Adventures in microsolar produce dazzling results

Solar ‘glitter’ supported by microelectronics and MEMS techniques

By Neal Singer

The idea of building a solar collector out of pieces the size of glitter at first seems peculiar. How would the tiny pieces be joined together? How would electricity be harvested from each piece? The costs seem prohibitive to wire the back of each tiny cell so that electrons — converted from incoming photons — can be properly channelled.

Yet Sandia benchtop aggregations of exactly such tiny photovoltaic (PV) collectors have resulted in inexpensive and efficient electricity-generating cells that have aroused commercial interest. The cells are fabricated of crystalline silicon, using microelectronics and microelectromechanical systems.

(Continued on page 4)

Sandia at 60: A brief history

To mark the culmination of Sandia’s 60th anniversary year, Labs historian Rebecca Ullrich and ITS Strategic Office Dept. 303 Manager John Taylor have written a brief but pointed history of the Labs since its inception in 1949. Follow the arc of the Labs’ evolution from its origins in the earliest days of the Cold War to the role it continues to play in the post-9/11 world. The story, illustrated with archival photos, is on pages 6-7.

Red Sky rated 10th fastest supercomputer

SUPERFAST — KATHRYN CHAVEZ (9233) checks the status of systems that make up Sandia’s Red Sky supercomputer. Red Sky has made the Top500.org list as the 10th fastest supercomputer. Sandia engineers achieved Red Sky’s top-10 performance by temporarily aggregating Sandia’s newest institutional machine with a second system being constructed.

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Managed by Lockheed Martin for the National Nuclear Security Administration

Sandia earns another ‘outstanding’ from NNSA in performance appraisal

Sandia received an “outstanding” rating on the annual Performance Evaluation Report for fiscal year 2009 from the National Nuclear Security Administration. This marks the fourth consecutive year that Sandia has received the highest possible rating.

The report details NNSA’s evaluation of Sandia’s mission-related performance, operations performance, and overall performance. The report defines outstanding as “significantly exceeds the standard of performance in all areas.” The other possible ratings are good, satisfactory, and unsatisfactory.

“Every Sandian should take great pride in this recognition of our significant contribution to the country,” Sandia President and Labs Director Tom Hunter wrote in a memorandum distributed to all employees. “We are able to demonstrate once again that our mission to the country is performed with excellence.”

“While the overall rating was outstanding, our mission execution was rated as outstanding and our operations rating was good. The latter evaluation recognizes some areas of improvement that we need to make regarding safety and our management oversight system.

Leadership in science, technology and engineering

“This laboratory has consistently demonstrated that we can deliver outstanding results to an enormous diverse set of customers, operate with excellence, and lead the nation in key areas of science and technology. Each day I take great pride in my association with an institution of such proud accomplishments.”

In a letter to Tom, NNSA Sandia Site Office Manager Patty Wagner said, “Congratulations on your outstanding score and we thank you and the rest of Sandia for your contributions to the NNSA missions and to the nation.”

“Sandia continues to demonstrate leadership in science, technology and engineering by strategically concentrating on the science that underpins and enables technology for DOE missions,” the report summary said. “Sandia is able to maintain and further develop expertise, facilities and equipment to create world-class science that pushes the frontiers of knowledge, in anticipation of future emerging threats and other mission need.”

The current DOE management and operations contract with Lockheed Martin runs through September 2012.

BATLab funding

Sandia’s Battery Abuse Testing Laboratory will receive $4.2 million in stimulus funds to modify and enhance its existing facility. The lab has been at the forefront of R&D efforts to understand the operational parameters of next-generation batteries. Story on page 5.

Shoes for Kids

There may be no one at Sandia who understands better than SPO Team Captain Pablo Montoya how much the Shoes for Kids program can mean to a child. To find out how the program touched his own life, see the story on page 12.
Okay, would you do it? It’s been reported that Richard Branson, the billionaire adventurer and owner of Virgin Atlantic and Virgin Galactic, intends to offer a free ride on SpaceShipTwo (SS2) to some lucky New Mexico resident each year. This seems to be a good time to pause for a moment to reflect on where we have come from, to remind ourselves of all that we have accomplished, and to ponder where our future may take us. To that end, I asked Sandia historian Rebecca Ullrich (9353) and John Taylor (9303), an accomplished historian in his own right who writes the History Guy blog on Lab News Interactive, to try to tell Sandia’s story in the Lab News in 1,500 words or less. Not an easy task, but I think they’ve done a marvelous job of capturing the big themes that have shaped our unique Sandia culture. You can read their brief history of Sandia on pages 6 and 7.

Can I also direct you to another story? For more than 50 years, Sandians have been supporting our own home-grown Christmas/holiday charity, the Shoes for Kids. See page 12. In this issue, Lab News Interactive has an article written by a Sandia Team Capt. Pablo Montoya (4211), who many years ago was himself a Shoes for Kids recipient. Pablo’s recollections are a testimony to the enduring value of sharing with the less fortunate, of how simple acts of kindness and generosity can resonate through the years.

