Drilling for answers

Sandia pioneers nuclear waste disposal techniques

By Stephanie Hobby

This month, amid growing concerns over what to do about the nation’s high-level nuclear waste, Nature highlighted a promising concept being developed by Sandia, and the idea could soon become a reality. Early indications are that the DOE Office of Nuclear Energy’s proposed budget request for FY15 might include $3 million to start a deep borehole disposal demonstration project.

Sandia’s deep borehole disposal design is relatively straightforward: Using existing oil and gas drilling technology, drill a hole 17 inches wide and five kilometers deep in crystalline basement rock, line it with steel, and lower canisters of waste down into a stack two kilometers high. Finally, seal the top three kilometers of the hole with concrete and other materials. Each borehole could store about 400 canisters of waste and all that would be left at the surface is a mound of concrete.

Every year, US nuclear power plants generate roughly 2,000 tons of high-level nuclear waste, and the federal government is obligated by law to find workable storage and disposal solutions. “Right now, that waste is sitting in temporary storage, but Sandia researchers estimate the current and projected inventory of spent commercial fuel from the existing reactor fleet in the US could be stored in fewer than 800 boreholes, and more storage could quickly be drilled as new waste is generated.”

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“Unlike a single mined repository that serves the entire US, boreholes are modular, so you could start...
That's that

Talk about the iron chef! IBM, the brains behind Watson, the supercomputer that defeated the world's greatest Jeopardy champions a couple of years back, is tweaking its powerhouse cognitive computing system in an unlikely arena: the kitchen.

For its "Cognitive Cooking" project, IBM, working with four prominent chefs, created a playbook for bigger, better, "smart" cooking — collecting thousands of recipes and ingredient combinations from cuisines around the world.

Steve Abrams, director of Watson Life at IBM, says, "From reading that cookbook and then trying out the results, we got a lot of different ingredients that are often used in different cuisines, and the ingredients that are often paired together." Watson "tastes" look at the ingredients and acts on them at the direction of the chef, resulting in some "interesting" dishes — a Belgian Bacon Fudding, for example, and an Austrian Chocolate Burrito with lean ground beef and two ounces of dark chocolate.

Hey, Watson, here's an idea from a people perspective: Pop about skipping the "Belgian" and the "pudding" parts and just serving up the Bacon! Or holding the "ground beef" and "Austrian" portions of the so-called "burrito" and simply dish up a double dose of chocolate! Watson may be smarter than a Fudding, but he/she clearly still has a lot to learn.

This is all interesting stuff, right in line with an item I wrote last time about computers surpassing us by the year 2019. The trends definitely seem to favor the silicon set. But regarding the cognitive cooking project itself, I say, pshaw. My clear still has a lot to learn.

* * *

Lab News Reader Service

The Sandia Lab News is distributed in-house to all Sandia employees and on-site contractors and to all Sandia retirees. It is also mailed to all Sandia retirees. It is also mailed to Sandia employees and on-site contractors and is on the external web at www-irn.sandia.gov/newscenter/interactive.

BRIG. GEN. John C. Flourny Jr. (center left), 4th Air Force com-

mander, presents a US flag to Heather Egtervanwissekerke, in the back, and Michelle Clark of Sandia's Military Support Committee (MSC). The flag, which was flown over Afghanistan on a 10 Air Force 

Globe Master III, was presented in appreciation of Sandia employees' support to the Air Force Reserve squadron during a recent deployment.

(Photograph courtesy U.S. Air Force / Lt. Col. Robert Coste-Baker)

Michele and Heather spearhead the Basket Brigade; an annual event organized by MSC. The Basket Brigade delivers turkeys, potatoes, canned goods, and other necessities to struggling service members and their families at Travis AFB during the holiday season. The com-

mittee expanded its reach this past year, collecting and delivering about 80 baskets of goods to Travis AFB, the 143rd Field Artillery Regiment in Walnut Creek, Calif., and the Camp Parks Reserve Forces Training Area in Dublin, Calif.

The Basket Brigade's efforts are patterned after the Tri-Valley Basket Brigade, a Thanksgiving food drive that delivers food and clothing items to families in need throughout the region. Reese Ramos (30) and his wife, Katherine Haven, are the founders and organiz-

ers of the Tri-Valley Basket Brigade.

Lending a hand to the military community

MSC encourages all employees to create and foster a military-friendly community and culture that supports Sandia's mission. The group supports veterans, active military personnel, guardsmen, and reserves, along with Sandia's own non-military employees who have deployed family members.

"Many families in the military community struggle economically, especially when the enlisted member is deployed and away for long periods," says Michele, a for-

mer Critical Care Air Transport Team (CATT) respira-
tory therapist who once served at Travis AFB in the 149th Air

A long-time supporter of the United Way of Alameda County, Michele volunteers at the Food Bank and is the chair of the MSC.

The award ceremony took place on March 8, with Michele Fleming (Ads, Milepost photos, 844-4902), Media Relations and Communications Team leader, and Heather Egtervanwissekerke (8511) have been awarded a special commendation in recognition of their efforts through Sandia/California's Military Support Committee (MSC) to assist enlisted families in need at Travis Air Force Base (AFB). Michele is the chair of the MSC.

The MSC at Sandia's New Mexico site sponsors a vari-

ety of activities to engage veterans inside and outside Sandia. "Our main mission is to promote a culture of being military-friendly to enhance the appreciation of our veterans on staff, potential new hires, and veterans in general," says Jody Thomas (2995), a member of the MSC at Sandia's New Mexico site.

"How valuable veterans are to the Sandia workforce."
**Labs’ human subject studies work having impact on airport security**

*By Mike Janes*

When people think about Sandia’s impact on homeland security, they probably think about tools and technologies such as explosive detection devices, chemical and biological countermeasures, border security, and nuclear and radiological detection systems. But, quietly, Sandia has developed a capability in human subject studies that is turning into a game-changer, too.

