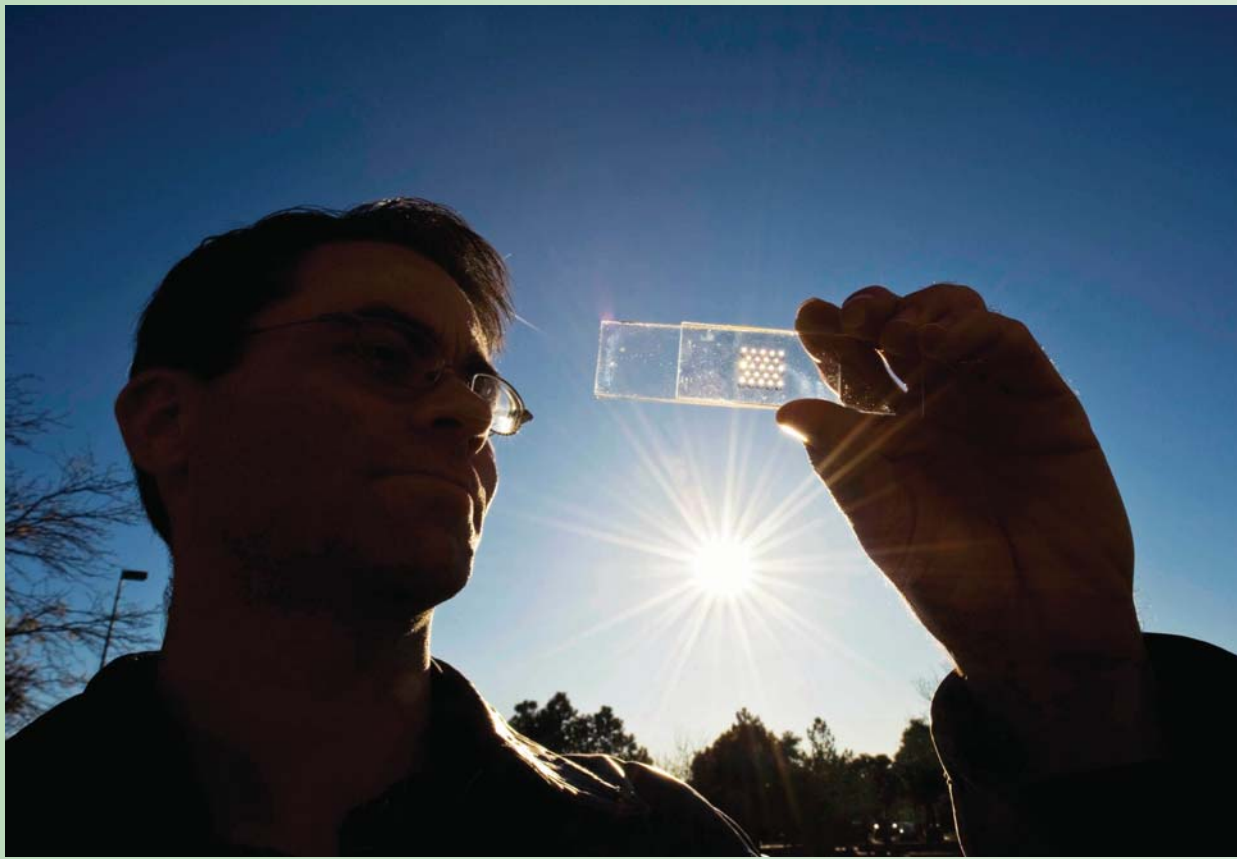


Adventures in microsolar produce dazzling results



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 channeled.

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 microelectronic and microelectromechanical systems

(Continued on page 4)

PROJECT LEAD Greg Nielson holds a solar cell test prototype with a microscale lens array fastened above it that together will help create a concentrated photovoltaic unit .

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 (9323) 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 on the planet. Sandia engineers achieved Red Sky's top-10 performance by temporarily aggregating Sandia's newest institutional machine with a second system being constructed using the same architecture and components. Story on page 4. (Photo by Randy Montoya)

Sandia LabNews

Vol. 61, No. 24 December 18, 2009

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 enormously 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 needs."

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

"This laboratory has consistently demonstrated that we can deliver outstanding results to an enormously diverse set of customers, operate with excellence, and lead the nation in key areas of science and technology."



TOM HUNTER



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.

Also inside . . .

- Erik Hart loved playing Saint Francis 2
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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.

That's that

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. That seems only fair and reasonable, since New Mexico taxpayers are helping finance construction of Spaceport America down near White Sands Missile Range.