Finally, as we wrap up another year of publication of the Lab News, I thank all of my colleagues in Dept. 3651 for their extraordinary efforts to produce week in, week out, a quality publication that does Sandia proud. And I thank you, our readers, for your close attention and for the kind words many of you have so generously shared with me throughout the year. And to all, I wish a very merry Christmas, a happy Hanukkah, a joyful Kwanzaa... however you observe this holiday season — whether religiously or secularly — please enjoy it thoroughly.

See you next year.

Bill Murphy  (505-843-0845, MS0165, wmurphy@sandia.gov)

Employee death

Erik Hart a ‘scraggly biker’ who loved playing St. Francis

Erik Hart (2718) died on Dec. 4. He was 59 years old and had been at Sandia 61 years. As a precision grinder in Active Ceramics Dept. 2718, he knew the intricacies of grinding, polishing, and lapping operations in both research and production environments in support of neutron generator operations.

“Erik was an outstanding employee and friend to everyone in the department,” says his supervisor, Chris Armito. “He had an easy-to-like personality. Chris possesses excellent work ethics, always staying on task to ensure the products he produced were of the highest quality.

“If you ever needed Erik, you did not have to look far. He was always working in the grinding area, manufacturing ceramic components or machining fixtures and parts for his team and customers. He did not like phones, but when he did, everyone listened. Erik had a unique insight and perspective on a wide variety of issues where he knew how to resolve problems with wins-win solutions.”

Thomas Pehr (2626) says Erik was definitely not a book you could judge by its cover. “He had the typical ‘Hells Angels biker look,’ which could be very intimidating,” says Thomas, “but he was one of the nicest persons you’d ever meet. Erik would usually eat his lunch outside on the south dock of our building. Every day he would take some chips or bread crumbs and spread them out for the birds and squirrels that lived there. It looked a bit odd to see a scraggly biker playing St. Francis, but that is the contradiction that Erik was.

“If you didn’t know him, you might think he was a grumpy old guy,” says the co-worker and friend of Erik, Tom Pifer (2718). “But he had a heart of gold. He could figure out and fix just about anything. Erik had been the head mechanic at Levi Strauss in Texas. He was very interesting, very sensitive.”

David Schroeder, (2718) says Erik was a quiet, humble, and funny guy. “When he was challenged, he would do research and was able to get straight to the point,” says David. “He was very knowledgeable. He was a pilot who loved flying and airplanes. He built several remote-controlled planes and loved to fly them.”

“Erik shared funny stories about his life,” says Rose Torren (1818). “He would always make us laugh and was ready to help with anything. Erik would stay late to finish the project for us and would help with locking the building.”

“Erik was a skilled machinist who brought a fresh look to design projects. He also had the most unique laugh. It was this loud, goofy, hard-to-describe guffaw that would make me smile whenever I heard it.”
Served as former Rep. Ellen Tauscher’s ‘eyes, ears, and voice’ in 10th congressional district

Erik Ridley joins Sandia/California’s Government Relations team

By Patti Koning

Erik Ridley (12122) may be new to Sandia, but he’s a familiar face to many at the California site. For the past six years, Erik worked in the office of Ellen Tauscher, who represented the 10th District of California in the US House of Representatives.

In November, Erik joined the government relations team at the California site, which Karen Scott (12122) has run as a one-person office since 2007. Erik joins the 12100 Institutional Development team.

“Erik brings a history of success in planning and implementing government relations strategies from his time in Washington, D.C., as well as a robust network of contacts and understanding of elected offices,” says Karen. “He has worked with local, state, and federal elected officials from throughout northern California for years, and has a keen understanding of how to build and work with a broad coalition of stakeholders.”

Tauscher resigned from her congressional seat, which she had held since 1997, when President Obama appointed her as Under Secretary of State for Arms Control and International Security. Tauscher’s transition was a natural point for Erik to consider new career opportunities, such as Sandia.

“The congresswoman was very supportive of the two national labs in her district, Sandia and Lawrence Livermore, as well as the entire nuclear weapons complex,” says Erik. “Her passion for national security evolved over the course of her congressional career, and she instilled some of that passion in me. It’s very exciting to continue working in the national interest.”

For the past 10 years, Erik has worked in politics, public policy, and government relations. He started out in Washington, D.C., with a firm that provided political intelligence to Fortune 500 firms and then moved back to California to work for state Sen. Don Perata while he was president pro tempore of the California State Senate. Erik was Tauscher’s local representative, serving as her “eyes, ears, and voice” while she was in Washington, D.C.

“The congresswoman was in the Capitol about 80 percent of the time, so on her behalf I engaged all levels of government – state, local, and federal,” he says. “At meetings and briefings, I discussed policy and advocated her point of view with local mayors, industry representatives, Travis Air Force Base, and even Karen Scott here at Sandia.”

