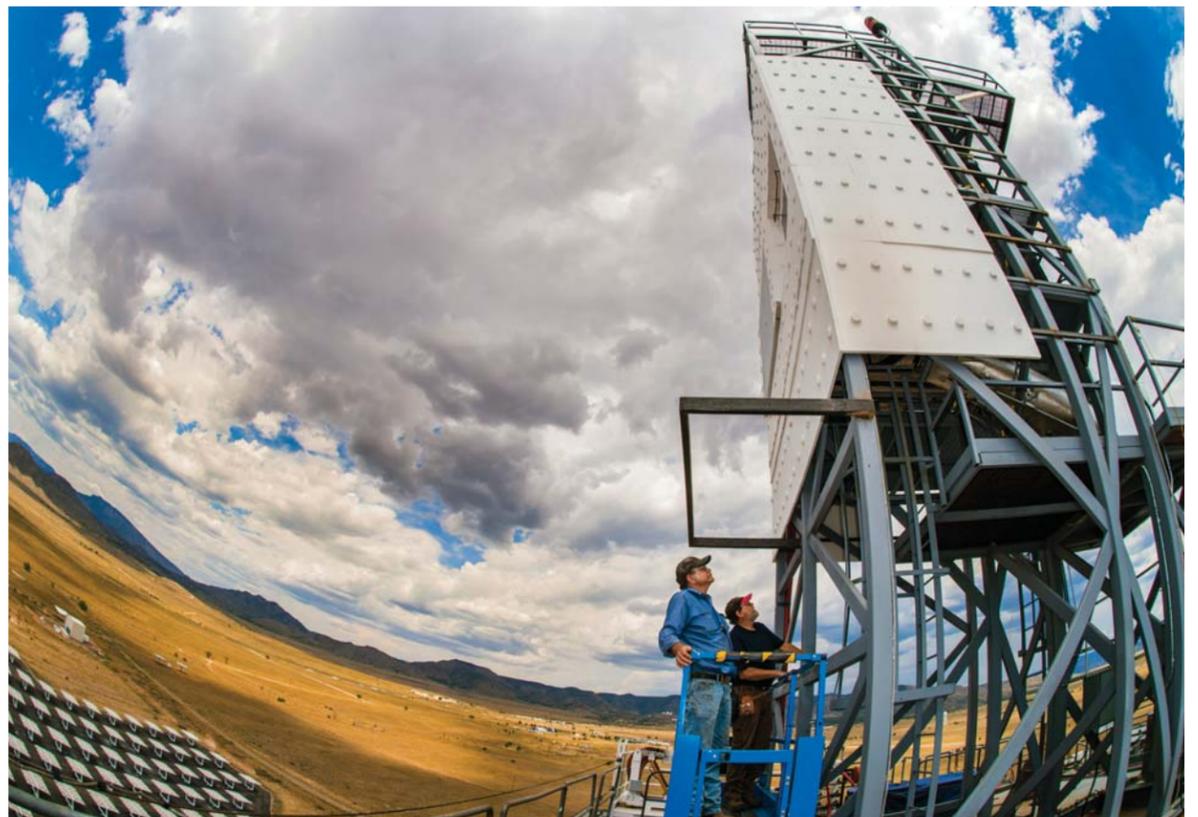
By Rebecca Brock

Sandia researchers are working to lower the cost of solar energy systems and improve efficiencies in a big way, thanks to a system of small particles.

In June, engineers lifted Sandia's continuously circulating falling particle receiver to the top of the tower at the National Solar Thermal Test Facility, marking the start of first-of-its-kind testing that will continue through 2015. The Sandia-developed falling particle receiver works by dropping sand-like ceramic particles through a beam of concentrated sunlight, capturing and storing the heated particles in an insulated tank. The technology can capture and store heat at high temperatures without breaking down, unlike conventional molten salt systems.

Conventional central receiver technologies are limited to temperatures close to 600 degrees Celsius (1,112 degrees Fahrenheit), while operating temperatures for the falling particle receiver could exceed 1,000 degrees Celsius. Higher temperatures mean more available energy and cheaper storage costs because less material

(Continued on page 4)



TECHNOLOGISTS JOHN KELTON and Daniel Ray inspect the Falling Particle Receiver during a cloud delay atop the National Solar Thermal Test Facility at Sandia National Laboratories. (Photo by Randy Montoya)



Animal planet

A veterinarian at a national lab might sound odd, but Sandia's Melissa Finley helps make the world safer through livestock health and biosecurity. To work effectively in rural Afghanistan, Melissa had to earn the trust of villagers. See page 12.

Inside . . .

Sandia, Lumerical Inc. collaborate to advance photonics design, manufacture 2
Sandia's BioWatch Indoor Reachback Center 3
Tracing the evolution of a drug-resistant pathogen . . . 4
Sandia's Z machine helps solve Saturn's 2-billion-year age problem 8

Meet Jeff Harrell

Priority one for Jeff Harrell, recently named manager of NNSA's Sandia Field Office, is to "make sure we put national security at the forefront of everything we do. That is our core mission and it's incredibly important for our nation." See page 9.



That's that

The announcement on June 22 by Sandia Corp. Board of Directors Chair Rick Ambrose that Jill Hruby will be Sandia's new Labs director was greeted with an astonishing wave of media interest from across the country and even beyond.

Speaking about the board's decision, Ambrose said: "We saw right away that Jill has the right combination of technical expertise and strategic vision to lead Sandia into the future. With more than three decades of experience at Sandia, she understands the core national security missions and scientific foundations that are fundamental to the Labs' success."

In the hours and days immediately following the announcement, news outlets large and small, from the *New York Times* to the *Hilton Head Island Packet*, picked up the story about Jill's new role at the Labs. Within just two days of the news, the folks on our media relations team had already logged more than 30 pages of links to the story online. In looking at the incredible diversity of newspapers, professional and trade publications, television newsrooms, and websites that carried the item, it's hard to say who *wasn't* interested in this story.

The fact that Jill was selected to lead the nation's largest national security laboratory in what we all know has been a male-dominated world is the very definition of news. But this wasn't just any news. It was the kind of news that signals a fundamental shift in how we think about our world, an expansion of our idea of what's not just possible but routine. I don't think I'm overstating the case here.

On any given day, particularly in the information-saturated environment we live in, news editors are barraged with choices: Should we report this story? Will our readers be interested? In the case of the story about Jill's new job, editors across the country (and at least one news site in the UK) determined that this was information that demanded to be published. Savvy editors know there is a huge amount of interest "out there" in encouraging women to embark on STEM careers. For editors not to share this news with their readers would be something akin to dereliction of duty.

Jill has been a role model for women at Sandia for some time; now that the word is out about her consequential accomplishments, Jill is a role model for girls and women everywhere.

In Sandia's own news release, Jill recognized the significance of her appointment. "I'm proud to be the first woman to lead an NNSA laboratory," she said, "but mostly I'm proud to represent the people and work of this great lab."

I think there are about 10,000 people who are proud right now, too.

* * *

The Trinity test, which occurred just 70 years ago this month near Alamogordo, New Mexico, is one of those historical touchstones that perfectly expresses the urgency with which this nation fought World War II.

Consider the challenges: The Manhattan Project's roots date to 1939, but the project as we know it only got started in June 1942. Within three years and at an expense of \$2 billion in 1940s dollars (probably the equivalent of more than \$30 billion today), the nation had recruited the top scientists and engineers on the planet to solve problems no one had ever dealt with before. A massive industrial infrastructure was created to produce materials that had never existed as more than benchtop-sized samples. A workforce of some 130,000 people spread across sites around the country was assembled, the vast majority of whom had no idea what they were really working on. That incredible effort culminated in the Trinity test and the subsequent deployment of atomic bombs that destroyed the Japanese cities of Hiroshima and Nagasaki and abruptly ended the war in the Pacific.

In the horrible calculus of war, I believe the use of the weapons ended up saving lives, both Japanese and American. I know that sounds like a gratuitous assessment when made from the safe and comfortable distance of 70 years and written from the victor's perspective. But I do believe there are millions of people – the descendants of those on both sides who would have died in an all-out assault on the Japanese home islands – who are alive today because President Truman made a very difficult decision in the summer of 1945.

– Bill Murphy (MS 1468, 505-845-0845, wtmurph@sandia.gov)

Advancing photonic integrated circuit design, manufacture

Sandia, Lumerical Solutions collaborating on compact model library

By Neal Singer

Sandia and Lumerical Solutions Inc. of Vancouver, British Columbia, are collaborating to develop a compact model library (CML) for Sandia's silicon photonics manufacturing process. The calibrated CML will enable designers to simulate the performance of photonic integrated circuits fabricated with Sandia's silicon photonics manufacturing process.

"This is an exciting time in the field of silicon photonics and there is much talk about the potential of the technology across a wide array of applications."

— Bill De Vries, director, product marketing, Lumerical Solutions Inc.

Silicon photonics hold the potential to become a cost-effective, scalable technology to produce photonic integrated circuits. Their applications include high-performance optical networking, data center interconnects, signal processing, and biological and chemical sensing. A comprehensive processing design kit that includes accurate simulation-circuit element models is critical to enabling a methodology that ensures predictable operation and reliable, repeatable fabrication of complex photonic integrated-circuit designs for these demanding applications.