SpaceShipTwo is the brainchild of Branson and radical aircraft designer Burt Rutan (that is, his designs are radical; regarding his politics, I haven't a clue). SS2 is essentially a scaled-up version of a craft that Rutan designed (with financing from Microsoft's Paul Allen) to capture the X Prize, which awarded \$10 million to the first private-sector team to launch a human being into space and return him or her safely to Earth. Rutan achieved that first with SpaceShipOne back in 2004; shortly after that stunning success, the aircraft designer and the adventurer inked a deal to take the enterprise commercial. Thus was born Virgin Galactic.

Now, "galactic" may be a bit of a stretch. While it makes for a catchy name, the fact of the matter is that the first paying customers – at a cost of \$200,000 apiece – will hardly be getting their toes wet, galactically speaking. Still, they'll be lofted to just over 60 miles (which is considered to be the edge of space), see the curvature of the Earth as you'll never see it from a conventional airliner, and experience about five minutes of zero-g.

Here's how the Virgin Galactic website describes the literal high point of the spaceflight: "After a graceful mid-space summersault you find yourself at a large window and what you see is a view that you've seen in countless images but the reality is so much more beautiful and provokes emotions that are strong but hard to define."

So, I ask again, if your number came up and you were selected as the lucky New Mexican to get a free ride on SpaceShipTwo, would you do it? Would you seize the chance to know firsthand something that just 510 humans from 38 countries have ever experienced? I know I would.

* * *

As we come to the end of this consequential 60th anniversary year of Sandia, it seems to me a good time to pause for a moment to reflect on where we came 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 (9532) and John Taylor (0303), 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 program. On page 12, Iris Aboytes writes about a fellow Sandian, 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.

* * *

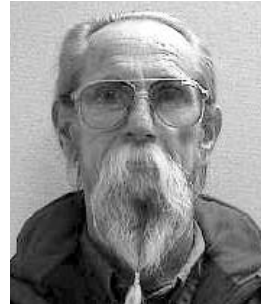
Finally, as we wrap up another year of publication of the *Lab News*, I thank all of my colleagues in Dept. 3651 for their extraordinary efforts to produce week in, week out, a quality publication that does Sandia proud. And I thank you, our readers, for your close attention and for the kind words many of you have 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 (505-845-0845, MS0165, wtmurph@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 10 years. As a precision grinder in Active Ceramics Dept. 2718, he worked in a variety of grinding, polishing, and lapping operations in both research and production environments in support of neutron generator operations.



ERIK HART

"Erik was an outstanding employee and friend to everyone in the department," says his supervisor, Chris Armijo. "He had an easy-to-like personality. Chris possessed strong 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 teammates. He did not talk much, but when he did, everyone listened. Erik had a unique insight and perspective on complicated issues and knew how to resolve problems with win-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 live 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 Toni 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 Torres (1818). "He would always make us laugh and was ready to help with anything. Erik would stay late to finish a project for us and would help with locking the vault."

"Erik was a skilled machinist who brought a fresh look to design problems," adds Thomas. "Erik also had the most unique laugh. It was this loud, goofy, hard-to-describe guffaw that would make me smile whenever I heard it."

Sandia LabNews

Sandia National Laboratories

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LOCKHEED MARTIN

Pedestrian/bike path links IPOC, Tech Area 1



A new pedestrian/bike path connecting Tech Area 1 and the Innovation Parkway Office Center (IPOC) and other Sandia Science and Technology Park locations opened Tuesday, Dec. 1. Operational hours are 6 a.m.-6 p.m. A turnstile/bicycle gate allows access to and from Tech Area 1 immediately south of the contractor gate at the extreme south end of Eubank. Prior to the project's completion, says project lead Carol Bicher (4846), pedestrians and bicyclists had to proceed north through the Eubank Gate along with all of the traffic entering and leaving the base. They were not allowed to proceed through the contractor gate. Now those wanting to ride or walk between the two points, Carol says, have a safer and more convenient route, adding that the new gate encourages walking and biking for better health, and reduces vehicle use.

With Carol at the gate dedication are Center 4800 Director Jeff Quintenz (holding the scissors) and Senior Manager Lynnwood Dukes (4820).

(Photo by Lloyd Wilson)

Erik Ridley joins Sandia/California's Government Relations team

Served as former Rep. Ellen Tauscher's 'eyes, ears, and voice' in 10th congressional district

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 until June 2009 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 as a member of 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



ERIK RIDLEY

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 his 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."

That teamwork seems to have paid off already. John Garamendi became the US representative for California's 10th Congressional District after winning a special election on Nov. 3. After being sworn in and voting on health care legislation, he held his first congressional town hall meeting in Livermore

"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 Kubiak, 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.