Erik made six visits to Sandia/California, two with Tauscher, during her tenure with her office. In his first month at Sandia, he’s learning about the site from a new perspective.

“My previous job was to have a broad understanding of the national labs as well as a number of other issues,” he says. “I’ve probably learned more in the weeks since I’ve been here than I knew after six years. I viewed Sandia primarily from the perspective of the nuclear weapons mission because that’s what my boss was working on. I visited Albuquerque recently and seeing all the different projects and sites really impressed upon me how broad our capabilities are.”

Teamwork has already paid off

Erik believes his knowledge of the political process and relationships with government representatives at all levels will be an asset to Sandia.

“What makes working with Karen great is she’s had a great career at Sandia and has a phenomenal understanding of our capabilities and the message we need to get across,” he says. “Combining her institutional knowledge with my experience from the other side of the process makes us a very strong team for Sandia.”

“Erik brings a history of success in planning and implementing government relations strategies from his time in Washington, D.C., as well as a robust network of contacts and understanding of elected offices.”

— Karen Scott (12122)

Washington, D.C.

“Erik brings a history of success in planning and implementing government relations strategies from his time in Washington, D.C., as well as a robust network of contacts and understanding of elected offices.”

— Karen Scott (12122)

on Nov. 12.

At the town hall meeting, Garamendi sat between Livermore Mayor Marshall Kamena and Glenn Kubik, director of Biological and Materials Science Center 8600.

“The fact that he made Livermore his first stop and included Sandia in the program is a great first step,” says Erik. “Our job is to help him understand Sandia and its importance. He doesn’t know a lot about Sandia yet, but why would he? It wasn’t in the scope of his previous roles.”

Sandia definitely felt a loss when Tauscher left her congressional seat, as she was the chairwoman of the Armed Services Subcommittee, which held sway over the entire nuclear weapons complex. Erik says he is excited about working with Garamendi and his staff.

“He’s an experienced legislator who has also worked in D.C., which is important coming in midterm,” he says. “It’s just a matter of putting the issues before him.”

Garamendi was the California state insurance commissioner from 1991 to 1995, the US Deputy Secretary of the Interior from 1995 to 1998, the California state insurance commissioner again from 2003 to 2007, and the lieutenant governor of California from January 2007 until his election to Congress.

Singapore delegation visits Sandia sites in California and New Mexico

PERMANENT SECRETARY Teo Ming Kian (seated, center) and other members of Singapore’s National Research Foundation (NRF) pose with Div. 6000 VP Rick Stulen, Div. 4600 VP Les Shephard, and other laboratory staff during a recent visit to Sandia’s California site. Sandia is leading an effort to establish the Transformational Energy Innovation Laboratory (TEIL), a new institute for multidisciplinary team science, at the Campus for Research Excellence And Technological Enterprise (CREATE) of Singapore’s NRF. The NRF delegation visited Sandia/New Mexico as well as Sandia/California.

(Photo by Randy Wong)
Red Sky at night, Sandia’s new computing might
Supercomputer rated as world’s 10th fastest in Top500.org’s latest listing

Stephanie Holinka

Engineers working on Sandia’s newest supercomputer have received some welcome recognition for their hard work: Red Sky made the November 2009 Top500 list as the 10th fastest computer in the world. Sandia’s engineers achieved Red Sky’s top-10 performance by temporarily aggregating the Labs’ newest institutional machine with a second system being constructed using the same architecture and components.

That second system, sponsored by the DOE’s Office of Energy Efficiency and Renewable Energy, will sit adjacent to the Red Sky project in the National Renewable Energy Laboratory’s building 100. (MEMS) techniques.

Project lead investigator Greg Nielson (1749-2) says the research team has identified more than 20 benefits of scale in converting the photovoltaic effect into micromechanical cells. These include new applications, improved performance, potential for reduced costs, and higher efficiencies.

For large-scale power generation, says project partici- pant Murat Okandan (1749-2), “One of the biggest scale benefits is a significant reduction in manufacturing and installation costs compared with current PV techniques.”

Part of the technical cost reduction comes about because micromcells require relatively little material to form well-controlled and highly efficient devices. From 14 to 20 micrometers thick (a human hair is approximately 70 micrometers thick), they are 10 times thinner than conventional 6-inch-by-6-inch, brick-sized cells, yet perform at about the same efficiency.

“So they use 100 times less silicon to generate the same amount of electricity,” says Murat. “Since they are much smaller and have less mechanical deformation for a given environment than the conventional cells, they may also be more reliable over the long term.”

Another manufacturing convenience is that the cells, because they are only hundreds of micrometers in diameter, can be fabricated from commercial wafers of any size, including today’s 300-millimeter (12-inch) diameter wafers and future 450-millimeter (18-inch) wafers. Further, one cell per wafer can be manufactured, the rest still can be harvested, while if a brick-sized unit goes bad, the entire wafer may be unusable. Also, brick-sized units fabricated larger than the conventional 6-inch-by-6-inch cross section to take advantage of larger wafer size would require thicker power lines to harvest the increased power, creating more cost and possibly shading the wafer. That problem does not exist with the small-cell approach and its individualized wiring.