Sandia and Lumerical's collaboration to develop a calibrated CML addresses key challenges in an initiative started in October 2014, when President Barack Obama announced funding for the Institute for Manufacturing Innovation on Integrated Photonics (IP-IMI). The idea, he said, was to create "an end-to-end integrated photonics manufacturing ecosystem in the US," including integrated design tools for efficient simulation and design of integrated photonic circuits and an accessible domestic photonic device foundry service. The combination of Lumerical's suite of photonic design tools and Sandia's foundry services for US national security missions enables photonic designers to innovate in the field of integrated photonics.

Rick McCormick, senior manager of Microsystems Process Science & Technology Dept. 1760, says, "The IP-IMI will accelerate the impact of photonics on information, communication, and sensing technologies, including those in many national security applications, and help facilitate broader industry engagements on Sandia's integrated photonics technology platform. Sandia is committed to supporting the success of IP-IMI and we welcome this collaboration with Lumerical, and future collaborations with other industry partners, to advance the photonic design and manufacturing ecosystem."

"This is an exciting time in the field of silicon photonics and there is much talk about the potential of the technology across a wide array of applications," says Bill De Vries, director of product marketing at Lumerical. "Our collaboration with Sandia aims to create the design ecosystem necessary to ensure integrated photonics reaches its full commercial potential."

"Photonics can improve performance and reduce energy use in metro and data center networks," says Nasser Peyghambarian, professor of optical sciences at the University of Arizona and director of the National Science Foundation-funded Engineering Research Center for Integrated Access Networks (CIAN). "This [Sandia-Lumerical] collaboration enables photonic designers and researchers everywhere to leverage the component knowledge developed by Sandia and CIAN researchers to rapidly and accurately design and simulate increasingly complex silicon-based photonic integrated circuits."

According to a company document, Lumerical has pioneered simulation technologies for photonic products since its inception in 2003. Its software solutions have been licensed in more than 40 countries by global technology leaders like Samsung, STMicroelectronics, Huawei, Agilent, Olympus, and Philips, and prominent research institutions including Caltech, Harvard, Max Planck Institute, MIT, NIST, University of Tokyo, and the Chinese Academy of Sciences.

For further information, see www.sandia.gov/mstc/IPII and <http://manufacturing.gov/ip-imi.html>.



Sandia National Laboratories

<http://www.sandia.gov/LabNews>

Albuquerque, New Mexico 87185-1468

Livermore, California 94550-0969

Tonopah, Nevada • Nevada National Security Site

Amarillo, Texas • Carlsbad, New Mexico • Washington, D.C.

Sandia National Laboratories is a multiprogram laboratory operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corp., for the US Department of Energy's National Nuclear Security Administration.

Bill Murphy, Editor 505/845-0845

Randy Montoya, Photographer 505/844-5605

Patti Koning, California site contact 925/294-4911

Michael Lanigan, Production 505/844-2297

Contributors: Michelle Fleming (Ads, Milepost photos, 844-4902),

Neal Singer (845-7078), Patti Koning (925-294-4911),

Stephanie Holinka (284-9227), Darrick Hurst (844-8009),

Heather Clark (844-3511), Sue Holmes (844-6362),

Nancy Salem (844-2739), Tim Deshler (844-2502),

Valerie Larkin (284-7879), Lindsey Kibler (844-7988),

Rebecca Brock (844-7772), Valerie Smith, manager (844-6167)

Lab News fax 505/844-0645

Classified ads 505/844-4902

Published on alternate Fridays by Internal & Digital Communications Dept. 3651, MS 1468

LOCKHEED MARTIN



Lab News Reader Service

The *Sandia Lab News* is distributed in-house to all Sandia employees and on-site contractors and mailed to all Sandia retirees. It is also mailed to individuals in industry, government, academia, nonprofit organizations, media, and private life who request it.

Retirees (only):

To notify of changes in address, contact Benefits Dept. 3332, Customer Service, at 505-844-4237, or Mail Stop 1021, Sandia National Laboratories, Albuquerque, NM 87185-1021.

Others:

To receive the *Lab News* or to change the address (except retirees), contact Michelle Fleming, Media Relations and Communications Dept. 3651, 505-844-4902, email meflemi@sandia.gov, or Mail Stop 0165, Sandia National Laboratories, Albuquerque, NM 87185-0165.

Employees:

To address concerns regarding delivery of the *Lab News* to your facility, call Mail Services Team 10268-4, at 844-3796. At Sandia/California contact the Mail Room at 925-294-2427.

Web users:

The *Lab News* is on the external web at www.sandia.gov/LabNews. *Lab News Interactive*, accessible on the internal web, is at: www-irn.sandia.gov/newscenter/interactive.

An Eye on the Unseen

Sandia's BioWatch Indoor Reachback Center

By Holly Larsen

In the event of a biological incident that threatens human health and property, public health officials nationwide will turn to the recently released Indoor Program Guidance Document to craft their response. Created through a collaboration among Sandia researchers, public health officials, and emergency responders, this instructional handbook distills experience gained at Sandia by operating the BioWatch Indoor Reachback Center (BIRC) for more than a decade.

Through BIRC, Sandia has been a key part of the US response to a potential bioterrorism or biohazard incident. For any indoor release detected by BioWatch — a system of early warning biological-agent detectors placed across the US — BIRC is poised to provide analyses that can rapidly help inform response decisions.

The role of BioWatch is particularly important because most biohazard releases can't be detected otherwise. Without it, a release will only be suspected when people become symptomatic — possibly days or even weeks after exposure.

Fortunately, the BioWatch system can detect and characterize what's happening early and accurately, providing information that can help first responders and public health officials determine how to handle a biohazard incident. The BioWatch program, initiated by the Department of Homeland Security (DHS) in 2003, is a crucial way of putting technology to work for the safety of the American public.

Rapid response is key

Donna Edwards (8114), the leader of BIRC since August 2014, says that the BioWatch network of biode-tectors has been strategically placed in urban areas and transportation centers around the country to continually monitor the air for biohazard releases.

"When the system detects something, an alarm goes off, and the system initiates a BioWatch Actionable Result, or a BAR," says Donna. "If the alarm comes from an indoor detector, the BAR activates BIRC and notifies the jurisdictional coordinator. That's the liaison between the BioWatch Program Office and the local government officials."

In a key development, local public health officials are now authorized to contact BIRC directly in the event of a BAR, whereas previously federal approval was required. This change saves time, allowing the BIRC to immediately begin collecting data for decision-critical modeling and analysis support.

As soon as a BAR comes in, Donna and her team spring into action, aware that speed is of the essence. "Limiting the number of people exposed is absolutely



IN A CONTROLLED EXERCISE, the BIRC team examines results from thousands of Sandia-developed air flow scenarios to interpret data from a BioWatch detector.

Sandia California News

critical to saving lives and ensuring that the local health system isn't overwhelmed," says Donna. Also crucial is reducing the size of the area that might require decontamination — a lengthy and costly process.

"We are on call 24/7, 365 days a year, and we assemble immediately in our facility at Sandia to analyze data. If members of the team are not all physically at the BIRC, we can still work together to develop maps and reports through conference calls and online collaboration."

Thousands of airflow scenarios guide data interpretation

In rapid response to a BAR's declaration, BIRC must provide a preliminary report during a conference call to key response staff, including the jurisdictional coordinator, and DHS personnel. A center at Los Alamos National Laboratory provides a similar service for outdoor incidents.

The report BIRC provides is based on a sophisticated computer model and a library of simulations.

"We have a computer model of airflow in each building or transportation system, and tens of thousands of scenarios of how the bioagent might spread through each," says Donna. "We can look at our sce-

narios and determine which ones best match the pattern seen by the detectors." She adds that these same scenarios helped Sandia recommend optimal placement of the interior detectors.

Members of the BIRC team collectively analyze the likely scenarios and then apply their expertise to advise the responders using charts, maps, and clear communications. To help ensure that the report is accurate and comprehensive, the BIRC team is diverse, including specialists in public health, systems analysis, emergency response and bioterrorism, indoor airflow, transportation systems, and software development. A dozen team members are located throughout the country, at both the California and New Mexico locations of Sandia; at Argonne National Laboratory in Chicago; and in other urban locations.

Improving preparedness

With this combined expertise, the team works to thoroughly understand the data so it can provide local responders information on where the biohazard release might have originated, where it's spreading, the amount of agent released, and the potential level of human exposure. Team members also focus on how best to present the findings.

"Our goal is to make the information as usable as possible. We want the local responders to be able to quickly decide where to direct their efforts and how best to stem the spread of the particular type of agent they are facing," says Donna.

Since 2004, the BIRC team has achieved a number of milestones to help the BioWatch program become better prepared. The newly prepared Indoor Program Guidance Document is one example. The team also developed a BIRC Overview Video, part of an ongoing effort to develop training materials for the jurisdictional coordinators.

For Donna, being the leader of BioWatch Reachback team is an immense responsibility. However, she is sure she and her team can make a significant difference in mitigating an actual biohazard incident. "We rehearse for biohazard release incidents regularly through controlled exercises, and we'll continue to do so into the future," she says. "We are confident we can respond quickly in an emergency."



THE BIRC TEAM — Sandians on the BIRC team, from left, include Steve Mier (8116), Ann Hammer (8112), Marilyn Hawley (8118), Meghan Peterson (8114), Julie Fruetel (8114), Donna Edwards (8114), Chuck John (8114), and Mark Gerling (8127). Not pictured are Ray Gordon (6630), Nerayo Teclmariam (8112), Nate Gleason (8116), Becky Levinson (8114), Ann Yoshimura (8118), and Stephen Mueller (8114); and Argonne National Laboratory members Dave Brown and Jim Liljegen.