Sandia California News

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. 8000 VP Rick Stulen, Div. 6000 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 Labo-

ratory (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 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 Red Sky and be operated by Sandia to support work done at the National Renewable Energy Laboratory.

Red Sky achieved a peak performance of more than 500 teraflops (or 500 trillion mathematical operations per second), and an impressive 433.5 teraflops against the Linpack benchmark commonly used for ranking supercomputing speed.

In addition to raw horsepower, the Labs' newest supercomputer has been designed to maximize its energy efficiency.

"Red Sky should really be called Green Sky," says John Zepper (9320), senior manager of Computing Systems & Technology Integration. "This

machine is the most energy-efficient high-performance system we have deployed to date."

The system uses a newly designed power distributing system that significantly reduces power leakage and a unique cooling system that is more than 95 percent efficient in cooling the system's multitude of computer racks.

"The Red Sky project has leveraged Sandia internal intellectual property and expertise in partnership with Intel and Sun Microsystems to deliver a leading-edge high-performance computing system," says Rob Leland, director of Computing and Network Services Center 9300.

Red Sky uses a number of innovative technologies, such as interconnect switches designed jointly by Sandia and Sun. These switches were used to build the first implementation of a 3-D torus

interconnect topology using InfiniBand networking. The system is also believed to be the first InfiniBand-based system that uses optical interconnect cables exclusively.

For computing, the system uses Sun's latest high-density dual node computer blades, which come with Intel's new Nehalem processors.

Red Sky began supporting a limited set of Sandia users this past June and is expected to be in full production this January.



Microsolar

(Continued from page 1)

(MEMS) techniques.

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

For large-scale power generation, says project participant 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 potential cost reduction comes about because microcells 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 deformations 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, if one cell proves defective in manufacture, 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 overhead 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."

Because flexible substrates 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, and maybe even clothing," he says. This would make it possible for hunters, hikers, or military personnel in the field to recharge batteries for phones, cameras, and other 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 Vipin Gupta (6338), "Photovoltaic modules made from these micro-sized cells for

cent efficiency. Off-the-shelf commercial modules range from 13 to 20 percent efficient.

A widely used commercial tool called a pick-and-place machine — the current standard for the mass assembly of electronics — can place up to 130,000 pieces of glitter per hour at electrical contact points preestablished on the substrate; the placement takes place at cooler temperatures. The cost is approximately one-tenth of a cent per piece with the number of cells per module determined by the level of optical concentration and the size of the die, likely to be in the 10,000 to 50,000 cell per square meter range. An alternate technology, still at the lab-bench stage, involves self-assembly of the parts at even lower costs.

Solar concentrators — low-cost, prefabricated, optically efficient microlens arrays — can be placed directly over each glitter-sized cell to increase the number of photons arriving to be converted via the photovoltaic effect into electrons. The small cell size means that cheaper and more efficient short focal length microlens arrays can be fabricated for this purpose.

Reduced costs

High-voltage output is possible directly from the modules because of the large number of cells in the array. This reduces costs associated with wiring, due to reduced resistive losses at higher voltages.

The project combines expertise from Sandia's Microsystems Center, Photovoltaics and Grid Integration Department; the Materials, Devices, and Energy Technologies Group; and the National Renewable Energy Lab's Concentrating Photovoltaics Group.

Involved in the process, in addition to Greg, Murat, and Vipin, are Jose Luis Cruz-Campa (1749-1), Paul Resnick (1749-1), Tammy Pluym (1746), Peggy Clews (1746), Carlos Sanchez (1746), Bill Sweatt (1512), Tony Lentine (1727), Anton Filatov (1749-1), Mike Sinclair (1816), Mark Overberg (1742), Jeff Nelson (6338), Jennifer Granata (6335), Craig Carmignani (6335), Rick Kemp (1815), Connie Stewart (1815), Jonathan Wierer (1123), George Wang (1126), Jerry Simmons (1120), Jason Strauch (1717), Judith Lavin (6338), and Mark Wanlass (NREL).

The work is supported by DOE's Solar Energy Technology Program and Sandia's LDRD 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 satellites and remote sensing, in addition to supporting warfighters."



THE NEXT-GENERATION GARAGE BAND? — From left to right, Murat Okandan, Greg Nielson, and Jose Luis Cruz-Campa, holding samples containing arrays of microsolar cells, are more interested in productions involving photovoltaics. (Photo by Randy Montoya)

the rooftops of homes and warehouse could have intelligent controls, inverters, and even storage built in at the chip level. Such an integrated module could greatly simplify the cumbersome design, bid, permit, and grid integration process that our solar technical assistance teams see in the field all the time."