Shade tolerance bests conventional PV
Other unique features are available because the cells are so small. “The shade tolerance of our units to over- head obstructions is better than conventional PV panels,” says Greg, “because portions of our units not in shade will keep sending out electricity where a partially shaded conventional panel may turn off entirely.”

Based on the simplicity of geometry, they can be easily fabricated, high-efficiency PV for ubiquitous solar power becomes more feasible, says Murat. “Eventually units could be mass-produced and wrapped around unusual shapes for building-integrated solar, tents, or clothing,” he says. This would make it possible for hunters, hikers, or military personnel in the field to recharge batteries for electronic devices as they walk or rest.

Storage at the chip level
Even better, such microengineered panels could have circuits imprinted that would help perform other functions customarily left to large-scale construction with the attendant need for field construction design and permits. Says Sandia field engineer Vinip Gupta (6318), “Photovoltaic modules made from these micro-sized cells for installations customarily left to large-scale construction with the attendant need for field construction design and permits. Says Sandia field engineer Vinip Gupta (6318), “Photovoltaic modules made from these micro-sized cells for...”

To Greg, Murat, and Vipin, are Jose Luis Cruz-Campa (1749-1), Paul Remick (1749-1), Tommy Playfon (1746), Peggy Clowers (1746), Carlos Sanchez (1746), Bill Swatt (1512), Tony Lertitte (1727), Anton Filatov (1749-1), Mike Sinclair (1816), Mark Overberg (1742), Jeff Nelson (6318), Jennifer Granata (6353), Craig Carlingman (6353), Rick Kemp (1815), Connie Stewart (1815), Jonathan Wierer (1125), Jerry Simmons (1120), Jason Strauss (1717), Judith Lavin (6318), and Mark Warnes (NREL).

The work is supported by DOE’s Solar Energy Technology Program and Sandia’s Laboratory Directed Research and Development program and has been presented at four technical conferences this year. The ability of light to produce electrons, and thus electricity, has been known for more than a hundred years. Are there other applications beyond terrestrial solar power? “Absolutely!” says Greg. “We envision this technology impacting many areas of Sandia’s business including submarines and remote sensing, in addition to supporting warfighters.”

(Continued from page 1)
$4.2 million in stimulus funds directed to Sandia’s Battery Abuse Testing Laboratory

By Stephanie Hobby

Environmentalists and car enthusiasts have been anxiously awaiting next year’s full-scale debut of electric cars that can run up to 40 miles on a single charge. But before those vehicles end up in your driveway, they will have to be tested and some have made in keeping our nation safe.”

During a Nov. 18 visit to be briefed on Sandia’s capabilities and programs, Deputy Secretary of Energy Daniel Poneman announced that Sandia’s BATLab will receive $4.2 million in stimulus funds to modify and enhance its existing facility. The funding is part of a $104.7 million American Recovery and Reinvestment Act package awarded to seven DOE national laboratories, to provide important technological insights to further develop the nation’s clean energy efforts.

“It’s so terribly important that we keep the nation’s work moving in this direction,” Poneman said. “As a nation have relied on the national laboratories since the time of World War II and well over half a century; to keep this nation strong, to keep us at the cutting-edge of science, of innovation in the service of the nation, and in the service of the American people. The scientists and engineers who have been working all these years at Sandia are owed a great debt of gratitude by the American people for the tremendous progress they have made in keeping our nation safe.”

For years, the nation has relied on Sandia’s BATLab to test lithium batteries in the relatively safe confines of a lab to make batteries in the relatively safe confines of a lab to make something imaginable to hybrid and plug-in electric hybrid vehicles. But before those vehicles end up in your driveway, the lithium-ion batteries that power them will have been through some serious abuse — including being crushed, punctured with nails, heated to boiling hot temperatures — to test the limits of what they can safely handle and provide critical scientific data for developing the next generation of batteries.

Sandia’s Battery Abuse Testing Laboratory (BATLab) has been at the forefront of this effort, doing everything imaginable to hybrid and plug-in electric hybrid batteries in the relatively safe confines of a lab to make sure that once they hit the road, they will provide safe and reliable transportation. And now, the BATLab is getting ready to offer more in-depth quantitative analysis as it prepares to test even more batteries.

Pete ROTH examines a component undergoing tests at Sandia’s Battery Abuse Testing Laboratory. (Photo by Randy Montoya)

“Pete and his team are already internationally recognized for this work, and this funding will help us to sustain that leadership position into the future as the auto manufacturers start to implement these lithium battery packs into their vehicles,” said Tom Wunsch (2546), manager of Advanced Power Sources R&D Dept. 2546.