Tracing the evolution of a drug-resistant pathogen

By Sue Major Holmes

To fight a pathogen that's highly resistant to antibiotics, first understand how it gets that way.

Klebsiella pneumoniae strains that carry a particular enzyme are known for "their ability to survive any antibiotics you throw at them," says Corey Hudson (8633) of Sandia/California.

Using Sandia's genome sequencing capabilities, Corey and colleagues Robert Meagher (8621) and Kelly Williams (8633), along with former postdoctoral employee Zach Bent, identified several mechanisms that bacteria use to share genes and expand their antibiotic resistance. They found that in some cases, bacteria can receive a new set of genes all at once and in the process become pathogenic.

To better understand how the process works, they focused on the large mobile DNAs, such as plasmids, which exist as free DNA circles apart from the bacterial chromosome, and genomic islands, which can splice themselves into the chromosome. These mobile DNAs are major mechanisms for evolution in organisms that lack a true nucleus. Genomic islands and plasmids carry genes that contribute to everything from metabolism to pathogenicity, and move whole clusters of genes all at once between species.

Identifying how genomic islands move and their effect on bacterial physiology could lead to new approaches to bypass bacterial defenses, Corey says.

Eventually, the effort might lead to a way to predict new pathogens before they emerge as public health threats.

"We're just starting on this path," Kelly says. "It's a harder problem to predict emerging pathogens, rather than just observe them. Determining what is pathogenic in the first place and how it might become more pathogenic is a research challenge."

Bacteria share genetic material with other bacteria

Bacteria share genetic material through free virus particles or through a cell-to-cell process called conjugation, where one bacterium sends out a tube from its surface into another's and injects genes into the other

cell, Kelly says.

A hypothetical example of sharing: A local water supply is contaminated with a pathogenic *E. coli* strain that is not antibiotic-resistant. *Klebsiella pneumoniae* enters the water, comes into contact with the *E. coli*, and donates genes. Now a pathogenic *E. coli* has acquired resistance, making it harder to eradicate.

"The great challenge is that bacteria can easily share

most common species of carbapenem-resistant Enterobacteriaceae (CRE) in the US, often having resistance to nearly all antibiotics in use. CREs also are dangerous because they can spread antibiotic resistance to other bacteria.

These opportunistic bacteria can grow on hospital surfaces or in lungs and tissues. The Centers for Disease Control and Prevention says about one in 25 hospital patients has an antibiotic-resistant infection, and it's lethal in up to one in nine cases.

Since publishing the genomic analysis in June 2014, Sandia researchers have developed an experimental technique that detects genomic islands on the move. The team applies a computational or bioinformatics technique to identify islands in genomes and does particular studies of gene expression to see which antibiotic-resistance and other genes get turned on during an infection.

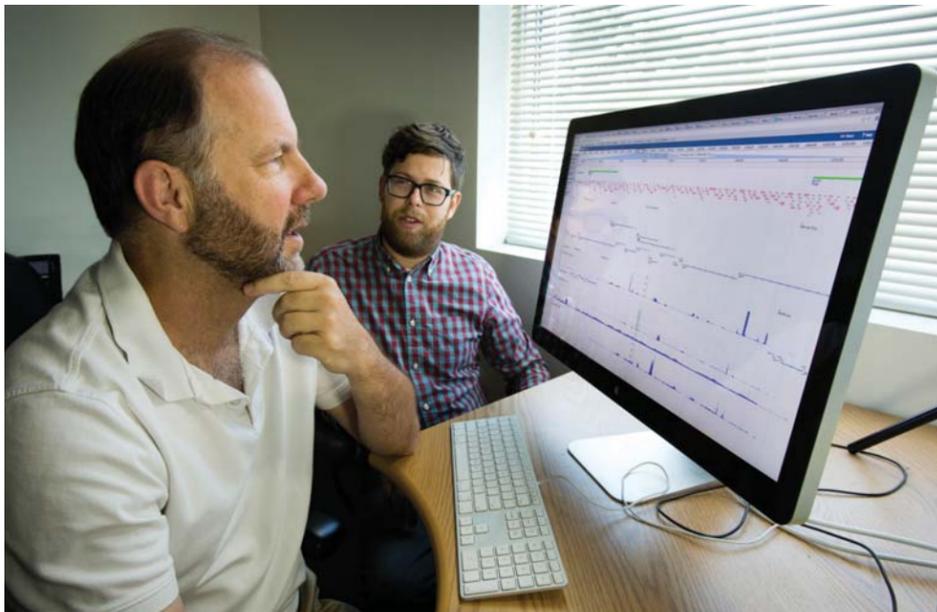
Research shows 'the bug is always armed'

The research showed the beta-lactamase genes in *Klebsiella pneumoniae* were on all the time, whether or not the bacteria were infecting human cell cultures. In essence, Kelly says, "the bug is always armed" against antibiotics.

The team built a database of genomic islands they found in a survey of all sequenced bacteria. So far, the database contains nearly 4,000 genomic islands — only a partial list of what bacteria share, Corey says. The database reveals both global features of genomic islands and unique features in select groups of bacteria.

Rather than relying solely on such bioinformatics, the team invented a new experimental approach to detect islands as they pop out of the genome. The team stimulates this beginning stage of island mobilization by stressing the cells in certain ways. During this stage, the mobilized islands take circular form, independent of the chromosome. The islands are now free to move into other bacterial cells, bringing with them new sets of genes.

Experiments and bioinformatics work together, each yielding information the other did not and confirming each other. "We do what we can with the computer, but we like to test the resulting hypotheses in the lab," Kelly says.



IDENTIFYING MECHANISMS BACTERIA USE — Sandia researchers Kelly Williams, left, and Corey Hudson (both 8633) view a segment of the *Klebsiella pneumoniae* genome around two genomic islands. The two researchers and their colleagues have identified several mechanisms that bacteria use to share genes and expand their antibiotic resistance. (Photo by Dino Vournas)

their defenses," Kelly says.

Over the two decades that various bacterial genomes have been sequenced, researchers have found rampant gene sharing. "They are not so much generating new genes all the time — that does happen slowly — but what they mainly do is shuffle genes around," Kelly says. "The new gene combinations can quickly give bacteria a new pathogenic niche. They may then invade more tissues or survive in even more conditions."

For the first time last year, Sandia microbiologists studying infectious diseases sequenced the entire genome of a *Klebsiella pneumoniae* strain that encodes New Delhi metallo-beta-lactamase (NDM-1). This enzyme makes the strain resistant to carbapenems, antibiotics of last resort. *Klebsiella pneumoniae* is the

Falling particle

(Continued from page 1)

is needed to transfer heat.

Sandia engineer Cliff Ho (6123), the project's principal investigator, says the goal of the testing is to develop a prototype, cost-competitive falling particle receiver that demonstrates the potential for thermal efficiency greater than 90 percent, while achieving particle temperatures of at least 700 degrees Celsius.

"This technology will enable higher temperatures and higher-efficiency power cycles that will bring down the cost of electricity produced from concentrating solar power," Cliff says. "In addition, the ability to cheaply and efficiently store thermal energy directly in the heated particles will enable power production at night and on cloudy days."

Falling particle receiver technology is expected to further advance the state-of-the-art in concentrating solar power tower systems capable of generating up to 100 megawatts of electricity.

Sandia's partners in the DOE project are the Georgia Institute of Technology, Bucknell University, King Saud University in Saudi Arabia, and the German Aerospace Center. The project is funded by DOE's SunShot Initiative, which aims to reduce solar energy costs and expand the use of solar energy technologies throughout the United States.

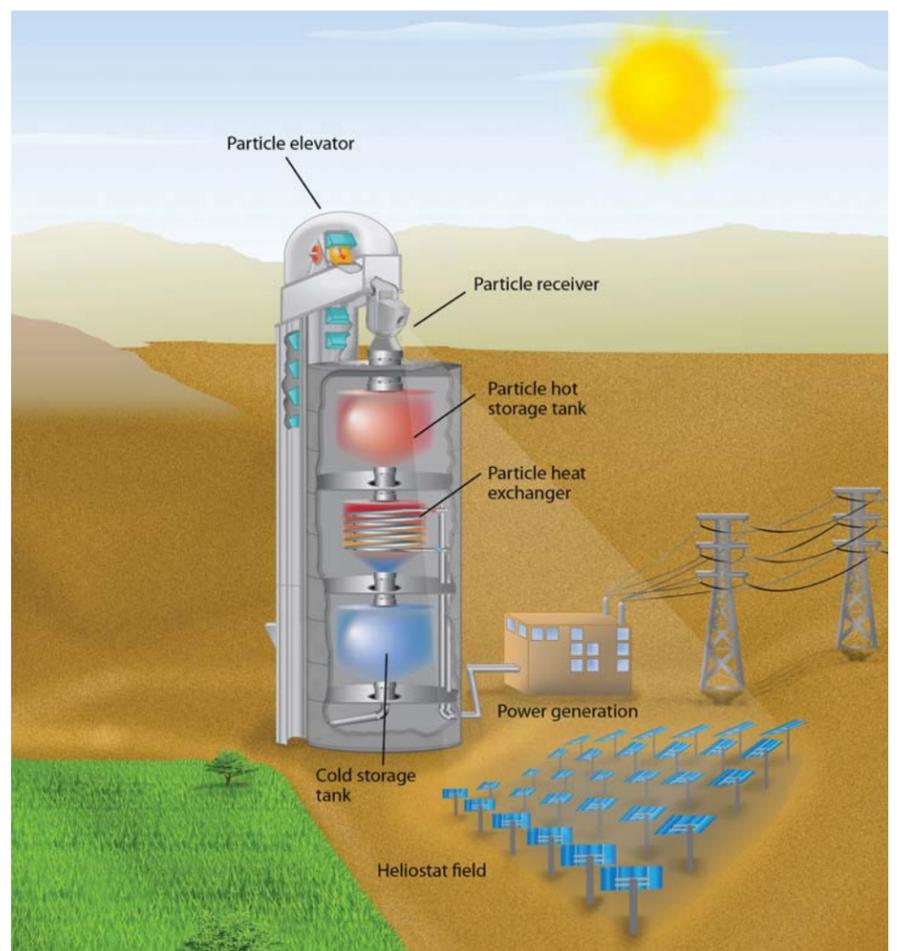
Sandia design engineer Josh Christian (6123) says the on-sun testing at the solar tower will occur in two phases. First, researchers will test an insert designed by Georgia Tech that slows falling particles inside the receiver like a Pachinko board to increase the temperatures of the particles as they fall through.

