

Labs water resource simulator rapidly calculates tomorrow's supply given today's choices

Water management tool may help quell regional tensions, avert water crises in the thirsty world of the future



AGRICULTURE AND DROUGHT have combined to dry up rivers and lakes in some parts of the world, crises that might have been prevented with better water management tools such as Sandia's water budget model, says model co-developer Dick Thomas, seen here in an Albuquerque crop field. (Photo by Randy Montoya)

By John German

By 2015, according to experts, half the world's population — 3 billion people — will lack access to fresh water. (See "Why water is a national security issue," on page 4.)

A team of Sandians is developing software models they think might help not only regions and nations with seemingly hopeless water shortages, but also water-wary areas such as the Southwestern US where sound resource management might still avert a crisis.

The simulations, called Dynamic Water Budget Models, allow decision makers to see how water policy options selected today will affect a society's water resources decades into the future.

The developers include Dick Thomas (6115), Steve Conrad (6515), Vince Tidwell (6115), Erik Webb (6115), and Cara McCarthy (University of Arizona).

Exploring policy options

The models are built on the commercial Powersim software tool, which Sandia has used to study everything from summer blackouts in California to global nuclear material inventories. The intuitive user interface allows easy changes to inputs and immediate extrapolation and visualization of results.

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Modernized system to manage codes for nation's nuclear weapons complete

Multiyear project delivers 14 custom products; now operational in Europe

By Ken Frazier

An ambitious Sandia-led program to fully update the code management system that supports control over use of the nation's nuclear weapons has completed a major milestone.

The Code Management Systems (CMS) project completed a multiyear, full-scale engineering effort at Sandia with its first full system delivery of all hardware and software to two Department of Defense customers.

On Nov. 30 the system became operational for the first time for weapons in Europe.

Code management systems and ancillary equipment are in place at headquarters command sites and at various bases in the field. They are used in conjunction with Sandia-designed permissive action links, or PALs, inside US nuclear weapons to recode, unlock, lock, and manage the weapons, while ensuring the secrecy and authenticity of command-and-control messages.

The systems allow those having custody of

Labs develops its first custom processor, the Sandia Secure Processor. See story on page 5.

"We wanted to develop a system that was modular in nature, so that it could be maintained and upgraded in pieces as needed in the future. It was a huge team effort."

weapons with PAL systems to plan, store, change, interrogate, track, use, or otherwise manage all necessary code-related information. This is a critical part of ensuring that weapons can be used when authorized and cannot be used when not properly authorized.

The Code Management System coupled with the B61 ALT 339 retrofit enables the recoding of nuclear weapons in a fully encrypted manner. This new class of code management equipment designed by Sandia greatly simplifies use and logistics for personnel. It replaces a variety of different vintages of code-management equipment that had been produced and put into place at different times and for different weapon systems and users

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Exceptional service? How about 50 years' worth!



HORACE POTEET, a weaponeer whose own career almost exactly parallels Sandia's entire history, retires this month after 50 years with the Labs. Read Chris Burroughs' profile of this remarkable Sandian, beginning on page 7.

Z-Beamlet celebration highlights scientific effort, political will

By Neal Singer

On a cold and windy day in a large tent put up for the occasion, Sen. Pete Domenici, R-N.M., and Rep. Heather Wilson, R-N.M., joined NNSA, Sandia, and private dignitaries behind the electronic gate in Area 4 to celebrate with several hundred Sandians and their families the successful operation of Z-Beamlet, the third largest laser in the world. Its beam recently peered into the heart of Sandia's Z accelerator to record that machine's smooth reduction in size of a prototype fusion pellet.

Sandia President Paul Robinson, who hosted the event, opened by looking over his shoulder at Domenici and Wilson and asserting coolly that the \$12 million used to dismantle, haul, store, and reconfigure the laser, discarded two years ago by Lawrence Livermore National Laboratory, was "one of the best investments you ever made."

Domenici, looking around at the billowing canvas walls, contrasted "the shiny buildings in which the breakthroughs were made" with the somewhat chilly space in which he spoke. "Remember that it's not the kind of environment in which we share our success, but what

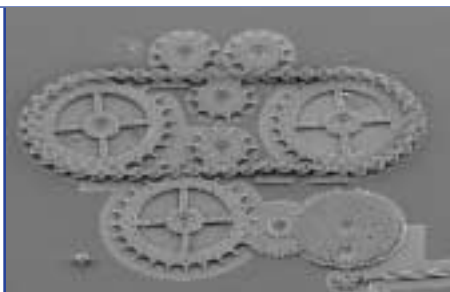
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World's smallest microchain drive fabricated at Sandia

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Nine Labs teams win Sandia President's Gold Quality Awards

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This & That

Well, here I am again all these years later, staring at a blank space – it's a screen now; it was a sheet of paper in a typewriter then – dreaming up clever things to jot down in an entertaining newspaper column. I got a real bang out of writing a weekly column for a newspaper I edited some years ago, but most of the grist then came from my kids who are all grown up now and probably wouldn't care much for having fun poked at what they say and do. And you probably wouldn't think it was very funny, either, so that rich trove of funny stories is all dried up.

Colleague Larry Perrine got a lot of help from readers over the dozen or so years he turned out this column, and I hope you'll be as free with suggestions for me. You'll find my phone number and email address below, and I'll enjoy hearing from you.

Meanwhile, like Larry occasionally leaned on his Oklahoma upbringing for a fresh perspective on something, I'll fall back on my Kentucky roots now and then. One thing I'll point out right now is that I don't know a thing about "possum surprise," which has always been Larry's favorite contribution to the more-than-occasional potluck meals we gin up in the PR group. I've been accused of a lot of things because of my Bluegrass connection, but "possum surprise" ain't one of 'em – No sirree!

* * *

Before we leave ol' Larry, he admitted sheepishly last week that he'd had a struggle working up enough genuine enthusiasm to come back to work after the holiday break. "But that's good," I told him. "My problem was working up enough fake enthusiasm to come back!"

* * *

Horace Poteet (5933) is leaving Sandia Jan. 14 after a 50-year career – among the longest in Sandia's history. You'll find Chris Burroughs' story about him, on Page 7, a fun read. Why retire? "I don't like to start things I can't finish," he told Chris. "And I don't think I can finish another 50 years at Sandia – much as I'd like to."

* * *

And on that subject of finishing things, I have a tip. A friend told me the way to achieve inner peace is to finish things I had started.

"Well, bucko, I'm ahead of you," I thought. "Just yesterday I finished a bag of chips and a jar of salsa, the last of a blackberry jam cake my mother sent for the holidays, and a box of chocolate truffles. And I feel inner peace already – even without the Alka-Seltzer."

Feel free to pass this along to your own friends who need inner peace.

* * *

As the old chestnut goes, "no news is good news," and Sandia got good news in the *Albuquerque Journal's* annual Cowchips Awards, which was published at year's end. *Journal* writer Fritz Thompson keeps up with foibles, lapses, embarrassments, gaffes, and just about everything else people or organizations can be guilty of, then splashes them across a couple of pages in the paper as a year-end story. I read this year's version from start to finish, and Sandia didn't get a single mention.

– Howard Kercheval (844-7842, MS 0165, hckerch@sandia.gov)

DOE/NNSA appraisal ranks Labs performance 'Outstanding'

Sandia's performance has again been rated "Outstanding" in the DOE/National Nuclear Security Administration's annual appraisal.

Each year a formal appraisal is required under terms of the contract with Sandia Corporation. This is the sixth year of evaluating Sandia under the Multi-Program Laboratory Assessment Management Structure.

"Overall, SNL's performance in FY01 was outstanding, indicating SNL significantly exceeded the standard of performance," said W. John Arthur III, Deputy Manager for Program Execution at the DOE Albuquerque Operations Office in his formal letter of transmittal of the report to Sandia President C. Paul Robinson, received Dec. 19.

"All performance groups (Laboratory Management, Programmatic, and Operations and Administration Support) were rated Outstanding," the letter continued.

'Outstanding' in 13 of 17 areas

Sandia's programmatic performance was rated outstanding in 13 of the 17 areas under categories of Directed Stockpile Work (2 of 5), Campaigns (4 of 4), Nuclear Non-Proliferation (2 of 3), and Science & Technology Other (5 of 5). The transmittal letter particularly noted Sandia's support for annual Stockpile Certification, development of W76 and W80 refurbishment options for stockpile life extension, start of the 12.3 teraOps Accelerated Strategic Computing Initiative white system, Z-machine experiments, and implementation of lean principles in neutron generator production.

In Operations and Administration Support, the letter took particular note of the Safeguards and Security (S&S) program's "commendable performance" in implementing an integrated S&S management approach throughout the Labs. Also, says the letter, "SNL management continues to do an outstanding job of focusing management attention, setting priorities, and aligning resources to accomplish missions assigned by DOE/NNSA," says the letter.

Lines of communication to HQ lauded

It continued: "Further, SNL management is commended for the lines of communication to DOE/NNSA, including establishing processes for interaction with HQ and AL management. Laboratory Management's overall rating was Outstanding. Sandia Laboratories management is congratulated for sustaining a high level of performance through a year in which the NNSA faced many significant challenges. SNL's response to the national emergency that occurred on Sept. 11, 2001, involving the terrorist attacks with the United States is commendable."

Referencing the Business Management Oversight Review (BMOR) of Sandia's administrative functions, the executive summary of the appraisal report stated, "SNL continues to dedicate appropriate management attention to the business systems required to support a vital national laboratory."

Some areas for improvement

While Sandia's overall performance was rated outstanding, the appraisal did identify "some areas where SNL performance did not meet expectations and needs improvement." These include the project management processes for the Microsystems and Engineering Sciences Applications (MESA) project, "although signs of improvement were noted late in the fiscal year," the letter says. The letter also said Sandia should improve support to NNSA/HQ in systems integration and systems analysis. It said a more consistent application of Integrated Safety Management is needed and full implementation must be carried out at all Sandia sites, "including SNL/California, Tonopah Test Range, and SNL Nevada Test site."