“This funding is an answer to a lot of our hopes and aspirations for where this program could go. Even though we’ve had programmatic support, we’ve been getting by on a shoestring in terms of facilities and equipment support,” Pete says. “I think this is going to take us into a whole new regime of conducting the science and testing we’ve always dreamed of doing. It’s going to be very beneficial.”

PETE ROTH examines a component undergoing tests at Sandia’s Battery Abuse Testing Laboratory. (Photo by Randy Montoya)

Sandia adds water power to clean energy research portfolio

By Stephanie Holinka

Sandia will receive more than $9 million over three years from a DOE competitive laboratory solicitation for the development of advanced water power technologies.

Sandia, through a partnership with several national laboratories and academic institutions, will lead two of the four topic areas awarded under the grant and will provide technical support in a third topic area. The topic areas are Supporting Research and Testing for Marine and Hydrokinetic Energy, Environmental Assessment and Mitigation Methods for Marine and Hydrokinetics Energy, Supporting Research and Testing for Hydropower, and Environmental Assessment and Mitigation Methods for Hydropower.

“We will perform fundamental research to develop and assess technology breakthroughs and help promote a vibrant industry that is currently in its beginnings,” says Jose Zayas, manager of Wind and Waterpower Technologies Dept. 6333.

Water power technologies contribute to the diversification of our nation’s energy mix,” Joe says, “by providing clean energy in areas near population centers as well as enhancing our nation’s energy security. Water power technologies could leverage an indigenous resource in parts of the country where other technologies may not be viable.”

Jose will add water power research to the department’s wind energy portfolio. He will oversee a multidisciplinary team drawn from many areas of Labs expertise, including structural and marine engineering, environmental monitoring and stewardship, performance modeling, and testing. The department will pursue a diverse research agenda in marine hydrokinetics (MHK) systems and will collaborate with Argonne (ANL) and Oak Ridge (ORNL) national laboratories on conventional hydropower.

Technology evaluation

Rich Jepsen (6333), a specialist in water resources engineering, will lead the project to examine the cost-effectiveness and reliability of technology for MHK technologies, which include wave, current/tide, and thermal energy conversion. Rich’s water power research will also evaluate the use of Sandia’s lake facility, used for large-scale wave testing.

In partnership with Oak Ridge National Laboratory, Pacific Northwest National Laboratory (PNNL), and the National Renewable Energy Laboratory (NREL), activities will evaluate new device designs and conduct basic research in materials, coatings, adhesives, hydromechanics, and manufacturing to assist industry in bringing efficient technologies to market.

The research will evaluate methods to develop advanced water power technologies designed to improve the performance of existing hydropower facilities. Sandia will work with NREL, the other lead in the technology area, in the direct design and testing of new technologies.

Environmental stewardship

Jesse Roberts (6333), a specialist in sediment transport and hydrology, will lead Sandia’s research agenda to describe and quantify environmental impacts caused by new and existing marine and hydrokinetic technologies. The team will evaluate environmental factors including rates of sediment transport, water flow, water quality, and acoustic changes. The results will help quantify the types and magnitude of environmental impacts for various new and existing technologies.

Researchers will collaborate with industry to develop criteria for selecting locations for projects and select technology to monitor and mitigate such impacts. Sandia will partner with ORNL, PNNL, and ANL in this work.

“The gap between research institutions and industry is incredibly large;” Jesse says, “Sandia will work with universities to leverage already-existing world-class facilities for research to provide students and faculty the opportunity to work on water power problems and technologies.”
MINING SIX DECADES OF SERVICE

By Rebecca Ulrich and John Taylor

In As You Like It, Jaques remarks that “All the world’s a stage … And one man in his time plays many parts, His acts being seven ages.” As Sandia enters its seventh decade, let us examine the highlights of its ages.

BEGINNINGS

Sandia began in 1945 as Z Division of Los Alamos with a mission of consolidating nuclear weapon engineering efforts. That group eventually moved to Kirtland Army Airfield, New Mexico, for its proximity to the military, an airstrip, and space to grow. By 1949, the site separated from Los Alamos, and Sandia Corp., a wholly owned subsidiary of Western Electric, was created.

By the late 1950s, this expansion left the Lab with new and unique design and testing capabilities. The internal focus remained on ensuring that there were sufficient personnel, appropriate expertise to support the new efforts. Upfront management pushed for both educational advancement and a deeper research capability. As the first in a series of educational programs, the Technical Development Program, or TDP, was initiated. Sandia also began to push in the sciences, focusing on materials science to both explore what was happening at materials metals and to provide improved materials for weapon designs.

During the Early Cold War

DURING THE 1960s, Sandia continued its role in developing nuclear weapons. Although the number of weapon designs declined in the 1960s, the Lab moved into advanced development efforts, improving passive-remote link technology and planning nuclear safety stud- ies in response to high-profile nuclear accidents at Go severely, Thule, and Talmage.