Later this summer, Sandia engineers will remove the Georgia Tech insert from the receiver and evaluate free-falling curtain configurations.

Weather and other factors will affect the pace of the testing.

"New Mexico is great for this project because our state has pretty consistent solar insolation throughout the year," Josh explained. "However the biggest thing we need to know is how much power is going into the falling particle receiver. So a cloudy or hazy day is a big challenge for us. An ideal day for testing is a clear day with no clouds and no wind."

The tower at Sandia's National Solar Thermal Test Facility stands 200 feet tall and is the only testing facility of its kind in the United States.



THIS DRAWING ILLUSTRATES the high temperature falling particle receiver testing system at Sandia's National Solar Thermal Test Facility. (Image courtesy of Sandia National Laboratories)

Deputy Energy Secretary Elizabeth Sherwood-Randall visits Sandia



MESA TOUR — Deputy Energy Secretary Elizabeth Sherwood-Randall, center, is flanked by dignitaries including Sandia President and Laboratories Director Paul Hommert, right, his successor Jill Hruby, to the left of Sherwood-Randall, and Dave Sandison, far left, Paul's chief of staff. The deputy secretary was touring the Microsystems and Engineering Sciences Applications complex.

(Photo by Randy Montoya)

(Continued from page 1)

nuclear, biological, and cyberthreats.”

Sherwood-Randall spent nearly two days at the Labs being briefed on programs and the transition in leadership from Laboratories President and Director Paul Hommert to Div. 6000 VP Jill Hruby, who will take the Sandia helm when Paul retires July 16.

The deputy secretary said she has a personal connection to New Mexico going back to the early 1980s when she moved to Santa Fe to write a book and later took a short-lived job as editorial page editor of *The New Mexican* newspaper. “From that time, our family has kept a home in Santa Fe,” she said. “It is our beloved retreat.”

She said she has great affection for Sandia and great admiration of its people and work. She said Paul has grown and sustained the Labs as a leading research institution in his five years as director. “The vitality here is in evidence,” she said to Paul. “Your work in nuclear security and robotics and energy and climate — the list goes on and on — is extraordinary. You have had a lifetime of service to our nation, and we thank you for that.”

Sherwood-Randall said she looks forward to working with Jill. “You have such an outstanding record of achievement across so many research areas,” she said. “Energy Secretary [Ernest] Moniz and I welcome you to your new role.”

Sandia a leader in technology innovation

In 2014, Moniz put forward a strategic plan that identified three broad goals: science and energy, nuclear security, and management and performance. Sherwood-Randall said Sandia is important to all three.

“The work you are doing here in science and energy is part of the ongoing DOE research, development, and deployment of innovative technologies,” she said. “The energy sector is one of the strongest in our economy and has positioned us to lead the world.”

She said Sandia has been a leader in technology innovation worldwide for decades and is a key part of

“Starting with fundamental research, going to new discoveries, then piloting those technologies and bringing them to widespread deployment in the marketplace, Sandia has been a leader. In the 1960s, Sandia’s invention of the cleanroom led to modern electronics. Today you are laying the groundwork for quantum computing and advancing US cybersecurity.”

what Moniz calls the DOE innovation chain. “Starting with fundamental research, going to new discoveries, then piloting those technologies and bringing them to widespread deployment in the marketplace, Sandia has been a leader,” she said. “In the 1960s, Sandia’s invention of the cleanroom led to modern electronics. Today you are laying the groundwork for quantum computing and advancing US cybersecurity.”

In nuclear security, Sandia’s work is critical to President Obama’s call to reduce worldwide stockpiles of nuclear weapons and strengthen nonproliferation while ensuring the US maintains a safe, secure, and reliable nuclear deterrent, Sherwood-Randall said. “I want to underscore a point that is sometimes misunderstood,” she said. “As we move to reduce reliance on nuclear weapons in our national strategy, that puts an even greater premium on the safety, security, and reliability of those weapons we retain to defend our nation and allies and partners around the world.”

She said she recently testified before Congress about the need for life extension programs such as the B61 as well as nonproliferation efforts to make the world a safer place. “Global nonproliferation relies on Sandia’s expertise in detection and monitoring technologies,” she said. “The world counts on you and your inventions to detect clandestine activity.”

Regarding the third strategic goal, management and performance, Sherwood-Randall said several recent reports have been critical of DOE. “Our contracting approach needs to help and not hinder the mission,” she said. “There has been a huge amount of analysis done the past couple of years on the way we manage our labs and sites.”

She said Moniz and Under Secretary for Nuclear Security and NNSA Administrator Frank Klotz are pursuing several initiatives to strengthen strategic partnerships and enhance the benefits of the management and operating, or M&O, contracting model. “Of course, in any contracting arrangement the federal government will retain responsibility for adherence to federal laws as well as ultimate responsibility for spending taxpayer dollars,” she said. “We think we are making progress in two key areas: first, by reviewing the overall governance model and looking for ways to be innovative; and, second, examining the NNSA M&O contract incentives and evaluation process. The simple focus is on desired outcomes versus burdensome processes. This is something we will have an opportunity to interact with Jill about in the weeks ahead.”

Making safety a top priority

She said DOE also wants decision-making that is as close to the work as possible and focuses on high-quality mission performance. Corrective actions are being tracked and managed by a joint DOE/NNSA governance and management performance steering committee, she said.

Sherwood-Randall closed by asking Sandians to continue to make safety a top priority and do work that benefits the American people. She quoted researcher Dahlon Chu (5020) as describing an innovation he was developing as the Sandia “secret sauce.”

“The truth is all of you are the secret sauce,” she said. “Thank you for what you do every day to make our nation what it is and enable us to be what we can be in the future.”

68 Sandians move into Distinguished ranks

Sandia's special appointments represent employees from all areas of the Labs' operations. According to Corporate Policy System documentation, placement in the Distinguished level signifies a promotion to the fourth level of the job. This level is populated with a few exceptional employees who have distinguished themselves in their careers while at Sandia. It is different from the other levels in that it is subject to a 10 percent population limit to preserve the distinction of the level.

Divisions are not obligated to fill all their distinguished "slots."

Employees selected for the new levels have been recognized with a special plaque and a nonbase salary award, in addition to this special mention in the *Lab News*.

Also pictured here are individuals appointed to the very select title of senior scientist/engineer or senior administrator, a unique recognition of professional accomplishment.

Photos by Lloyd Wilson and Stephanie Blackwell (New Mexico) and Randy Wong (California)

Senior Scientists/Engineers



 Susan Esfahani 2600 Electronics Engineering	 Tina Nenoff 1100 Materials Science	 Gary Polansky 5400 Systems Engineering	 Patrick Sena 2200 Mechanical Engineering	 Scott Slezak 400 Systems Engineering	 Hy Tran 2500 Mechanical Engineering
---	--	---	--	--	---

 Jeffrey Brewer 411 Systems Engineering	 Laurence Brown 163 Program Development	 Polly Gutierrez 153 Administrative Support	 Frances Martinez 91 Administrative Support
--	--	--	---

**Organizations
90, 100, 400**



Division 1000



 Howard Anderson 1833 Laboratory Support Technologist	 Todd Bauer 1746 Electronics Engineering	 Hongyou Fan 1815 * Promoted to Manager	 Brian Franke 1341 Computer Science	 Kathryn Hanselmann 1932 Technical Business Development	 John Hewson 1532 Mechanical Engineering
--	---	---	--	--	---

 Richard Hills 1544 Mathematics	 John Hofer 1521 Laboratory Support Technologist	 Patrick Lake 1675 Microelectronics/Semiconductor Technologist	 Andrew Landahl 1425 Computer Science	 Anthony Lentine 1765 Optical Engineering	 Ricky McFarland 1755 Test Operations Engineering	 Genaro Montoya 1933 Technical Business Development
--	---	---	---	--	--	--

Division 2000



 Gary Ashcraft 2662 Computer Science	 Leonard Buchholz 2521 Solutions Architect	 Jeffery Cherry 2159 Mechanical Engineering	 Thomas Denman 2242 Electronics Engineering	 Randy Harrison 2137 Systems Engineering
---	--	--	--	---