A commercial move to microscale PV cells would be a dramatic change from conventional silicon PV modules composed of arrays of 6-inch-by-6-inch wafers. However, by bringing in techniques normally used in MEMS, electronics, and the light-emitting diode (LED) industries, the change to small cells should be relatively straightforward, Vipin says.

Each cell is formed on silicon wafers, etched, and then released inexpensively in hexagonal shapes, with electrical contacts prefabricated on each piece, by borrowing techniques from integrated circuits and MEMS.

Offering a run for their money to conventional large wafers of crystalline silicon, electricity presently can be harvested from the Sandia-created cells with 14.9 per-

\$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, the lithium-ion batteries that power them will have been through some serious abuse — including being crushed, pounded with nails, and 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 beat up even more batteries.

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. "We as a nation have relied on the national laboratories since the time of World War II, 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 everything from regular small cells about the size of a laptop computer battery up to modules and packs weighing several hundred pounds for the DOE-funded FreedomCAR hybrid vehicle initiative. And while the BATLab team has been recognized for its ability to per-



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

form scientific analysis and a full range of measurements, members face a number of limitations.

"The equipment and facilities that we currently have allow us to do only one test at a time, so our throughput has been somewhat limited," says Pete Roth (2546), lead researcher for Sandia's FreedomCAR program. "The new equipment and upgrades that we will be able to implement will enhance the amount and range of testing and diagnostics that we can do, and we expect to at least be able to double our throughput."

Those upgrades include fire suppression, improved lighting, and advanced electrical systems, as well as new software and analytical equipment to help diagnose battery responses and provide data for manufacturers.

Such improved efficiency will allow Sandia to continue to build on its past success, and offer increasingly valuable

contributions to the nation's FreedomCAR effort.

"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 modules and packs into their vehicles," says 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."

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.

Sandia is adding water power to its already multidisciplinary energy portfolio. "Water power technologies contribute to the diversification of our nation's energy mix," Jose says, "by providing clean energy in areas near high 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 materials and manufacturing research, 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



WATERMEN — Rich Jepsen, left, Jose Zayas, and Jesse Roberts (all 6333) are part of a team that is developing advanced water power technologies. (Photo by Randy Montoya)

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, hydrodynamics, and manufacturing to assist industry in bringing efficient technologies to market.

The research will evaluate methods

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.

In both stewardship and evaluation, Jose 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.

"Sandia will work to bridge the gap between research institutions and industry by helping to develop technologies that deliver cost-effective and reliable energy while also committing to the importance of environmental stewardship," he says.



MARKING SIX DECADES OF SERVICE



By Rebecca Ullrich 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 ordnance engineering activities. That group eventually moved to Kirtland Army Airfield, a site chosen for its proximity to the military, an airfield, and space to grow. By 1949, the site separated from Los Alamos, and Sandia Corp., a wholly owned subsidiary of Western Electric, was created.



SANDIA AERIAL VIEW in 1945, when it was still a part of Los Alamos Laboratory called Z Division.

The Berlin Blockade, the first Soviet nuclear test, and the beginning of the Korean War firmed the resolve of policymakers to maintain a war reserve nuclear weapon stockpile, and by 1953 Sandia's role included non-nuclear design, testing, production, and military liaison. Sandia was also the primary assembly site for nuclear weapons from 1948 to 1952.



LITTLE BOY

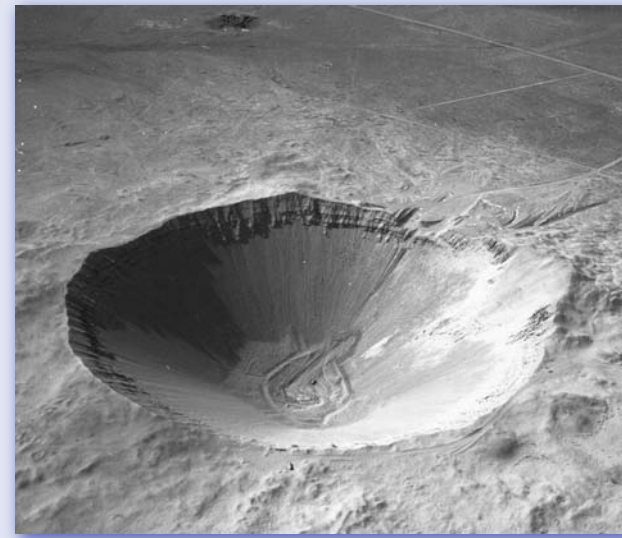
THE EARLY COLD WAR

During the 1950s, both the numbers and types of nuclear weapons "exploded." Transistors, printed circuit boards, and the introduction of missiles as a delivery system pushed smaller, lighter designs. Introduction of low-maintenance, ready-for-use weapons and the lay-down capability drove redesign of many nonnuclear components and systems. Sandia expertise expanded to design and test the resulting technologies, innovating in parachute design, materials science, and data capture during testing. The workforce and the site grew. Unique test facilities, beginning with a rocket-powered centrifuge and expanding to include additional centrifuges, drop towers, sled tracks, and shock facilities were added over the years. By the end of the decade, plans were underway for nuclear reactor facilities to expose components to a variety of radiation environments. The Lab also opened a second facility in Livermore, Calif., in 1956 and added the Salton Sea site and Tonopah Test Range to its arsenal of capabilities.