The laminar flow clean room originated in 1959, when Willis Whitfield was asked to address the problem of removing particulates from the environment for manufacturing. Willis Whitfield was asked to address the problem of removing particulates from the environment for manufacturing.

TWO MACHINE laser power generators helped understand the fusion process. Sandia was the primary assembly site for nuclear weapons from 1948 to 1952.

The Energized Eighties

The 1980s started with the Soviet invasion of Afghanistan, a turning point in the Cold War was essentially over. Three new nuclear weapons, the W88, the W89, and the B61, were put into production and development efforts began in 1982, the W88, the W89, the B61, B61-12, these, only the W88 for the Trident missile would survive to enter the stockpile.

ACTIVE DIVERSIFICATION came in the form of alternative energy research, a role that has increased substantially over the years.

By the 1970s, Sandia was deeply involved in alternative energy research, a role that has increased substantially over the years.

The FALL OF THE BERLIN WALL marked the beginning of the end of the Cold War. In the post-Cold War world, Sandia’s mission would evolve to address new challenges.

However, the Sandia can do attitude prevailed. Major programs were initiated to prevent the spread of nuclear technology by among the Struggling Korean nuclear establish- 

ments along with an innovative Cooperative Monitoring Program that focused on nuclear facilities in the Adriatic and South Asia.

Sandia remained focused on military areas; however, the Lab focused its new effort on other forms of energy production, including the B61, and the W76, and the B61, and the W76, and the B61, the W76, and the B61.

Sandia Corporation in 1945, when it was all a part of Los Alamos Laboratory called Z Division.

The Berlin Blockade, the first Soviet nuclear test, and the beginning of the Korean War brought the Cold War to America’s doorstep. In response to the threat, the U.S. government began to build a new generation of nuclear weapons, the B53. The Lab also pro- vided nuclear effects and explosives expertise to the Navajo Project.

As Sandia enters its seventh decade, let us examine the highlights of its ages.

Jaques’ seventh age of man is “second childhood” with a largely negative context. Sandia seems destined to “upstage” Jaques by identifying second childhood as a rebirth of the energy and enthusiasm that has characterized the Lab for its six decades and that meets President Truman’s 1949 challenge to perform “exceptional service in the national interest” for many decades to come.
Is Explora a family fun center or part of grandma's attic?

By Iris Aboytes

Where do you go if you want to experience science firsthand besides Sandia? Explora. Explora is a new kind of learning place, providing real experiences with real things that put people's learning in their own hands. According to its website, Explora is part science center, part children's museum, part free-choice school, part neighborhood full of interesting people, and part of many people's lives.

In its third year, the Portal to the Public (PoP), a National Science Foundation-funded project, Explora brings together visitors and Albuquerque scientists to engage in experiential activities.

"More than 50 scientists, mostly from Sandia, have participated in the PoP program," says Kristin Leigh, Explora education coordinator. "They have worked with Explora educators and exhibit developers to create dynamic activities that help Explora visitors explore topics like hydrology, cell growth, nuclear engineering, and more."

Explora board member Len Duda (5737) sees Explora as a comfortable place that opens the door to science learning for visitors.

"Through Explora, science learning is hands-on, and it's fun," says Len. "Explora creates excitement. All you have to do is see children's faces as they are filled with amazement."

As a child, Sandian Cecilia Venuk (4871) got good grades in math but rarely experienced fun or enjoyment. "In high school, I was fortunate to have math and science teachers that mentored my skills and interests and helped me understand and grow to appreciate math and science," she says. "In college, my journey continued and my appreciation became challenging and rewarding. I spent several years tutoring in math and science, which reinforced my understanding, but also taught me the importance of sharing my skills and excitement of math and science with others."

When she was growing up, Aleksandra Faust (5533) spent hours trying to program her computer and observe the results. "Through trial and error, I was finally able to understand it," she says. "It was fun and eventually led to my career. I am hoping to bring a similar experience to Explora visitors by developing materials that will introduce computer programming in a fun, experimental way. In addition to that, my own children, 5 and 2, are my big motivation for me to participate in this program. We spend lots of time at Explora and it was an opportunity to introduce them to what I do professionally."

"The PoP fits well with Explora's core value of community," says Leigh. "Albuquerque has one of the largest scientific research centers in the state at Sandia National Laboratories, but 40 percent of our ninth-graders don't graduate from high school. There is a gap in the community in that respect. We want Explora visitors to see scientists as neighbors in their community."

For 9-year-old Pojoaque Valley Intermediate School student C.J. Law, Explora is really a family fun center. "There are rainbow lights, balloons, and water activities," says C.J. "You get to learn about gravity and static electricity. It is cool. Instead of just sitting down and listening to people talk, you get to do all the fun stuff."

Theodore Borek (1822) wants kids to have hands-on science experiences. "I have been involved with science outreach with kids for many years and these outreach experiences have been very rewarding for me."

"Explora is the best place in the world to be," says S.Y. Jackson third grader Maddie Lund. "I hope I can go there during Christmas break."