 Ian Thomas Kohl 2554 Laser/Optical Technologist	 Arlene Lucero 2913 Publications Support	 Adrian Miura 2982 Solutions Architect	 David Van Ornum 2732 Engineering Support Technologist	 Michael Partridge 2627 Electronics Engineering	 Daniel Petersen 2613 Mechanical Engineering	 Jason Podsednik 2244 Engineering Support Technologist
---	---	---	--	--	---	---

Division 2000



Philip Rodacy 2555
Materials Science

Division 3000



Pamela Catanach 3652
Community Relations



Shelby Green 3522
Organizational Development



Neal Singer 3651
Corporate Communications



Steven Showalter 2547
Chemical Engineering



Danelle Tanner 2632
Electrical Engineering



Michael Tritt 2615
Electromechanical Technologist

68 Sandians move into Distinguished ranks

Division 4000



Richard Dramer 4824
Facilities Technologist



Andrew Zeitler 4122
Safety Engineering

Division 5000



James Felix 5645
Cybersecurity



Thomas Loughry 5521
Computer Science

Division 6000



Stanley Atcitty 6111
* Promoted to Manager



Timothy Brown 6625
Mechanical Engineering

Division 8000



Scott Bisson 8128
Physics



Arthur Brown 8259
Mechanical Engineering



Robert Copeland 6122
Laboratory Support Technologist



Abraham Ellis 6112
* Promoted to Manager



Ernest Hardin 6224
Nuclear Engineering



Samuel Leininger 6813
Engineering Support Technologist



Winalee Carter 8511
Classification Technical Reviewer



Michele Kahn 8949
LAN/WAN Support Technologist



Albert Talin 8342
Material Science

Division 9000



Roger Adams 9338
Computer Systems



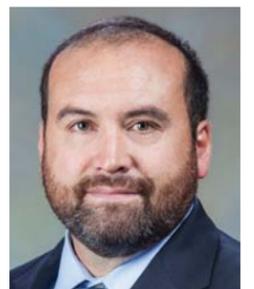
Joseph Brenkosh 9338
Computer Systems



Leland Clise 9542
Solutions Architect



Timothy Meeks 9513
Solutions Architect



Alex Quintana 9317
Cybersecurity

Photos unavailable

Thomas Hafenrichter 5943
Mechanical Engineering

Terrence Kraus 6631
Nuclear Engineering

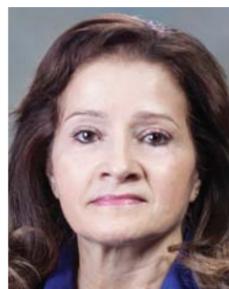
Deborah Espinosa 10223
Performance Assurance Analyst



Nikki Lobato 10665
Business Management Professional



Connie Luera 10675
Administrative Support

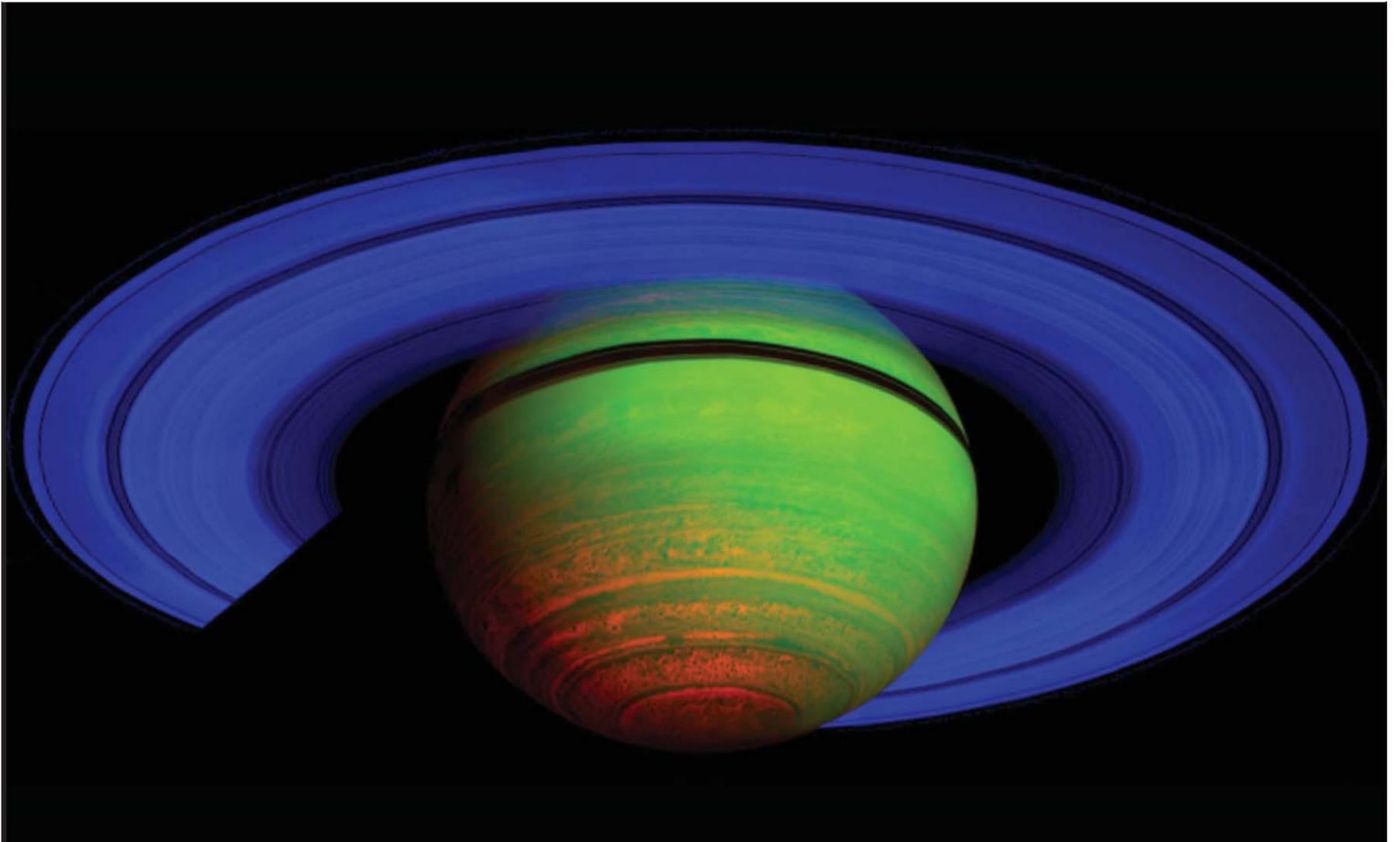


MaryAnn Prieto 10598
Administrative Support

Division 10000



How does Saturn hide its age?



RESULTS FROM SANDIA'S Z MACHINE provide hard data for an 80-year-old theory that could correct mistaken estimates of the planet Saturn's age. In this false-color image made from data taken in 2008 by *Cassini's* visual and infrared mapping spectrometer, heat emitted from the interior of Saturn shows up as red. (Image credit: NASA/JPL/ASI/University of Arizona)

Sandia's Z machine helps solve Saturn's 2-billion-year age problem

Research supports 80-year-old prediction regarding molecular hydrogen under pressure

By Neal Singer

Planets tend to cool as they get older, but Saturn is hotter than astrophysicists say it should be without some additional energy source.

The unexplained heat has caused a 2-billion-year discrepancy for computer models estimating Saturn's age. "Models that correctly predict Jupiter to be 4.5 billion years old find Saturn to be only 2.5 billion years old," says Thomas Mattsson, high-energy-density physics theory group manager (1641).

Experiments at Sandia's Z machine may have helped solve that problem when they verified a formerly untested 80-year-old proposition that molecular hydrogen, normally an insulator, becomes metallic if squeezed by enough pressure. Physicists Eugene Wigner and Hilliard Huntington predicted in 1935 that a pressured lattice of hydrogen molecules would break up into individual hydrogen atoms, releasing free-floating electrons that could carry a current.

"That long-ago prediction would explain Saturn's temperature because when hydrogen metallizes and mixes with helium in a dense liquid, it can release helium rain," says Mike Desjarlais (1600). Helium rain is an energy source that can alter the evolution of a planet.

"Essentially, helium rain would keep Saturn warmer than calculations of planetary age alone would predict," says Marcus Knudson (1646). Marcus and Mike are the lead authors of a June 26 *Science* article, "Direct observation of an abrupt insulator-to-metal transition in dense liquid deuterium."

This proposed density-driven hydrogen transition

had never been observed experimentally until Sandia's recent experiments.

The tests ran on Sandia's Z machine, the world's most powerful pulsed-power machine, which sends a huge but precisely tuned sub-microsecond pulse of electricity at a target. The correspondingly strong magnetic field surrounding the pulse was used to shocklessly squeeze deuterium — a heavier variant of hydrogen — at relatively low temperatures. Previous experiments elsewhere used gas guns to shock the gas. This increased its pressure but at the same time raised its temperature beyond the range of interest for the density-driven phase transition.

A transition at 3 megabars of pressure

"We started at 20 degrees Kelvin, where hydrogen is a liquid, and sent a few-hundred kilobar shock — a tiny flyer plate pushed by Z's magnetic field into the hydrogen — to warm the liquid," says Marcus. "Then we used Z's magnetic field to further compress the hydrogen shocklessly, which kept it right above the liquid-solid line at about 1,000 degrees K."

Says Mike, "When the liquid was compressed to over 12 times its starting density, we saw the signs that it became atomic rather than molecular. The transition, at 3 megabars of pressure, gives theorists a solid figure to use in their calculations and helps identify the best theoretical framework for modeling these extreme conditions."