That’s right: human subject studies. That line of work, says Ann Speed (1463), includes disciplines such as psychology and cognitive and neuroscientific research that might seem foreign to the Labs’ engineering-rich research environment. “Sometimes, we Sandians seem to want to engineer problems. Sometimes we’re more interested in the human,” says Ann, who earned her PhD in cognitive psychology from Louisiana State University. “But more and more around the Labs, programs are starting to realize that the human element can be just as important as the hardware, software, or engineering.”

**TSA projects focus on supervisor pressures, image resolution**

Ann’s Sandia work has largely been funded since 2009 by the Department of Homeland Security’s Transportation Security Administration (TSA). “The bread and butter of human subject studies is the TSA,” Ann says. “They’ve funded us a fair amount of time and money.”

Ann’s work is a subset of mitigations that improve the standard lane, and vice versa? says Ann. “We’re capturing the countermeasures, border security, and nuclear and radiological detection at the X-ray station? Does it improve accuracy? Does it contribute to fatigue or other factors? Another project aims to understand the attributes TSOs bring to the table prior to training that may influence their ability to perform duties other than the X-ray interrogation of bags.”

TSA-funded efforts, including one recent project that explores how long TSOs can look at scanned images before their performance starts to degrade due to fatigue or other factors. Another project aims to understand the attributes TSOs bring to the table prior to training that may influence their ability to perform duties other than the X-ray interrogation of bags. “TSOs serve many purposes, each of which requires different kinds of communication skills,” says Ann. “Scientists have been doing this for 150 years and we’re still learning on how people communicate with passengers in the event they come about.”

They [the experiments] do have to be pretty clever, though,” says Ann. “Humans are thinking beings who will try to outsmart one another, so we have to be careful about experiment construction and the different variables that go into them. Even the instructions we give subjects can alter the outcome of a study.”

Ann says that her work has led directly to additional TSA-funded efforts, including a current project that explores how long TSOs can look at scanned images before their performance starts to degrade due to fatigue or other factors. Another project aims to understand the attributes TSOs bring to the table prior to training that may influence their ability to perform duties other than the X-ray interrogation of bags. “TSOs serve many purposes, each of which requires different kinds of communication skills,” says Ann. “Scientists have been doing this for 150 years and we’re still learning on how people communicate with passengers in the event they come about.”

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When Sandia researcher Katrina Grotch (6231) first saw Sandia’s new Research Quality Standards document, she immediately welcomed it with open arms. “I’ve been at Sandia for only a couple of years and the standards document was something that I had wanted for my group,” she says, Katrina, who conducts research for hydrogen fuel cell infrastructure and nuclear power plants. “It’s an incredibly useful document. I’ve sent it to many of my colleagues at Sandia.”

Longtime Sandia research and mentor Laura Swiler (1441), who alerted Katrina about the document, says it thẩm in its way presence important information using short, interesting vignettes. “It definitely has a Sandia focus to it.”


The team, consisting of a number of senior managers, managers, and technical staff, was created after Div. 8000 VP Steve Rottler, then serving as Sandia’s Chief Technology Officer, championed the effort to develop a research quality standard for Sandia. The team standard for Sandia. The team researched and wrote the document over nearly a year.

Standards approved in February

The Laboratory Leadership Team approved the standards in February after they had been adopted by the Research Leadership Team, composed of Sandia’s Chief Technology Officer (CTO) and directors of the Labs’ research centers and Program Management Units, and by Div. 1000.

“[This Research Quality Standards] team thought deeply about the issues that have been bothering researchers at Sandia and the kind of standard that would be most helpful in clarifying our expectations,” says acting Div. 1000 VP Duane Dimons. “Ultimately, they developed a standards document based on real case studies that address key research quality issues.”

Acting Div. 7000 VP and CTO Julia Phillips says she’s eager to have the document distributed and read. “I encourage everyone in Sandia’s R&D community to read the document and to discuss its content with colleagues,” she says. “The standards are not only highly readable, they will help ensure we continue to meet our own demanding expectations and those of our customers.”

The document consists of 50 case studies that present, in story form, examples of behaviors that lead to either good research outcomes or bad ones. The case studies are based on real events at Sandia, details have been changed and names omitted. The case studies cover each of the six phases of research, from planning and initiating the research to delivering prototypes.

The Research Quality Standards Development team began its work by looking at existing materials on quality standards for research offered by the American National Standards Institute and National Academy of Engineering. “After studying these documents and discussing how they apply at Sandia, the team created a list of things we believed our staff should be aware of to be successful in their research,” Mike says. “We thought the team should be a guide to address each issue.”

Adds Jerry, “Sandia has a great tradition of conducting high-quality research. The Research Quality Standards should serve to perpetuate our strong research culture by sharing lessons learned.”

Team member Carol Stamper (1740) interviewed Sandians for each of the document’s 50 case studies and served as its principal editor. The standards are written in a tone that’s both instructional and engaging, giving it greater appeal to new research staff and making it ideal for seasoned researchers to use as a mentoring tool. “I think the standards are helpful and I like the case-style format,” says Troy Savice (1557). “Clarification on issues specific to conducting research at Sandia — both legal, review and approval, LDRD, and so on — is where the standards provide the most value.”

The Research Quality Standards are posted on Sandia’s Office of the CTO website.

Borehole

“Deep boreholes allow us to design a disposal system that should be faster, cheaper, and better performing.”

Andrew Orrell, director of Energy Technologies and System Solutions Center 6100

further study of deep boreholes and asked the team to produce the first performance analysis of the deep borehole disposal concept, which eventually led to the three-year LDRD. Sandia researchers formed collaborations with the University of Sheffield in England and MIT, which were instrumental to how well the analysis was received. “The team took on the challenge and produced a pivotal report that set the stage for enthusiastic discussions among the waste management community, in the US and abroad,” Andrew says.

An engineered solution

He says one major advantage of boreholes is that they can be engineered, which avoids the costly time-consuming task of characterizing imperfections found in a natural setting such as a mountain. “The US invested heavily in Yucca, and one third of that spending went to site characterization of a complex natural system. That’s more than the GDP of some countries that have nuclear waste, so we need to find a solution offering high-confidence isolation that can be developed faster and at less cost” Andrew says. “Deep boreholes allow us to design a disposal system that should be faster, cheaper, and better performing.”