SANDIA LIVERMORE in 1958, two years after it was established across the street from the Lawrence Livermore laboratory.

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 with appropriate expertise to support the new efforts. Upper management pushed for both educational advancement and a deeper research capabilities, piloting the first in a series of educational programs, the Technical Development Program, in 1959. Sandia also began to hire PhDs in the sciences, focusing on materials science to both explore what was happening as materials interacted and to provide improved materials for weapon designs.



PROJECT PLOWSHARE sought ways to harness nuclear explosives for peaceful purposes.

Nineteen fifty-nine proved a banner year for change in other areas. As Sandia achieved maturity in its primary mission area, it began to move into spinoff areas, including the Vela program to detect nuclear detonations; Sandia participated in both the seismic detection and satellite components of Vela, work that became significant permanent lines of business for the Lab. The Lab also provided nuclear effects and explosives expertise to the Plowshare Program.



WILLIS WHITFIELD in the laminar flow clean room in 1959.

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 close-tolerance parts. This work led to Sandia's first commercial spinoff, with the improved clean room transforming surgery, food handling, and manufacturing.

Although the number of weapon designs declined in the 1960s, the Lab moved into advanced development efforts, improving permissive-action link technology and pursuing safety studies in response to high-profile nuclear accidents at Greensboro, Thule, and Palomares.



DURING THE 1960s, Sandia continued to refine weapon components.



Active diversification came in the form of alternative energy research, beginning in the early 1970s. Declines in defense and government research spending also led to a series of layoffs, causing retrenching and the elimination of some advanced programs.



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

THE ENERGIZED EIGHTIES

The 1980s started with the Soviet invasion of Afghanistan, but by the end of the decade, the Cold War was essentially over. Three new nuclear weapons, the W84, the W85, and the B83, were put into production, and development activities began on the W82, the W88, the W89, the B90, the B91. Of these, only the W88 for the Trident missile would survive to enter the stockpile,



A W88 launch vehicle, the Trident submarine-launched ballistic missile, undergoes test-firing in the Pacific.

although that outcome was far from clear in the mid-1980s. In addition, 10 nuclear weapons, ranging from the venerable W31 to the relatively young W66, were retired. The residents of "Weapon City" were busy indeed! On the other side of the coin, revenue from WFO programs reached 50 percent of the Laboratory budget for the first time, a harbinger of things to come.

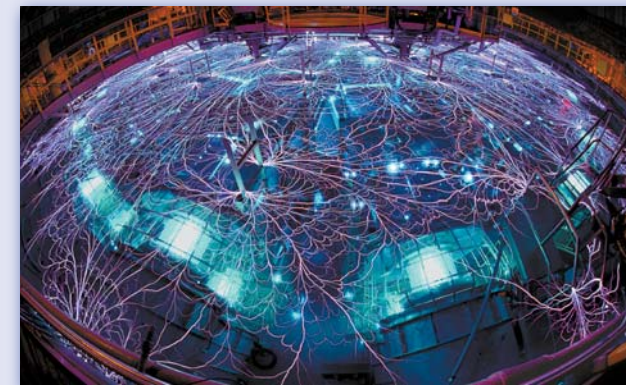
The thawing of the US-Soviet relationship that began under President Reagan finally bore fruit with the signing of the INF Treaty in 1986. Sandia played a major role in both the negotiation of this landmark agreement and in its implementation. The unprecedented portal-perimeter monitoring system installed at the Votkinsk Missile Plant was designed, prototyped, and constructed at Sandia and



PERIMETER MONITORING SYSTEM undergoing tests at Sandia.

then disassembled and flown to the Soviet Union. Sandia also participated in the Joint Verification Experiment, a set of jointly monitored nuclear detonations at the Nevada Test Site and the Semipalatinsk Test Site.

Reagan's Star Wars initiatives gave Sandia the impetus to upgrade its weapon effects and pulsed power fusion



Z MACHINE pulsed power experiments have helped understand weapon effects without nuclear testing.

work in Area 4. The Lab also started what would become a major initiative with the Defense Department to examine nuclear weapon technologies that might be adapted to improve our conventional weapon capabilities.