The results need to be plugged into astrophysical models to see whether the now-confirmed transition to atomic hydrogen significantly decreases the age gap between the two huge planets.

"The Sandia work shows that dense hydrogen can be metallic, which in turn changes the coexistence of hydrogen and helium in the planet," says Thomas. "The mechanism of helium rain that has been proposed is therefore very plausible, given our results, but

the scientific discussion will continue over the next few years in establishing a new consensus."

Interestingly, the determination that a metallic phase was reached was made optically. "There's too much electrical noise in Z to make an electrical test, though we plan to directly measure current down the road," Marcus says.

Optical tests rely on the transition from zero reflectivity (insulators) to the reflectivity achieved by metals.

"The only way you get reflectivity is when a material is metallic," Marcus says. Reflectivity was tested across the visible spectrum because the experiment itself produced light. "We collected it, put it through a spectrometer to disperse it, and passed it into a camera to observe it."

When the hydrogen insulator reached enough pressure to become metallized, the researchers observed 45 percent reflectivity, an excellent agreement with theoretical calculations, says Mike.

"This is a very nice merging of theory and experiment," he says. "We threw all our computational tools — which are significant — at providing verification and interpretation of the complex experimental observations at Z."

The work was done in collaboration with professor Ronald Redmer's research group at University of Rostock in Germany and is a part of the Z Fundamental Science Program at Sandia. The multidisciplinary team included researchers with expertise in innovative experimental design, diagnostics, and pulse-shaping capabilities, matched with theoretical analysis using methods based on quantum mechanics.

Other authors besides Marcus, Mike, and Thomas include Redmer and Andreas Becker at University of Rostock, Ray Lemke and Kyle Cochrane (both 1641), Mark Savage (1651), and Dave Bliss (1675).

The Z machine is a National High Energy Density Science Facility supported by the NNSA.

New NNSA Sandia Field Office Manager Jeff Harrell emphasizes shared mission

By Bill Murphy

Jeff Harrell is clear about the priorities that will drive his leadership as the new manager of NNSA's Sandia Field Office.

"Priority one is what we've had for a long time: to make sure we put national security at the forefront of everything we do," Harrell says. "That is our core mission and it's incredibly important for our nation—especially right now."

Harrell, who since 2009 had served as assistant deputy administrator for NNSA's Office of Secure Transportation, assumed his role as SFO manager in April.

Related to keeping the focus on the national security mission, Harrell adds, "We are here to accept the work we're given and make sure we get it done and get it done right. And when I say 'we' I mean Sandia and the Field Office."

Harrell notes that he stepped into a position in which the relationship between Sandia and the Field Office was already "on a good footing." He says he wants to ensure that the "very positive" relationship continues to mature. "We want to build on that," he says.

A graduate of the US Air Force Academy, Harrell served in the USAF for 25 years, logging 3,300 flying hours, including more than 100 combat hours in the F-16. Serving in roles of increasingly leadership responsibility in the Air Force, Harrell's last assignment before retiring was as vice commander of the 27th Fighter Wing, Cannon Air Force Base, New Mexico.

After leaving the Air Force in 2006, he continued to work for the federal government, joining the Senior Executive Service and heading up DOE's National Training Center in Albuquerque.

Getting the right talent

In addition to the intrinsic challenges of executing a complex portfolio of national security work, Harrell says Sandia — and the Sandia Field Office — face a couple of notable longer-term challenges.

"If you look at the most important thing that we possess, and the most important consideration for the future, it's, first, the right people," he says. "To accomplish our mission, it's essential that we have the right skill set, the right talent. That's especially true in skilled technical positions, where the competition with outside industry is incredibly intense."

"The other piece is the infrastructure: We have buildings all across the NNSA — and not just here at Sandia — that are very old. We have facilities that are old; we have equipment that is old. We need to make sure that we keep that modernized."

"We have a couple of projects that [Sandia Executive VP for National Security Programs] Steve Rottler and I have talked about recently — specifically about the



"I really didn't realize the breadth of the work that's done here. When I look at the organizational chart for the Field Office and I see where our SMEs — our subject matter experts — are, it's not just in weapons work. It's in all kinds of things. So whether it's environmental protection, safety, security, whether it's the programs and projects the Labs is working on, it's just incredibly broad."

— NNSA Sandia Field Office Manager Jeff Harrell

need to update Sandia's microfabrication capability. We need to make sure Sandia stays at the forefront of that technology, because resources outside of Sandia may no longer be there in the future. So, as I see it, the biggest challenges right now are infrastructure and people."

Harrell emphasizes that infrastructure is about more than buildings, roads, and equipment. "The cyber infrastructure, cyber software, is going to be critical," he says. "That's been in the news a lot lately and it's a very serious concern for us. Cybersecurity is one of the things we're watching very closely."

When Harrell became head of the Sandia Field Office, he was already familiar with Sandia, particularly its weapons work. But he still found some things



NNSA SANDIA FIELD OFFICE Manager Jeff Harrell, right, who has been on the job since April, confers with Tom Zipperian, director of Neutron Generator Enterprise Center 2700, about Sandia's neutron generator-related work. (Photo by Randy Montoya)

"Our job is to see the success of the Labs and we're successful in the Field Office when Sandia is successful. I really do believe it's a partner relationship. In the Field Office, we have responsibilities to ensure that things are done right, are done in a safe and secure manner, that we're doing everything legally, but right along with that we want to make sure that we're helping you get the work done, that we provide assistance when needed. It's working hand in hand, it really is."

— Jeff Harrell, NNSA Sandia Field Officer Manager

that surprised him.

Scope of Sandia's work is impressive

"I really didn't realize the breadth of the work that's done here," he says. "When I look at the organizational chart for the Field Office and I see where our SMEs — our subject matter experts — are, it's not just in weapons work. It's in all kinds of things. So whether it's environmental protection, safety, security, whether it's

ensuring that the work performed by the Laboratories is aligned with the terms of the contract as published.

"If I had to define the mission of the Field Office, that's it, but there's really more to it. The important thing is that we work together for the national interest. I am going to use a phrase that's probably been used by every field office manager out there: Our job is to see the success of the Labs and we're successful in the Field Office when Sandia is successful. I really do believe it's a partner relationship. In the Field Office, we have responsibilities to ensure that things are done right, are done in a safe and secure manner, that we're doing everything legally, but right along with that we want to make sure that we're helping you get the work done, that we provide assistance when needed. It's working hand in hand, it really is."

Harrell leads a staff of 83 NNSA/SFO federal personnel to oversee a laboratory that employs more than 10,000 people. That lean team, Harrell says, "is an indication of Sandia's demonstrated ability to manage itself, which is reflected in the number of people we need to oversee the laboratory. If there were greater issues and concerns [with Sandia's self-management and assurance systems] we'd need more presence and more involvement. The fact that we don't say a lot about Sandia's leadership."

An issue that will assume increased visibility over the next year and a half or so is DOE/NNSA's plan to rebid the management and operation contract for Sandia Corp., a contract held by Lockheed Martin Corp. since 1993. Harrell says he doesn't think the rebid process will prove to be a significant distraction for Sandia.

"The Labs and the Sandia Field Office both know that the focus needs to be on the mission at hand," he says. "So as long as we stay focused on getting the mission done — providing service to the nation — there shouldn't be any special concerns. This is a process that NNSA goes through periodically. I really don't see anything that's going to change the strong relationship between NNSA and Sandia Corporation."

the programs and projects the Labs is working on, it's just incredibly broad.

"The other thing that has impressed me has been the close relationship between Sandia's leadership and the Field Office. I didn't know what to expect, but the tie-in, especially at the vice president level, and the cooperation between that level and above and the Field Office, has made a great impression."

The relationship between the Labs and the Sandia Field Office is synergistic, Harrell says, noting that the Field Office's responsibility to administer the terms of the management and operations contract between Sandia Corp. and DOE/NNSA includes such routine but important functions as ensuring the bills are paid, but also

Mileposts

New Mexico photos by
Michelle Fleming
California photos by
Randy Wong



Scott Anderson
35 2221



Jeana Brosseau
35 11000



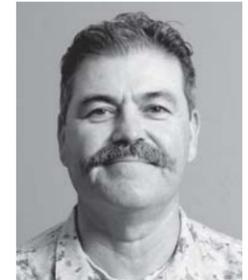
Cathy Farnum
35 6231



Fran Nimick
35 1010



Graham Yelton
35 1728



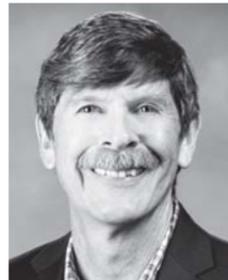
Lawrence Armijo
30 4237



Cynthia Caton
30 9343



Dennis Lierz
30 5358



Mike Partridge
30 2627



Dana Striker
30 9343



Bill Tedeschi
30 5900



John Torczynski
30 1513



Barbara Jennings
25 6924



Mark Johnson
25 1118



Emily Lujan
25 10614



Terri Macias-Torres
25 4824



Rebecca (Becky) Martinez
25 10501



Douglas Nordquist
25 10620



John Parmeter
25 6633



Kent Robbins
25 4122



Kevin Seager
25 5944



Melissa Sisneros
25 2955



Alan Wright
25 1131



R. Sheryl Vahle
25 10656



Ed Brady
20 5339



Timothy Berg
20 8940



John Burns
20 5544



Rich Field
20 1523



Cecily Glissman
20 153



Mark Grazier
20 1831



Matt Hankins
20 2723



Marcey Hoover
20 8040



Chuck Rhykerd
20 2555



Lisa Trainor
20 90

Recent Retirees



Michael Vahle
37 9000



James Walker
37 421



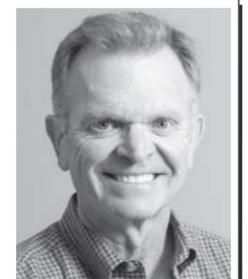
Jerry McDowell
34 250



Rick White
31 422



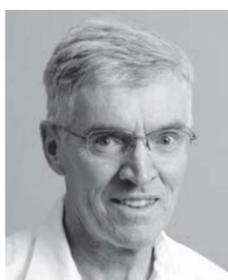
Guylaine Pollock
29 5621



Steve Parker
27 11011



Elaine Herrera
20 10221



James Stevens
20 1747



Terry Hinnerichs
17 1554



Dave Arpin
10 5556



Gracie Martinez
15 10657



Joniva Mondragon
10 5945



Sandia Classified Ads Sandia Classified Ads Sandia Classified Ads Sandia Classified Ads

MISCELLANEOUS

BURIAL SITES, 2, Devotion Garden at Sandia Memory Gardens, block 3, lot 61-B, spaces 2 & 3, \$2,500/both. Tobyas, 877-0354 or 944-5422.

