

Z-Beamlet image shows Z evenly compresses pellet

Third biggest laser in world reopens for business under new management

By Neal Singer

In its first try as a Sandia diagnostic tool, Sandia's Z-Beamlet — the third largest laser in the world — confirmed that Sandia's Z machine — the most powerful laboratory producer of X-rays in the world — spherically compressed a simulated fusion pellet during a firing, or "shot," of the giant accelerator.

Uniform 3-D compression is an essential step in creating controlled nuclear fusion. It means that almost none of the X-ray energy delivered to the pellet is squirting uselessly away. Instead, the energy is compressing the pellet and forcing its atoms closer to fusing.

Until now, Z researchers had to be content with electronic images of smoother and smoother Z pinches — the tool of compression. The pinch — a vertical magnetic cylinder — impels ions of tungsten toward its vertical axis at a considerable fraction of the speed of light. But knowing that the tool is good and getting better isn't definite information about the pellet upon which the tool is operating. Only direct data is entirely convincing, or, to put it in a more homely way, seeing is believing.

Z-Beamlet images the pellet in a kind of giant dental X-ray, says project director John Porter (1673). In a burst of energy only a fraction of a billionth of a second long, it takes a snapshot by creating a shadow on a piece of X-ray film placed behind the BB-sized pellet inside the central chamber of the firing Z machine. The shadow, like the picture taken of a tooth, accurately depicts what is going on in the "mouth" of Z. Eventually, an electronic recorder will replace the film.

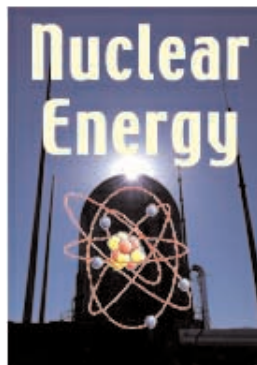
The comparison with the dental X-ray process is closer than it might appear. The laser's light itself is not used to create the pellet image. Higher frequencies of light are needed to produce better



SURROUNDED BY Z-BEAMLET — Technologist Benjamin Thurston (1673) examines the debris shield that protects the giant Z-Beamlet laser's final focusing lens from flying debris when the Z accelerator fires. The lens is square because the beam generates an approximately 12-inch-square footprint, like a kind of flying pancake, until focused down to approximately 100 microns. (Photo by Randy Montoya)

information. So the beam, after traveling 75 yards from a former warehouse adjacent to the Z building, is turned downward 90 degrees into the maw of Z, where it is focused to a small spot about the diameter of a human hair. Because the duration of the pulse is about 300 picoseconds — about enough time for light, which can travel around

the earth seven times in a second, to travel about four inches — an extremely powerful beam is created because of the short time duration in which its energy is expended. The powerful beam striking the metal plate causes the plate to release X-rays. It is these X-rays, as they emanate from a single (Continued on page 4)



If the rest of the country was flush with power this summer, why couldn't some of it be sent on "the grid" to California? The reason is that no single national grid exists. There are actually 10 grids. Read about them in Howard Kercheval's story on page 8.

Battery-based energy storage system grows into multimillion-dollar industry

By Chris Burroughs

Garth Corey (6251) feels somewhat like a proud parent. His child — a battery-based energy storage system he helped develop in the mid-1990s — has grown into a multimillion-dollar industry.

Today he watches as large semiconductor wafer manufacturing plants, pharmaceutical companies, power utilities, and credit card companies around the world adopt the technology.

The system, originally called PQ2000 Power Quality Supply System and now sold as the Pure-Wave Uninterruptible Power System (UPS) by S&C Electric Co. in East Troy, Wis., is made up of hundreds of ordinary lead acid truck batteries that store energy. It also has a sensing device that monitors a power line for voltage sags, swells, or momentary interruptions.

When the system senses something amiss, it transfers the load in less than four milliseconds to stored battery energy. This acts as a high-power voltage source for a minimum of 30 seconds before returning the equipment to normal power service as the momentary disturbance passes. If the inter-

(Continued on page 6)

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Classified network enters Internet age

Some 2,000 Labs employees linked to Sandia Classified Network

By Chris Burroughs

The charge was huge. Bring Sandia's classified network into the Internet age.

That was one of Pace VanDevender's charges when he took over as Chief Information Officer (9400) four years ago.

His overall mandate was to make the Labs' information infrastructure a "differentiating advantage for people doing engineering, science, and manufacturing." The classified network was a major part of meeting that mandate.

Today some 2,000 Labs employees are linked to the Sandia Classified Network (SCN), which was rolled out last November with rapid expansion of classified desktops this year. Also, workers with a need to know at Lawrence Livermore and Kansas City were added to the system this spring and summer with other DOE facilities scheduled to come on board soon.

"The SCN and classified e-mail that is part

of it helps engineers and scientists do their jobs better and more efficiently," Pace says. "Lots of information is available on it and more is being added daily. It's faster and easier than previous systems and reduces work time."

A classified electronic environment was started at Sandia in the mid-1980s. However, not being web-based, it was cumbersome to use. Individual groups had their own local networks, making it difficult to share information with people in other organizations who had a need to know.

By the 1990s it was recognized that a non-common, need-to-know classified network was essential for Sandia and the other weapons laboratories to do their work. As a result, in 1996 Sandia initiated the Classified Network Security Architecture (NwSA) Project championed by Hank Witek (now 2910). Hank has maintained

(Continued on page 4)

NNSA's Gordon calls for action on continuing diversity problems 3

Lockheed Martin gives APS science cluster program \$250,000 7



This & That

Even VPs need a break – If you’ve been around Sandia long, you’ve waited days, weeks, maybe months for someone in management to review and approve something. But sometimes we get pleasant surprises.

One of my hundreds of important tasks for Sandia in addition to writing this vital column is to clear (via e-mail) certain Sandia news releases involving Lockheed Martin with Wendy Owen, LM Technology Services VP of Communications, in Cherry Hill, N.J. After e-mailing her one to review last week, I got her reply *four minutes* later, approving it with no changes. I couldn’t resist sending her a return message thanking her for the approval but asking, “What took you so long?” Her immediate reply: “I had to run to the bathroom.” Don’t you just love it when you find a corporate VP with a real sense of humor?

Speaking of Wendy, she presented a \$250,000 check Aug. 9 to Albuquerque Public Schools on behalf of Sandia and Lockheed Martin to help fund a new program to prepare students in math, science, and technology disciplines (see photo on page 7).

* * *

Hot line or lukewarm line? – One of my colleagues complains that one Sandia service group that has a phone number it advertises as a “hot line” seldom answers it in person and that he recently left a message and didn’t get a return call for several hours. Such hot lines “ain’t so hot,” he observes, and that obviously makes him pretty hot!

* * *

Amusing names, final list – A few more amusing business names and slogans have trickled in from employees and retirees after they read others in the last two issues:

- Sue Stillie (6516) says there is a sign along highway 44 south of Farmington for an automotive repair shop: “Malfunction Junction.”

- Retiree Charles Karnes recalls several years ago seeing a small maternity shop in Rhode Island called “The Watermelon Seed.” I’m not sure all women would find that name amusing, especially those about 8.5 months pregnant. I wonder whether it’s still in business.

- Finally, a Sandian who didn’t want his name used wasn’t sure whether the owner of this small-town Montana business intended to redefine the term “full service” when naming it: The “Triangle Motel and Gun Shop.” (Because he asked to remain anonymous, it did make me wonder whether he knows the ol’ Triangle a little better than he admits.)

* * *

How I save energy – Although electricity “brownouts” have eased in the US, I remain convinced we must use electricity and all forms of energy wisely. To show my dedication to this cause, I’ve started a new schedule that saves energy at work: I arrive late and leave early daily, which saves Sandia electricity because I use my lights, computer, etc., fewer hours. Sure, I have to work harder than other Sandians when I’m here to get everything done, but I’m willing to do it for the good of the Labs!

– Larry Perrine (845-8511, MS 0165, lgperri@sandia.gov)

Paul Robinson: A memorable day with President and a thank you to Sandians

Sandia President and Labs Director C. Paul Robinson spent much of the day Wednesday, Aug. 15, in the company of President George W. Bush during Bush’s visit to Albuquerque. The next day Paul wrote this personal note to employees.

Yesterday I spent an extraordinary day participating in a number of events with the President of the United States during his visit to Albuquerque. It was truly a memorable day for me — from the arrival of Air Force One to the final speech of the evening, in which the president made reference to “the exciting work of our labs” that are “making important advances, not just for New Mexico, but for the nation.” Similarly, I was very graciously welcomed at the ribbon-cutting for the Hispano Chamber of Commerce building and its associated Barelás Job-Training Center.

Sandia/Lockheed Martin was one of the first contributors to the fund for the new building, and many Sandians have made exceptional contributions in making the computer equipment operational in the job center. Everyone in the chamber was extremely grateful for our efforts.

All of these events made me pause to reflect on what wonderful relationships we now have with the community. The efforts all of you are making to partner with community organizations and to volunteer your time to make Albuquerque a better place to live are being noted by many. Thank you for the great job you do in showing by your examples what great people make up Sandia National Laboratories. I enjoy being your president every day, but yesterday I truly enjoyed representing you and harvesting the good feelings toward Sandia that were so evident throughout the events. For that I want to say thank you!

— C. Paul Robinson

“All of these events made me pause to reflect on what wonderful relationships we now have with the community.”

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Roger Hagengruber new director of UNM institute

Senior VP Roger Hagengruber (5000) has been named Director of the Institute for Public Policy (IPP) at the University of New Mexico, effective Aug. 1. In that role, he will help guide the university and Sandia as they explore opportunities for expanded collaborations in the interactions of policy and technology.

The UNM post is a part-time position and Roger will continue with his current responsibilities as senior vice president for national security and arms control at Sandia.

The IPP — part of UNM’s political science department — is a nonpartisan forum for research, analysis, data collection, and training. A major focus has been research to understand public perceptions of the risks associated with technology-related activities and subjects, such as nuclear waste management, deterrence, and genetically altered foods.

“Relationships between technology and policy have become increasingly of interest to both UNM and Sandia,” says Roger, “and the IPP is an important research capability for addressing the societal element of technical issues.”

Roger has served as an adjunct professor of political science at UNM for more than 20 years,



ROGER HAGENGRUBER

and began his association with IPP in the mid 1980s, serving on its advisory board.

“Sandia has been supportive of my work with UNM for many years,” he says. “I believe that the Laboratory has the view that interactions of this type develop strategic opportunities of enormous potential for both institutions.”

Retiree deaths

Albert Cherino (age 71)May 31
Arturo Jimenez (71)June 22
Tony V. Gallegos (83)June 18
Ruth E. Randolph (82)June 24
Leonard E. Baker (80)July 4
Bobby D. Kindsvater (68)July 5
Fred B. Grey (92)July 6
Brian H. Finley (79)July 7
John E. Westbrook (83)July 8
Orrin E. Smith (81)July 14
Betty M. Brake (81)July 21

Sympathy

To Richard (12610) and Kay (3333) Sanderville on the death of his mother and her mother-in-law, Phyllis Sanderville, in Albuquerque, Aug. 5.

To Bobbie Williams (12111), on the death of her mother, Bernice Lee, in Albuquerque, July 1.

NNSA's Gordon: Diversity problems a catalyst for action

By Chris Burroughs

Gen. John Gordon, administrator of the National Nuclear Security Administration (NNSA), told an audience at Sandia/California last week that "diversity is not our mission, but it's a key to the successful accomplishment of our mission."