In January 2012, with Yucca Mountain essentially off the table, the US Nuclear Regulatory Commission (NRC) announced funding for a deep borehole demonstration project, which is under consideration by DOE for implementation. In addition, DOE has provided $500 million for a full-scale demonstration project.

Since the initial DOE funding for further study, Sandia received an additional $800,000 to design a borehole demonstration project, which is understood by DOE for implementation. In addition, DOE has provided $500 million for a full-scale demonstration project, which is under consideration by DOE for implementation. In addition, DOE has provided $500 million for a full-scale demonstration project, which is under consideration by DOE for implementation.

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One of the 50 case studies... Peer reviewing the work of a well-known researcher

A new staff member was assigned to review the contract work of a well-known university professor who also happened to be the chair of an external review panel. The professor was chosen because research was the closest to the research performed under the contract. His director had been funding the professor for several years.

As a new staff member, he tried to review the proposal fairly but found several problems with the work. When he brought his findings to his director, the director questioned the staff member’s review and was uncomfortable bringing the possible mistakes to the attention of the professor. Although pressured to soften his critique, the new staff member held his ground. The director insisted that the staff member demanded a retrial of the professor and the director acting as referee. The new staff member felt somewhat intimidated but worked very hard on keeping his interaction professional and focused on the technical issues. The professor was initially defensive but quickly grasped and conceded the issues the new staff member was raising.

A few years later this same professor asked the staff member to join his editorial board for one of the prestigious journals in their field. He was the youngest member of the team and was sure this resulted from the careful but expected way he handled the critique of the professor’s work.

Moral of the story

You can maintain your integrity, provide critical reviews, and still be successful as long as you handle it respectfully and professionally. In fact, doing so just may open up opportunities that may not have been afforded you before.
Sandia has rolled out three more research challenges, the latest in a string of complex, difficult challenges that interest the Labs. Each addresses a security-related research problem the Labs has decided to tackle.

All the challenges share general characteristics. Among other things, they break down barriers based on organization, geography, or discipline by bringing together broad, multidisciplinary teams; the expertise needed to bring the ideas from fundamental science to applying technology; and the work has a long life — even up to a couple of decades — but shows a measurable impact throughout that span, acting Div. 7000 VP and Chief Technology Officer Julia Phillips said in introducing the latest challenges in a Feb. 27 town hall.

The work also must leave behind a science and engineering legacy for the Labs. “That may be in the tools that we develop, that may be in the hearts and minds of the people in terms of the knowledge that they have as well as the experience they gained from working together on these very large efforts,” Julia said.


Julia outlined what each challenge needs to become mature, and urged Sandians to attend subsequent workshops, each focused on a particular research challenge, to help focus and guide the challenge that interests them.

Resiliency in Complex Systems

Senior manager Richard Griffith (6130) said Sandia has studied numerous complex systems for national security for more than a decade, but “Resiliency in Complex Systems” will focus on three key areas: the nation’s energy infrastructure, nonproliferation, and terrorist network systems. The next test will be to understand, quantify, and control the resiliency of those systems, he said.

The goal is to make sure the energy grid functions “in the face of everything that can happen” and can rapidly recover from damage or disruption. Richard said. On the other hand, the research challenge is targetting proliferation and terrorism systems to understand what decreases their resilience and ability to recover, he said.

He appealed to people across the Labs to join the team, calling for a “national energy grid field” capable of data calibration and evaluation, computer science, neuroscience, mathematics, engineering, plasma physics, biology, ecosystems, computational psychology, and more.

“It’s a very broad and challenging effort that’s really going to require all of the disciplines represented at Sandia coming together,” he said.

Sandia is in a position to tackle the work because of its pioneering research in complexity theory-based analytics for national security problems; world-class, multi-disciplinary research teams; and unique access to both open source and classified data, Richard said.

“Useful, quantitative metrics around resiliency are really at the heart of being able to control any system,” he said. “If you cannot measure it in a quantitative way and express it in a quantitative way, you can’t really control it.

The US has a great deal of data on its energy infrastructure, but doesn’t have nearly as much hard data on processes in terrorist or weapons systems, he said.

“So when I stress useful, quantitative metrics, I’m also talking about metrics that can be evaluated given the data we have, addressing the need of uncertainty that we have, and addressing the fact that we’ll always have missing data in the understanding of those systems,” Richard said.

Science and Engineering of Quantum Information Systems

GIL HERRERA

Using a tag-team approach, directors Gil Herrera (Microsystems & IT Center 1700) and James Peery (Information Systems Analysis Center 5600) explained the research challenge titled “Science and Engineering of Quantum Information Systems (SEQISs),”

 Gil, who spoke first, said that the goal of SEQIS is to synthesize the quantum physics that underpins semiconductor microelectronics and photonics hardware with information theory to develop information technologies, sensors, and communication systems based on quantum physics.

“The excitement in quantum is warranted,” he said. “We have a pretty broad team that already spans four divisions and nine centers, but we also know those of you in the audience to join us. All we ask is that you bring your best ideas unconstrained by convention.”

Quantum information theory provides a framework for quantum devices to sense, process, and communicate. “Resiliency a big challenge,” Gil said. “How do you deal with a stochastic computer and make sure the information is accurate?”

Aims of the challenge are to develop entanglement-enhanced sensors that surpass the state of the art, advanced information storage and processing devices, and to establish long-distance secure communication protocols that leverage unique quantum information-disturbance relationships.

He mentioned three outstanding Sandia capabilities that apply to the quantum challenge.

MOSAIC, he said, is a team of 10 of labs, hundreds of labs, and a thousand people who, teaming with scientists and engineers across Sandia, solve difficult technical challenges like building ion traps.

CINT, also part of the challenge and an important partner to the process, said Gil, “can place individual ions exactly where we want, with sub-nanometer precision.”

Third, Sandia maintains world-class computing facilities, and has world-class researchers with expertise in the design of novel architectural systems.

In addition, he said, these capabilities are backed by “our ability to demonstrate to our customers and government sponsors that we are responsible stewards in maintaining a unique research environment.”