PORTABLE HAMMOCK, w/steel frame & carrying bag, opens & closes quickly, weight capacity 250-lbs., \$60. Kaplan, 298-7953.

SCUBA GEAR, 2 full sets, tanks/suits/respirators/weights etc., valued >\$5,000, asking \$2,500. Williams, 379-8994, leave message.

3/4-TON PICKUP BED TRAILER, long, wide, w/camper shell, 16-in. tires, \$150. Fleming, 869-9165.

FILM PROJECTOR, 8 mm, Keystone 98Z, has take-up reel, looks new. Pfeiffer, 505-299-3951.

TRAMPOLINE, large oval, Rainbow brand, w/net, excellent condition, call for photos, \$400. Martinez, 505-792-3608.

YARD SALE, July 11-12, 11505 Bar Harbor NE, downsizing, small appliances, linens, collectibles, fabric, crafts, Christmas décor. Morris, 298-3349.

PRINTER, HP OfficeJet 2620, brand new, box never opened, purchased for school, did not use, \$60. Colgan, 344-3776.

SLEEPING BAG, North Face, down, used once, \$75. Stubblefield, 263-3468.

BABY BOY CLOTHING, 3-12 mos., sleeper/rocker, Colorplay Super-yard, ball mobile for crib, excellent condition. Valdez, 702-6767.

LOVESEAT, Potterybarn, cream color, <1 yr. old, originally \$1,200, asking \$600. Martinez, 274-2787.

'53 WILLY'S M38 A-1 GENERATOR, 24-volt, rare, various parts; new air brush compressor, call for prices. Romero, 505-917-7066, ask for Rupert.

RIDING PANTS, First Gear, leather, 32 x 32, new condition, \$25. McDonald, 554-2048.

DESKTOP PC, w/dual 22-in. monitors, Windows 7 Pro, 330 GB HD, 4 GB RAM, 256 MB graphics, mouse, keyboard, 2.1 speakers, \$325. Cocain, 281-2282.

TABLE SAW, 10-in., 3-hp, 220 vac motor, model TSC-10HK, \$400; bar stools, 4, black leather/chrome, \$40 ea. Bobbe, 505-350-9544.

REFRIGERATOR, 4.5-cu. ft., Haier, \$85; Tappan chest freezer, 22" x 16-1/2" x 28-1/2", \$150. Harger, 238-7879.

GAS RANGE/OVEN, over-the-range microwave, \$150 ea. or \$275/set. Wagner, 505-690-2028.

TRANSFER CHAIR, \$30; old-style floor lamp, \$5; Dirt Devil vacuum cleaner, \$15. Marchi, 265-6211.

SOFA, La-Z-Boy recliner, medium brown leather, excellent condition, \$600; water skis, men's, O'Brien Celebrity, 67-in., used once, \$150. Drebing, 293-3335.

TRANSPORTATION

'06 LEXUS IS350, fully loaded, only 39K miles, great condition, \$19,750. Guncel, 271-1826.

'08 DODGE GRAND CARAVAN SXT, 110K miles, well maintained, daily driver, \$8,200. Neidig, 822-0203.

'90 MIATA, 5-spd., AC, new tires, timing belt, water pump & clutch slave cylinder, 155K miles, \$3,500 OBO. Williams, 505-836-2117.

'05 TOYOTA COROLLA LE, AT, gray, beige interior, 114.6K miles, runs great, \$5,000. Parker, 505-362-0966.

'02 MUSTANG, V6, 5-spd., upgraded stereo, good tires, battery, 133K miles, very good condition, \$3,600 OBO. Mancini, 505-639-3871.

'73 DODGE DART, replaced V6 engine, 54K miles, runs great, good body/interior, could be fully restored, \$6,500 OBO. Begay, 259-7219.

How to submit classified ads
DEADLINE: Friday noon before week of publication unless changed by holiday. Submit by one of these methods:
 • **EMAIL: Michelle Fleming** (classads@sandia.gov)
 • **FAX: 844-0645**
 • **MAIL: MS 1468 (Dept. 3651)**
 • **INTERNAL WEB: On internal web homepage, click on News Center, then on Lab News link, and then on the very top of Lab News homepage "Submit a Classified Ad." If you have questions, call Michelle at 844-4902. Because of space constraints, ads will be printed on a first-come basis.**

Ad rules

1. Limit 18 words, including last name and home phone (If you include a web or e-mail address, it will count as two or three words, depending on length of the address.)
2. Include organization and full name with the ad submission.
3. Submit ad in writing. No phone-ins.
4. Type or print ad legibly; use accepted abbreviations.
5. One ad per issue.
6. We will not run the same ad more than twice.
7. No "for rent" ads except for employees on temporary assignment.
8. No commercial ads.
9. For active Sandia members of the workforce, retired Sandians, and DOE employees.
10. Housing listed for sale is available without regard to race, creed, color, or national origin.
11. Work Wanted ads limited to student-aged children of employees.
12. We reserve the right not to publish any ad that may be considered offensive or in bad taste.

'12 MAZDA 3, AT, sea green, black interior, 40K miles, great condition, \$12,500. Feeney, 573-8350.

'08 HONDA ACCORD EXL, mystic green, new timing belt & rear brakes, garaged, 106K miles, \$11,800. Wayne, 505-263-1999.

'11 FORD ESCAPE XLT, 2.5L, 4-cyl., loaded, moon roof, 45K miles, \$13,500. Kreiting, 293-1416.

RECREATION

'05 SUZUKI 650 VSTROM, 6,870 miles, w/cover & few other accessories, \$3,000 OBO. Baros, 850-3227.

VINTAGE BICYCLE, early 60s, Schwinn Racer, all original, 3-spd., immaculate condition, \$325 OBO. Hanks, 249-1931, call or text.

WALKER BAY SAILING DINGHY, 8-ft., full sail kit, oars, excellent condition, \$1,700 new, asking \$1,200 OBO. Kercheval, 505-266-5833.

'09 POLARIS 500 HO, 4-wheeler, AT, 4WD, new w/cover, \$5,000 OBO. Green, 803-7228.

'09 HONDA VTX 1300R, silver, garage kept, 16K miles, excellent condition, \$6,200 OBO. Herrera, 505-382-9670.

'98 TRAVEL TRAILER, Alumascap, 28-ft., sleeps 6, new awning, heater, refrigerator, 6,700-lbs. dry, \$7,000 OBO. Ahrens, 294-8986.

SAILBOAT, Apollo, 16-ft., sloop-rigged, roller-furling jib, kick-up centerboard, trailer, \$900. Novotny, 505-296-7167.

REAL ESTATE

3-BDR. HOME, 3 baths, 1,200-sq. ft., 4954 Nickel Drive, Zillow, Craigslist, Rio Rancho, \$129,900, \$125,900 w/o realtor. Ramos, 972-951-0290.

4-BDR. HOME, 2 baths, ~1,640-sq. ft., newly remodeled, 11636 Cooper, 2.8 miles to Eubank gate, MLS#842042. \$175,000. Vaitkus, 803-5429.

4-BDR. HOME, 3 baths, 2,500-sq. ft., 2-car garage, carport, in-ground pool, foothills, near SNL, MLS#839341, \$315,000. Tomlinson, 505-298-1632.

6-BDR. HOME, 3 baths, 3,000-sq. ft., on 3 irrigated acres, wood stove, sun room, beautiful kitchen, FSBO, \$274,000. Farnsworth, 865-6160.

4/5-BDR. HOME, 3,100 +-sq. ft., w/workshop, completely remodeled, central air, 1/3 acre, beautiful backyard, in-ground heated pool, \$379,000. Fitzpatrick, 505-269-0069.

SHARE 1,500+ ACRES, Northern NM mountain land holding corp seeks new owners, hunting, fishing, >10-to-1 leverage, www.blokbranch.com, \$125,000. Smith, 238-0502.

3-BDR. HOME, 1,720-sq. ft., 1.25 acres, built in '05, young fruit trees, Edgewood, MLS#836882, \$193,000. McCord, 505-252-2248.

3-BDR. HOME, 2 baths, 1,850-sq. ft., updated home w/granite, stainless appliances, wood floors, 11609 Oconee, \$220,000. Hughes, 806-676-3584.