The following active Sandians currently volunteer at Explora:

- Marissa Reno (6733)
- Curtis Peters (6771)
- Sandra Faust (5533)
- Jim Bronder (5536)
- Eric Spoerke (1816)
- Wayne Trott (1512)
- Malcolm Carroll (1725)
- Leslie Phinney (1513)
- Ted Borek (1822)
- Marlene Brown (5737)
- Dave Dell (5622)
- Cecelia Venuk (4871)
Online computer program aids food producers in assessing vulnerabilities

Individual farmers can play roles in national defense, says Sandia researcher

By Neal Singer

A n online computer program Sandia helped develop two years ago to protect the entire US food manufacturing industry — from field to retail or food services — from malicious interference has been extended for use by farmers and food producers.

The idea is to make step-by-step tools available to assess and mitigate vulnerabilities in food production processes, says Sandia principal investigator Phil Pohl (6761).

“Every US farmer can help in this effort merely by clicking the online program and taking the steps suggested there,” he says.

The tool, called Agriculture CARVER + Shock, was field-tested in Lancaster, Pa., and Baltimore, Md., on actual potential users and is supported by the US Department of Agriculture and the US Food and Drug Administration, says Phil.

The program asks food producers a series of questions about each component of their production process. Based on the responses, Ag CARVER provides scores for those components and specific risk-mitigation measures are recommended. These might include upgrades or enhancements to physical security, process operations, or a change in personnel practices. Information entered by the program user is not recorded by either FDA or USDA.

The software is free and available to the public at http://www.fda.gov/Food/FoodDefense/CARVER.

“While this particular program is designed primarily for harvest and preharvest food production operations, ‘we’ll update the 2007 manufacturing version over the next few months and have plans to produce the retail and food service version next year,’” says Phil.

Formal computer program Sandia researchers David Haaland (8622) and David Myers (1770) were elected Fellows of the American Association for the Advancement of Science (AAAS) last week in San Diego. AAAS Fellows began in 1874.

Fellows are elected to recognize distinguished contributions to science and its applications. The tradition of electing AAAS Fellows began in 1874. New Fellows will be presented with an official certificate and a gold and blue (representing science and engineering, respectively) rossette pin on February 20 at the AAAS Fellows Forum during the 2010 AAAS Annual Meeting in San Diego.

Two Sandia researchers elected AAAS Fellows

By Neal Singer

Sandia researchers David Haaland (8622) and David Myers (1770) have been elected Fellows of the American Association for the Advancement of Science. Election as a Fellow is an honor bestowed upon AAAS members by their peers.

Dave Haaland was cited for “distinguished contributions in the area of chemometrics and spectral imaging, especially in the application of multivariate spectral analysis techniques.”

His work helps materials researchers to simultaneously use many frequencies of light to perform more accurate analyses. His collaborative work in spectral imaging has also dramatically expanded the capabilities of research fluorescence microscopes to obtain more information from images of subcellular structures in live human, animal, and plant cells.

Dave Myers was cited for “contributions to the science, management, and early application of ion implantation, lattice-mismatched heteroepitaxy, and microelectromechanical systems for commercial and national security applications.”

He was a major contributor in the early development, maturation, and eventual commercialization of the science and technology of ion implantation, especially as applied to strained-layer semiconductors for national security applications. Later, as a program manager, Dave also contributed to the maturation of these technologies, as well as to micro-electromechanical systems for national security applications.

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Sandia’s Safeguards and Security program and for Sandia’s Microsystems and Photonic Systems Program Center, accountable for design and construction of the Microsystems and Engineering Sciences Applications (MESA) complex. In 2003, he assumed program director responsibilities for Sandia’s Infrastructure Program and for Sandia’s Microsystems and Photonic Systems Program Center, accountable for design and construction of the Microsystems and Engineering Sciences Applications (MESA) complex.

Former Sandia director Don Cook tapped to serve in senior NNSA position

former Sandian Don Cook has been nominated for the job of deputy administrator for defense programs at NNSA. A 28-year veteran at the Labs, Don worked in pulsed power sciences, microtechnologies, infrastructure, and security. From 1999-2006, he was director of the MESA Program Center, accountable for design and construction of the Microsystems and Engineering Sciences Applications (MESA) complex. In 2003, he assumed program director responsibilities for Sandia’s Infrastructure Program and for Sandia’s Microsystems and Photonic Systems Program Center, accountable for design and construction of the Microsystems and Engineering Sciences Applications (MESA) complex.
**Retiree Richard Sons honored as Master Model Railroader***

By Iris Aboytes

Young children look forward to getting their first model train for Christmas. They play with it a while and then put it away. Retiree Richard (Dick) Sons has never put his train away. In fact, he has kept building more and more of them.

Richard recently received the highest award in the nation as the 429th Master Model Railroader from the National Model Railroad Association.