While four of the five administrative functional areas in the BMOR evaluation were rated "outstanding," the BMOR report said there were opportunities for improvement in property database and accountability, Sandia's collection of Other Federal Agency delinquent accounts receivable, responsiveness to Defense Program budget requests, and the lack of progress in complying with the contract's make-or-buy plan.

Jerry Hanks (12141), owner of the Sandia appraisal, was pleased with the overall assessment. "Thanks to each of you for your efforts in this accomplishment," he wrote in a Jan. 2 memo. "Your hard work and cooperation are always appreciated!"

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Marion Scott named Director of Microsystems Science, Technology, and Components Center 1700

VP 1000 Al Romig announced the selection of Marion Scott as Director of Microsystems Science, Technology, and Components Center 1700, effective Dec. 14.

Also, Marion has named Dave Myers "Principal Deputy" of Center 1700, with a vital role in center operations and in maintaining lines of communication with DOE Defense Programs.

Marion earned a PhD in electrical engineering from Southern Methodist University and was hired by Sandia as a Member of Technical Staff in 1986 in the Optoelectronic Components Development Division.

Until his new appointment, he was Deputy Director for Sensors and National Security in the Microsystems Science, Technology, and Components Center. Marion's professional contributions to Sandia include assignments as a Manager in the Sensor Programs Department and Advanced Geophysical Technology Department.

Prior to coming to work for Sandia, he was a Senior Engineering Specialist at LTV Aerospace and Defense Co.

Sympathy

To Carolyn Lange (12100) and Steve Barnard (2661) on the death of her mother and his mother-in-law, Elizabeth Gross, in Albuquerque, Nov. 19.

Students honored for success in Go Figure Math Challenge



CELEBRATING SUCCESS—Teacher Elizabeth Woodhouse congratulates 7th-grade student William Nguyen, who was a winner in the Go Figure Math Challenge that Sandia and DOE co-sponsored representing 36 schools in Alameda, Contra Costa, and San Joaquin counties. In the background is Valerie Knighton of Recruiting & University Partnerships Dept. 8524. A total of 244 students in grades 3-12 participated in the Third Annual Go Figure Math Challenge on Oct. 27, 2001. The math challenge was held at three Bay Area and San Joaquin locations with the help of the Pacific Mathematics, Engineering, Science Achievement (MESA) program in Stockton, Tracy African-American Association in Tracy, and Las Positas College in Livermore. Sixty-two high-scoring students were honored at four different award banquets in December with their parents and teachers.

Sandia California News

GO FIGURE—Several students (shown in photo above left) recognized for high scores in the Go Figure Math Challenge were honored in December at a banquet hosted by Recruiting & University Partnerships Dept. 8524 (Manager Karen Scott is standing at the back right). Former Sandia Director Dona Crawford, now the Associate Director for Computation at Lawrence Livermore National Laboratory, back left, was a speaker at one of the four banquets that honored the 62 high-scoring students, as well as their teachers and parents, out of the 244 students in grades 3-12 who spent a Saturday in October taking the challenge in an SAT-like test. This is the third year Sandia and DOE have co-sponsored the challenge. It was held with the help of the Pacific Mathematics, Engineering, Science Achievement (MESA) program in Stockton, Tracy African American Association in Tracy, and Las Positas College in Livermore. Participating students represented 36 schools and 82 teachers.

HONORABLE MENTION—Third-grader Evan O'Darney (shown in photo at top right) likes math so much, he participated in the third annual Go Figure Math Challenge on Oct. 27, 2001, and received an honorable mention. The challenge, co-sponsored by Sandia and DOE, is designed for students in grades 3-12. He was among 244 students from 36 schools in Alameda, Contra Costa, and San Joaquin counties who spent a Saturday taking the SAT-like test of carefully thought-out math problems. The 62 high-scoring winners were honored at four different banquets in December, along with their parents and teachers.

Holiday Spirit Drive rocks . . . and rolls



FROM MEALS TO WHEELS — Employees at the California site gathered 850 pounds of food and 22 bicycles, as well as about \$500 in cash, during the annual Holiday Spirit charity drive. A special effort was made to gather bicycles, including used bicycles that were refurbished in an arrangement with a local bicycle store. Seventeen went to requestors and five more were donated to area shelters. Above are Michaela Salas (8724), left, and Julie Cablayan (8723), on bike, with Renee Haynes (8527) in background.

Sandian Karl Gross honored as a DOE Young Investigator

Karl Gross (8723) has received the rare distinction of a Young Investigator award from the DOE Office of Energy Efficiency and Renewable Energy's Office of Power Technologies.

The award, presented Dec. 13 at the DOE Forrestal Building in Washington, recognizes exceptional talents of researchers who are working to advance DOE programs. Building upon the doctoral thesis work he completed at the University of Fribourg in Switzerland in 1998, Karl has made many breakthroughs that have helped establish Sandia as a leading laboratory in hydrogen storage research.

The research centers on developing new lightweight hydride materials for hydrogen fuel-cell-powered vehicles. Hydrides are metallic alloys that can absorb hydrogen under pressures and temperatures that are close to ambient conditions, unlike the common storage method that involves compressing the gas in a cylinder to 5,000 psi, or liquefying the gas to -260°C with a refrigeration system.

In fuel cells, hydrogen combines with oxygen to form water, generating electricity in a virtually pollution-free process. Storing hydrogen in a hydride bed is especially attractive for on-board vehicle storage, says Jim Wang, Karl's manager in Analytical Materials Science Dept. 8723.

Karl is one of five researchers receiving the honor this year, the first year of the EERE/OPT awards.

Karl's research centers on developing new lightweight hydride materials for hydrogen fuel-cell-powered vehicles.

Water

(Continued from page 1)

Making policy changes is as simple as fiddling with a few knobs, says Dick.

But underneath it all is a complex model not only of water uses but of the subtle interrelationships among ground and surface water sources, recharge rates, groundwater pumping, irrigation, climate, evapotranspiration, and demographics. Future models will include other factors, such as environmental impacts, water quality, economic productivity, and an area's social and cultural foundations.

"There are modeling tools that provide greater fidelity in modeling individual components of the water system," says Erik. "We've abstracted and combined those kinds of models to ask what the water resource picture might be 20 years down the road. This is the only model we've found that allows for big-picture, long-term planning."

Thinking globally, acting locally

Development of the tool, first envisioned by Dennis Engi (16000) in 1986, has been funded primarily through the Laboratory Directed Research



WATER POLICY TEST DRIVE — Steve Conrad (sitting) demonstrates the Middle Rio Grande Basin Dynamic Water Budget Model to Sen. Jeff Bingaman, D-N.M., during a visit to Sandia in February 2001. Later Bingaman took the model for a test drive. In Bingaman's simulation, restricting lawns was among the policy combinations that resulted in a sustainable water future for central New Mexico.

and Development (LDRD) program.

Dick and Steve built the first model in the mid 1990s to examine water supply and demand trends for China's 10 major water basins, concluding that water will become a limiting factor in the country's ability to feed itself during the next two decades as China's major agricultural areas run increasingly large water deficits.

Why water is a national security issue

Rampant overuse of fresh water resources — along with land industrialization, drought, and pollution — have made long-term agricultural self-sufficiency a vanishing hope in countries such as China, where lakes have dried up and rivers have stopped flowing.

Parts of South Asia, East Asia, and the Middle East are fast approaching crises, when water demands may outstrip supplies, rendering governments unable to feed their burgeoning populations.

Much of Africa and the Middle East already are in dire straits.

Half the world's population will lack access to fresh water by 2015, according to the 2000 National Intelligence Council report "Global Trends 2015."

Because a starving populace brings political instability, water shortages may soon be a major cause of regional tensions, predict

many experts.

Water clearly is a national security issue, says Steve Conrad.

If the price of grain goes up because of world shortages, for instance, Third World nations, which import much of their grain, would not be able to feed their people, he says.

"We must do something now to prevent water resources from instigating political instability, or prepare for the inevitability of conflict over water," he says.

Water scarcity may play a role in nurturing terrorism, as well.

"Some say terrorism is the atom bomb of the hopeless," adds Dick Thomas. "Water and food shortages soon may be the chief cause of hopelessness in many places. It is in our self-interest to help these governments make their own futures."

The simulations were part of a Harvard University study that helped alter the way some experts now think about China's future.

"China's goal is to be a self-sufficient nation with regard to grain production," says Steve. "Our conclusion was that China is not going to be self-sufficient unless something changes drastically."

The team then used the Middle Rio Grande Basin, the basin that supplies water to the Albuquerque area, as a test-bed for developing the tool further.

"It's a way of helping our community with sustainability issues while also creating a tool that could help the nation and the world," says Dick.

Working with the US Geological Survey and the state engineer's office they built a model that shows, not surprisingly, that current water use practices in New Mexico are not sustainable.

The team continues to work with city planners in Albuquerque and Rio Rancho to apply the tool to Albuquerque-area policy-making efforts, in cooperation with the UNM Law School's Utton International Transboundary Resource Center.

Workable vs. unworkable options

A similar model of New Mexico's Estancia Basin, in cooperation with the Estancia Basin Water Planning Committee, is helping show farmers and developers the possible results of various development schemes and agricultural practices for the area.

"Different users have different ideas about what optimal use of the water resource is," says Dick. "We helped get them talking sooner about realistic approaches rather than dwelling on unworkable, unsustainable options."

The team expects to deliver to officials a web-based version of the Estancia Basin model in four to six months as part of a project sponsored internally by Corporate Outreach Dept. 12650.