He discussed the importance of diversity within the NNSA during a talk that was video linked to Sandia/New Mexico's Steve Schiff Auditorium. The California audience consisted of people from both Sandia and Lawrence Livermore National Laboratory.

Gordon said diversity is important if "we want to perform at the world-class level and if we want an effective and efficient work force."



JOHN GORDON

questioning still continued.

Gordon said that after talking to Wu, he is "convinced this was not racial profiling."

"We treat all visitors that way," he said, citing two other instances he personally knew about where individuals without badges were asked if they were US citizens.

Gordon said Secretary of Energy Spencer Abraham requested that he form a small group to look at racial profiling at DOE. The group concentrated on the 1999 report by the Task Force on Racial Profiling established in the wake of the Wen Ho Lee case. The report contained 19 recommendations. However, implementation of the recommendations has been unequal.

"Many of the recommendations were partially implemented, exist only in paper, and remain in bureaucratic purgatory," he said. "We don't need more studies and we don't need more ideas. We just need to complete what we know needs to be done."

The group said in its report that the original 19 recommendations should be narrowed, tasks be assigned to specific individuals, and dates be established to make sure the recommendations are accomplished.

The group also recommended that diversity efforts be focused in three areas: leadership, trust building, and communication.

Gordon said clear policy statements need to be made in the area of leadership. He noted there appears to be a lack of trust by some people of their immediate supervisors and "maybe the system

itself." People with grievances are unwilling to bring their issues forward. Hence, the need for trust building. Regarding communication, he said it was important to talk about the problems — as people were doing at this meeting — and expand on best diversity practices being used successfully at the different laboratories.

During a question-and-answer segment after his brief remarks, Gordon was asked what he was doing to set a tone of diversity at NNSA. He said the "senior leadership of NNSA looks like a white guy's club" but that it is better at the office director level. Part of the reason is that there has not been enough mentoring or opportunities created. He said NNSA needs to spend more effort in that area.

Tri-Labs Diversity Workshop

Directors and senior managers from Sandia, Lawrence Livermore, and Los Alamos national laboratories will participate Aug. 24 in a Tri-Lab Diversity Workshop in Albuquerque. The meeting is at the request of Gen. John Gordon, administrator of the National Nuclear Security Administration (NNSA), who wants the leaders to identify issues and develop improved procedures for resolving workforce diversity issues. Although the meeting will focus on the Asian Pacific Islander American community, the format is intended as a regular means of addressing diversity issues for other employees at the laboratories. Also attending will be some 60 EEO/diversity professionals from the three labs and representatives of various ethnic-minority outreach groups.

Sandia California News

"We must not be cut off from any of the great talent in America, and we can't limit the most talented Americans from achieving their potential."

He noted that DOE "doesn't have a great record in the area of diversity." Surveys tell of serious concern, and several recent high-profile cases have indicated problems exist as well.

"Because of these high-profile events over the last couple of years, diversity has been seen as an Asian American problem," Gordon said. "But it's not [just an Asian American problem]. That's what's at the forefront for the moment."

The high-profile events have spawned high tensions among Asian Americans. The truth, he said, is that these events "serve as a catalyst for action that includes all."

Among the prominent cases he mentioned were Wen Ho Lee and a recent situation with Oregon congressman David Wu. Wu went to DOE headquarters to attend a meeting and wound up at an entrance where he wasn't expected. Guards stopped him and asked if he was a US citizen. He showed them his Congressional ID card, but the

Microfluidics technology goes to Eksigent

Eksigent Technologies has signed a license agreement with Sandia that secures rights to Sandia's microfluidics technology for use in many applications in chemical analysis, biotechnology, proteomics, drug discovery, microelectromechanical systems, and microelectronics. Microfluidics is the movement, manipulation, and measurement of tiny amounts of fluid.

"We are very excited about transferring this promising technology from the national laboratories and continuing its development in the private sector," said Don Arnold, cofounder of Eksigent. "Combined with additional efforts at Eksigent, this technology will soon be ready for integration into commercial products."

Initial target applications include chemical analysis systems for the life sciences industry, where

microfluidics systems incorporating the licensed technology can offer much higher analysis speed, throughput, and efficiency than conventional systems.

"Sandia is fully committed to the technology transfer process and we look forward to further advances from the team at Eksigent," said Sandia's John Vitko, Director of Exploratory Systems and Development Center 8100. John oversaw the development of μ ChemLab™ at Sandia.

Eksigent Technologies is a start-up company dedicated to commercialization of the EKPump technology discovered by its founders. Prior to May 2000, Eksigent's technical personnel led development of portable chemical analysis systems at Sandia, including breakthrough technologies that form the basis of Eksigent's extensive suite of microfluidic technologies.

Students receive job advice from promising young scientists

By Nancy Garcia

Navigating the thickets of transition from college to career was the topic of a panel discussion earlier this summer in Livermore. The five panelists represented Sandia, industry, and Lawrence Livermore.

Opportunities such as this question-and-answer session, the panelists agreed, are very helpful for preparing to enter the world of work. "When you go to school," said Alf Morales (8729), "you get almost no career advice, almost no career training. Professors don't know what it's actually like to have a real job." Summer students, postdoctoral fellows, and early-stage career employees were invited to attend the talk.

Doing work you care about that fits the larger mission of the organization, staying focused, and seeking out information were all common threads of advice in the discussion.

"As scientists," said LLNL genomics researcher Joanna Albala, "we spend a lot of time selling ourselves in a very valuable way. If you have a passion about what you do, it's very easy to sell."

She almost literally sells her projects, since she is responsible for securing her own funding through a variety of grants — a resourcefulness she initially developed when she needed to piece

together enough money for living expenses during graduate school (in that case, she received a student loan to supplement her research stipend).

"Money starts to come from different directions if people see you're motivated," said Christina Back, a laser scientist. "You're not always going to know 10 years out what your funding is." For instance, she accepted a year-long post working with a colleague in France and was able to stretch the research experience another 18 months through continued funding. Overall, she called that sojourn "not always easy, but positive."

Pat Bresenhand, a biologist who helps develop new genomics tools for Amersham Pharmacia Biotech Inc., said only 20 percent of the doctorates in her field obtain the tenure-track academic posts that their training is primarily designed for, so it is important to consider a broader array of possibilities.

In any setting, she added, "learning how to get money is a skill you need to acquire," one that primarily relies on being able to express how your work benefits society.

Asked what led to success, panelist Christine Hartmann-Siantar said her academic career would not have foretold her later achievements. She has been widely recognized for helping cre-

ate an FDA-approved radiation-dosing approach called Peregrine, but joked that the most anyone might say of her school career was that she "got through." Her motivation and curiosity to forge new inroads were engaged while she was an undergraduate physics student who watched seven family members succumb to cancer in 18 months. She wondered why physicians' tools were not better. Through her efforts, she said she found "there's usually more money around than vision and leadership."

She continued, "The only reason I've had any success at all is that I've had good mentors. If someone comes around with a vision, people who are very competent will come and help."

Albala, meanwhile, credits serendipity for much of her success. She told listeners that one of the precepts she likes to live by is, "Success is when preparation meets opportunity."

And Alf concluded by giving several pieces of advice for people beginning a technical career. He recommended establishing a good baseline by doing well at all your tasks, keeping in mind your company's goals, making time to read up on current activities in your field, and always striving to understand your work from its basics.

This was the second of three panel discussions presented to summer students on this theme this summer.

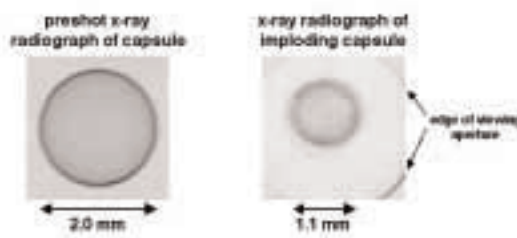
Z-Beamlet

(Continued from page 1)

point, that have the accuracy and intensity to image the pellet.

While pulsed lasers are not new, they normally produce mere millijoules of energy in university research labs. "DOE wants lots of energy," says Porter, and Z-Beamlet delivers kilojoules of laser energy for its diagnostic work. (Z itself, firing, delivers megajoules.)

Light starts its voyage humbly enough in Z-Beamlet with picojoules (10 to the minus 12 joules) of energy in its initial beam. On a simple metal table — using an assortment of small mirrors, lenses, beam splitters, and polarizers — researchers develop as perfect a "seed" beam as possible. Then, like a teenager drafted for a Hollywood makeover, the little beam is amplified and smoothed to clear up any spatial nonuniformity. Then it is passed through a vacuum chamber in which it is focused into a point source from which it opens again. The entire laser system is run and monitored by an elaborate computer control system residing on five desktop computers. (This is one enhancement of many incorporated into Z-Beamlet to modernize the mid-1990s vintage laser.)



BEFORE AND AFTER — or at least, during: An empty (dummy) pellet compressed by Z and monitored by Z-Beamlet "demonstrates an encouraging uniformity," says John Porter. Pellet symmetry appears good enough to be "worth pursuing," says John. Hard figures describing the shape of the compressed pellet have not yet been developed. To create controlled nuclear fusion, the pellet would be filled with deuterium and tritium.

After a final smoothing using an adaptive optics system (a flexible mirror that is continuously pushed and pulled by an array of 39 electro-mechanical actuators), yet more energy is added to the laser pulse by flash lamps that look like fluorescent tubes.

Lawrence Livermore National Laboratory originally built the Beamlet laser to serve as the scientific prototype of the National Ignition Facility. The California lab decided to remove the laser to

make room for those of the NIF (*Lab News*, Aug. 28, 1998).

The entire project to reassemble the recycled Livermore laser cost \$12.875 million, took three years to complete, and required the talent and dedication of scores of individuals from Lawrence Livermore and Sandia, says John.

"Of course we were worried when we first fired the laser up," he says. "There was no reason it shouldn't work, but we didn't know that it would work. The laser didn't come with assembly instructions, and certainly there was no warranty. Frequently, we were putting the laser together only from pictures taken as it was being disassembled at Livermore. There could have been shattered glass all over the place."

Echoes operations coordinator Mike Hurst (1673), "This was cutting-edge technology that fell in our laps, and many people thought we didn't have the laser expertise to succeed. The complexity was so great that it was a shock to us as well as others that we got incredible data right out of the gate."

"Now we're more optimistic than ever," says John. "Now, instead of seeing the outside of Z science — the instabilities in the compressing magnetic field — we can now see the inside, the pellet at the center of the million-degree furnace — the interior of the sun, if you will — and we can accurately describe what's happening there."

Classified

(Continued from page 1)

this leadership role on behalf of the engineering community for a classified enterprise architecture over the last five years while performing other NWSBU roles in Divisions 5000, 9000, and 2000. The first phase of the NwSA was implemented in 1997.

The biggest concern in developing the NwSA was security.

"To make this brave launch we had to make sure that the classified network was sufficiently secure while providing the required functionality," Pace says.

Over the next three years Sandia computer whizzes developed a system that matches people in work groups with classes of information they need to know — all securely within the

Ensuring classified network is sufficiently secure

Since security can never be perfect, how does a national laboratory protect the information and detect malicious users? The answer lies in extensive cyber security.

Sandia Chief Information Officer Pace VanDevender grappled seriously with this issue last year when he headed up a cyber security study group of laboratories and the DOE Office of Defense Programs. They produced the Integrated Security Management Plan (ISecM) covering policy, people, and technology for a highly functional and secure environment with pre-eminent cyber security.