He has been one of 15 members of the Rio Grande Valley Model Railroad Club for more than 30 years. The club makes sure that the railroad exhibit at Expo New Mexico is realistic and exciting. Dick spends many hours making sure each train rides its own rail, has its own destination, and does not get in the way of the other trains. At each train's terminus or convergence towards the inevitable ultimate crash, like magic, at exactly the right instant, each train makes it through and continues on its own path. Visitors become mesmerized as they view the exhibit.

Dick was an engineer at Sandia for 32 years. His engineering experience enables him to construct electrical circuit systems that are used not only in the Expo exhibit but throughout the nation.

“Dick uses his trains as a means of preserving New Mexico history,” says his wife Marjorie. “One day, we drove west of Los Lunas to see an old bridge that was going to be destroyed. He took photos of the bridge and its surroundings, then designed a layout to replicate it. It is wonderful seeing it all come to life.”

Dick is an active member in the Friends of Cumbres & Toltec Scenic Railroad in Chama N.M., and an active member of the Santa Fe Locomotive 2926. When he is not building a train, he is riding one.

Richard also is an accomplished competitive classical accordionist, holds ama- teur radio's highest classification, and is active in the restoration of Albuquerque's steam engine 9296.

“We all need to take our hobbies, our interests, or our skills and be the best that we can be,” says Dick. “It is not always about the money we make. When we share our talents for others to enjoy, we are also giving others entertainment, information, and assistance: Volunteer.”

* Dick passed away shortly after being interviewed for this story.

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**‘Shoes for Kids was my window into Sandians’ generosity’**

By Iris Aboytes

As Pablo Montoya (4211) helps Arturo select a pair of shoes, he remembers a young boy of 9 years ago, who experienced the same excitement. Through Sandia’s Shoes for Kids Program, Pablo and his three younger sisters received new shoes.

“Cuáles zapatos le gustan (Which shoes do you like?),” Pablo asks Arturo. With tears of joy running down his cheeks, Arturo proceeds to find his special pair. "It was that little boy," says Pablo. “It seems like it was yesterday. Seeing Arturo is like seeing me all over again.”

“When I participated in the program more than 35 years ago, we would go get ice cream at a place called Soda Straw before we headed back to school,” says Pablo. “We never came into the city, so that in itself was exciting. Like the children we fit today, I did not think I was poor. I just knew there were people who gave us shoes. We even got to pick them out!”

“I will never forget Julian Sanchez, Bill Benedick, and John Shunny. They were theSandians who worked in the program for many years. They were not only Sandians, they became our friends,” Pablo grew up in Escobosa, about 35 miles southeast of Albuquerque in the Manzano Mountains. He and his family of nine lived in a two-room house. One of the rooms was the kitchen, the other was the bedroom. At night he slept on cushions on the floor. “It was no big deal,” says Pablo.

His father Tomas was a dry land farmer.

“If the rains did not come, the crops would not grow. Those years we struggled.

“Once a month my dad and mom would come into the city in a wagon pulled by horses to get our provisions and commodities,” says Pablo. “We did not have a car. My sisters and I stayed at the rancho tending to the animals and working in the fields. We lived in such a different world.

“We planted beans, peas, and corn,” says Pablo. “My mother Barbara would can vegetables for the winter. We would keep the beans we needed and take the rest to sell in the distance.”

After high school, Pablo joined the military. “I think it was my way of giving back,” he says. Pablo recently retired after 25 years of service in the US Army Reserve after returning from his tour of duty in Iraq.

“Thank you for the wonderful clothes and old-fashioned shoes,” he says. 

“I don’t take anything for granted. I know about hard work. I believe that is why I am so passionate and dedicated to my work here.”

Pablo says he has always donated to Shoes for Kids, but this is the first year that he has actually helped fit shoes. “Immediately I had feelings of joy,” says Pablo.

“I would have never imagined I would be working for the company whose employees’ generosity put shoes on my feet. As a child, I did not think I was worthy of working here. I will always be indebted to Sandia’s National Laboratories.”

Pablo has been at Sandia 24 years.

Sandia’s Shoes for Kids program began 53 years ago. Instead of exchanging gifts or cards with one another, two Sandia scientists decided they would spend the money to benefit others. They bought shiny new shoes for children.

Over the years, word spread and Sandia’s Christmas program has grown. Since 1959 each year has been a new all-time high in donations. Last year, Sandia employees and retirees donated more than $17,000.

The children are selected to receive shoes by their teachers. Twenty-two schools participate in the program. To date, more than 11,500 pairs of shoes have been donated. Several bus companies provide transportation.

Donations can be made to in person to any of the Sandia Laboratory Federal Credit Union branches to account number 223180, Shoes for Kids Fund, or online transfer to SLFCU 223180, 90-01 shoes, or by mail to P.O. Box 23040, Albuquerque, NM 87122-0140.

For information, contact Patty Zamora (3652) at 505-844-2146.

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**The Shoes for Kids story**

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