They also are exploring, in cooperation with Sandia's Cooperative Monitoring Center, the possibility of modeling water issues for basins shared by countries of the Former Soviet Union, for nine countries that border the Nile River, and for the US and Mexico in the El Paso/Cuidad Juarez area.

The team has demonstrated the model to local school children as well.

"It's a great educational tool," says Steve. "Anybody can play their own 'what if' game. It allows different people with different stakes in the outcome to rapidly test the long-term effects of many policy options. It's very democratizing."

Z-Beamlet

(Continued from page 1)

we do that counts."

Keynote speaker Mike Campbell, former director of the LLNL National Ignition Facility and now vice president of General Atomics, headquartered in San Diego, Calif., offered the long view. "A million and a half years ago, a human ancestor — probably a woman — invented the controlled fire we all sit comfortably around today," he said. "A million and a half years from now, our descendants will recognize the contribution of the generation that brought the world the unending power supply of nuclear fusion." He praised "the Labs, DOE, and politicians who had the ability to stand up for a dream not for the faint-hearted."

Dave Crandall, director for research, development, and simulation at DOE's National Nuclear Security Administration, said simply of recent breakthroughs, "The people who made this possible are my heroes." He described Sandia as a "master of electrons," LLNL as a "master of photons," and LANL as a "master of neutrons." He said that now at Sandia, it was time to "go get those neutrons."

Said Sandia's Senior VP for Nuclear Weapons Tom Hunter (9000): "I don't think there's any better example of bringing together science, engineer-

ing, and results than what you see here today. It builds confidence in the American public, and it builds fear into the adversaries of this nation."

After a rapid tour of the large and complicated machines, Heather Wilson said, "I don't even know how you came up with the idea that this thing could be done." She said she hoped the researchers didn't lose through familiarity "the sense of how special this work is."

Domenici, who spoke last, closed on a realistic note. "I wouldn't think that the administration would choose this work as a very high-priority item. They'll go with their plans right now."

"But I do believe this work is so successful, has so much opportunity to succeed, and needs so little money in comparison with other projects in this field, that we'll get it funded, keep it going, and see it reach fruition."

"Then, perhaps, we'll have another day of celebration. And it won't matter to me where it is."

Sandia Executive VP Joan Woodard presented Domenici and Wilson with Z-Beamlet jackets — which they donned immediately — to keep them



THE WAY THINGS WORK — Sandia Z-Beamlet project leader John Porter (far left) holds forth to (in order) Sen. Pete Domenici, R-N.M., Sandia President C. Paul Robinson, and Rep. Heather Wilson, R-N.M., along with assorted Sandia High School science students, on how Z-Beamlet analyzes pellet compressions obtained by Z firings. The object on the table is one of Z's targets. The photo was taken in the renovated building housing Z-Beamlet in Area 4. (Photo by Bill Doty)

warm on the stage and in Washington, as well as to help them remember the Sandia laser and accelerator.

A video explained the somewhat complicated operation of the two machines for the benefit of guests, who included science-oriented students from Sandia High School, present by invitation.

Use-control code

(Continued from page 1)

over the decades.

The new hardware and software has been redesigned from scratch in a systems approach intended to provide a common architecture, modular products, and reusable processes to facilitate future upgrades. Now that it is operational with USEUCOM (US European Command) and USAFE (US Air Forces in Europe), the CMS becomes the common foundation for all future upgrades of PAL system hardware and software.

A huge team effort

"To design and develop a system with an overall architecture to replace everything in the field was quite a challenge," says Doug Clark, CMS project lead engineer in Use Control Systems Dept. 2121. "We wanted to develop a system that was modular in nature, so that it could be maintained and upgraded in pieces as needed in the future. It was a huge team effort."

Fourteen custom products (nine software and five hardware products) were delivered, accepted by DOE/NNSA, and put into operation in Europe in November. All were designed at Sandia, and in addition all the software was implemented and produced at Sandia. The custom hardware was manufactured at NNSA's Kansas City Plant.

The software contains about 160,000 lines of uncommented computer source code (260,000 including comments). About 570 documents and drawings were prepared in support of the requirements, development, production, and qualification of all CMS products.

The project started at Sandia in 1995 at a low

level of effort, but became focused on its current development strategy in 1997. The use-control community realized that code management and PAL system equipment for recoding and managing nuclear weapons developed over 30 to 40 years was becoming difficult to maintain and depended upon a frustrating variety of different vintages of equipment.

"This culminates eight years of work in both code management and the B61 program that had to come together at the end of November," says Doug Mangum, Manager of Dept. 2121. "It all came together and worked as expected," he says.



DOUG CLARK (2121) demonstrates three of the hardware components of the new Code Management System for nuclear weapons, the field processor and the combined communication module/power module. Sandia has completed full system delivery of all the hardware and software system components (14 in all) to the US European Command and US Air Force, Europe, and on Nov. 30 the system became operational for the first time for weapons in Europe.

(Photo by Randy Montoya)

The 14 products that make up the new CMS include a cryptographic processor (which was completed and delivered in Europe first, in 1997, to address some Y2K concerns), its software, host processor software, field processor software, file transfer software, a communication module, that module's software, a power module, an interface adapter, a field tester, a field training simulator, field training material, headquarters training material, and system operation definitions.

A kit the size of a small suitcase

The field hardware all fits in a kit the size of a small suitcase. Software and hardware products to support fifty of the kits have been delivered from Sandia and the Kansas City Plant.

The cryptographic processor, which contains three cryptographic chips and can support any current nuclear command and control cryptographic system, looks something like a large, sturdy, all-metal laptop computer and is, says Doug Mangum, "secure and trusted." He says the CMS system will support the use-control community's "end-to-end encryption requirement for crypto-capable weapons," in which PAL data are never exposed in the process of doing PAL recodes.

The Sandia CMS team will next focus on replacing the remaining code management equipment for all US military and NNSA users by the end of 2003 or early 2004.

At that point all the main objectives of the project will be complete. The nation will have new, modernized use-control code management capabilities and equipment providing greater flexibility and speed. The capabilities will incorporate advanced principles of nuclear surety (integrated anti-tamper features, enhanced use of encryption and no-knowledge systems, and improved equipment safety). And maintenance and logistic burdens will be eased, with personnel training and operation simplified.

A hundred Sandians, others across the complex involved in project

Delivery of all the software and hardware in the Code Management Systems project on Nov. 7, 2001, and their acceptance by NNSA/DOE culminates years of significant engineering efforts by approximately a hundred different people at Sandia, says Doug Mangum, Manager of Use Control Systems Dept. 2121. Organizations 1700, 2100, 2500, 2900, 5900, 6500, 12300, and 14100 have all been involved. The Honeywell FM&T Kansas City Plant was instrumental in providing product engineering support and in meeting production schedules for the hardware. All in all, he says, several hundred people across the nuclear weapons complex, including NNSA/AL and multiple DoD organizations, have had a hand in the project.

Rebuilding a capability at Sandia

The Code Management Systems project had a purpose and value beyond even all the new systems, hardware, and software that was designed and developed to eventually replace everything now in use in the field. That value is in stimulating and maintaining the expertise to execute on Sandia's coded control responsibility to NNSA and the nation.

"We were rebuilding a capability [at Sandia]," says Lead Project Engineer Doug Clark (2121). "It was something new," he says. "It was designed to sustain a capability and deliver products. We designed tools and processes that will provide a foundation that lets us do this for a long time to come. The overall implementation of the CMS architecture and ability to sustain it was more important than any single deliverable."

Labs develops its first custom processor, the Sandia Secure Processor

The same department that developed the hardware and software for the Code Management System (see main story) has developed Sandia's first custom microprocessor architecture. The Sandia Secure Processor, or SSP, will have its first application in weapon use control, as a PAL-system component. But the architecture is generic, in the expectation that it will have multiple applications.

"It is important to note that this system is not designed for blazing speed as most commercial processors are," says Greg Wickstrom of Surety Electronics and Software Dept. 2125, which has project responsibility. "It is targeted for small, embedded, safety-critical systems. Any safety-critical system may find it useful." Satellites and medical devices are among the possibilities.

Although some of the newer use-control systems use modern processors, they are still constrained to older languages that make devel-

oping safe and secure software difficult. The Sandia Secure Processor is based on a subset of the newer Java language, which has inherent advantages for safety and security.

"Basically, we wanted to select a language that protects programmers from themselves," says Greg — one that helps identify and correct errors. The Java language fits the bill. "We're leveraging its safety and security capabilities to the maximum extent," he says.

"Java usually requires a software virtual machine to execute, and we are turning that virtual machine into a physical one," says Department 2125 Manager Tom Perea. "This lets Java software run much more efficiently in very small systems."

The processor is not only secure but fully verifiable. "Since Sandia owns this design, we can analyze it to any level of detail," says Tom. In fact, a goal of this program is to enable the application of mathematically provable meth-

ods for verifying flawless, secure operation.

"We are now integrating all the parts of the processor into one coherent piece and testing the whole system in simulations," says Tom. The tools that synthesize the design into a producible part are currently generating a mere 40,000 logic elements capable of running at 50 MHz.

He notes that while major microelectronics chip companies might require large teams of developers to design a new processor, the SSP has been developed with the equivalent of three full-time employees over the last three years. This has been enabled through the use of modern development tools and close teaming between the three departments contributing to its development, 2125, 1735, and 2121.

Plans are to fabricate the SSP in a radiation-hardened technology at Sandia's Microelectronics Development Laboratory. — Ken Frazier

World's smallest microchain drive fabricated at Sandia

Microscopic bicycle-chain look-alike could power multiple MEMS devices or microcamera shutters

By Neal Singer

Except that each link and pivot could rest comfortably atop a human hair, a microchain that closely resembles a bicycle chain has been fabricated at Sandia.