In establishing Sandia’s bonafides to pursue the quantum information challenge, James mentioned Sandia’s experience in creating a MESA-based ion-trap foundry for IARPA, the Labs’ research into qubits and quantum computer architectures, and three LDRD Grand Challenges [BST, for exploring silicon-based qubits; Aquarius, for researching adiabatic quantum applications; and SECANT, for advancing quantum-based secure communications].

GARY SANDERS

Nuclear weapons are Sandia’s core mission and the initial foundation of many of its other missions. Gary noted that President and Labs Director Paul Hamelmann has stated more than once that we fail as a lab.

Gil outlined the history of the nation’s stockpile, from a rapid increase in weapon system types developed and fielded through the 1950s and 1960s, to the growing awareness and revolutionary approaches to safety, and evolutionary changes in weapon designs as the number of separate systems dwindled in succeeding decades. But he also based on the technology challenges of the future stockpile.

With the national discussion about nuclear weapons focused on rising costs for fewer weapons, scientists and engineers must ensure a thorough understanding of how weapons age and what that means for reliability in a smaller stockpile in which the current average age of US weapons is approximately 27 years.

“Worse, our nuclear stockpile maintenance and evolutionary modernization the way we have been doing it,” Gary said. “So there comes our biggest challenge for our revolutionary approach to the stockpile: How are we going to do this in an affordable, more effective way, given all the technologies we now have?”

The current stockpile has elements of what Gary called “modularity,” or integrating common components across the stockpile. In the near term, there will be evolutionary options, with more adaptable non-nuclear subsystems. “Adapted, not necessarily different,” Gary stressed.

But the stockpile of the future requires “bold, game-changing approaches” in design, qualification, manufacturability, and surveillance that are still cost-effective, he said.

Those include ideas such as common adaptable architectures that could reduce future development risks with shorter cycle time and lower costs, and new approaches in everything from surveillance to additively manufacturing to computational information modeling.

“Sandia is the weapons system integrator” that ensures weapons are designed and manufactured with maximum reliability and safety at the best value, Gary said.

This represents a $40 million LDRD investment,” he said. “I will report that no other lab, federal or private, has the capabilities Sandia has established in pursuing quantum information sciences.”

“Very proud to list a variety of high-level goals. “We’re interested in developing and maturing quantum information devices,” said James. “And then, we want to integrate these devices into functioning quantum systems for our national security customers.”

“We want to achieve the perhaps audacious goal of being the national lab the US government turns to for the engineering of quantum information systems. We want to lead in understanding and mastering the theoretical physics involved in these technologies. We want to overcome the significant challenge of maintaining quantum coherence in a physical device.”

The SEQIS 10-year roadmap will focus on few qubit devices, he said. “We’re interested in applying algorithms and protocols and executing applications on these devices. [But] we’re a long way from doing this on many qubits, to date we’ve only achieved a one-qubit computer.”

He assured his audience several times that there are many challenges remaining.

Revolutionary Approaches to the Stockpile

Deputy Chief Engineer for Nuclear Weapons Gary Sanders (2200) outlined the history of nuclear weapons development in the US and Sandia’s vision for the stockpile of the future in “Revolutionary Approaches to the Stockpile.”

Gary also asked for every part of the Labs to get involved in the challenge.

RICHARD GRIFFITH

By Sue Major Holmes and Neal Singer

The US has a great deal of data on its energy infrastructure, but doesn’t have nearly as much hard data on processes in terrorist or weapons systems, he said.

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More entrepreneurial training

Take a license, form a company

Thirty-three of the 99 companies involved in ESTT since it was launched in 1994 responded to the survey gauging its economic impact. Respondents said 579 jobs were created by their companies through the program since it began, and that in 2012 they employed 1,550 people at an average annual salary of $80,000. Their 2012 sales revenue was $212 million. From 2008 through 2012, the businesses invested $40 million in equipment and $277 million in goods and services. Two-thirds of them had commercialized a technology as a result of ESTT.

“Those are notable numbers and reflect just a third of the companies affected by the program,” Jackie says. “ESTT is a tool Sandia has to deploy technology by giving people an opportunity to take a license and form a company. Four startups using Sandia technology licenses came out of the program in the past two years alone, along with a number of company expansions. Of these, three licensed technologies from Sandia.”

Jackie says one of Sandia’s hottest technologies, the medical diagnostic lab-on-a-disk SpinDx, is being commercialized using ESTT. Greg Sommer, a former Sandian who helped develop SpinDx, co-founded and is chief executive officer of Sandstone and develop cutting-edge medical products based on technology originally developed for Sandia’s biodefense missions.

ESTT encourages researchers to take technology out of the Labs and into the private sector by guaranteeing them reinstatement if they return within two years, and a third-year extension can be requested. Since the program began in 1994, 145 people have left on ESTT; 41 returned, 98 left for good. Six are currently out. Here are two who came back to Sandia and two who stayed in the private sector.

Where Are They Now?

Catch up with four Sandians who took the entrepreneurial plunge

Entrepreneurial Separation to Transfer Technology (ESTT) lets qualified Sandians leave the Labs to start or help expand a small technology-based business. They are guaranteed reinstatement if they return within two years, and a third-year extension can be requested. Since the program began in 1994, 145 people have left on ESTT; 41 returned, 98 did not, and six are currently out. Here are two who came back to Sandia and two who stayed in the private sector.

TODD CHRISTENSON: A small world

Todd turned his Sandia research into a company that today makes the world’s smallest electromechanical switches. He came to the Labs from the University of Wisconsin in 1995 to work in components. His interest was using metal microfabrication to maintain tolerance in mechanical components at small dimensions. He worked five years with a group that did microelectromechanical systems, or MEMS, for safety and security mechanisms. He later worked in optics, photonics, and electronics, which fit his background in semiconductor physics.

“Those are two distinctive features of the technology our company works with,” Todd says. “Fabrication is based on metal materials versus semiconductor materials like silicon. And the structures have a relatively large thickness compared to the processes used in fabricating MEMS.”

Todd left on ESTT in 2003 and formed HT MicroAnalytical Inc., licensing Sandia technology. “I wanted to make and sell product,” he says. “The entrepreneur- ship path that Sandia offered was appealing and the time was right.”