The catastrophic nuclear accident at Chernobyl, following on the heels of the less severe, but politically sensitive, event at Three-Mile Island, also brought nuclear power back into a rather negative public spotlight, and Sandia worked in its niche specialties of waste disposal, transportation, and risk assessment to try and minimize those aspects of the problem for policymakers. Work on other forms of energy production, including solar and wind, continued.

Science took a front-row seat with development of the Center for Radiation-hardened Microelectronics and its successor, the Materials Development Laboratory.



WILLIS WHITFIELD during a tour of Sandia's Materials Development Laboratory, a facility that grew out of Willis's invention of the laminar flow clean room in the 1950s.

TRANSITIONS IN THE NINETIES

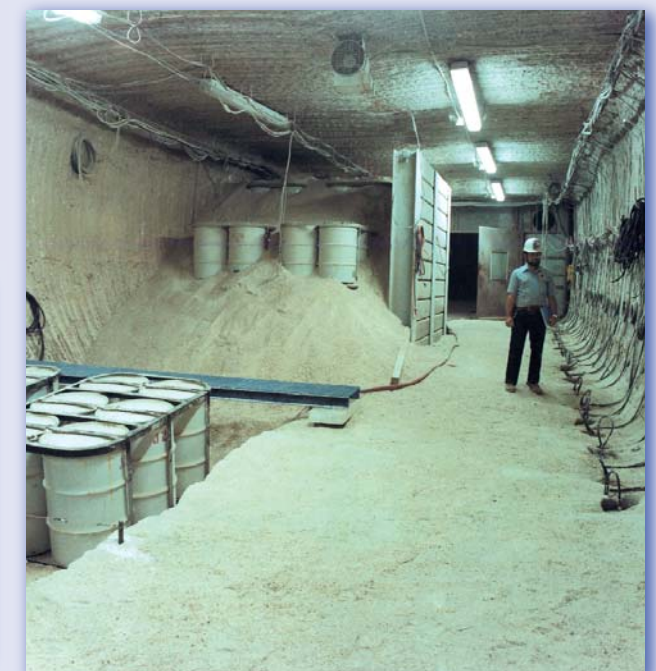
The fall of the Berlin Wall and the collapse of the Soviet Union ushered in a period of transition and change at Sandia. The apparent loss of our nation's primary adversary, the change from AT&T to Lockheed Martin oversight, the increasingly shrill debate over maintaining an aging weapon stockpile and its associated infrastructure, the end of underground testing, and the substantially increased oversight by DOE in the form of the Tiger Teams all jarrd the traditional stability of the Lab.



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 weapon technology by assisting the struggling Russian nuclear establishment, along with an innovative Cooperative Monitoring Program that focused on relief of regional tensions in the Middle East and South Asia. Sandia increased its emphasis on modeling and simulation in support of the DOE Science-Based Stockpile Stewardship program, and we rose to the occasion by implementing new and more stringent ES&H requirements.

The end of underground testing made the Area 4 accelerators even more critical to stockpile certification and, for a time, Sandia had no active nuclear weapon development programs. Instead, the focus was on more agile and environmentally friendly production of components for existing weapon systems. In addition, litigation over the WIPP site continued, finally leading to the issuance of an operating permit in 1999. Design and evaluation work continued at Yucca Mountain.



SANDIA was a key player in the opening of the Waste Isolation Pilot Plant near Carlsbad, N.M.

NEW THREATS EMERGE

On the morning of Sept. 11, 2001, the world changed. Certainly each of us knows exactly where he or she was when the regular programming on KOB or KGO was interrupted with news of the terrorist attacks. We reacted with a full-court press in homeland security, adapting long-term expertise in areas such as radiation monitoring, physical security, and explosives detection to direct efforts by Sandia in the area of homeland security.



THE 9/11 ATTACKS led to ramped-up efforts by Sandia in the area of homeland security.

Stimulated by a new war in Afghanistan, the ongoing conflict in Iraq, and continued concern over the availability of low-cost, climate-friendly sources of energy, work for others funding



SANDIA-DEVELOPED synthetic aperture radar has been a key capability for the modern American warfighter.

has grown to more than 60 percent of Laboratories revenue. Technologies such as synthetic aperture radar, enhanced combustion, and advanced robotics have gained broad acceptance.

There was something of a hiatus in arms control in the early part of the decade, but interest resumed following the 2008 presidential election. The MESA project, Sandia's largest-ever construction project, began in the spring of 2002 and finished three years early and under budget in August 2007.