(The distance between chain link centers is 50 microns. The diameter of a human hair is approximately 70 microns.)

Because a single microchain can rotate many drive shafts, the device could make it unnecessary to place many tiny microelectromechanical systems (MEMS) motors in close proximity. Usually, a separate driver powers each MEMS device.

"All those drives take up a lot of real estate on chips,"

says Sandia technician Ed Vernon (2614), who has received a patent for the silicon microchain.

The microchain also makes it possible to drive a MEMS device from a motor situated at a distance, again saving considerable space on the MEMS-bearing chip.

The microchain, says Ed, could be used to power microcamera shutters, as larger chains currently do in the macroworld. It could also be used in mechanical timing and decoding.

The 50-link silicon microchain is designed to transmit power somewhat like the drive belt



CLOSEUP views of microchains.



OVERVIEW — Pictured is a microchain. The distance between chain link centers is 50 microns.

in a 19th-century sewing factory. There, a central engine shaft powered by steam turned drive belts to power distant work stations — for example, sewing machines — before the dawn of the age of electricity.

Chain systems, unlike stroke systems, do not require back-and-forth movements but instead allow for both continuous and intermittent drive translation.

Ed fabricated a microchain rather than a microbelt because though silicon belts are tough and flexible, they are spring-like and produce too much torque on gears not aligned in a straight line. Each chain link, on the other hand, is capable of plus-or-minus 52 degrees rotation with respect to the preceding link, without creating pressure on the support structure. The wide angle means designers can be relatively unconstrained in positioning multiple devices.

The longest span unsupported by gears or bracing is 500 microns. A microchain tensioner is needed to accommodate longer spans.

The multilevel surface-micromachined silicon device was constructed with the aid of Sandia's patented Summit IV and Summit V technology, which enables construction of complicated MEMS devices.

Program seeks current, retired Sandians who suspect beryllium exposure

Current and retired Sandia employees who suspect they have been exposed to beryllium while working at the Labs may be eligible for benefits under the Energy Employees Occupational Illness Compensation Program.

Floyd Archuleta, who heads up an Energy Employees Compensation Resource Center in Española, will outline who is eligible and what benefits are available during a presentation for Sandia employees and retirees on Jan. 17 from noon to 1 p.m. at the Bldg. 810 auditorium. The presentation will be simultaneously broadcast on Video Sandia as well as video teleconferenced to Sandia/California's Bldg. 904 auditorium.

Also on hand in Albuquerque will be two claims workers who, following the presentation, will answer questions from employees on an individual basis.

In addition, during the following week case managers from the Española office will be available to assist with processing new claim applications. They will be at a temporary office set up at the Sheraton Uptown in Albuquerque. Office hours will be 9 a.m.-7 p.m., Jan. 29, 30, and 31, and 9 a.m.-noon on Feb. 1.

The Energy Employees Occupational Illness Compensation Program Act was designed to locate people who became ill as a result of exposure to airborne concentrations of the light-weight metal and its alloys while working in the nuclear weapons industry for DOE. Individuals who developed cancer from exposure may be eligible for a \$150,000 lump-sum compensation and medical expenses provided through the act.

The Energy Employees Compensation Resource Center in Española is one of 10 around the country designed to assist people exposed to beryllium, silica, or radiation while working in the nuclear weapons industry for DOE, including its contractors or subcontractors.

Claims filed through the Energy Employees Compensation Center will be sent to the Department of Labor regional office in Denver for processing.

More information can be obtained by calling the center at 1-866-272-3622 or by visiting the Department of Labor's website at www.dol.gov.

Horace Poteet's mark on Sandia and US will 'forever endure'

Editor's note: The following poem about Horace Poteet (see story on opposite page) was written by John Taylor (5907).

A career let me outline that stands far apart.
Five decades have passed since it got its start.
Back then — in the fifties — things differed from now,
So let me recount what was different and how.

Horace came to the lab from Texas, I'm told;
But in spite of that fact, we let him join the fold!
B4s and B6s were bombs on the line —
And some were still carried by B-29s!
He worked in a group that was fuzing these bombs,
Making diodes and triodes do their thing with aplomb.
For we have to remember that back in those days,
Vacuum tubes were the piecyparts that kept things in phase.

So let's just review these times long ago
By recalling some things that I'll bet you don't know.
Route 66 was a place to go fast,
And two dimes would get you a gallon of gas.
Bogart procured the Oscar that year,
And the Yankees were baseball's reason to cheer.
To reel-to-reel tapes our data did flow,
And digital still meant fingers and toes!
However, the fact that should open your eyes
Is thinking about two of our favorite guys:



YOUNG HORACE POTEET is pictured at his lab in 1955.

Dave Nokes was fourteen and Roger was nine
When Horace Poteet did his first real design!

Horace was here just five years or so,
When off to the Navy he elected to go.
Because of his background in radars and tubes
He became an instructor to help the young rubes.
He returned to the lab just as Ike bid adieu,

And soon he was faced with a new task to do.
Our nukes were deployed all over the world,
And bad guys might try to give them a whirl.
So Horace and others began to compare
Just who might decide to do this, and where.
Vulnerability studies, as this art was known,
Soon found itself in a new vaulted home.
Eight sixty-eight, as this building was named,
Would eventually become a place of acclaim.

So you see our boy, Horace, was there at the start;
And from that day forward, he played a key part.
His career took some twists and some wonderful turns,
As electrical pulses he learned to discern.
He went to the steppes for the first JVE,
Then back to the Test Site, some Russkis to see.
He labored for Roger, for Stokes, and Bob Clem,
Vonderheide, and Lieber — all stalwart, good men.
His projects had names that were strange and obscure,
Designed to protect them from seekers impure.
These tasks became blacker and no one could know,
As he and the Center continued to grow.

"Exceptional service," our T-bird exclaims
To describe these five decades of hard work and fame.
So now he and Joy can try something new,
And we wish them luck in whatever they do.
And though it is clear that we'll miss him for sure,
His mark on this lab will forever endure.

A key contributor to Labs' whole history, Horace Poteet retires after 50 years at Sandia

Projects included radars, US/Soviet Joint Verification Experiments, Taos Hum, 'black-hat' studies

By Chris Burroughs

The Cold War was burgeoning, the transistor was a new fangled invention, and many current Sandians weren't even a twinkle in their parents' eyes when Horace Poteet (5933) joined the Labs in 1951.

With 50 years of service, among the longest in Sandia's history, Horace officially retires Jan. 14.

"I don't like to start things I can't finish." Horace says.

"And I don't think I can finish another 50 years at Sandia — much as I'd like to."

During his career at Sandia, Horace has been involved in many projects ranging from radar work to investigating the "Taos Hum," and from doing "black-hat" studies on coded switches in nuclear weapons to participating in US/Soviet Joint Verification Experiments.

The variety and novelty of the work he performed were among the many reasons he stayed at Sandia five decades.

Horace came to Sandia shortly after obtaining his master's degree in physics at North Texas State College. He was a young engineer who just wanted to work with electronics.

He started undergraduate school at Texas Wesleyan College in Fort Worth on a Methodist scholarship; his father was a Methodist minister. Knowing that he wanted to study physics and math, he transferred to North Texas State Teachers College in Denton, which had programs more to his liking.

During his final year at North Texas, a recruiter



YOUNG HORACE with wife, Joy, and two of their four children in 1958.

"I don't like to start things I can't finish. And I don't think I can finish another 50 years at Sandia — much as I'd like to."

from Bell Labs approached him, suggesting that Horace look at Sandia Corporation as a possible employer.

"I had no notion of what Sandia did," he says, "but when I came out for the interview I was hooked — both on Sandia and Albuquerque. Sandia hired me as a physicist and immediately put me to work doing electrical engineering. This suited me fine since while I was growing up I was interested in radio. It was the only electronics around."

He spent part of that first year in the "leper" colony (place where people worked who didn't have clearances), though he hardly remembers it, and roomed with some other young men also newly hired at the Labs. Mostly about those first months he recalls driving back and forth to Denton in his 1940 Chevy to court his girl, Joy, a recent graduate of Texas State College for Women in Denton. They married on March 23, 1952.

Between 1951 and 1956 he did analysis, design, and testing of MC-60 fuzing radar for the MK-4 bomb as well as advanced fuzing radar development. Then in 1956 he joined the active duty US Naval Reserve where he attended Officer's Candidate School. He was assigned to the Armed Forces Special Weapons Project, Nuclear Weapons Training Group at Sandia Base — now Kirtland Air Force Base and home of Sandia National Labs. There he taught maintenance and repair of the MC-1 and MC-3 fuzing radars.

It was while he was in the Navy in 1956 that he and his wife purchased their home near San Mateo and Constitution in Albuquerque — the same house where they raised their four sons and, after many modifications, continue to live today. (They've had the same telephone number for 46 years.)

After three years in active duty, he returned to Sandia in 1959 and has remained ever since.

Horace recalls that when he first came to Sandia, vacuum tubes were in their highest state of development; they were used in everything. The transistor had been invented only a few years earlier.

"I had read about them and heard about them, but I had never seen one," he says. "I saw my first transistor at Sandia."

Asked what his most significant and favorite project over the past 50 years has been, Horace is



MEMORIES OF SERVICE — Horace Poteet, who is retiring after 50 years, talks of his memories of the early years of Sandia's history during a visit last week to the National Atomic Museum. (Photo by Randy Montoya)

quick to reply: his participation in the US/Soviet Joint Verification Experiments between 1988-1992. The experiments involved underground nuclear tests conducted in August 1988 at the Nevada Test Site and in September 1988 at Semipalatinsk Shagan River Test Site in the then Soviet Union. They were designed to demonstrate that the Threshold Test Ban Treaty could be verified.