He went to the angel markets and got startup capital, and brought in a business partner. They built a prototype facility and put product demos into customers’ hands. “That built traction and attracted strategic funding from companies that wanted specific devices using the technology,” Todd says.

HT MicroAnalytical has 15 employees and is growing. It partnered a year and a half ago with Rosenberger Inc. of Germany, a MEMS switch manufacturer with a global marketing and distribution network, and built an 18,000-square-foot facility in Albuquerque that can produce about 20 million parts a year. A distribution partnership was formed recently with Coto Technologies of Rhode Island.

HT MicroAnalytical sells to commercial and military customers worldwide. “They range from the medical industry to classic industrial automation,” Todd says. “It’s been hard work, but I never looked back. This was what I wanted to do, to apply technology to help people solve problems.”

“If you have a vision to change into the marketplace, to build companies, and employ people, the ESTT path is the best I know of.”

Todd says he continues to work with Sandia researchers through the New Mexico Small Business Assistance Program, which helps small companies get technical support from scientists at Sandia and Los Alamos national laboratories.

“Sandia does some of the best research in the world,” Todd says. “It has the best facilities without any question, and great people. It really is the best place on Earth to work.”
**Innovative tech transfer program marks two decades of sharing scientific expertise**

Mary Crawford: A rare opportunity

Mary (1120) describes ESTT as "an exponential learning experience." She joined Sandia in 1993 and worked in the field of optoelectronics with a focus on light-emitting diodes, or LEDs. "LEDs were emerging as an entirely new type of lighting envisioned to replace conventional incandescent bulbs," she says. "Companies around the world were starting to work on this and it was an exciting time. Sandia was also engaging in the technology, given the potential for high energy efficiency." 

Mary left in 2000 to join Uninoyal Optoelectronics in Florida, a startup developing LEDs for commercial lighting. She worked for the company a little more than two years, rising from senior scientist to director of research and development. She had come to Sandia as a post-doc, so Uninoyal was her first experience in the startup business world.

"It was an entirely different environment, much smaller," she says. "But I liked it. It was a small group intensely focused on the same goal. If one succeeded, everyone succeeded." 

She says she learned a lot by working on the growth of LED materials. "My work at Sandia was on the fabrication of LED devices," she says. "I now have a much better understanding of how the way one grows the LED materials impacts the device performance." 

She decided in 2002 to return to the Labs. "Sandia wanted me back and there were family considerations as well," she says. "It made sense to return." 

She continued her work in semiconductors and LEDs, and is now a senior scientist. "Working outside the Labs was a tremendous experience and I'm happy I did it," she says. "I think it's a rare opportunity to be able to take that kind of risk and have a safety net. And the experience one gains can be very valuable to Sandia." 

Dan Neal: Millions of eyes

Dan says it was daunting to start a company after years at Sandia. "Sandia has enormous resources, incredible equipment, and exceptional people," he says. "It was quite a transition to start with three of us in a small facility with what we could buy at auction." 

He had joined the Labs in 1984 working on high-powered lasers and optics. In the early 1990s he helped develop a sensor for lasers that had commercial applications. He took entrepreneurship training through Technology Ventures Corp. in 1995, found a business partner, licensed wavefront sensor and binary optics technologies from Sandia, and left on ESTT.

His company, Wavefront Sciences, presented at the 1996 TVE Equity Capital Symposium and got an investor. It made a variety of instruments based on an optical sensor that could measure everything from the flatness of a silicon wafer to the characteristics of a human eye. It contracted with the US Navy and Air Force to build systems to measure supersonic seeker windows for wind tunnel testing, and worked with NASA on the James Webb Space Telescope. "Of all those applications the ophthalmic one had the largest market traction," Dan says. "We were the first to introduce a commercial product to take eye measurements that could be used to program the laser in Lasik vision correction." 

Wavefront grew from three to 54 employees. It sold in 2007 to Advanced Medical Optics of Santa Ana, Calif., which bought several companies involved in the lasers for Lasik. "They wanted us for the sensor technology," Dan says. 

Abbott Laboratories of Chicago acquired Wavefront in 2009 and renamed it Abbott Medical Optics. It's still in Albuquerque, and Dan has remained as a research fellow. "Oh, man, have I ever learned a lot about business," he says. "My advice to Sandians considering ESTT is take advantage of every bit of business training you can and don't be afraid of the future. You don't know what it holds but it will certainly be different. My technology has helped millions of eyes. It's been extremely gratifying." 

Jim Novak: A full-contact sport

Jim, senior manager of Tailored Operational Support Dept. 5950, says ESTT gave him management skills he hadn't developed as a researcher. He worked on sensing technologies for tech transfer applications after coming to the Labs in 1988.

One project was a sensor that allowed a robotic arm to track the surface of a space shuttle engine and deposit a paste to fill cracks. It was done through a Cooperative Research and Development Agreement with Rocketdyne in Canoga Park, Calif., which was building the shuttle's main engines.

Jim left on ESTT in 1996 to commercialize the sensors for Rocketdyne. He founded Sertidive in Albuquerque and got a master's in business administration from the University of New Mexico. "I licensed the technology and learned how to run a business," he says. "We developed the product — sensors for robots in manufacturing—and raised venture capital." 

But in the end he closed the company, which employed six people at its peak, and returned to Sandia with the experience. "Technology is only part of what people buy. The product needs to solve a customer's problem, not just be cool technology," he says. "We had visions of providing full-motion sensing for robots in six dimensions. It turns out the vast majority of robots in manufacturing only need one or two dimensions. Our products were too complicated." 

Jim rejoined Sandia in microsensors product development. What he brought from the private sector was management know-how. Within a few years he was promoted to manager and in 2011 to senior manager. "The marketplace is a full-contact sport," he says. "You learn to run a company. The experience was extraordinarily interesting and extremely useful. It was a great thesis on top of the MBA in preparing me for management. And I'm absolutely glad I came back. This is a great place."
Sandia recognizes 24 outstanding women

By Sue Major Holmes

In celebration of Women’s History Month 2014, Sandia has recognized two dozen Outstanding Women for awards they received in fiscal years 2012 and 2013 for contributions to the nation, professional societies, or the community.