Unfortunately, the plan carried an \$850 million price tag — too high to gain support. Instead, Congress approved a supplemental appropriation of \$20 million to make some immediate improvements at the National Nuclear Security Administration (NNSA) laboratories and to prepare a systems-engineered approach for implementing best practices at less cost than ISecM. That effort resulted in an Integrated Cyber Security Initiative (ICSI).

The ICSI program plan, now complete and moving toward implementation this fall, contains features to ensure that the classified network is sufficiently secure, that security is an integrated feature, and that people are engaged in security.

classified environment.

The classified network has several aspects that allow employees to share knowledge securely.

First, to be given access to the network a person must enter a classified kerberos password for authentication of identity. A need-to-know engine, which provides access control to information, checks out the person's identity and authorizes access. A classified network homepage then pops up and provides navigation to network resources — all operating similar to the Sandia Restricted Network. It includes a classified e-mail system, a need-to-know engine, and the ability to share information and access classified documents. Some 275 applications that process information on the network have been approved since 1999.

Witek says a key aspect of the network is the Meta Group Utility that allows owners of classified information to easily create a need-to-know sharing group. It is tied to the Human Resources database that provides rich information about each employee and contractor at Sandia.

The SCN was rolled out in November 2000 on Classified Network Day. Three classified sessions, held at the CNSAC auditorium and transmitted live to Sandia/California, were designed to introduce Sandians to the network.

In March a survey was conducted of users to see what they thought about the classified network and learn ways it could be improved. A random sample of 400 classified network account holders — from a then total of 1,144 — was selected for the surveys. A total of 114 responses came back, representing 28.5 percent of the sample.

Pace says the average overall satisfaction was 6.9, slightly below the "satisfied" standard of 7.

"It showed that for people who were accustomed to working on the restricted network, which is easy to navigate, the classified network was working but still needed more work to make it sufficiently user friendly," Pace says.

One thing people seem to like is that the network is simple and saves time.

Classified network user Ray Zazworsky (9813) tells how it's helped him with his work. He was using the classified document management system, Web Fileshare.

"Two recent studies have required searches through the document database," he says. "In one case I identified 37 documents with potential contributions and I examined all 37 within just two or three hours and narrowed down to a half dozen main contributing documents. This would normally have taken at least a couple of days searching, page-by-page, through a larger collection of documents."

A little classified computing history

Pre-1985 — Classified computing was "batch processing" on large scientific computers with some Remote Job Entry (RJE) station.

1985 — Networked, interactive computing begins with two interactive computing networks in place: Classified/Secure-unclassified and Unclassified. The unclassified network had access to the Internet.

1990 — Kerberos first implemented in Classified/Secure-Unclassified network.

1995 — Three interactive computing networks established: Classified, Restricted, and Open.

October 1995 — DOE SecureNet accredited linking classified networks at Sandia, Los Alamos National Laboratory, and Lawrence Livermore National Laboratory.

December 1996 — Classified Network Security Architecture (NwSA) Project started.

1997 — First phase of NwSA implemented.

December 1998 — Windows NT (Network) Master Domain accredited.

1999 — Classified network desktop roll-out began.

July 2000 — Meta Group Utility written to facilitate creating need-to-know groups.

2000 — Launch of Web-based Sandia Classified Network.

2001 — Rapid expansion of classified desktops.

In another situation he needed to prepare a presentation. Not only was he able to quickly identify key documents in the database, but he was also able to copy figures and tables from the documents and directly paste them into the presentation without handling the hard copy of the document.

Others also give the network rave reviews.

George Mayes, Manager of Dept. 2952, says about the system, "Works great! The folks in charge of the SCN are providing us with really useful tools."

Early champion Hank says, "I am delighted with the enhancements that are appearing within the classified exchange environment. Please thank those who have contributed to this accomplishment."

Pace says the next step with the classified network will be to hook up some additional DOE sites to the system and develop a system that allows Sandians to link to other laboratories' classified material on a need-to-know basis only.

(Continued on next page)

Nanoscience Alliance agreement signed by LANL, UNM, and Sandia during Aug. 7 ceremony

Joint nanotechnology framework expedited

By Neal Singer

Though a bright morning sun that shone in the face of about 100 spectators caused considerable seat shifting, few if any left the courtyard of the Technology Ventures Corp. on Aug. 7 before a formal memorandum of understanding was signed to increase cooperation in nanoscale research among Los Alamos National Laboratory, the University of New Mexico, and Sandia.

Signing for a "New Mexico Nanoscience Alliance" to strengthen the framework of inter-institutional efforts were the presidents of those institutions — respectively, John Browne, Bill Gordon, and Paul Robinson. New Mexico's two US senators and a number of representatives of private industry looked on.

While cooperation between the three institutions already exists, the statement of intent specifically suggests that Sandia and Los Alamos will, when appropriate, help UNM secure nanotech funding from DOE and other funding sources; that the two national labs will work with UNM to establish more joint professorships in nanoscience at UNM; and that UNM will work toward establishing a graduate nanomaterials science degree program.

Meeting co-chair Terry Michalske (1140) said in opening remarks,

"By definition, nano refers to things that are incredibly small. . . . However, the excitement surrounding nano is enormous: new science, new properties of matter, and the promise of new and revolutionary technologies."

Sen. Pete Domenici helped the intra-state mood by praising "a very bright young man" at Sandia who years ago gave the senator his first explanation of the microworld. Domenici said that the young man was so well-spoken and well-versed in his subject that the senator was sure his explicator was from Cal Tech or MIT. "When I learned he was a graduate of UNM," he said, turning at the podium to look behind him at UNM President Gordon, "I couldn't have been prouder."

(The Sandian was Steve Rodgers, who graduated with a bachelor's degree in electrical engineering from UNM in the mid-1980s. "I told Pete I was from UNM and that seemed to make his day," remembers Steve, who recently left Sandia to become one of the founders of MEMX, a Sandia micro-optical start-up in the telecommunications field.)

"By definition, nano refers to things that are incredibly small. . . . However, the excitement surrounding nano is enormous."

Sen. Jeff Bingaman mentioned "hoping to capture a substantial amount of funding" for the next-generation lighting initiative, a branch of nanotechnology intended to move the country more quickly into light-emitting diodes and light-conducting plastics at considerable savings in energy and costs.

(The Alliance agreement may be more potent if DOE funds a joint nanotechnology science center between Sandia and Los Alamos. Currently, says Don Parkin, deputy division director of Materials Science and Technology at LANL, there are \$4 million of Plant Engineering and Design funds in President Bush's budget to fund conceptual design for three nanotechnology centers. Parkin, along with UNM's Steve Brueck, co-hosted the meeting with Terry Michalske.)

UNM President Gordon mentioned the "strong nanotechnology effort in UNM's medical school," and said UNM's mission in the alliance would be to generate a new generation of scientists and engineers, develop a graduate program in nanoscience, and work toward joint professorships between both national labs and UNM.

Keynote speaker R. Stanley Williams, a Fellow at Hewlett-Packard Labs, described a stunning assortment of nanotechnology possibilities, including biocide molecules attached to nanoparticles unable to pass through the walls of healthy cells but able to pass through cancer cell walls to kill them. He said other interesting nanopossibilities could be found at www.nano.gov. But, as a kind of footnote, he cautioned resistance to "nanotech infatuation" and encouraged continued funding for the wide range of sciences and engineering that form the basis for the field. "Don't starve the other sciences," he said. "I don't know what the 'next thing' will be, but there will be a next thing."

Said Bill Garcia, a spokesperson for Intel Corp., "Computer chips, which have fueled today's scientific advances, need nanoscience research to lead the way" because silicon isn't necessarily the ideal material from which to make chips. "On a nanometer scale, silicon fabrication is as difficult as any other material. New materials need to be



NANO-SIGNING — Signing for a "New Mexico Nanoscience Alliance" to strengthen the framework of inter-institutional efforts were the presidents of three institutions. They are, seated from the left, Paul Robinson, Sandia; Bill Gordon, University of New Mexico; and John Browne, Los Alamos National Laboratory. Observing the signing from behind are, from left, Sen. Jeff Bingaman; R. Stanley Williams, a Fellow at Hewlett-Packard Labs; Steve Brueck, director of UNM's Center for High Technology Materials; and Sen. Pete Domenici. (Photo by Randy Montoya)

researched."

Former Sandian Tom Brennan, CEO of UNM start-up Zia Laser, said his New Mexico-based company had received \$6 million in venture capital funding — which he described as an amazing feat in the current economic climate — for his lab's work in quantum dot laser diodes 20 nanometers in diameter. He praised work at Sandia and other scientific institutions that made the advance possible.

Jim Prendergast of Motorola described his company's interest in building materials from molecules "inherently nanoscale that will self-assemble into functioning materials, rather than taking out material we don't want in order to create an object."

Browne said better technology would "tremendously impact quantum computing if we can develop materials at the nanoscale." Such materials could also help detect biological threats, and improve work on quantum dots and magnetic resonances.

Paul Robinson, who spoke last, quipped, "Everything's now been said, just not everyone has said it." He praised the National Competitive Technology Transfer Act of 1989 "that changed the way the national labs operate," allowing them to begin or augment outside business and university interactions.

"I'm very happy," Paul said. "Let's sign." And they did.

Classified

(Continued from preceding page)

"Our partners are now obtaining electronic access to data to do their jobs, but we need to have similar access," Pace says. "We need more of a two-way street."

Here are Classified Network Security Architecture (NwSA) Project Members and Other Major Contributors to Sandia Classified Network Noncommon Need to Know:

Doug Brown (9332), Mike Cahoon (9327), Karen Current (14407), Pete Dean (8903), Dave Ellis (6512), Robyn Hartley (9336), Dick Hawkins (9327), Jack Hudson (9336), Jim Hutchins (8910), Carol Jones (9332), Glenn Machin (9332), Pat Moore (6535), Melissa Myerley (9332), Darl Patrick (9327), Paul Sands (2618), Len Stans (9336), Walt Vandevender (9327), Dirk Vanwestrienen (9329).

Sandia adopts new approach to security

One of the primary principles of the Integrated Cyber Security Initiative plan is to "trust people with appropriate clearance and need to know and verify that trust without undermining it," says Pace VanDevender, Sandia's Chief Information Officer.

"The last phrase is the hard part," Pace says, adding that he will be "soliciting feedback from managers in California on Sept. 17 and from managers in New Mexico on Sept. 26 and 27."

The new plan takes a principled approach to security that involves:

- Identifying assets to be protected and their required level of protection.
- Identifying and assessing threats to the

information assets.

- Limiting information/administration access to those who require such access to perform their jobs.
- Detecting unauthorized activity.
- Responding in real time and defeating attacker or delaying attacker if timely defeat is not possible.
- Protecting in depth with multiple layers of independent protection.
- Managing by performance-based measures that determine system effectiveness.
- Using an accepted and sound systems-engineering methodology.
- Making sure security measures do not preclude mission functionality.

Batteries

(Continued from page 1)

ruption continues, a diesel generator or other backup power source will kick in.

"This technology is of particular interest to industries that can't afford to have power disturbances of any sort," Garth says. "For example, a utility power voltage sag can cause hundreds of thousands of dollars of loss in the blink of an eye

Differences between battery systems

John Boyes, Manager of Energy Infrastructure and Distributed Energy Resources Dept. 6251, says the battery storage system at Metlakatla is different from the PureWave in design and in application. (See main story above.)

The PureWave serves as a short-term high-power source during power disturbances for up to 30 seconds. As soon as the disturbance is over, the batteries recharge from the utility. PureWave uses common lead acid truck batteries.