Among the more unusual projects Horace has worked on was the "Taos Hum." He joined a team of several engineers from Sandia, Los Alamos, the Philips Lab, and the University of New Mexico to study the hum, believed to be a low frequency noise heard by some Taos residents.

"Theories on where the hum came from were rampant," Horace says. "Some said it was a big government conspiracy and others said it was made by aliens."

Horace and other team members spent a week at various locations in and around Taos with microphones, antennas, geophones, magnetometers, and other instruments measuring noise. And although he could hear the noise (and not everyone can) — it sounds like a big diesel engine running far off in the distance — no source was found.

In his retirement, Horace says, he has a long "honey-do" list around the house and also plans on taking time to hike, travel, do woodworking — and some technical consulting to Sandia.

"Sandia's been a marvelous place to work," Horace says. "It's been a long and interesting trip. And, for the most part — fun!"



HORACE at work circa 1970.



CONGRATULATIONS HORACE — Executive VP Joan Woodard and Senior VP Roger Hagengruber (5000) congratulate Horace Poteet, center, for 50 years of exceptional service to the country.

Mountain comes to Mohammed

The mountain came to Mohammed just before the holiday break when the Labs Leadership Team (LLT) participated in a celebration for Horace Poteet, who is retiring after 50 years.

The group, made up of Sandia's top executives, went to the Center for National Security and Arms Control (CNSAC) building for the celebration that featured a video about Horace's time at Sandia and a plaque presentation.

Senior VP Roger Hagengruber (5000) said that people who reach their 40th anniversary are invited to attend an LLT meeting generally held in Bldg. 802. But for someone who achieved 50 years at Sandia,

the LLT wanted to honor him by going to his work area.

Of Horace, Roger says, "Horace is an example of one who is able to contribute at a high level."

He notes that Horace was in one of the first groups selected for Distinguished Member of Technical Staff (DMTS) at Sandia.

"He is an outstanding example of what a DMTS should be," Roger says. "He is able to move from task to task, quickly become technically capable in a new area, and to reflect credit on Sandia with outstanding performance. A measure of his value is that he would be among the first people selected for any new assignment."

Nine teams win 2001 Gold President's Quality Awards

By Chris Burroughs

Nine teams will be named Gold Award winners Jan. 15 during the ninth annual Sandia President's Quality Awards (PQA) program. Also to be awarded will be 12 silver awards and six turquoise awards.

Mary Nation (12142), PQA project manager, says this year's applications for the awards were "the best that we have ever seen."

"Many," she adds, "were written in the days after Sept. 11. We saw enormous pride in our jobs reflected in the applications. This has been a great year for the program."

The PQA Program is designed to provide a self-evaluation of project activities. It encourages Sandia teams to identify customer needs and requirements, implement improved processes, and monitor the quality of goods and services provided to customers.

Independent PQA examiners evaluate all the teams' applications and recommend recipients of the gold, silver, and turquoise awards.

Teams winning Gold Awards must have achieved and sustained excellent results relative to customer requirements. Silver winners had to achieve and sustain very good to excellent results, and Turquoise winners had to show very good results relative to key customers.

Here are this year's Gold Award recipients:

Infrastructure System Engineering Study (ISES)

In late 2000 the Small Infrastructure Leadership Team chartered an Infrastructure System Engineering Study (ISES) to better understand and find solutions to three "visionary challenges" Sandia faces in achieving its new vision and highest goal. The challenges: ensure a world-class workforce, provide a great work environment to enable people's performance each day, and regain Sandia's self-governance by restoring trust. Working with two nationally recognized system consultants, the ISES team used system engineering and project management processes to understand the problems and to create and deliver the desired system solution and recommendations on schedule. Executive management's subsequent decision to implement the ISES design is expected to irreversibly improve the way enabling services are delivered to the mission customers.

Team members include: Douglas Weaver (7001), Curtis Johnson (7000), Terry Bahill (non Sandian), Wanda Bechdel (10003), Douglas Bloomquist (1630), James Bryson (6431), John Coffman (10820), Frank Dean (2104), Rosemary Dunivan (6001), Waylon Ferguson Jr. (10508), Rod Geer (12640), Arthur Grimley III (9817), Carol Harrison (9515), Charles Hartwig (8907), Linda Houston (8520), Marlene Keller (10004), Timothy Knewitz (7002), Denise

Krupka (7002), Christopher Madigan (12111), Daniel Rondeau (15003), Edward Saucier (3051), and Susan Schear (9412).

Information Design Assurance Red Team (IDART™) Program

The Sandia Information Design Assurance Red Team (IDART™) developed assessment methodologies, processes, metrics, and tools that are replicable, defensible, effective, and efficient. These methodologies are currently used in assisting national security-focused customers in improving the security robustness of their information systems. In addition, Sandia IDART continues to develop a program designed to provide awareness on security vulnerabilities, education on security technologies, and improvement on the security design of complex information systems. Red Team Assessments are targeted assessments used to identify vulnerabilities in Information Technology (IT) systems from an adversarial perspective. Although assessments that actively

"Many [PQA nominations] were written in the days after Sept. 11. We saw enormous pride in our jobs reflected in the applications. This has been a great year for the program."

engage systems are best used when security policy and procedures are institutionalized, the methodology developed can be applied throughout the life cycle of an information system. The assessments include analysis of nightmare consequences, identification of potential vulnerabilities and how they might be exploited to achieve those nightmare consequences, and recommendations for mitigation

Core team members include: Ruth Duggan (6512), Michael Skroch (6512), Jennifer Depoy (6512), David Duggan (6516), Stephen Kaufman (6512), Mary Lopez-Carter (6517), Martin Moore (6516), Thomas Obenauf (6514), Raymond Parks (6512), and Reynold Tamashiro (6517). Many others throughout SNL contributed to this effort.

IT/CS Retraining Program

The Information Technology/Computer Science (IT/CS) Retraining Program was formed in March 2000 to retrain current Sandia employees in skills related to information technology — an area where critical skill shortages exist Labs-wide. The first group of students started in May 2000. To date 45 Sandians have successfully completed

the program. This fast-track, challenging program addresses the increasing demands for critical IT/CS skills, hiring limitations, competing external market demands for these skills, and Sandia's commitment to enhance employee career development. Unique characteristics of the program include: cooperative partnerships with line organizations; customized curriculum; creation of a new organization for the students in New Mexico; students reassigned full-time to the program; and a mentorship component to help ensure that students successfully move into their new organizations. The program is divided into four tracks: 1) fundamental software development; 2) data exploitation and analysis; 3) system administration; and 4) retraining in information systems and engineering analysis. Tracks one, two, and three are administered in New Mexico. Track four is administered at the Sandia/California site.

Team members include: Belinda Holley, Linda Wilson, Jodi Case (all 3021), Sharon Chapa (6543, now ret.), William Cook (6542), Patricia Cover (3020), Larry Ellis (6500), Emily Soares (8910), Sheryl Stewart (8522), William Swartz (9329), and Steven Weissman (6523).

Back Injury Reduction Program (BIRP)

The Back Injury Reduction Program (BIRP), originally conceived in 1982 in the Physical Therapy Clinic, provides on-site, job-specific information, education, and skills to Sandia employees, contractors, and management. It is designed to reduce the number of occupational and nonoccupational back injuries, decrease costs associated with back injuries (days away and restricted days), promote employee health and safety, and empower individuals to be proactive about back health and safety. In April 1999 BIRP evolved into a cross-team program to support a broader customer base, using the integrated expertise of Physical Therapy, ¡SALUD!, and Disability Management. From 1998 to 2001 the number of back-related incidents has been cut by 45 percent, days away for back-related incidents have been reduced 100 percent, and restricted days have declined 82 percent. In addition, costs associated with restricted days and days-away back-related injuries for organizations participating in BIRP have declined from \$279,000 to \$48,000. Customer satisfaction has remained high, with an average rating greater than 8.50 for the past three years.

Team members include: Larry Suzuki (3333), Judith Boswell, Phillip Block, Eileen Burch (all 3335), Larry Clevenger (3300), Linda Duffy, Jennifer Hamrah, Renee Holland, Sara McCabe, Debra Menke, Bridget Priddy (all 3335), Wanda Sanderville (3333), Lisa Teves, and Brian Trujillo (both 3335).

Computer Support Unit Operations

Computer Support Units (CSUs) were established in the mid-1990s to provide a standard level of desktop and laptop computer service to Sandians. As the customer base increased, well-designed processes and metrics became a key to successful operation. Beginning in FY99, basic CSU service became and remains an indirect-funded "utility" available to all computer users at Sandia, including on-site contractors. The CSU organization has worked extensively with Sandia management to improve support and reduce costs through standardization of CSU services and of the computing environment at Sandia. Most CSUs are staffed through contractor-directed contracts, with each CSU overseen by a project manager who is a Sandia employee. The exceptions are where many customers are involved in activities that require computer technicians to have Q or SCI clearances, so it is more appropriate to staff that CSU entirely with Sandia employees. All CSUs are within one department, the CSU Operations Department.

Team members include: Donald Rogers, Charles Shirley (both 9623), Mary Adams (9624), Dennis Bonnville, Kevin Cantwell (both 9623), Cynthia Caton, Debbie Chavez, Jerry Davis,

(Continued on next page)

Silver and Turquoise winners

Here are the Silver and Turquoise winning teams.

Silver Award winners and their points of contact: **Emerging Threats SBU Web-Based Financial Forecasting Tool**, Carla Ann Scott (9517); **B61-7/11 Lab Test Data System Replacement**, Biu So (2955); **Total Rewards Statement Team**, Gabrielle Sarfaty, 3341; **Pension Fund Investment Organization Value Manager Search**, Jane Farris (10310); **Metallize Characterization and Improvement**, Paul Morrison (14402); **Corporate Training and Development Learning Management System**, Lorraine West (3051); **Quality/Excellence from Suppliers Team**, Maria Armijo (10205); **Microelectronics Development Laboratory Customer Support Team**, Ronald Jones (1741); **Human**

Resources Reporting, Alan Armentrout (3051); **Monitor Logic Simulator for the B61-4 Type 3E Trainer**, Perry Molley (2331); and **Staples Electronic Online Web-based Ordering of Office Supplies**, John Beitia (8523).