The honor reflects “an external recognition of your leadership, your accomplishments, for a wide variety of activities,” all of which share the characteristics of leadership and commitment, President and Labs Director Paul hommetter told the honorees at a March 10 ceremony. The Sandia Women’s Action Network (SWAN) in New Mexico and Sandia Women’s Connection (SWC) in California honored women who received awards or other significant recognition in the past two fiscal years, and created a poster with their names and accomplishments. The poster’s unveiling coincided with the March celebration of Women’s History Month. SWAN and SWC called for nominations for outstanding women during the performance review period last year.

Paul says Sandia’s recruitment of women has made it a more diverse place.

“W what that says, more than anything, is for the laboratory to succeed, for the laboratory to continue to be recognized in the way it is, all of your leadership is going to become more and more important. I have great confidence in that because of the examples here,” he said. “All I can say is, keep it up, keep demonstrating the flavor of leadership that you can bring to the lab, to your professional arena, and to our communities,” both in New Mexico and California.

The 24 women recognized are only the beginning, said one honoree, executive VP Kim Sawyer, who pointed out suffragettes were marching on Washington, D.C., 100 years ago. “We’ve got decades ahead of us in terms of helping to advance women in the future.

Certainly we have many role models here who can make a difference.”

The honorees:

- Melecia Archuleta (2720): Samaritan Counseling Center’s 2013 Hopkins Award for Excellence in Ethical Practice by a Nonprofit Organization
- Jackie Chen (8051): Distinguished Paper Award at the 34th International Combustion Symposium
- Jo Cunningham (11011): National Contract Management Association’s Blanche Witte Memorial Foundation Award and National Contract Management Association’s Fellow
- Lisa Deblieker (1849): First-place Poster Award in the 2012 International Metallographic Contest
- Felicia Duran (6612): Fuel Cycle R&D Excellence Award, November 2012, and Institute of Nuclear Materials Management Southwest Regional Chapter Vice President, October 2012-September 2013
- Amanda Frischknecht (1814): American Physical Society Fellow
- Rita Gonzales (1750): NNSA Defense Programs’ Employee of the Quarter Award, first quarter FY12
- Pierrette Gorman (1831): American Welding Society District Mentors Honor Award 2012
- Katherine Guzman (8112): Hispanic Engineer National Achievement Award Corporation 2013 Luminary Honoree
- Jill Hruby (6000): 12th Annual Women Worth Watching Award from Profiles in Diversity Journal

Women’s business group adds Sandia to prestigious list

Sandia made the Women’s Business Enterprise National Council’s 15th annual list of America’s Top Corporations for Women’s Business Enterprises. It is the first time Sandia was named to the prestigious list.

The council says the award is the only one that recognizes corporations for supplier diversity programs that break down barriers and integrate women’s business enterprises into supply chains.

Ann Riley, advocate for woman-owned businesses in the Small Business Utilization Dept. 10222, says Sandia diligently pursues contracting opportunities for women by engaging with them on a local, statewide, and national level. “We have a variety of matchmaking activities to identify potential suppliers and connect them with buyers,” she says. “The goal is to contract with woman-owned small businesses and grow our economy. We work on it all the time.”

Sandia for five years exceeded its goal of 10 percent of total procurement contracts, or about $90 million, being awarded to woman-owned small businesses. “New Mexico has a very active women’s business community,” Ann says. “We partner with local chapters of the National Association of Women Business Owners, Women in Communication, Women in Technology, and other groups that provide recommendations. Women are great at networking.”

The top corporations will be honored at the council’s Summit & Salute to Women’s Business Enterprises March 18-20 in New Orleans. Other honorees include Accenture, Allstate Insurance Corp., Bank of America, BP America, Bristol-Myers Corp., Coca-Cola, Ernst & Young, Ford Motor Co., General Mills, IBM Corp., Raytheon Corp., United Technologies Corp., Target Corp., and Walmart.

“Our top corporations know that stronger women’s business enterprises will drive new sources of revenue, deepen customer satisfaction, and generate a stronger economy,” said Pamela Prince-Eason, president and CEO of the council, which was founded in 1997.

The organization promotes women’s business development and is a third-party certifier of businesses owned and operated by women. Its certification is accepted by more than 1,000 corporations, states, cities, and other entities. — Nancy Salem
Employee death

Kind, thoughtful, smart student intern Robby Cook was an inspiration to his colleagues

Robby Cook, whom one colleague described as “ninja quiet” and whom all who worked with him agree was a kind and gentle young man, had been at Sandia for less than a year before having his life cut short at age 21 as a result of an auto accident.

Robby, a year-round intern since last fall in the Materials Reliability Dept. 1818, was a senior majoring in mechanical engineering at New Mexico Tech. Like so many aspiring engineers, Robby’s first foray into engineering was by building things with LegOs.

At the time of his death, Robby was exploring graduate school options, but once told a friend that making a lot of money wasn’t a high priority for him. “I just want to be happy,” he had said.

His manager, Jill Glass, says of him, “Robby was a bright light in Sandia’s science and engineering future, and it’s hard for me to accept that his career and future ended just as they were taking off.”

In an email about Robby’s passing, Jill wrote, “Despite the short time that he was with us, I will always remember him for his smile and sense of humor, and for his thoughtfulness, both to people and for his work.”

Friend and colleague Daniel Yonemoto (1815) says the strength of Robby’s character shone through on the soccer field. “In the three seasons that I played soccer with him,” Daniel says, “there are a few things I will never forget about his personality that set him apart from the rest of the players: his laid-back attitude, his unrivaled composure, his wonderful smile, and above all else his unwillingness to give up. He completed whatever challenges he faced with an exuberance that you could only know if you knew Robby. The world would be better off if there were more people like him. It was truly an honor to know him, and it is truly heartbreaking to know that the world has lost one of its treasures in Robby Cook.”