The Metlakatla system uses a different type of battery — a valve-regulated lead acid (VRLA) battery, which has a higher energy density and contains significantly less acid, minimizing the risk of spills. It serves as the primary power source of the utility for long periods of time. In this case, the batteries are recharged using a hydroelectric generator, effectively eliminating the use of the diesel generator.

for semiconductor wafer manufacturers."

Some of the world's leading wafer manufacturers are purchasing PureWave for their fabrication units, including one in Rio Rancho, N.M.; STMicroelectronics, which has fabrication installations in Europe, North America, and Asia; and Tower Semiconductor in Israel. Other industries — a major pharmaceutical company in Puerto Rico; Discover Card; American Electric Power; and a Sears Teleserve data center in Mobile, Ala. — are all using the technology.

The PureWave system is a modular design that can be combined for large systems. The system in Rio Rancho is 16 megawatts while one at STMicroelectronics in Phoenix is 10 megawatts.

The system is seen as a way of correcting voltage sags and short outages caused by utility equipment malfunctions, lightning, fallen poles, and tree or animal contact with lines. Power outages and other power quality disturbances cost the US economy more than \$119 billion annually, according to a recently released study sponsored by the Electric Power Research Institute Consortium for Electric Infrastructure to Support a Digital Society (CEIDS).

Garth says PQ2000, now PureWave, started out as an idea following an industrial meeting in 1994. He and several others in the energy storage business sat around a coffee table in a hotel lobby and had a vision.

"We came up with the concept of combining a sensing device with battery-based energy storage," Garth recalls. "It had never been done successfully before."



GARTH COREY won an R&D 100 Award in 1997 for his work on a battery-based energy storage system. The system has now grown into a multimillion-dollar industry. This photo was taken when he won the award. (Photo by Randy Montoya)

DOE provided \$470,000 for initial research. Garth was involved in the early design efforts, working closely with Omnion Power, AC Battery Corp. (East Troy, Wis.), Electric Power Research Institute (Palo Alto, Calif.), Oglethorpe Power Corp. (Tucker, Ga.), and Pacific Gas and Electric Co. (San Ramon, Calif.). The research efforts earned Garth and the external team an R&D 100 award in 1997.

"We wanted to do the research and development fast so we could quickly have a product," Garth says. "DOE provided the base funding to start the work. Without the startup money, the project probably never would have gotten off the ground and there would never have been a new industry created."

Currently S&C Electric Co. is the only company in the world manufacturing and selling this type of system.

In the short time the battery-based energy storage system has been commercialized, it has survived several corporate restructurings. Omnion Power Engineering, with assistance by Garth, did the original design of the PQ2000. General Motors Delphi Division invested in the product's development because the company's batteries were used in the system. General Motors then bought the product line and formed a new company, AC Battery, to finish the commercialization and take it to market. In 1997 General Motors sold the product line back to Omnion, which launched a marketing and sales program to sell the product directly to utilities and users. Omnion formed a marketing relationship with S&C Electric in 1998. One year later S&C Electric acquired Omnion and formed the S&C Power Electronics Division.

Metlakatla battery energy storage project wins DOE Energy 100 Award

Editor's Note: Several Sandia projects won DOE Energy 100 Awards earlier this year. The Lab News will be publishing stories on some of the winners over the next few months. The awards went to the top 100 DOE energy discoveries and innovations that have resulted in improvements for American consumers since DOE's inception in 1977. The award stressed three simple criteria: 1) Did it have a consumer orientation? 2) Did it save money? 3) Did it improve our quality of life?

A battery storage system that Sandia researchers helped develop and install on the remote island of Metlakatla, Alaska, won a DOE Energy 100 Award earlier this year.

The Metlakatla Indian Community, which resides on the island, turned to Sandia to help with its energy needs in the early 1990s says Abbas Akhil (6251), who headed the project at the time.

"The manager of the community's utility heard that we had an expertise in the area of battery storage and contacted us, asking if such a system might work for them," Abbas says.

Metlakatla is located on the Annette Islands Reserve in southeast Alaska. The economy is based primarily on hunting, fishing, and commercial lumber export. Electricity is provided by Metlakatla Power and Light (MP&L), using rain-fed hydroelectric generation. In 1986 a local lumber mill acquired a wood chipper that created extreme load swings the utility could not handle, resulting in voltage sags and brownouts for the electricity customers.

MP&L bought a diesel generator to handle the load fluctuations. However, the generator could not completely eliminate the problem. In addition it was expensive, costing \$360,000 a year. Some 800,000 gallons of diesel fuel —



METLAKATLA BATTERY ENERGY STORAGE — Nick Miller of General Electric, who served as technical manager of the Metlakatla, Alaska, battery energy storage project, is in the battery room. The picture was taken in August 1997 when the system was dedicated.

enough for two years — was stored at the site.

That's when the MP&L turned to Sandia for help. Abbas and others from the Labs assisted MP&L in assessing the utility's problems. After a period of study, the research team suggested the power company use battery energy storage to improve reliability and efficiency.

Since installation in 1997, the battery energy storage system has handled the mill's load swings and eliminated the majority of the reliability problems. The diesel generator is used only as an emergency backup. The tribe saves money and has a cleaner, quieter environment. Sandia continues to monitor the battery system performance.

Paul Butler, current Manager of Dept. 2522 who was manager of the Energy Storage Program during the Metlakatla and PQ2000 projects says, "Both are successful prototypes which have demonstrated the value of integrated energy storage systems for electric networks of the future."

Truck batteries best

The basic building block of the PureWave battery-based energy storage system is a 250-kilowatt power module consisting of an insulated gate bipolar transistor inverter and an integral battery charger, combined with 48 maintenance-free batteries. Eight of these power modules can be put into one large container that provides 2,000 kilowatts of UPS (Uninterruptible Power System) power from a total of 384 batteries.

Brad Roberts, director of marketing for S&C's Power Electronics Division, which manufactures and sells the system, says that since the batteries are the heart of the system, the type of battery used becomes very important. In researching the battery best suited for a high-power short-duty application, the Delco 1150 truck battery surfaced as the ideal candidate. The battery requires virtually no maintenance.

"The PureWave system was actually designed around the battery's capabilities, and the results have proven that very reliable performance is possible in a battery that requires no regular maintenance," Roberts says.

Rep. Heather Wilson to speak to Sandians at C-Club Aug. 30

Topic: Senior issues/caregiving

Many of us must be caregivers to our own aged parents and loved ones. It is an increasingly typical group, sometimes called the sandwich generation. A couple years ago Sandia approved founding a Sandwich Support Group for employees and on-site contractors in this situation. They meet every second and fourth Thursday at noon in Bldg. 832 (Conference Room 31). If there is an outside guest speaker, they usually meet in the Steve Schiff Auditorium.

As a support group the members share their concerns, problems, and suggestions for resolution.

"The one thing is to show folks who are facing problems that many of us have faced — or ones quite similar — that we are there to help," says Dick Steele (12142), who originated the group and serves as its facilitator.

The group has had guest speakers on various topics from how to work with Alzheimer's patients, how to work legal matters, assisted living, Medicare, Medicaid, insurance programs, hospice, and services offered by the city and the state.

"I have received calls at home from folks facing a crisis with a request for help," Dick says. "In one case a wheelchair was needed immediately and luckily my church had just been given one. The church was located only a few blocks from where the chair was needed and the loan was made immediately."

"Several of our speakers have been from the city and state, and Sandia has been recognized as an employer who cares for its employees who are facing the tough job of caring for aging loved ones," Dick says.

Recently, at the suggestion of a member concerned about a question involving Social Security benefits, Sandia's Sandwich Support Group requested management's approval for inviting Rep. Heather Wilson, R-N.M., to address the group on senior issues.

"She accepted and will speak to us and answer questions on Aug. 30 from noon to 1 p.m. at the Coronado Club Patio," says Dick. "It is a no-host lunch, but folks don't have to buy lunch to attend." (If you want to eat, you might go through the line early on.)

"Questions were requested from the members of the group, and these have been sent to Rep. Wilson to help her formulate her talk," Dick says. "The patio was chosen since we were not sure of how many folks to anticipate and it allows for expansion. We encourage all Sandians and their spouses and on-site contractors who would like to hear her discuss senior issues or have questions on senior topics to attend."

Dick says retirees are welcome. He adds that if there is enough interest among retirees, the group can help facilitate a retiree support group and then share guest speakers.

Boating skills course Sept. 18

The Albuquerque flotilla of the Coast Guard Auxiliary is beginning a 13-lesson Boating Skills and Seamanship course on Tuesday, Sept. 18. It continues each Tuesday for 11 weeks. Certificates indicating satisfactory completion of the course will be presented on Nov. 27.

There is a nominal fee for the text and workbooks, but the instruction is free. Course subjects include: "Which Boat is For You," "Equipping and Trailing Your Boat," "Boat Handling," "Highway Signs," "Rules You Must Follow," "Piloting," "Radio," "Lines and Knots," "Weather," and others.

Classroom space is limited, so preregistration is necessary. Call Ben Gardiner (ret.) at 298-0116 for information.

★ Congratulations

To Carol and Bruce (6245) Kelley, a son, Joshua Daniel, Aug. 14.

To Annette Hoff (8935) and Robert Kitajima, a daughter, Miako Alena, May 19.

Lockheed Martin gives APS science cluster program \$250,000



A BIG BOOST — Wendy Owen, vice president of communications for Lockheed Martin Technology Services (center), presents a check for \$250,000 to Albuquerque Public Schools Superintendent Brad Allison during an assembly at Sandia High School on Aug. 9. On hand for the ceremony were Labs Director C. Paul Robinson (left), and New Mexico congressional representatives Sen. Pete Domenici, Rep. Heather Wilson, and Sen. Jeff Bingaman. The event kicked off a pilot program that will create a new cluster geared to preparing students in the math, science, and technology disciplines. The cluster school programs are aligned with many existing math and science outreach programs managed by Sandia and the National Atomic Museum. Lockheed Martin's donation will help establish programs that will allow Albuquerque students to visit New Mexico's laboratories and talk to scientists. (Photo by Randy Montoya)

Feedback

Employee's 1999 earnings not on record at Social Security Administration — Here's what's being done

Q: While reviewing my Social Security statement for 2001, I noticed that my 1999 earnings from working at Sandia were listed as \$0. On my statement from 2000, they were listed correctly. So, I went to the Social Security office in Albuquerque. I was told that Sandia hadn't reported me earning any money in 1999. And, they said they have appointed a supervisor at Social Security to deal with the stack of complaints from Sandians.

Will Sandia fix whatever glitch it is that is messing up Sandians' Social Security information, correct it all with Social Security, and make sure it doesn't happen again? Will Sandia tell everyone that there is a problem and they are working with Social Security to fix it, so don't panic?

A: Please know that we share your frustration with the incorrect 1999 Social Security data. Despite numerous attempts to correct the data, we continue to have nearly 3,000 Sandians with \$0 reflected for their 1999 earnings. Currently, we are working directly with a programming group in Baltimore to fix the issue. Their current estimate is that data will be corrected by October. Unfortunately, we are dependent on the Social Security Administration to correct the data and they have not been able to meet earlier commitments.

We are often asked what individuals can do to correct their own records. If you are not planning to retire in the next several weeks, we ask for your continued patience as we work with the various Social Security offices to provide a complete remedy. If you do plan to retire in the next three months, take a copy of your 1999 W-2 when you meet with the Social Security office and they will manually make the adjustment. If you cannot locate your W-2 in your records, please call the Payroll Help Desk at 844-2848 and we will provide a replacement copy. — Bonnie Apodaca (10500)

Q: Why do the tax deductions on our paychecks fluctuate from paycheck to paycheck? Is there something that can be done about it? It is frustrating when entering the data into personal finance software.