Turquoise Award winners and their points of contact: **Software Process Improvement - Center 9500's**, Joseph Schofield (9510); **Just-In-Time Purchasing Green Team: Purchasing of Environmentally Preferable Products**, James Romero (10254); **Spend Plan Tool Redesign Team - Oracle Compatible**, Rose-mae Mckillip (2305); **Occupational Medicine Team**, Annamaria Miller (3335); **Scale-Up of the Chem-Prep PZT 95/5 Synthesis Process**, James Voigt (1846); and **Per Diem vs. Actual Travel Study**, Bonnie Hardesty (10507).

Computer retraining PQA gold winner really shines

Sandia's two-year-old Information Technology/Computer Science (IT/CS) Retraining Program, recipient of a 2001 Gold President's Quality Award, is helping to solve a Labs-wide problem — filling critical jobs in computer science.

"We are very pleased to receive this award," says Linda Wilson (3021), a co-project lead. "This has been a truly unique program that is a win-win situation for both the students and Sandia. The students learn a new skill and Sandia gets highly trained information technology professionals."

The program was created to help meet Sandia's critical need for information technology and computer science skills. It enables existing Sandia staff to acquire new skills in these areas. A fast-track program for retraining individuals to perform work in a number of organizations throughout Sandia, it is divided into four tracks designed to equip students to perform specific job functions.

Many students are Sandia scientists and engineers who already have master's degrees and PhDs. During the six to eight months that students are in the New Mexico program, they leave their old organizations and move into a new organization, Retraining in Information Science and Engineering (RISE) Dept. 3010. They take rigorous and challenging classes offered by the National Technological University and the University of New Mexico, as well as a Sandia-specific curriculum developed on-site.

Mike Tebo (6536), who is a manager in Center 6500 that hires many of the graduates, gave high praise for the program during last month's graduation of the fifth class of students.

"We are pleased with our graduates and with their contributions," Mike said. "Overall, we have been pleased to have nine IT/CS retraining

"This has been a truly unique program that is a win-win situation for both the students and Sandia."

graduates over the last year. We have put them into some of our most important and challenging projects. They are holding their own and are contributing. That is high praise for this program."

Other graduates were assigned to Centers 1600, 3100, 5300, 9100, and 9300.

Students, too, give a big "thumbs up" for the program.

Sandy Ballard (6533), who has been at Sandia for 15 years and has a PhD in geophysics, saw the program as a way to "take a right-hand turn and do something different and energizing." Previously he worked on the Yucca Mountain Project and on the Strategic Petroleum Reserve. But he was always interested in computer simulations and saw the program as a perfect opportunity to learn and work in a new and growing area.

December graduate Tracy Woolever (3133), who has an MBA in accounting and is a CPA, worked on the "travel side of the house" — working with airline ticket databases. She saw the program as way to blend her accounting and computing skills.

"Coming from the administrative side, the program gave me a whole new slant on Sandia," Tracy said. "It was interesting getting to know the scientists and engineers and learn about their projects. Everyone should experience this."

She started Jan. 2 working in Dept. 3133, building a security badging database. Sandia/California worked with the students



GRADUATION DAY — From left, Sandy Ballard (6533) and Tracy Woolever (3133) receive congratulations on graduating from the Information Technology/Computer Science Retraining Program from Linda Wilson (3021), co-project lead, and Bill Cook, Manager of Retraining in Information Science and Engineering (RISE) Dept. 3010.

in a different way. Students there remained in their current positions and took classes on-site through the University of California-Berkeley and Davis. Ten more students completed the training in December 2001. They return to their assignments with a deeper understanding and skill base to perform tasks previously beyond their capabilities.

A unified, general comment heard from the students is the appreciation of being able to gain new skills at work while growing their personal careers. The camaraderie of the students working together, helping one another learn and study, was an additional benefit.

Since the program began in June 2000, 45 people have completed the rigorous courses and are now working in new areas at the Labs. Seven others are currently enrolled in the program.

— Chris Burroughs

PQA winners

(Continued from preceding page)

Craig Hansen, Wilda Harms, Kenneth Hatfield, James House, Samuel Jones, Mark Judy (all 9623), James Kelly (9624), Joseph Kieltyka, Tom Klitsner, Rado Kovachevich, David Ortiz, Dorothy Rarick, Susan Sackinger, Michael Schalip, Robert Shinn, Wayne Shirley (all 9623), and Karl Wiegandt (9624).

MC4300 Neutron Tube Product Realization

A neutron tube is a miniature ion beam accelerator in which deuterium ions are accelerated to a tritium-loaded target. The resulting D-T fusion reaction produces the neutrons, which are used to initiate weapon nuclear fission reactions. The MC4300 neutron tube is positioned as a broad-use, limited-lifetime replacement for the MC3854-like neutron tube. Like the MC4277 neutron tube currently in production at Sandia, the MC4300 is a focused ion beam neutron tube, using production capabilities already existing for the MC4277. Performance requirements for the two applications are very similar, yet the size requirement for the MC4300 is half the volume, creating significant challenges. The MC4300 Product Realization Team has embraced the challenges, meeting them with a simplified design, greatly easing manufacturability and exceeding performance requirements.

Team members include: Carla Busick (2564), Michelle Fleming (12640), John Brainard (2564), Scott Gillespie (14408), Ronald Goeke (14171), Charles Jojola (2996), Faye Long (10252), Rosalie Lopez-Spinello (14405), Kevin McBride (2996), Keith Meredith (14405), Gregory Neugebauer (2564), Gary Pressly (14402), Juan Romero (14171),

Matthew Senkow (14405), John Stephens (141812), Fernando Uribe (14171), David Van Ornum (14405), Charles Walker (14171), and David Zamora (14172).

Dinero Compensation Review Tool

Dinero is an Excel-based tool designed to support and facilitate the corporate Compensation and Performance Review process. It was designed and implemented in 1998 to conform to a market-focused compensation structure and align pay with an employee's value of contribution. From a program administration perspective, Dinero provides both division and center users the ability to receive and return their compensation and performance review data for their employees. In addition, it allows managers to conduct "what if" scenarios of pay decisions, thereby understanding the impacts of those decisions. At the highest level, compensation data needs to be securely distributed and returned in a standardized format. Dinero meets this need by providing data at the desktop, security and accuracy of information, and the ability to transmit data in a timely and efficient way. Dinero has been continually improved to meet and surpass customers' desires by offering automated tools and exceedingly more flexible analysis.

Team members include: Kelli Strader (3052), Roberta Jaramillo (9513), Kimberley Brown (3052), Richard Garcia (3031), and Mary Roehrig (6535).

Oracle 11i Procurement E-Learning Project Team

Moving to an enterprise E-Commerce solution such as Oracle can be successfully adapted at Sandia and the Labs' suppliers only through successful user training. The Oracle 11i Procurement E-Learning Project Team has begun this journey by developing six web-based e-learning course modules with simulations that help increase the authenticity of the learning program — thus mak-

ing it more transferable and motivating. In addition, the e-learning modules complement the Lab's E-Commerce strategy by providing the right information to the right customers at the right time, even though the content is constantly changing.

Team members include: Theresa Carson (10205), Judith Hubbard (10206), Carla Forrest (3021), Shelby Green (non-Sandian), Frank Lujan III (10305), Christine Tomlin (10206), and Linda Wilson (3021).

SNL/CA Mixed Waste Management

The SNL/CA Waste Management Group in Organization 8516, Environmental Operations, disposes mixed hazardous and radioactive waste from the California site on behalf of DOE Kirtland Area and Albuquerque Operations offices. The most recent activity began in August 1999 during transition, survey, and decontamination of Bldg. 913 and has continued. These wastes contain both a hazardous chemical contaminant, regulated by California Department of Toxic Substances Control (DTSC) rules and permits, and radioactive material contaminant, regulated by DOE rules and orders. Each step of the mixed waste management process — characterization, handling, packaging, transportation, treatment, storage, and disposal — must meet customer and regulatory requirements for both the hazardous and radioactive contaminants in the waste. Sandia/California Waste Management employs a quality process for disposal of mixed wastes derived from nuclear quality assurance requirements for low-level radioactive waste management. This quality process allowed Sandia/California to successfully establish a mixed waste disposal program and meet DOE mission needs.

Team members include: James Bartel, Deanna Dicker (both 8516), John Beitia (8523), Earl Conway (3134), Laurie Farren, Leighton Ford, Sarah O'Connor (all 8516), Steven Orth (8119), and Warren Tenbrook (8516).

Mileposts

Photos by Iris Aboytes



Randall King
35 5913



Robert Varga
35 14181



Douglas Weaver
35 7001



Joseph Bonahoom
30 2612



Raymond Decker
30 2541



Doug Greenway
30 1751



Richard Brazfield
25 2111



Carolyn Bucklen
25 9821



James Dawson
25 10824



Michael Deveney
25 1734



Rick Eisler
25 15212



Mario Garcia
25 3114



Richard Heintzleman
25 2333



Sharon Jensen
25 5800



Martin Jinzo
25 15322



Duane Patrick
25 9134



Charles Randour
25 5921



Joseph Roesch
25 5850



J. David Sealey
25 3113



Paul Smith
20 10821



Judd Hollister
15 3132



James Jones
15 15272



Jeffrey Kawola
15 9126



Dennis King
15 10827



Michial McDuffie
15 12620



Fredrico Mora
15 9334



William Peters
15 10251



Richard Shagam
15 2612



Randy Shul
15 1763



Gerard Sleaf
15 2613



Frank Trowbridge
15 2616

Recent Retirees



Kathy Marder
20 5951

Barry Marder
26 1674



Raymond Patrick
30 6516



Olivia Salisbury
25 3031



Samuel Key
23 9142



Gerrie Garcia
27 10825

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

MISCELLANEOUS

DESK & CREDENZA, large, natural oak, \$500; La-Z-Boy office chair, \$100; Hon filing cabinet, \$25. Nist, 275-1788.