Gabe Shipley (6221), a childhood friend of Robby and fellow soccer player — they played on the same team for eight years — saw the two sides of Robby, the two sides that made the complete man. “As a fellow defenseman on the team, I knew him to be fierce, aggressive, and extremely dedicated,” Gabe says. “As a friend, I knew him to be kind, soft-spoken, and炽热地/ infectious. If ever there were dark moments for the team, I always remember that Robby’s mood was never tarnished and helped bring the spirit of the team back from the brink. As a student, Robby was a shining star, always humble and reserved about the vast quantity of knowledge he had about multiple facets of academics, subject matter, and life. But when the time came for him to apply his know-how to the job, he never hesitated, always giving his utmost and never shying away from a challenge. I can confidently say that his work ethic and academic prowess were among the very best we ever had the pleasure of knowing, but still paled in comparison to the warmth and kindness of his spirit.”

“The highlight of my week!”

Sandia researcher Mike Dugger, who worked with Robby in Dept. 1818, calls him “a valuable member of the tribology team.”

“We will miss his thoughtful work and willingness to lend a hand,” Mike says.

Brendan Nation (1818) remembers Robby as “kind-hearted, thoughtful, and quiet. I would say that Robby was ‘ninja quiet,’ as there were many times I would walk into the room and never see or hear him there.”

His encounters with Robby, Brendan recalls, “were always the highlight of my work; we always had good discussions about classes, professors, and plans for the future. Robby always spoke of his family and his work on the family home. It seemed to me that Robby was always willing to give of himself to ensure that others had the help they needed. That serves as a daily inspiration to me. He will be sorely missed both as a colleague and as a friend.”

At Sandia, Robby was just beginning to make his mark. According to Mike, who worked closely with and mentored Robby on the tribology team, “He used his mechanical engineering skills and curiosity about materials to investigate the friction and wear behavior of diamond-like carbon thin films. He joined the tribology group knowing very little about these materials, but he carefully reviewed the related literature and conducted his own experiments to gain a better understanding of them. Robby had begun an investigation aimed at discovering the mechanisms responsible for anomalously high friction coefficient in inert atmospheres for some films. Confidence in his knowledge and abilities had reached the point that Robby was genuinely enjoying the process of discovery, and discussing his observations and ideas with colleagues. In his relatively short time with Sandia, Robby had become a valuable member of the tribology team.”

At New Mexico Tech, Robby was a member of the Space Structure Design Clinic Team that was part of a successful rocket launch at the New Mexico Spaceport late last year. His teammates in that effort recall Robby as “the smartest one out of us all. He had that secret sort of smart that no one knew about until they got to know him. We will remember Robby fondly as a friend, colleague, expert presenter, and all-around good guy.”

In a statement about Robby’s death, New Mexico Tech President Daniel Lopez said, “Our thoughts go out to Robby’s family and friends for their tragic loss. Robby was an excellent student and his professors and student colleagues all spoke highly of him. Any time we lose a member of the Tech family, it’s a very sad day and all we can offer is our thoughts and prayers.”

Away from work and school, Robby’s interests were those of many young people: club soccer, robotics, fishing, skiing, gaming, and other outdoor activities. He is survived by his parents, Robert (6913) and Juanita Cook, of Rio Rancho, N.M., a brother and sister, and several other close relatives. — Bill Murphy

(Photos courtesy of Daniel Yonemoto)
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New Mexico MESA Day opens doors to science, engineering, and math

New Mexico MESA Day competition in February. Len Duda (5782), seen in center of photo at left, judged the Food Distribution System prepared design challenge. Other Sandia judges included Blythe Clark (1111), Tommy Goolsby (6812), Esther Baldonado (6923), Richard Kotzenstette (6824), David Scrymgeour (1728), Barbara Stirrup (1741), and Drew Woodbury (5572). New Mexico MESA’s mission is to prepare students from historically underrepresented ethnic groups for college majors and careers in math, engineering, and science. In the photo at right, Katrina Wagner (3654) explains how nonpoint sources contribute to pollution, impacting the quality of shared water resources. The theme of New Mexico MESA Day was “Sustaining Our Future,” with a focus on water management.

Mileposts

New Mexico photos by Michelle Fleming

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New Mexico MESA Day opens doors to science, engineering, and math

New Mexico MESA Day competition in February. Len Duda (5782), seen in center of photo at left, judged the Food Distribution System prepared design challenge. Other Sandia judges included Blythe Clark (1111), Tommy Goolsby (6812), Esther Baldonado (6923), Richard Kotzenstette (6824), David Scrymgeour (1728), Barbara Stirrup (1741), and Drew Woodbury (5572). New Mexico MESA’s mission is to prepare students from historically underrepresented ethnic groups for college majors and careers in math, engineering, and science. In the photo at right, Katrina Wagner (3654) explains how nonpoint sources contribute to pollution, impacting the quality of shared water resources. The theme of New Mexico MESA Day was “Sustaining Our Future,” with a focus on water management.

Mileposts

New Mexico photos by Michelle Fleming

Recent Retirees

<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jeff Everett</td>
<td>33</td>
<td>260</td>
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<tr>
<td>Debra Jaramillo</td>
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<td>1800</td>
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<tr>
<td>Mike Hightower</td>
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<td>5786</td>
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<td>Andy Boye</td>
<td>30</td>
<td>1720</td>
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<td>Mary Bonner</td>
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<td>6612</td>
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<tr>
<td>Charles Bruseau</td>
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<td>6633</td>
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<td>Ray Dukart</td>
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<td>3417</td>
</tr>
<tr>
<td>Marianne Walck</td>
<td>30</td>
<td>6900</td>
</tr>
</tbody>
</table>
SPRING GARAGE SALE, ABQ

LADIES BOOTS, by Gwyneth

WOMEN'S CLOTHING, suits, w/dresses: sizes 10-12, dresses, sizes 8-8.5, possibly a 9; retiring, no longer needed. Call for info. Gomez, 877-8482, ask for John.

CASH FOR KITTIES: 1-5 yrs. old, neutered, litter box trained, indoors. Nickels, 505-719-0691.


LOST: Golden Retriever puppy, 2.5 mos., tan with orange markings. Call 845-7022. Future record of publication unless changed by holiday.