Even with uncertainties about the nuclear weapon budget, Sandia continued to fulfill its historic responsibilities to help to keep the stockpile safe, secure, reliable. Improvements were made to several weapon systems, including the B61 and the W76, and Sandia engineers continue to work with Los Alamos, Livermore, and Pantex to ensure that the weapons in the stockpile retain their capabilities.



AS SANDIA enters its next 60 years, its stewardship of the nation's nuclear deterrent remains a critical mission.

Jaques' seventh age of man is "second childhood" with a largely negative context. Sandia seems destined to "upstage" Jacques by redefining second childhood as a rebirth of the energy and enthusiasm that has characterized the Labs 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 grandma's attic, part grandpa's garage, part laboratory, 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



CARLOS COX engages visitors with a variety of materials to help them explore lenses and mirrors. (All photos courtesy of Explora)

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."



MELISSA MARTINEZ uses wooden models of mechanical locks to help visitors experiment with mechanical sensors that turn on electrical switches.

"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 want 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."

ETHICS IN ACTION: REAL CASES AND OUTCOMES

ETHICS CASE #3

Ethics and Business Conduct Office is proud to introduce **Ethics in Action: Based on Real Cases and Outcomes.** Many Sandia National Laboratories employees want to know when Ethics or Corporate Investigations takes action on reports of unethical business conduct. Ethics in Action will highlight Sandia National Laboratories Ethics and Corporate Investigations cases, and outline the responsive action taken by the Corporation.

CASE ISSUE: WHAT CONSTITUTES INAPPROPRIATE BEHAVIOR IN THE WORKPLACE?

Background:
A member of management contacted the Ethics office with an allegation that another member of management was displaying inappropriate behavior. The manager in question was using inappropriate language for the workplace (e.g., cursing, etc.).

Issue:
Interpersonal Skills, Intimidation or Harassment (non-sexual)

Facts:
An investigation found that:

- The manager was using foul language that was offensive to the employees.
- The manager's behavior is considered offensive, disrespectful, and unprofessional. This behavior is not acceptable in the workplace.
- The manager's behavior caused the employees to feel intimidated and disrespected.
- The manager was not exhibiting behaviors outlined in Full Spectrum Leadership Imperatives and Attributes.

Resolution/Discipline:
The manager was given a verbal reprimand and counseling.

Applicable Policy:
The manager was in violation of CG100.4.1, Setting the Standard - Code of Ethics and Business Conduct and The Employee Handbook.

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

An 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.



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 multi-variate 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-electro-mechanical systems for national security applications. Strained-layer semiconductors have become the basis for the world’s fastest transistors and integrated circuits as well as for vertical-cavity lasers, photodetectors, and photonic systems.

This year, 531 members have been elected by AAAS steering committees because of their scientifically or socially distinguished efforts to advance science or 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) rosette pin on February 20 at the AAAS Fellows Forum during the 2010 AAAS Annual Meeting in San Diego.



DAVID HAALAND



DAVID MYERS

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.

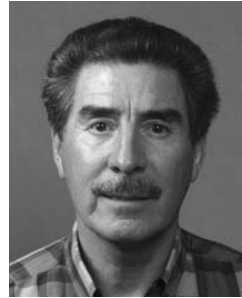
In 2003, he assumed program director responsibilities for Sandia’s Infrastructure Program and for Sandia’s Safeguards and Security Technologies Program, which responded to a new design basis threat. From 1977-1999, Don led efforts in pulsed power accelerator design and experimentation, fusion research, hydrodynamics, radiography, diagnostic development, and computational code development. Most recently, Don was the managing director of the Atomic Weapons Establishment (AWE) in the United Kingdom from 2006 to 2009. In this capacity, he was accountable for AWE’s performance on the contract with the UK Ministry of Defence, which includes support of the UK Trident warheads and development and sustainment of capability in nuclear weapon design, development, manufacturing, qualification, assembly, transport, support in service, and finally, decommissioning, dismantlement, and disposal. — Neal Singer