GUARD RINGS, 2-1/4 carat, Butterfield appraisal \$2,500, asking \$1,200 OBO. Charles, 332-3923.

PIANO, Koehler & Campbell, very good condition, \$500. Rhodes, 899-5444, evenings, ask for Peggy.

WATERBED, queen, 6-drawer under-dresser, headboard w/lighted shelves, mattress, heater, padded rails, 1 yr. old, \$75. OBO. Jennings, 268-8789, ask for Dane.

SOUTHWEST AIRLINE TICKETS, 2 roundtrip, expire Sept. & Oct. 2002. Castillo, 828-9603.

SOUTHWEST AIRLINE TICKETS, 3 roundtrip, expiration dates of 4/02, 8/02, 11/02, \$290 ea., \$275 ea. for all three. Cocain, 281-2282.

LEATHER BRA, '96-'98 Subaru Outback, great condition, \$50 OBO. Plummer, 828-3028.

PIANO, Wurlitzer console, like new, wood finish, \$1,000 OBO. Occon, 888-5140.

HANDSPRING VISOR PALM, w/folding keyboard, CDs, boxes, manuals, & ISDN cradle, like new, \$200. Di Palma, 856-0260.

HOTPOINT WASHER/DRYER, almond, good condition, \$400 OBO. Westfall, 884-8701.

CAMPBELL'S "LABELS FOR EDUCATION," free to student/school who can use them. Sifford, 869-3982.

TWO-CYCLE ENGINE OIL, 50:1, 1 gal.; chain oil, 1 gal.; both free. Hayes, 299-1200.

KING HEADBOARD, Ethan Allan, wood/cane, originally more than \$500, asking \$250, frame, mattress/box spring, \$75. Gomez, 291-1062.

FREE-STANDING WOOD STOVE (Godin), fire-brick-lined, burns wood or coal, unique (round w/claw feet), \$500 firm. Bronkema, 286-0423.

HOLIDAY DRESSES (new from Helen's Wedding Belle): 2-piece jade, size 10; 2-piece champagne, size 10; 1-piece black, size 12. Morales, 249-8800, leave message.

TABLE SAW, Craftsman 10-in., develops 3 hp, cast-iron table & extensions, rolling platform, includes dado molding/blade insert, excellent condition, \$260. Vigil, 271-1328.

COUCH, full-size, 8 ft., tan color, good condition, \$50. Kearns, 898-4122.

ACCORDIAN DOORS, 2-ft. wide, free. Luna, 872-0193.

VACATION, 1 week timeshare for up to 6 people, 2-bdr., anywhere in RCI catalog, \$800. Luther, 296-7402, ask for Fran

MOVIE SOUND PROJECTOR, 16mm, Revere, excellent condition, w/carrying case & speaker, \$35 OBO. Vook, 884-4754.

CUTE SIAMESE CAT, 3-yr.-old female, spayed & declawed, to good home. Duncan, 923-8092.

POWER MAC 6100/66, modem, monitor, Jaz drive with 2GB disks, PhotoShop, lo Astrology software, \$100 for all. Hamilton, 858-1371.

SWAP MARKLIN "Z" gauge steam loco-era, 2-axle freight cars for 2-axle passenger car. Aas, 856-6674.

SONY CONSOLE STEREO TV, 27-in., PIP, shelf for VCR, universal remote, paid \$750, asking \$400. Schuster, 828-3415.

AQUA QUEEN WATERBED HEATER, 300W, new, \$35; small pet carrier \$15. Kettleborough, 293-4503.

BAR STOOLS, 24-in., 3 dark rattan, swiveling, w/neutral cushions, \$150; wrought-iron fireplace tools, \$10. Kepler, 296-0402.

SONY VIDEO 8 HANDYCAM, battery, remote, charger, camera repair/buff, needs adjustment, make offer. Schofield, 292-7220.

RC AIRPLANE ENGINE, OS- .61FX w/muffler, brand new, never taken out of box, \$150. Diprima, 275-3479.

TWIN MATTRESS & BOX SPRING, w/frame, \$50; Panasonic dot-matrix printer, wide, free; new white American Standard oval sink, \$20. Thornberg, 869-0421.

SOUTHWEST AIRLINE TICKETS, 4 roundtrip, expiring June '02 & later, \$280 ea. Tapia, 280-8888.

SOFA/SUPERSIZE CHAIR, down seat cushions/back pillows, custom made from Krause's Sofa Factory, earthy/desert colors, \$395. Gendreau, 266-7573.

SOUTHWEST AIRLINE TICKET, roundtrip, anywhere SW flies, expires June '02, \$290. Perrine, 293-1429.

ROUND OAK BREAKFAST TABLE, 42-in., w/chairs, \$100; matching 48-in.-wide buffet/hutch, \$300. Campbell, 296-8304.

INDOOR CAT, 4-yr.-old female, spayed, sweet, loving, to good home with no other pets. Kincaid, 296-6014.

STEEL BED for dual-wheel pickup, Western Hauler-style, w/stainless-steel auxiliary fuel tank, \$2,500 OBO. Cox, 865-0123.

SOFA, like new, beige w/pastel colors on pillows, \$200 OBO. Elevario, 323-0448.

WOMEN'S SKI BOOTS, cross-country, 3-pin, size 40 European (approx. 8 American), Nordic brand, nearly new, \$35 OBO. Ropp, 881-8033.

GREAT VACATION DEAL, timeshare in Hawaii, 1 week, \$750. Varoz, 831-6093.

STEREO RECEIVER/AMPLIFIER, Yamaha mode CR-1040, excellent condition, \$50. Sinton, 828-9672.

WOMEN'S GOLF CLUBS, almost new, woods, irons, bag, \$85; wet suits, men's med/large. Cenicola, 792-0391.

WHITE SLIDING CLOSET DOORS, 3, 32" x 80" x 1 3/8", w/hardware, \$25; dozen good moving boxes, free. Wishard, 266-6772.

LOVE SEAT, light-brown upholstery, good condition, \$75; microwave oven, good condition, \$25. Hesch, 350-9903.

COMPUTER MONITORS: large 20-in. HP, \$140; 21-in. NEC-XP21, \$175; small 15-in. IBM w/touchscreen, \$30. Jarek, 821-2720.

GOLF CLUBS, Calloway Great Big Bertha, \$100; King Snake 3-SW, \$150; others, graphite, \$20/club. Philbin, 828-2414.

CUSTOM CAR COVER, Covercraft Evolution, 3-material, fits full-size Bronco w/spare tire, excellent condition, \$50. White, 294-5692.

NINTENDO 64, 4 controllers, expansion pak, rumble pak, memory card, 7 games, \$75, w/monitor \$100. Heintzleman, 294-1284.

LUMBER, precut pine 2x4's, limited quantity, \$1.50 ea; plywood sheets. Zelnio, 243-2652, ask for Jerry

LARGE OVEN, almond, self-cleaning, 4 sealed European-styled burners, electric, \$250; large microwave w/instructions, cookbook, \$25. Alexander, 291-8028.

TWIN ROLL-AWAY BEDS (2), heavy-gauge steel frames w/ mattresses, \$25 ea. Linnerooth, 299-6558.

SNARE DRUM, Standard Cannon, w/accessories (case/silence pad/sticks/stand), good condition, already tuned, \$115 OBO. Ernest, 293-1757.

APARTMENT WASHER & DRYER, w/attachments, washer 1 yr. old, paid \$499, asking \$350 for both. Vigil, 293-5623.

ELECTRIC ADJUSTABLE TWIN BED, w/beautiful white iron headboard & mattress, \$125. Rutten, 869-6381.

CHEST FREEZER, 7 cu. ft., 11 years old, great condition, \$40. Meeks, 828-9825.

GIRL'S DAY BED, ivory color w/brass trim, includes mattress, \$125. Schlavin, 299-6592.

How to submit classified ads

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

- E-MAIL: Michelle Fleming (classads@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 News, and then on the very top of Lab News homepage "Submit a Classified Ad." If you have questions, call Michelle at 844-4902. Because of space constraints, ads will be printed on a first-come basis.

Ad rules

1. Limit 18 words, including last name and home phone (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.**

SOUTHWEST AIRLINE COUPONS, 1 roundtrip expires 6/22, 1 roundtrip expires 8/10, \$295; 1 one-way expires 5/9, \$140. Roseth, 856-6964.

AKC WHIPPET, 1-1/2-year-old neutered male, brindle-colored, trained, smart, loving, rambunctious, indoor dog. Ferrell, 256-2531.

OAK DESK, w/exec chair & bookcase, desk is 30" x 62" x 31", bookcase is 30" x 35" x 12", \$300 OBO. Curtis, 771-1064.

SNOWBOARD, 2 yrs. old, 159cm Crazy Creek, good condition, 1 deep (repairable) scratch, w/stomp pad, \$75. Miller, 332-4845.

TRANSPORTATION

'95 MERCURY COUGAR YR 7, V8, AT, AC, low miles, all power, excellent condition, garage-kept, \$7,250 OBO. Rogers, 263-9459.

'94 NISSAN PATHFINDER, SEV6, 4x4, AT, AC, new tires, 76K miles, tow pkg., loaded, excellent condition, \$12,100. Olbin 275-2681.