AD TIMES: Deadline: Friday noon before week of publication. Submit by one of these methods: classified@sandia.gov or/interior, 171,600 miles, 2005, 5-speed, $3,750. Laiche, 505-681-7262.

10. Housing listed for sale is available for active Sandia members of the Laboratory and employees on temporary assignment. Sandia will publish any ad that may be considered discriminatory on the basis of race, creed, color, or national origin.

9. For active Sandia members of the Laboratory and employees on temporary assignment, ad length is limited to 140 words. One ad per issue. Type or print ad legibly; use capital letters in the subject headings.

8. Advertisers are responsible for the accuracy of the information and the content of their ads. Advertisers should contact Michelle at 844-4902 with questions about their ads or to make changes to existing ads.

7. No “for rent” ads except for employees on temporary assignment.

6. We will not run the same ad more than once within a 4-week period. Advertisers should call Michelle at 844-4902 if another ad is placed for the same item.

5. One ad per issue.

4. Type or print ad legibly; use capital letters in the subject headings.


2. Include organization and full name of member(s) or employee(s). No ads are accepted from non-Sandia members or from companies.

1. Limit 10 words, including last name and home phone number if you (as a private individual) wish to include your phone number. All ads must be submitted in writing. No phone-ins.

#808808. Steele, 275-8611.

WANTED

WOOD BOOKCASE, 32" x 12" x 68"., $495.00. Ross, 332-0659.

ROOMMATE, 3-bdr. home, non-smoker, near Juan Tabo/Menlo, extra security, washer/dryer, sauna, large pool, 450.00/mo. Hannah, 293-1450.

MOVING BOXES, packing materials, Kallis, 507-2914.

MACHINES, computers, dog crates, Chi-weeners, 2 yrs old, brother & sister, email for photos. Mapus, 505-515-9059.

DONATIONS, to Long Leash on Wheels. Olsberg, 505-269-3285.

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Welcome aboard!

Div. 5000’s People Initiative enhances onboarding experience, bolsters career development

Onboarding is the art and science of successfully bringing new employment into an organization. Done correctly and creatively, it goes beyond the obvious new-hire processes of filling out paperwork and assigning office space, phone numbers, and web and email access privileges. It’s more than a buzzword; it’s the real thing, and organizations that do onboarding effectively have a leg up in a competitive hiring market.

Sandia’s Defense Systems and Assessments (DS&A) Div. 5000 has launched an ambitious People Initiative to do onboarding the right way. But the People Initiative is about more than onboarding, which is just one piece of a coordinated effort to make sure the division’s people have growth opportunities and enjoy job satisfaction throughout their careers at Sandia. The People Initiative is aligned with the division’s Strategic Plan and Sandia Strategic Plan objectives 4 and 5: “to excel in the practice of engineering” and “to connect to a learning, inclusive, and engaging environment for our people.”

To ensure the program stays on track and accomplishes what it aims to do, best practices and tools are identified and documented, with metrics established. What makes the People Initiative unique and effective, says project manager Dominique Foley Wilson (5001), is that “staff become aware of all the division has to offer and develop a line of sight between personal contribution and overarching mission.”

The variety of customers and their respective needs, she says, “spans a literal continuum of time and space, from atomic clocks to sensing solutions — each has a protocol unto itself!”

Maintaining employee satisfaction in a complex work environment, Dominique says, requires diligence in the areas of recruiting, hiring, onboarding, professional development, skills retention, and succession planning. To bring order and synergy to these related but discrete functions, the People Initiative evolved to take a lifecycle approach to the division’s talent management efforts.

Essentially a grass roots movement

Senior Manager David Gallegos (5540) says he thinks one of the reasons the People Initiative has been effective is that “it has essentially been a grass-roots movement by a number of individuals invested in taking personal ownership in improving and enhancing the division and corporate workplace. The intent has been to address and improve all phases of the employee lifecycle for all employees in the division.”

Earl Creel, manager of Navigation Guidance and Control Dept. 5416, says, “The People Initiative is really helping me identify and connect with qualified applicants for my hard-to-fill job postings.”

Top-down engagement and support are key success factors, as is total inclusion, Dominique says. The program has been vetted and endorsed by center directors. It has technical management representation from all centers and includes additional support from 7980 and 10000.

The program supports Computer Science/Computer Engineering recruiting efforts, the TITANS pipeline initiative, and the Critical Skills Masters Program. Via coordination with the line and HR, gaps and outreach mechanisms and strategies to more effectively promote Sandia overall — and DS&A in particular — will be developed to ensure long-term staffing needs are met.

All in all, Dominique says, the People Initiative represents a movement toward an inter-divisional, inter-agency synergy of people and has become a hallmark of Defense Systems & Assessments Div. 5000.

DS&A TECHNOLOGY & PROGRAMS Deputy Anthony Thornton (5220), far right, says, “My intent in providing the DS&A Overview to new staff is to get them to know about the work we have been doing and accomplishments performed in our national interest. I want them to believe that their talent and contribution matter to our country.”

SAM FELIX, senior manager of Div. 5000 Business Operations (10650), includes representatives from Supply Chain, Controller, Safety & Security, and HR in his presentation DS&A Gets Down to Business.

Componentsof the orientation onboarding experience include:

- A welcome video from VP Jeff Isaacson on the Div. 5000 homepage
- DS&A Organization & Structure briefing
- DS&A Gets Down to Business briefing
- Mission Assurance briefing
- National Security Technology Gallery tour
- Strategic Alliances briefing
- Professional and competency development curricula
- Targeted networking
- Office supplies and computer setup
- Classroom training

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Former participant Will Rice (5953) says, “The People Initiative onboarding was a really good way for me to learn not only about the division’s capabilities, but also some of the important problems we are working to solve.”

The People Initiative SharePoint site (http://tiny.sandia.gov/s5x27) offers a one-stop reference utility for the program. In addition to information about onboarding, the website provides links to the individual centers, important documents, candidate pipeline resources, center hiring needs, recruitment, workplace satisfaction surveys, professional development, perks, and archives.

A feedback form is incorporated for the purposes of gauging usefulness and effectiveness, as well as incorporating improvements.