A: The income tax tables are on a graduated basis — the more you make the more you pay. In addition, Social Security and Medicare taxes are a straight percentage of taxable wages. There are a few things that happen to change your gross pay, taxable income, tax deductions, and net pay. These include:

1. Any increase in pay: You received a pay raise on 2/9/01 and a royalty payment on 4/26/01.

2. The third payroll in a month does not process taxable deductions: This changes the taxable earnings for that pay period by a very small amount. This occurred on paychecks dated 3/29/01 and will occur again on paychecks dated 8/30/01.

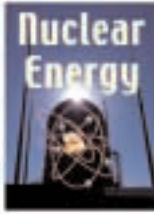
3. Sandia makes a NM Worker's Compensation payment of \$2 the last pay of each quarter. This is included in your taxable earnings for that pay and changes your tax by a few cents.

4. Any changes in before-tax or taxable deductions will change your taxable income. For example, adding a before-tax 401(k) deduction or before-tax insurance, or making changes to the amounts will change the taxable income.

5. Rounding on annual amount: Example, 25K/26 payments = 961.53, sometimes \$961.54.

Although this may cause complications in updating your personal financial software, these items are going to occur due to the definition of taxable earnings and the structure of the tax tables. If you have further questions, please call Betty Glover in Payroll at 284-3621.

— Bonnie Apodaca (10500)



National power 'grid' actually 10 separate, independent regional grids throughout country

US not really wired for shifting excess power from one area to another

By Howard Kercheval

New power plants churning out megawatts, and cooler-than-feared weather, have so far tipped the balance favorably in a make-or-break conservation campaign to keep the lights shining and escalators and air conditioners humming in California this summer.

That good news has transformed the tight-lipped visages of politicians who were scrambling last winter and spring to deflect retribution at the polls with promises of regulatory shields. The dread also has eased for utility executives who, just settling into the world of deregulation, were grimly anticipating an onslaught by resurgent regulators. And consumers, as well, are resettling into their electrified world with — if not exactly delirium — at least something short of hopelessness.

Power costs that had doubled and tripled and more have retreated, allowing producers, consumers, and everyone plying the power trades between them to take deep breaths and wind down a little before beginning a less frantic search for solutions to a power-supply problem that has not evaporated — only eased somewhat.

As rolling California blackouts a few months ago darkened businesses and homes and sent motorists skittering breathlessly through intersections suddenly without working traffic signals, discussion of potential solutions to the power problem often featured talk about “the grid.” Despite “the grid,” however, the blackouts kept rolling.

But if the rest of the country was flush with power, why couldn't some of it be sent on “the grid” to California?



10 REGIONS comprise “The Grid.” The above illustration shows the regional locations and names of the grids. They are: East Central Area Reliability Coordination Agreement (ECAR), Electric Reliability Council of Texas (ERCOT), Florida Reliability Coordinating Council (FRCC), Mid-Atlantic Area Council (MAAC), Mid-America Interconnected Network, Inc. (MAIN), Mid-America Interconnected Network (MAPP), Northeast Power Coordinating Council (NPCC), Southeastern Electric Reliability Council (SERC), Southwest Power Pool (SPP), and Western Systems Coordinating Council (WSCC).

No single national ‘grid’

Well, there is no single “grid” per se; there are actually 10 of them linking sections of the United States, southern Canada, and the northern part of the Mexican state of Baja California. And even if there is a power shortage in one of the states making up one of those sections and an adjoining sec-

tion has more power than it can use, the state with the shortage is, in all likelihood, going to remain short of power.

“There is some, but not much, movement of power between sections,” says Dave Robinson of Risk & Reliability Analysis Dept. 6413. “There’s a lot of movement of power interstate, but not much inter-region.”

Dave conducts uncertainty analysis for a Laboratory Directed Research and Development (LDRD) project headed by his department manager, Bob Waters. Other team members are Dave Kunsman (6413), principal investigator; Rolf Carlson (6517), supervisory control and data acquisition (SCADA) analysis; Andy Lutz (8362), power park analysis; and Rudy Matalucci (5862), vulnerability analysis.

During the California blackouts, for example, DOE ordered power routed from the hydroelectric sources in the Northwest. At the same time, even though the Palo Verde nuclear power plant in Arizona — owned partly by the Public Service Company of New Mexico — was producing excess power, that power was not diverted to California, even though Arizona and most of New Mexico are part of the region

comprising the Western Systems Coordinating Council (WSCC).

WSCC is geographically the largest of the 10 regional councils, covering 1.8 million square miles stretching from the Canadian provinces of Alberta and British Columbia into Baja California Norte, Mexico. The power-producing utilities among its 118 member organizations provide service to more than 65 million people in all or parts of Arizona, California, Colorado, Idaho, Montana, Nebraska, Nevada, New Mexico, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming, in addition to the Canadian and Mexican parts of the region.

The 10 regions are outlined in the illustration above and described in the accompanying text.

10 regional grids autonomous

“Each of the 10 regions is pretty autonomous,” says Dave. “Within each coordinating council there are a number of command centers, and they control the power movement in that council’s region.”

The only significant movement of power is that in summer some is shifted from northern parts of the regions to their southern parts, and vice versa in winter. And what little power shifting there is follows guidelines set up by the National Energy Regulatory Commission (NERC) following its annual analysis of upcoming power needs.

Inter-regional power sharing is so minimal because the transmission lines that would carry the power “simply don’t exist,” he says.

In addition to the inconvenience and frustration of power blackouts, there is the more esoteric fact of cost. An August 1996 failure on the WSCC grid left 5.6 million people without power, and is estimated to have cost California alone between \$1 billion and \$3 billion.

Dave predicts that two primary issues could cause serious problems for the country’s power supply. “Rights-of-way for transmission lines are going to be a very big issue in the near future,” he says, “and there is going to be a problem with the location of power plants. We’ll have enough generating capacity, but just not in the right places.”

Bob emphasizes that point. “One of the rec-

(Continued on next page)

Sandia’s power grid work has three thrusts

Risk & Reliability Analysis Dept. 6413 leads a multi-division LDRD team developing tools that will help improve the reliability of the power grid and reduce its vulnerability to natural and other disruptions. There are three main thrusts to the effort.

SCADA systems

Modeling supervisory control and data-acquisition systems to identify potential vulnerabilities will provide the tools to analyze alternative SCADA systems in terms of data security.

Current SCADA (supervisory control and data acquisition) systems typically transmit data and control the flow of power using communications systems that were designed without data security in mind. Sandia has shown that these systems are vulnerable to hacking, where the hacker can relatively easily take control of parts of the grid. The team is working to model the SCADA aspects of the power grid to understand how it could be vulnerable to attack so software less prone to attack can be designed.

Power parks

Modeling power parks and the way their placement in the grid can increase the reliability of the overall system will provide tools for power park developers as well as another way to model changes in reliability of the grid.

For example, if analysis of the power grid shows a potential vulnerability in a particular

location due to insufficient power flow, a model could demonstrate how adding a power park could mitigate that vulnerability. That capability could make the set of tools being developed by the Sandia team of interest to regional planners as well as power park developers.

Uncertainty, vulnerability analysis

Adding uncertainty analysis to the currently deterministic power flow models will allow analysts to more systematically identify potential vulnerabilities in the system and thereby increase its reliability.

The federal government is interested in providing more inter-ties among the 10 regional grids, assuming the result would be increased reliability. Sandia’s tool will enable the assessment of the impact of these changes in terms of reliability. Changes such as these don’t always increase reliability, and sometimes they can reduce reliability, as some of Sandia’s previous work has shown.

The Labs’ work also might help in determining where reducing vulnerabilities will have the greatest impact. Vulnerability analysis — identifying how an adversary can attack a facility and what measures can be taken to prevent or mitigate the attack — is time-consuming and expensive. Sandia’s modeling tool can help identify the most critical nodes of the system, so that limited resources can be spent most effectively.

Recent Patents

William Sweatt (1743): Apparatus and Method for Generating Partially Coherent Illumination for Photolithography.

Jeffrey Brinker (1846), Alan Sellinger, and Yungfeng Lu: Self-Assembly of Nanocomposite Materials.

Susan Hietala, Vincent Hietala (1751), and Chris Tigges (1742): Method and Apparatus for Measuring Surface Changes, in Porous Materials, Using Multiple Differently Configured Acoustic Sensors.

Christopher Cherry (5932): Fluid-Filled Bomb-Disrupting Apparatus and Method.

James Small, Douglas Loy (6245), David Wheeler (1764), James McElhanon (8722), and Marvie-Lou Durkin-Voss (rep. for Randall Saunders): Method of Making Thermally Removable Polymeric Encapsulants.

Jeffrey Brinker, Hongyou Fan (both 1846), and Yun-Feng Lu: Method for Making Surfactant-Templated Hybrid (Organic/Inorganic) and Composite Thin Films.

Jeffrey Brinker, Carol Ashley (both 1846), Scott Reed (14192), and Thomas Harris: Method for Net Shaping Using Aerogel.

Amir Mohagheghi (7132) and Robert Reese (2521): Detection of Alpha Radiation in a Beta Radiation Field.

Eric Schlienger (1800), David Schmale (1835), and Michael Oliver (2554): Precision Powder Feeder.

William Replogle (8731) and William Sweatt (1743): Extreme-UV Lithography System.

UNM/Sandia student Dhaval Doshi, Jeff Brinker win national collegiate inventors competition

University of New Mexico graduate student Dhaval Doshi, who works under a DOE Basic Energy Sciences contract in a research group headed by Jeff Brinker (1846), has won a \$20,000 cash prize and a \$2,000 gift certificate as a winner in the 2001 Collegiate Inventors Competition. Hewlett-Packard, Corning, Goodyear, and the US Patent and Trademark office sponsor the national competition.



DHAVAL DOSHI

Jeff, a senior scientist at Sandia who also is a professor of chemistry and chemical and nuclear engineering at UNM, as mentor will receive a \$10,000 cash prize.

The awards will be presented at a formal dinner in Akron, Ohio, on Sept. 14 at the National Inventors Hall of Fame, where the work will be showcased.

Five other winning teams will represent Harvard, Stanford (two), the University of Illinois at Chicago, and the University of Maryland.

The UNM/Sandia winning entry, "Optically-Adjustable Nanostructures," was featured in an article in the journal *Science* last October. It describes how the technique of self-assembly can be used to prepare photosensitive porous thin-film nanostructures. Lithographic procedures were developed that enabled the researchers to optically adjust properties such as pore size, refractive index, wettability, and etchability.

The Collegiate Inventors Competition rewards college students in science, engineering, mathemat-

ics, and technology. The contest encourages active relationships between students and advisors as well as interest in technology and economic leadership. The rules require participants to submit essays describing the invention and its potential economic, environmental, and societal benefits.

Areas of application claimed for the UNM/Sandia work included low-dielectric-constant thin films for microelectronics, chemical purification, pollution mitigation, sensor arrays, biosensors, and photonic structures for optical communication.

Doshi said the invention embodies several novel concepts enabling the efficient formation of nanostructures, their integration into devices, and the optical definition of both their form and function.

Doshi, from Mumbai, India, received his Bachelor of Technology in chemical engineering from the Indian Institute of Technology in Bombay in April 1997. He is pursuing a PhD in chemical engineering at UNM.

The prize money, given without strings, will enable Dhaval to refurbish his prized 1987 Buick Century. "It is my first car, it was stolen, and I got it back," the graduate student explained. "The glass was broken and so was the steering column." The car also needs a coat of paint. In addition, Dhaval says he hopes to spend at least a little time scuba diving in remote places.