3-BDR. HOME, 2 baths, 1,770-sq. ft., on 2.3 acres, 12 Nexus, Tijeras, MLS#843870, \$189,000. Labrum, 681-8969.

WANTED

HOST FAMILY, urgently needed for high school exchange students, make a difference in the world. Follingstad, 823-4750.

SINGERS, for women's 4-part barber-shop harmony chorus, meets Tuesdays, 6:30-9 p.m., Hope Church, 4710 Juan Tabo NE. Parma, 296-7959.

RIVER ROCKS, for landscape, will pick up. Begay, 505-301-8943, text Denise.

ELLIPTICAL, high-end, or cross-trainer, stationary exercise machine, good shape. Rivers, 505-720-4701.



Animal planet

(Continued from page 12)

infectious diseases. The country has challenges including rampant rabies, brucellosis, and anthrax.

Sandia's strategy in Afghanistan is to piece small projects into a large, comprehensive program. "We started with fundamental work in laboratory biorisk management. We then looked at naturally occurring outbreaks as repositories for biological materials," says Melissa, whose field experience contributed to the development of Sandia's portable laboratory platforms Syndromic SpinDx and BaDx.

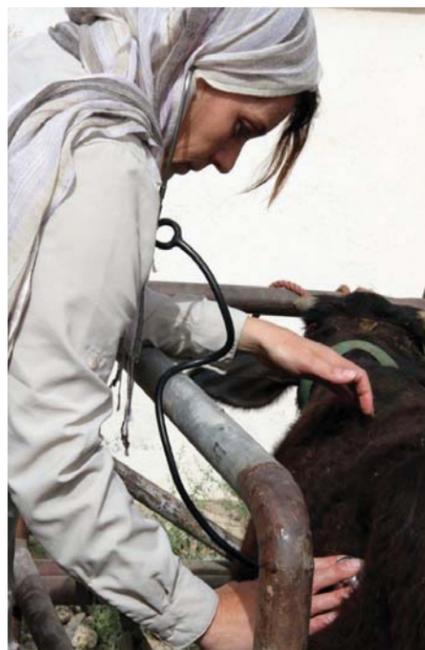
Sandia has hired two other veterinarians: Van Brass and Carrie McNeil (both 6825) who work in Mali and Southeast Asia, among other places.

Some scary moments

Melissa, who had to conquer a serious fear of flying to do her job, has had a few scary moments in the field. "You have to be a little scared or you're not aware," she says.

She recalls rickety helicopter rides over Afghan mountains and military escorts into danger zones. "I got used to it, how body armor fits, how to wear a helmet," she says. "I know the do's and don'ts."

But she says she wouldn't trade her Sandia work for anything else the veterinary world has to offer. "I never dreamed I would have a job like this," she says. "It's been exciting for me as a veterinarian and as a person who works in global security. I've watched areas like Afghanistan and Iraq transition from war to sovereignty. It's part of history."



A GLOBAL MISSION – Melissa Finley has made 21 trips to Afghanistan as part of Sandia's International Biological and Chemical Threat Reduction organization, working closely with the country's veterinary services on biosafety and biosecurity. In these photos, Melissa, an accomplished veterinarian, arrives by helicopter at a rural location and treats a local herd of cattle. (Photos courtesy of Melissa Finley)



Animal planet

By Nancy Salem

Melissa Finley's credibility was on the line as she worked, surrounded by skeptics, to save the life of a dehydrated calf in rural Afghanistan. As a woman and foreigner she had to earn the trust of the villagers she was trying to help.

"They had never given fluids before, so I sent them to the market to get dextrose solution, a baby bottle, catheter, and antibiotics. I had to reassure them I wasn't going to kill the calf, that they could trust me," she says. "When the calf started to come around I had instantaneous respect."



MELISSA FINLEY

Melissa (6825) has been working in Afghanistan since 2009 as a member of Sandia's International Biological and Chemical Threat Reduction organization (IBCTR). A seasoned veterinarian, she travels throughout the country teaching safe laboratory practices, providing continuing veterinary education to reduce the spread of infectious disease, and collaborating with the government's animal health agencies.

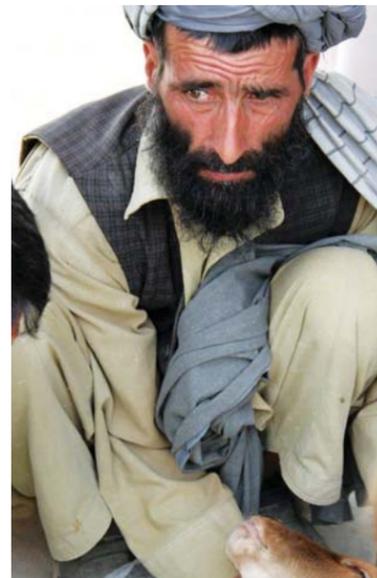
Sandia's hiring of a vet was outside the box. "It was off-the-charts nontraditional from what I was told," Melissa says. But there is a tie between infectious diseases of animals, public health, and bioterrorism. Veterinarians play an important role by encouraging and helping governments implement animal-health policies.

Veterinary medicine is linked to biological threat reduction because about 75 percent of the agents that can be used as biological weapons are animal in origin. Melissa and her Sandia colleagues establish biorisk management practices at laboratories worldwide and improve the ability of veterinary and public health workers to reduce the potential for criminal acquisition of biological agents such as *Bacillus anthracis*, *Brucella sp.*, and foot and mouth disease virus.

"The most likely repository for biological material is a laboratory. What happens when you secure all of the



A veterinarian at a national lab might sound odd, but Sandia's Melissa Finley helps make the world safer through livestock health and biosecurity



SAVING A LIFE – In the photos above and below left, Sandia veterinarian Melissa Finley works to revive a critically dehydrated calf as worried Afghan villagers look on. After Melissa administered fluids, the calf came around and rode home on the back of a motorcycle, below right. (Photos courtesy of Melissa Finley)

laboratories? You are forced to think more broadly about biorisk management and reducing the biological threat," Melissa says.

Another possible reservoir of biological material exists in naturally occurring infectious disease outbreaks. "If you target animal populations and help countries prevent and control infectious diseases then there is less available in the environment for acquisition and fewer positive samples to be sent to laboratories for analysis," she says. "I like to think we help developing nations bridge the gap between biosecurity and veterinary medicine."

An early love of horses

Melissa is an Albuquerque native who grew up around animals. "We had dogs and my grandfather had a small farm with chickens, pigs, and a cow or two," she says. "When I turned nine I pleaded with my parents to get me a horse."

They did, and in high school Melissa decided she



wanted to be a vet. She did a three-year pre-veterinary program at New Mexico State University then went to Colorado State University where in four years she earned a Doctor of Veterinary Medicine, or DVM.

Melissa wanted to focus on horses and landed a yearlong internship in private practice at the exclusive Alamo Pintado Equine Medical Center in Los Olivos, California. She worked on horses belonging to the renowned thoroughbred trainer D. Wayne Lukas, singers Jackson Browne and Wayne Newton, and rapper MC Hammer. She played with Michael Jackson's monkeys and went to Ronald Reagan's ranch. "It was very cool," she says.

Her next stop was Cornell University in Ithaca, New York, where she did a two-year residency in large-animal internal medicine. "I was told the caseload was primarily horses, but when I got there it was dairy cattle," she says. "I came to really appreciate bovine medicine. It was a whole new area of interest for me."

After a brief stint in private practice that ended

when she found herself wrestling a pig in mud while his buddies piled on, Melissa joined the University of California, Davis as a post-graduate researcher studying the impact of *Neospora caninum*, a protozoa, on bovine abortions. "It was an important project because *N. caninum* is one of the leading causes of abortion in cattle. It was my introduction into using animals for laboratory purposes," she says. "But it was tough because I got attached to all of the cattle, even the one that kicked me more than once."

Melissa moved on to Kansas State University as an assistant professor in clinical sciences in the College of Veterinary Medicine. Two years later she became a graduate student and teaching assistant in the college's Department of Anatomy and Physiology. She taught sophomore, junior, and senior veterinary students internal medicine and pharmacology, and pursued her PhD investigating the molecular basis of repolarization of the equine cardiac action potential.

"I enjoyed working with animals but also found the research component interesting," she says. "My research career started there."

Melissa's postdoctoral fellowship was at the Salk Institute for Biological Studies in La Jolla, California, where she continued to study repolarizing potassium channels, this time the structure and function of those that maintain resting membrane potential of heart and brain cells. "I was shaping my career to balance clinical relevance and research," she says. "I wanted to bridge fundamental science and clinical practice."

Mother was right

On a visit home to Albuquerque, Melissa's mom suggested she look into jobs at Sandia. "I told her there weren't any positions at Sandia for a veterinarian with a graduate degree in cellular physiology. It is an engineering laboratory," she says. "I decided to look anyway and show her."

But there was one. Sandia was looking for someone with a biosciences background to work in global security and biological weapons nonproliferation. Melissa was hired in 2005. "Biological threat reduction was the main goal, but the focus was on fundamental biosafety and biosecurity," she says.

Melissa has traveled to about two dozen countries but spent most of her time in Afghanistan and Iraq. She focused on Afghanistan because she could work closely with its veterinary services and support IBCTR's mission there. She has made 21 trips to the country.

Melissa developed a comprehensive training course to enhance veterinarians' ability to detect and control

(Continued on page 11)