DON COOK

Mileposts

New Mexico photos by Michelle Fleming
California photos by Randy Wong



Phillip Gallegos
35 2663

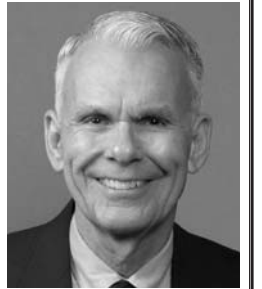


Joan Funkhouser
30 8243



Lynda Hadley
30 8944

Recent Retirees



Jim Rush
42 4844



Fredrick Harper
30 5400



Willie Johns
30 4122



Len Napolitano
30 8900



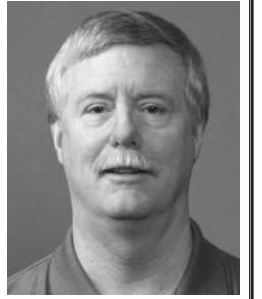
Paul Nielan
30 8116



Chris Robertson
30 6751



John Taylor
34 303



Ken Osburn
31 9515



Patrick Sena
30 2110



Angela Campos
25 9512



Perry Cowen
25 2134



Fran Current
25 2992



James Dotson
25 4844



Karen Marlman
30 4242



Elizabeth Scott-Patterson
30 1300



Mary Garcia
25 6431



Anthony Gomez
25 1522



Brian Schwaner
25 5923



Richard Steeper
25 8362



Mike Tootle
25 8243



Deborah Mulligan 20 10693
Ed Mulligan 25 2552



Chuck Yagow
25 2997



Janise Baldo-Pulaski
20 1505



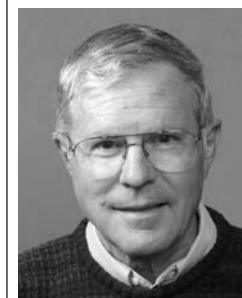
James Davis
20 4856



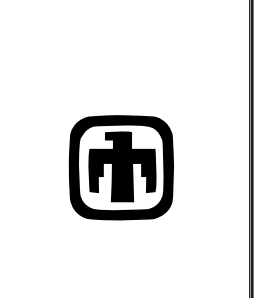
Michael Dugger
20 1813



Reeta Garber
20 10614



Doug Lawson
22 543



William Jenkins
20 8420



Karen Gardner
20 3500



Karen Griego-Peralta
20 6322



Allison Kane
20 212



Dorothy McCoy
20 12123



Timothy Peterson
20 4827



Bryan Spicer
20 6325



Pearl Garcia
15 10621



Shelley Baca
15 8945



Nicholas Francis
15 1514



Bonnie Green
15 8900



Timothy Hobson
15 9329



Nancy Irwin
15 5535



Jeffrey Jarry
15 4139

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. As each train seems to be converging toward 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.



RICHARD SONS' model train layouts have been perennial favorites at the New Mexico State Fair.

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.

"My dad has endless patience and a very impressive eye for detail," says his son Robert. "He spends hundreds of hours working on them. It has become a lost art. Growing up, I remember my dad working on his trains as a means of relaxation after a long day."

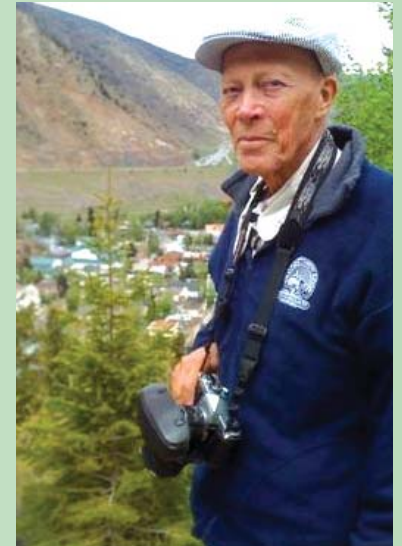
"Dick uses his trains as a means of preserving New Mexico history," says his wife Marjorie. "One day, we drove west of Los Lunas to see an old bridge that was going to be destroyed. He took photos of the bridge and its surroundings, then designed a layout to replicate it. It is wonderful seeing it all 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 amateur radio's highest classification, and is active in the restoration of Albuquerque's steam engine 2926.

"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.



RICHARD SONS

'Shoes for Kids was my window into Sandians' generosity'

By Iris Aboytes



PABLO MONTOYA (4211) shares smiles with Arturo during a Shoes for Kids fitting at the Shoe Dept. in Albuquerque. (Photo by Cheryl Garcia)

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.

"*Cuales zapatos te gustan* (Which shoes do you like?)," Pablo asks Arturo. With tears of joy running down his cheeks, Arturo proceeds to find his special pair. "I 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 the Sandians 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 Barbarita would can vegetables for the winter. We would keep the beans we needed and take the rest to sell in Estancia."

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.

"My upbringing was very disciplined and old-fashioned," 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,

The Shoes for Kids story

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 1999 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 pair of shoes have been donated. Several bus companies provide transportation.

Donations can be made 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 87192-1040.

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



ROLE MODEL — Pablo Montoya with new friends at a Shoes for Kids fitting. (Photo by Randy Montoya)



SISTERS wait excitedly to be fitted for new shoes. (Photo by Randy Montoya)

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 National Laboratories." Pablo has been at Sandia 24 years.

The two-room house that he grew up in has been remodeled and Barbarita still lives there. The house now has three rooms and a bathroom.

"You can't fully appreciate the Shoes for Kids program until you have experienced it," says Pablo.