Said Jeff of Doshi, "He's a very motivated researcher. I'm very appreciative of all the hard work he's put in." Jeff's own spending plans for his winnings are more restrained: "I have a couple of kids. We have a college fund."

The website for the Brinker group homepage is <http://www.unm.edu/~solgel> —Neal Singer

Grid

(Continued from preceding page)

ommendations from the president's National Energy Policy [issued May 17] was for the secretary of energy to examine the benefits of establishing a national electrical grid and identify the major transmission bottlenecks and remedies to remove them," he says. "DOE is now beginning to develop this study and we at Sandia expect to be involved."

Transmission lines needed

DOE Secretary Spencer Abraham warned governors Aug. 6, for example, that if state governments could not help ease the country's electricity supply crisis by rapidly approving construction of transmission lines, the Bush administration would consider asking Congress for authority to take over the approval process.

Power plant location is not a problem right now, Dave says, "but it could be in a couple of years, because of shifts in population centers."

And, he says, "In many cases, we'll have plenty of generation capacity, but it will be costly for the utilities to keep it on-line because of the cost of pollution controls. For example, we have a lot of coal-fired capacity, but those plants require a lot of pollution controls, and once they're shut down — if they have to be shut down because of a problem — it's very hard to get them going again."

One way to get power to where it's needed is through "power parks," a relatively new concept channeling different types of electrical generation together to supply power for a local need, and often generate excess energy that can be sold back into the grid for a profit. Power parks offer the potential for increasing the reliability and reducing the vulnerability of the power grid, thereby decreasing the need for additional transmission inter-ties.

Bob says power flow models can analyze power transmission under different conditions of production and demand. "These models are very

good at what they do and are used widely," he says. "However, they are deterministic models, in that they don't incorporate the uncertainty in loads, demands, data, and other factors. When utilities use these models to look for vulnerabilities in their systems, they have to run the model over and over, each time removing one of the nodes — such as generation stations, substations, switch gear, and transformers — from the model to assess the impact of it not being there. Given the size of the system and the time it takes to run the model, this one-at-a-time, bottoms-up approach quickly becomes an overwhelming task."

At the same time, he says, utilities are increasing the sophistication of their computerized SCADA systems, which handle the second-to-second control of the grid, and without careful planning, these SCADA systems might lead to new vulnerabilities from hacking.

Sandia's LDRD work

One of the primary thrusts of Sandia's LDRD work is adding Dave's uncertainty analysis to the deterministic power flow models to increase the reliability of the system.

"We expect existing developers of power flow models to be interested in adding this uncertainty analysis capability to their existing commercial tools, which will allow them to provide a unique service to their existing customers," says Bob. "We expect to license this technology to these companies, which will provide a return on our LDRD investment."

In addition, he says, the in-house expertise Sandia is developing to provide sophisticated analysis of reliability and vulnerability of the power grid should be of interest to Sandia's national security sponsors. It may also generate new program growth from those government agencies interested in increasing reliability and reducing vulnerabilities to electric power transmission.

For a more detailed look at Sandia's work in this area, see "Sandia's power grid work has three main thrusts," on the preceding page.

Pogo, the insightful little possum character from the popular 1950s and '60s comic strip, remains quotable, despite being out of publication for decades. The line he is best remembered for sprang from his erstwhile campaign for president one election year. "We has met the enemy," he observed, "and he is us."

And perhaps that observation applies to our power paradox. We demand more and more electricity for our increasingly technocentric world, but layer its production with conditions — plant location, transmission-line rights-of-way, emission limits, etc. — increasingly difficult to meet.

Power grid an immense machine

Dave Robinson (6413) wrote in the successful proposal seeking Laboratory Directed Research and Development funding:

"There are over 11,000 generation facilities, in excess of 200,000 miles of very high-voltage transmission line and thousands of substations that constitute one of the largest machines ever constructed in the United States: the national power grid.

"Between 1980 and 1989 there were 5,000 worldwide attacks against power transmission lines and towers; 386 of these were documented attacks against US energy assets. . . .

"In addition to the obvious costs to consumers and the direct impact on the US economy, there are obvious national security implications as well. As noted in a special US Senate report, the 'destruction of bulk energy systems would not only affect the ability of the US to mobilize its forces, but would obviously impact the ability to support the war effort of a NATO member.'"

Mileposts

New Mexico photos by Iris Aboytes
California photos by Lynda Hadley



Julia Norwood
25 9412



Jose Padilla
25 14186



Larry Pope
25 14405



Olivia Salisbury
25 3031



David Saxton
25 7862



Jerry Soden
25 1739



David Sparks
25 12610



Kenneth Ystesund
25 5352



Robert Baca
20 7112



Naomi Christensen
20 14402



Robert Cutler
20 5832



Richard Farwell
20 7863



Thomas Fischer
20 1745



John Garcia
20 7823



Adrian Romero
20 14405



Lawrence Shapnek
20 15322



Barbara Surbey
20 7864



Edward Boucheron
15 9231



Larry Grube
35 2991



Gary Romero
30 10256



Gerald Bollig
25 9327



Carla Chirigos
25 14100

Advanced Technology Academy seeks to produce high-tech high school students

Reading, writing, and 'rithmetic aren't the only subjects available to high school students these days. How about computer-aided design and manufacturing, machining, materials processing, and automotive and transportation technologies, as well as science and math?

"Engaging high-school students early on in hands-on, inquiry-based math, science, and technology could reduce the student drop-out rate and provide workers to meet the high-tech employment needs of Sandia and many local technology firms," said Albuquerque Public Schools Superintendent Brad Allison in a June 13 letter to APS colleagues, members of the state legislature, and the business community.

A community-sponsored education model, the Advanced Technology Academy (ATA) has been developed by Sandia with DOE/DP funding to provide local students with the best technology-related education, offering them a roadmap to the real world of technical employment.

The first four-year cycle of ATA has been completed at West Mesa High School in Albuquerque as a pilot for Sandia's Advanced Manufacturing for Education (AME) program (<http://www.sandia.gov/HighTechHighSchool/>). The Academy has now expanded to Albuquerque High and there are plans to include all APS district high schools.

A curriculum of math, science, computer applications, computer-aided design, computer-aided manufacturing, machining and materials processing, automotive and transportation technologies is available to high school students enrolled in the program.

The Advanced Technology Academy program is supported by DOE/Defense Programs, Sandia, the Center for Occupational Research & Development (CORD), University of New Mexico, Albuquerque Public Schools, New Mexico Department of Education, Albuquerque Technical-Vocational Institute, and the Air Force Research Laboratory (AFRL).

AME serves as a link to Sandia's Manufacturing Science and Technology Center and its internship program Mutual Education of Skilled

Technologies (MEST), training students to work in the center's design, development, or fabrication areas. The center includes specialized state-of-the-art focus areas: ceramics, electronics fabrication, machining of parts, mechanical measurements, thin films, and packaging.

The AME program is a four-year high school curriculum funded by DOE/Defense Programs that combines advanced manufacturing and research and development activities with technical organizations at Sandia. Students pursue a balanced curriculum at their high schools and can take advantage of concurrent enrollment at Albuquerque Technical-Vocational Institute (T-VI) or the University of New Mexico (UNM). AME's curriculum creates a technology-focused pathway, offering sufficient math and science for students to pursue higher education or employment.

After graduation from high school, students may work as summer interns at Sandia and continue to pursue a technology-related degree at UNM or T-VI. AME provides students with a useful foundation for exciting educational or job opportunities. AME offers students a pathway previously unavailable to them at the high-school level.

For information, contact Dominique Foley Wilson at 844-1315 or dfoley@sandia.gov.

— Janet Carpenter

ATA on the radio

APS Superintendent Brad Allison will discuss high-tech high school on KKOB Radio's High Tech New Mexico radio show airing Sunday, Aug. 26, at 10:05 a.m. He will be joined by Albuquerque High School student Sheree Boblick, a summer intern in Electronic Fabrication Dept. 14112, and Dominique Foley Wilson (3031), Sandia's DOE/Defense Programs education programs coordinator.

Recent Retiree

Fred Rodriguez
22 14181



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

MISCELLANEOUS

STAIR STEPPER, \$20; 2 good portable electric typewriters, \$15 ea. Daniel, 260-0461.

MALE CAT, 2-yr.-old short-hair orange tabby, very friendly, indoor/outdoor, neutered, current shots, to good home. Page, 832-5576.

SEARS TRASH COMPACTOR, 20 yrs. old, stored indoors 10 yrs., free, you transport. Claussen, 293-9704.

DINING ROOM TABLE & 4 CHAIRS, handsome dark wood, w/matching highback upholstered chairs, oldie but goodie, will deliver. Zamora, 881-2835.

ROLLTOP DESK, solid oak, 60", by Oak Crest, \$750. Jones, 281-9145.

DEWALT CHARGER, 9.6VDC to 18VDC, 2 18VDC batteries, \$65 OBO. Plummer, 828-3028.

PING-PONG TABLE, net, paddles, & balls, \$75. Smith, 299-6873.

TICKETS, two seats for The Who's "Tommy," Oct. 21 at 2 p.m., \$20 ea. Torres, 292-1663.

BUNK BEDS, pine, w/bottom drawer, 2 mattresses, matching 4-drawer chest, \$250. Sorenson, 298-1593.

TWO ANIMAL KENNELS, chainlink, 10 x 4 x 6, new condition, Rowe, 286-5432.

FENDER AMPLIFIER, Super Reverb, 1970's vintage, like new, \$700 OBO; Guild classical guitar excellent condition, \$100. Schneider, 296-0868.

OFFICE DESK, 47"L x 30"D x 26"H, regular drawer & file drawer, \$50 OBO. Long, 294-4591.

JAMES TAYLOR LAWN TICKET, Journal Pavilion, Aug. 30, 8 p.m., \$20 (note, children are free). Brosseau, 299-3980.

GAS BARBECUE GRILL, new, never used, side burner, side table, 3-level interior, covered, on wheels, \$200. Paul, 299-6387.

CARPET, 1000+ sq. ft., less than a year old, great condition, \$150, you haul. Brown 265-0406.

USED BOOKS, *Now it Can be Told*, Groves, Los Alamos, primer. Brown, 884-8581.

FREE RR TIES; baby stuff; cradle, \$75; walker, \$10; stroller, \$5; electric swing, \$20; carseat, \$20. Maxam, 343-9409.

TWO ADJUSTABLE WALKERS, one has 5-in. wheels, other has 3-in. wheels, \$75 ea. OBO. Hole, 255-1444.

TIRES/RIMS, 31x10.5 Sport King AT tires on 15x8 aluminum rims, 6-hole to fit Toyota, Chevy, or Nissan, \$400. Yazzie, 281-2223.

PUPPIES, full-blooded miniature Chihuahuas, chocolate female, chocolate male, & tan male, not registered, \$350. Gutierrez, 474-5784.

VOICESTREAM CELL PHONE, Nokia 6190 w/analogue sleeve adapter & charger, \$125. Johnson, 255-6650.

ENTERTAINMENT CENTER, only 6 mos. old, holds up to 27-in TV, \$120. Minke, 385-1397.

FUJI ROAD BICYCLE, \$20; Schwinn Air-dyne exercise bike, \$500; lead shot, \$6/bag; camera tripod, \$15; duck decoys, \$2 ea. Linn, 296-3176.

ESTATE SALE, Sept. 1, 8 a.m.-4 p.m., Sept. 2, 9 a.m.-noon, sectional sofa, dishes, glassware, misc. items, 5516 El Encanto, NE (San Pedro/Constitution). Armstrong, 299-8705.

BAKER'S RACK, attractive, cream-colored, like new, \$50. McHugh, 293-4307.

SIX BLACK KITTENS, six weeks old, litter box trained, to good home. Ballance, 265-5853, ask for Melissa.

KITTENS, to good loving home, 2 black, 1 black/white, very cute. Pino, 866-5309.

RUNNING BOARDS, for full-size Bronco, aluminum, free to first taker. Stirbis, 299-8442.

DOG-GROOMING TABLE, \$50, queen-size sofa bed, \$100. Marder, 291-8140.

POWER FEED, for Delta Unisaw, minimally used, excellent condition, \$350. Hertel, 345-1088.

CROSS-COUNTRY SKIS, boots, poles, 2 adult, 1 youth, \$25/set; 1 adult downhill set, \$10. Woods, 884-4224.

SEARS WATER PUMP, 1/2-hp for shallow well (20'), includes pressure tank, \$150; box trailer, 3' x 5' ft., \$250. Trollinger, 265-1615.

CONTEMPORARY SECTIONAL SOFA, 3-piece, ash-blue fabric, \$350 OBO; contemporary recliner, ash-mauve fabric, \$150 OBO; oak frames recently cleaned, perfect condition. Goodson, 286-1267.

PENTIUM 333 COMPUTER, bare-bones system, motherboard, 128MB memory, case, videocard, modem, manuals, \$70; 6GB HDD, \$35. Molecke, 296-5850.

QUEEN-SIZE SOFA BED, hardly used, like new, luxurious removable pillows, \$300 OBO. Burstein, 899-8971.

APPLE IBOOK SE, 366/128/6-CD ROM, \$990; HP CD Writer Plus 7100e, external, \$170; MS Intellimouse explorer, optical, \$20. Rider, 450-2018.

NORDICTRACK, brand new, \$250. Ballweg, 291-8735.

PEAVEY BANDIT AMP, like new, \$125; pedal steel guitar, 12-string, 3 floor pedals, 5 knee, \$1,000. Gendreau, 268-3436.

PICKUP CAP, white, fits '99-'01 Chevy/GMC short-wide box, paid \$895, asking \$700. Mayes, 821-0698.

GARAGE SALE, Aug. 25-26, 1100 Stagecoach Rd. SE, double wall-oven, white Corian countertop, girls 24-in bike. Stiles, 275-2941.

GAS-POWERED BLOWER, McCulloch, 28cc, \$25. Diprima, 275-3479.

SEARS WEIGHT BENCH EXERCISER, new, still in box, \$75 OBO. Zamora, 294-3737.

RV AIR CONDITIONER, Duo Therm model, 110V, 12,000-Btu, w/mounting hardware, \$265. Bolton, 275-7571.

SWIMMING POOL SLIDE, 10'L w/wooden support structure, free, or will deliver & set up, \$25. Wood, 299-8826.

COLOR TV, 9-in, AC/DC operation, cable-ready, remote, excellent condition, great if traveling w/kids, \$100. Graham, 896-2231.

RECLINING LOVE SEAT, recently purchased, dark brown, will accept \$250 OBO. Liguori, 256-3613.

GARAGE SALE, 8 a.m.-12 p.m., Sat., Aug. 25, lots of kids' stuff, 9209 Wallace NE. Porter, 821-7813.

YAKIMA "A" TOWERS, w/clips, \$30; "Q" towers, \$40; Q34 clips, \$10. Laird, 766-7696.

KITTENS, 12 wks. old, were rescued & are ready to be adopted by a loving family. Tapia, 292-7043.

FREE GRAVEL, small gray river rock, approximately 1 truckload; 1 doz. assorted RR ties. Lunsford, 299-5187, ask for Bob.

NINTENDO 64, controls, Shark, Rumble, expansion, 6 games, Game-boy, GB color, 5 games, cable, \$250 OBO. Wallace, 256-1643.

DRESSER, 6-drawer 30"H x 52"W, painted, good for kids, \$50. Beckmann, 296-1829.

TODDLER BIKE SEAT, w/mounting bracket, attaches above the back tire, excellent condition, \$35. Fong, 822-1367.

COMPUTER, P-166 mmx, CD, 2.5GB HD, 32MB RAM, 17-in monitor, modem, 2G tape, scanner, Windows 95, software, \$350 cash. Abbott, 298-2039.

SOUTHWEST ROUNDTRIP TICKET, expires 10/3/01, good anywhere Southwest flies, \$150 firm. Jensen, 839-1250.

REFRIGERATOR, Signature, almond, w/ice maker, \$100. Harris, 821-3001.

BABY ITEMS, Simmons maple crib & changing table, \$200; Perego stroller, \$90; various toys. Gruda, 291-8433.

STORM DOORS, fit double doors 6-ft. wide, \$100 OBO; Nordic-Track trainer, top of the line, \$100. OBO. Pitts, 299-0271.

TWO JAMES TAYLOR TICKETS, center section, #6 row Q, 8/30, list \$39, asking \$35 ea. Clem, 463-7824.

SOFA & LOVESEAT, Southwestern pattern, forest-green background, great condition, \$425. Sullivan, 298-4880.

NEW SOFA, beautiful, loveseat, chair & ottoman, mauve color, treated for stain resistance, \$1,350 OBO. Green, 898-3791.

How to submit classified ads

DEADLINE: Friday noon before week of publication unless changed by holiday. Submit by one of these methods:

- E-MAIL: Janet Carpenter (jacarpe@sandia.gov)
- FAX: 844-0645
- MAIL: MS 0165 (Dept. 12640)
- DELIVER: Bldg. 811 Lobby
- INTERNAL WEB: On Internal Web homepage, click on News Center, then on Lab News frame, and then on the very top of Lab News homepage "Submit a Classified Ad." If you have questions, call Janet at 844-7841. Because of space constraints, ads will be printed on a first-come basis.

Ad rules

1. Limit 18 words, including last name and home phone (We will edit longer ads).
2. Include organization and full name with the ad submission.
3. Submit the ad in writing. No phone-ins.
4. Type or print ad legibly; use accepted abbreviations.
5. One ad per issue.
6. We will not run the same ad more than twice.
7. No "for rent" ads except for employees on temporary assignment.
8. No commercial ads.
9. For active and retired Sandians and DOE employees.
10. Housing listed for sale is available without regard to race, creed, color, or national origin.
11. Work Wanted ads limited to student-aged children of employees.
12. We reserve the right not to publish an ad.

BROYHILL YOUTH BEDROOM SET, twin canopy bed, desk, chair, bookhutch, double dresser w/mirror, \$600. Ritz, 822-8775.

SOCCER CLEATS, Umbro specials, man's size 6-1/2, worn twice, new \$139, asking \$70. Kelly, 299-3527.

TIME SHARE, week 41, (10/6-13), Orlando, Fla., 2-bdr., 2 baths, Oct. 6-8, type red, \$900 OBO. McCreight, 296-3293.

TRANSPORTATION

'65 FORD MUSTANG, runs & looks great, red w/black interior, 6-cyl. 200ci engine, must sell, \$4,200 negotiable. Lucero, 345-6420.

'01 FORD EXPLORER SPORT TRAC, brand new, only 2K miles. Salas, 480-2726.

'60 CHEVY BELAIR, V8, AT, primered gray, great for restoration project, interior poor/exterior good. De La Rosa, 249-0993.

'95 JEEP GRAND CHEROKEE LAREDO, exceptionally clean, loaded including power everything, "Infinity Gold" sound, tow pkg., Selec-Trac 2- or 4-WD, AT, \$10,800 OBO. Smith, 296-1908.

'83 CHEVY 1/2-TON, 305 engine, w/toolbox, camper, \$1,700 OBO. Parra, 203-2025, ask for Matt.

'97 GRAND AM SE, 46K, 4-dr., V6, AT, AC, ABS, AM/FM stereo cassette, PW, PL, cruise, warranty, \$8,500. Sensi, 299-3958.

'89 ACURA LEGEND, 119K miles, new sunroof, tires, alternator, brake cylinder, transmission, keyless entry/alarm system, \$4,500. Kuhn, 268-1575.

'91 LINCOLN MARK VII, 89K miles, new tires, excellent mechanical condition, \$5,000 OBO. Campos, 890-4462.

'96 CHEVY SUBURBAN LS, 1/2-ton, electronic 4x4, AT, 5.7L V8. 62K miles, like new, \$19,900 OBO. Hutchins, 856-3361.

'98 FIREBIRD TRANS AM, WS6, RAM air, 6-sp., T-bars, black exterior, leather interior, 12-CD 500W AM/FM cassette, 17-in. wheels, \$19,500. Weston, 350-7059.

'66 CLASSIC DART, convertible, 225 slant-6, 3-sp. manual on column, factory AC (needs repair), \$3750. Gershin, 293-9648.

'92 MERCURY GRAND MARQUIS, gas-saving 406 V8 engine, smooth/quiet, superior performance/cleanliness, garaged, Michelin tires. Keener, 298-0892.

'99 FORD 250, HD, LB, 2WD, V10, 47K miles, tan w/matching shell, below book, \$18,000. Helgesen, 281-5407.

'83 MERCURY CAPRI, L, 2-dr hatch-back, V6, AC, AT, 63K miles, very reliable, \$2,000 OBO. Dudley, 271-1413.

'97 NISSAN PATHFINDER SE, excellent condition, 42K miles, 5-sp, AC, AM/FM CD, teal, \$18,500. Wilson, 247-2032.

'79 GMC PASSENGER VAN, 3500-STX, white, low miles, dependable, original owner, all records, see to appreciate, \$2,500. Northrop, 844-4718.

'93 SAAB 9000 CDE, classy, 4-dr. sedan, AT, deep blue, leather interior, heated seats, sunroof, CD, 94K miles, well maintained, \$7,550. Keegan, 323-8823.

'91 FORD F250, custom supercab, 4x4, 351, 5-sp., AC, 116K miles, good condition, runs well, see at KAFB car lot. \$7,600. Lusader, 856-9506 or 622-9506.

'93 CHEVY S-10 BLAZER, 4WD, 4-dr., AC, alarm, 4.3 V6, alloy wheels, excellent condition, well maintained, forest green, 78K miles, \$7,500 OBO. Roach, 269-0432.

'97 MERCURY GRAND MARQUIS, candy-apple red, 19K miles, tan leather, 8-cyl., Michelins, excellent condition, \$13,300. Iverson, 249-0072.

'91 FORD F250 XLT/LARIAT, 351, AT, 2WD, tow package, dual tanks, great condition, 75K miles, \$8,295. Gurrieri, 294-8541.

'86 GRAND AM, 6-cyl., F1, 101K, 2-dr., clean body, AT, AC, PW, PL, alarm, must sell, \$2,500 OBO. Smith, 881-5383.

'86 CAMRY, 155K, 5-sp., AC, PS, PB, 4-dr., new battery, tires, & belts, \$1,900. Stermer, 255-1083.

'91 TOYOTA CAMRY LE WAGON, AC, AT, AM/FM cassette, PW, PL, sunroof, 98K miles (50K on engine), \$4,500 OBO (NADA retail \$4,900). Ottesen, 292-7147.

'86 FORD F250, extra cab, 4x4, 460, 4-sp., 5th wheel hitch, loaded, excellent condition, \$5,000. Miller, 869-6383.

'96 GRAND VOYAGER SE, 3.3V6, AT, AC, CD, rear air, left sliding door, 7-passenger, \$7950. Campbell, 296-5792.

'95 CHEVY SILVERADO XCAB, 350, Z71, Sportside, 59K miles, matching shell, great condition, \$15,500. Hart, 323-0415.

'90 TOYOTA TRUCK DLX, X-cab, 2x2, cargo cover, runs great, rebuilt engine, AC, AM/FM/CD, \$3,500 OBO. Gurule, 440-9432.

'99 FORD EXPEDITION, XLT, 4x4, approx. 32K miles, 6-CD changer, 3rd seat, towing pkg., running boards, \$22,800. McRee, 898-5030.

'98 CHEVY MALIBU, runs great, PW, SL, AM/FM cassette, slight body damage, 75K highway miles, \$7,000. Sanchez, 866-4225.

'84 FORD F-150, truck, PS, PW, AT, 80K miles, needs work, great work truck, forest green/primer gray, \$2,000 OBO. Chavez, 323-9343.

JET SKIS, 2 Kawasaki 550s, '88, '84, rebuilt engines, tilt trailer to hold 3, all \$1,500. Suo-Anttila, 275-8373.

REAL ESTATE

5-BDR. CUSTOM HOME, 3 full baths, 3,000 sq. ft., \$145,000; vacant lot \$35,000 OBO. Trujillo, 873-3175 or 899-4881.

3-BDR. HIGH DESERT HOME, 2 yrs. old, 2,000 sq. ft. +/-, award winning builder/designer, acid-etched concrete floors, landscaped, timed sprinklers & bubblers, alarm, 2 full baths, radiant heat FSBO. Rivera, 823-1812.

3-BDR. MOBILE HOME, double-wide 2 baths, 1,536 sq. ft., in Four Hills MH Park, excellent condition, \$38,000. Rarick, 293-0644.

1-ACRE BUILDING SITE, east of Tome, N.M., new subdivision, near schools, \$8,500. Shaffer, 256-7601.

3-BDR. HOME, Lomas at Eubank, 1 3/4 baths, LR+ great room, w/ fireplace, sunporch, quiet park, 1,752 sq. ft., \$115,000. Neff, 298-3895.

2-BDR. TOWNHOME, 2 baths, FP, garage, new carpet, paint, floors, Tramway & Candelaria, \$87K, must refinance. Milliman, 256-5312 or 350-1896.

2-BDR. HOME, 1 bath, located in Eagle Nest, N.M., 17 miles from Red River & 10 miles from Angel Fire, \$69,000. Martin, 296-8154.

5 ACRES in Pagosa Meadows, Pagosa Springs, Colo., for development, city water, views, very quiet, \$73,000. Davis, 323-9079.

2.5-ACRE VIEW LOT, fantastic, wooded, secure gated community, 15 min. east of Albq., water, power, phone, \$39,500. Smith, 281-5096 or 281-2851.

3-BDR. HOME, airy, former model, Willow Wood, 2-story, 2-1/2 baths, w/loft, 5 min. drive to Labs. Jarecki, 323-7162.

2-BDR. TOWNHOME, 2-1/4 baths, 1,120 sq. ft., fireplace, covered carport, recent upgrades, Comanche/San Mateo, \$76,000, Morgan, 872-9113.

2-BDR. MOBILE HOME, 85-ft. KB Baywood, 14' x 52', w/all appliances, in 4-Hills Park, clean and affordable, \$10,500. Haushalter, 275-6772.

WANTED

HOUSESITTER, Sept. 4-8, care for 4 dogs & cats, in Algodones. Putelli, 867-6653.

HOUSEMATE, nice residential area, private entrance, convenient to Sandia, \$350 mo. Smith, 298-7365 or 292-1976.

CASSETTES/CD ROM, *Readers Digest*, "Dancing and Romancing Through the '40s." Piatt, 299-7486.

COMPOSTER (for table scraps and yard clippings), prefer round drum type. Strosinski, 281-9451.

USED LAPTOP, prefer IBM-compatible with CD ROM. Greer, 281-4688, leave message.

BREAST PUMP, Medela, electric, single or twin. Thomas, 281-0585.

HOUSEMATE (one, maybe two) to share large 4-bdr. house in NE area, 10221 San Gabriel NE. Dickerson, 323-5280.

'90 HONDA TRAIL BIKE or Kawasaki KE100 in good shape and running condition. Holmes, 897-0916.

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<http://www.savingsbonds.gov>

New Sandia program aims to help regional small businesses

Small businesses wanting to improve their business practices and procedures to become better, more effective suppliers are learning more about a new program to help them do that in free information sessions this month in Farmington, Albuquerque, and Las Cruces.

Sponsored by Sandia's Office of Small Business Advocacy (OSBA, in Regional and Small Business Partnering Dept. 1302) in collaboration with Sandia Supplier Relations Dept. 10205, the new program is designed to help small businesses (500 or fewer employees) and create a positive economic impact in a "regional service area" including New Mexico, Arizona, Colorado, Utah, and El Paso County, Texas.

The Mentor/Protégé Pilot Program for Small Businesses involves mentors from Sandia and some of its proven suppliers, protégés (small business participants who want to become better suppliers), and business service advisors. These advisors include service providers and Sandia employees who will help with short-term solutions with issues requiring expertise that a regular mentor does not have.

Benefits of the mentor/protégé relationship include a more qualified supplier base for regional businesses, including Sandia, and more qualified partnerships to transfer technology. For mentors, benefits include the ability to locate and evaluate potential teaming partners and the opportunity to have a direct impact on the quality and development of suppliers and businesses. Business service advisors benefit with a marketing opportunity and a chance to provide community service. Protégés receive strengthened business practices and greater awareness of their businesses within Sandia and the community.

Project manager Toni Leon Kovarik (1302) emphasizes that the program is not just for companies that are now or want to be Sandia suppliers. "It's for any small business that wants to improve its business practices and procedures to become a better supplier in general," she says.

A team of Sandians, including the OSBA

Commander in chief of the US Strategic Command visits Sandia, honors B61-11 Team



STRATEGIC VISIT — Adm. Richard Mies, Commander in Chief of the US Strategic Command (USSTRATCOM), talks with Executive VP Joan Woodard and Senior VP for Defense Programs and Nuclear Weapons Programs Tom Hunter during a visit to Sandia Aug. 15. During his visit, Mies presented an award to Sandia's B61-11 Certification Team "from the men and women of United States Strategic Command" for the team's work in certifying the B61-11 for the stockpile. He also conferred with Sandia President and Labs Director C. Paul Robinson. Paul has been a member since 1991 of the Strategic Advisory Group for the Commander-in-Chief, USSTRATCOM. (Photo by Bill Doty)

and a representative from Supplier Relations and Community Involvement, will meet once a year to review applications and match mentors and protégés. The pilot program rollout began this month with information sessions. Selections will be made in September, and program orientation and training begins in October. Sandia employees who want to participate as mentors or business service advisors can contact Toni Leon Kovarik at (505) 843-4150 or tlkovar@sandia.gov, Mariann Johnston at (505) 843-4171, or Vic Chavez at (505) 843-4190.

— Janet Carpenter

Coronado Club

Aug. 24 — Comedy show and dance. Food and drink specials. Cost is \$10 per person. 7 p.m.

Aug. 26 — Sunday brunch, 11 a.m.-1 p.m. Entertainment, 1-4 p.m.

Aug. 28 — Adult bingo. 6:15 p.m., early bird begins at 6 p.m.

Aug. 31 — Hispanic Dance Night with DJ and karaoke, 5 p.m.

Retiree book author Gay Dybwad takes Lab News photographer's advice

Have portable studio, will travel

Before he began work on his and wife Dr. Joy Bliss' latest book, *Dryden Pottery*, Sandia retiree Gay Dybwad stopped by *Lab News* photographer Randy Montoya's office for advice. Not that Randy writes books but he does know a little something about photography and Gay knew Randy wouldn't steer him wrong.

Gay wondered how he could set up a portable studio using digital cameras and still get the high-quality photos of various pottery collections he needed for *Dryden Pottery*, published by The Book Stops Here, 2001.

Gay and Joy made six trips, traveling to Arkansas, Kansas, Missouri, and Illinois, using the portable studio. The book's cover photo was taken in that studio. Although the book is black and white, a CD containing color photos of various collections of Dryden pottery comes with the book. Cost of the portable studio was \$14.

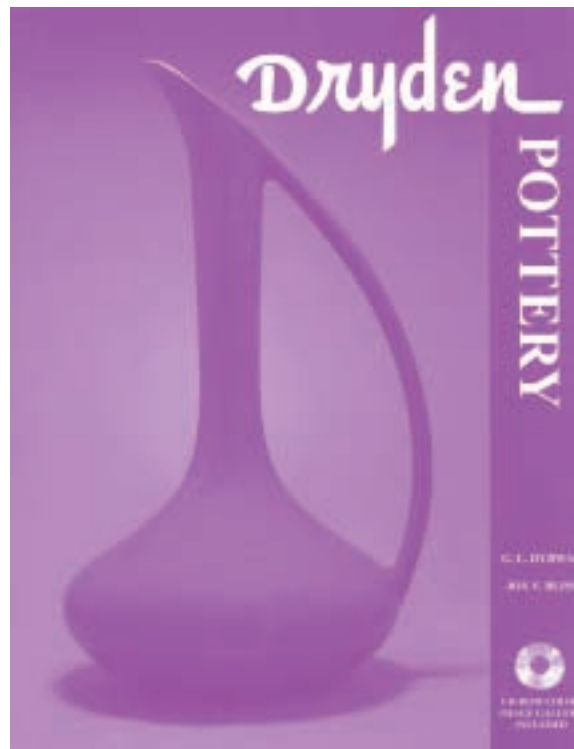
"Without Randy's advice, we wouldn't have had such excellent pictures," says Gay.

Gay and Joy decided to produce a book about Dryden pottery because they have a collection of the pottery. They learned about it when they were in Kansas — Gay as a student at Kansas State University and Joy as a practicing physician in the Kansas City area.

The book will be available nationwide, with the initial concentration of advertising in Kansas, where Dryden pottery began, and Arkansas, where it is now made. Other books Gay and Joy have written and published include *Annotated Bibliogra-*

phy: World's Columbian Exposition, Chicago 1893; James A. Michener, The Beginning Teacher and His Textbooks; Chicago Day at the World's Columbian Exposition; and Annotated Bibliography: World's Columbian Exposition, Chicago 1983 Supplement.

— Janet Carpenter



Feedback

Q: Is it possible that a weekly pay schedule will be offered to employees as an alternative in the future?

A: We are not considering changing to a weekly pay schedule. We changed to biweekly pay in October 1997, and it seems the optimum pay schedule, weighing the cost of pay distribution against the employees' desire for frequent pay. We are always looking for process improvements, and our ability to pay all employees on the same schedule has resulted in significant savings for the Laboratories. Thank you for your question.

— Bonnie Apodaca (10500)

Q: Has any way been devised to make up for the fact that some of us were not allowed to contribute to our 401(k) plan (and receive matching contributions from Sandia) during our first year of employment here?

A: When a policy is changed, many times there is a population that does not retroactively receive the same treatment. Such is the case of new hires being able to contribute to our 401(k) plan (without a company match) for their first year of employment. Prior to that time, all Sandia employees, regardless if they had been employed for two months or twenty years, were required to wait one year before participation.

You refer to the possibility of also receiving retroactive matching contributions from Sandia. There was no change in this policy. Even though new employees can now immediately contribute their own money to the 401(k), they do not start to receive the company match until their first anniversary.

— Ralph Bonner (10300)