'95 CHRYSLER TOWN & COUNTRY VAN, 118K miles, leather, quad seating, cell phone, rear AC, new tires, loaded, must sell, \$6,800 OBO. Lipke, 271-0645.

'90 MITSUBISHI GALANT, DOHC, AWD, AC, 5-spd., new timing belt, rebuilt trans., new brakes, \$3,500. Mitchell, 822-1439.

'93 FORD EXPLORER, Limited Edition, 4-dr., w/all the extras, 60K miles, great condition. \$7,500. Rodriguez, 883-9396.

'74 VOLKSWAGEN SUPER BEETLE, looks good, runs well, sunroof & CD player, \$3,000 OBO. Thoessen, 833-5895.

'98 BMW 318TI, under warranty, silver/black leatherette, 5-spd., hatchback, sunroof, 18.5K miles, Active Package, onboard computer, alloy wheels, \$17,500. Pundit, 821-3295 (pundit@ieee.org).

'96 CHEVY S10 PICKUP, ext. cab, w/camper shell, 4WD, 5 spd., loaded, new brakes, 75K miles, \$9,900. Crine, 292-5321.

'92 LUMINA 4-dr. sedan, 99K miles, excellent condition, cruise control, white, \$3,000. Cheng, 823-9160.

'98 MAZDA SE PICKUP, \$6,500. Lord, 299-9505.

'93 CHRYSLER CONCORDE, 3.5L, 6-cyl., 99,950 miles, leather seats, single owner, AT, PS, 30-mpg hwy., \$4,400. Pickering, 281-3145.

'90 EAGLE TALON Tsi, AWD, 111,283 miles, \$1,500. Burns, 237-9026.

'91 NISSAN 300ZX TWIN TURBO, white, T-top, 90K miles, \$13,000. Van Den Ayale, 480-2724.

'99 TOYOTA TACOMA PRERUNNER 4x2 pickup, AT, AC, AM/FM cassette, SR5, bed liner, extended cab, excellent condition, \$12,950. Lininger, 856-0422.

'95 MERCURY SABLE GS, 73K miles, ABS, PW, power seats, AM/FM cassette, original owner, white, \$4,500. Sturtevant, 275-0170.

'97 FORD F250, 4x4, XLT, 7.3L diesel, HD, LB, AT, reg cab, towing & camper pkgs., alarm, bed liner, 49K miles, excellent tires, cream puff, \$20,000. Blankenship, 281-2257.

'98 DODGE ST, 3/4-ton, 4x4, diesel, 5-spd., ext. cab, short bed, ext. warranty, sprayed-in bed liner, extras, 25K miles \$22,000 OBO. Vieth, 899-9625.

'95 LEXUS ES300, champagne/tan leather, all records, book value \$14,500, asking \$11,950. Heise, 823-6355 or 573-6355, unmlobo1@aol.com

'90 JEEP COMANCHE, 2WD, short bed, AT, AC (nonworking), cruise (sometimes working), white/beige, looks & runs great, 145K miles, \$1,900 OBO. Dudley, 255-3626, padudle@spinn.net. See <http://members.spinn.net/~padudle/comanche.htm>.

'00 SATURN SL1, 4-dr., 4 spd., AT, AC, white, 15K miles, ABS, traction, immaculate, warranty, \$10,900 OBO. Doren, 899-1652.

'86 FORD TAURUS, 3.0L, V6, AT, AC, PW, PL, AM/FM cassette, cruise, reliable, 142K miles, \$1,400. Clement, 293-1416.

'95 BMW M3, 49K miles, blue metallic, gray custom leather, new tires, outstanding local car, \$23,600. Wallace, 256-1643.

'95 JEEP GRAND CHEROKEE LAREDO, tan, 4WD, 6-cyl., 82K miles, tow pkg., cruise, PW, PL, sunroof, new transmission, great condition, \$7,900. Fricke, 265-2865.

'95 F350 XLT CREWCAB, 4WD, Powerstroke, 5-spd., CD, keyless entry, alloys, rack, 180K miles, \$12,900. House, 293-6016.

'98 DAKOTA PICKUP, 4x4, ext. cab, SLT trim, AT, V6, AC, PS, PB, PDL, tilt, PW, cruise, bed liner, red, 62K miles, \$13,200. Wavrik, 856-7544.

'93 TOYOTA COROLLA DX, AC, PS, PL, AM/FM, good condition, clean, white, 100K miles, \$4,200 OBO. Smith, 293-3296.

'89 ACURA LEGEND, 4-dr., V6, new brakes, well maintained, 151K miles, \$2,500. Larson, 294-6705.

'94 FORD EXPLORER XLT, white, 4WD, 4D, AC, power, tow pkg., excellent condition, 155K miles, \$5,400. Timmerman, 983-1750.

'00 CHEVROLET CAVALIER, 4-dr., white, AT, AC, 51K mi., excellent condition, \$8,800. Cobb, 286-8278.

'99 SILVERADO 1500, 4x4, 42K miles, tow pkg., dark blue/gray, bed liner, running boards, loaded, runs great, \$21,900 OBO. Torrez, 839-9776.

'97 MUSTANG GT CONVERTIBLE, only 36K miles, loaded, leather interior, new tires, AT, \$12,500. Fromm-Lewis, 332-1280.

'98 CHEVY 4X4, 1/2-ton, original owner, ext. cab, nerf bars, AC, perfect condition, short bed, towing pkg., 5.0L, 5-spd., AM/FM/CD, 60/40 bench, beige/blue, 25K miles, ext. warranty, \$17,900 OBO. Honest, 832-6040 or 291-0182.

'93 OLDSMOBILE 88, AC, PW, PL, power seats, 75K miles, white, \$5,000. Billane, 275-3180.

'92 FORD CROWN VICTORIA, good condition, 120K miles, \$3,500. Bartholomew, 896-4221.

RECREATIONAL

'98 ARCTIC CAT ATV 500, 4x4, AT, very good condition. Aguilar, 873-1261.

'00 CRUISEMASTER MOTOR HOME, 35 ft., Ford V-10, fully loaded, 8,300 miles, 2 side-outs, light-color interior, \$72,000. Kraemer, 345-9842.

'01 YAMAHA YZ125, dirt bike, new top end, well-maintained PC pipe/silencer, many extras (gear/helmet) \$4,200, OBO. Gallegos, 281-5515.

'99 CAMPLITE POP-UP CAMPER, sleeps 6-8, excellent condition, fully equipped. Hyatt, 262-4929 or 853-0708, ask for Jim or Shelley.

'78 HARLEY DAVIDSON FXWG, complete custom rebuild, very clean & lots of chrome, \$14,000 OBO. Garcia, 892-9347.

SCHWINN COLLEGIATE 5-SPD BIKE, excellent condition, great for tech area, hardly used, \$30 OBO. Rogulich, 298-5261.

REAL ESTATE

2-BDR. HOME, 1 bath, 1-car garage, for sale by owner, 2017 Alvarado NE, border Alvarado Park. Kelley, 232-3176.

2-1/2 ACRES in Algodones, all utilities, \$56,000 OBO, terms negotiable. Martinez, 294-7694.

2-BDR. HOME, 1-1/2 baths, garage, landscaped, dog-run, tile, Berber, good rental, located in Rio Rancho, relocating, must sell. Solano, 891-2990.

1-BDR. CONDO, at base of ski slopes at Angel Fire, sleeps 6, covered parking, \$55,000. Layne, 857-0989.

WANTED

BASS PLAYER to substitute occasionally in intermediate jazz practice/jam session, we play mostly from the *Real Book*. Tucker, 281-8342.

TELESCOPE, larger aperture, 9-in. or larger size, weight, age not important, must be in good condition. Campbell, 281-0744.

HOUSEMATE, 3-bdr., separate baths, walk-in closets, security alarm, washer/dryer, near bus stop, \$325/mo, 1/2 utilities. Ewen, 836-3563.

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

'68-'72 CORVETTE project car, doesn't have to be running. Briand, 821-1904.

TENT TRAILER, sleeps 4 or more, sink. Moss, 298-2643.

PAINTINGS, on small barnwood slabs, depicting Indian artifacts (pots, etc.), by Gayla. Blackledge, 294-6030.

TRIPOD, inexpensive, for digital camera. Harrigan, 266-4143.

LOST & FOUND

TOOL BOX found on Wyoming Blvd. between Comanche & Menaul before Christmas. McConahy, 884-5071.

SHARE-A-RIDE

SEEKING PARTNERS for ride sharing from Santa Fe area to Sandia. Trujillo, 982-0823.



Ocean's Eleven filmmakers 'pinch' Sandia technology

Z-Pinch plays major role in blockbuster Hollywood movie – kind of

If you saw the current remake of the Hollywood movie, *Ocean's Eleven*, you might have found something weirdly familiar in the terminology of something called "the Pinch," employed as a plot device to short out the electricity of Las Vegas, Nev.

The movie's Pinch is actually a take-off of Sandia's Z-pinch accelerator, reassigned to a fictional California university and assigned new characteristics.

In the film, 11 con artists employ a physics device called "the pinch" to help them rob a vault containing the riches of three casinos. Set off in the middle of Las Vegas, the pinch allegedly detonates an intense "electromagnetic pulse" (EMP) that blacks out the city's power grid for a few moments.

"I enjoyed the movie and the 'pinch' was an amusing twist but had little to do with science," says Jeff Quintenz (1600), director of

Sandia's Pulsed Power Sciences Center housing Sandia's Z (pinch) machine — the world's most powerful producer of X-rays.

"I can confirm that Sandia's Z machine is the inspiration for the movie's gimmick," says Neal Singer (12640), who spent several hours more than a year ago talking to the prop people from the movie about the Z pinch, which creates lightning-like skeins of startling beauty for



THE POPULAR movie *Ocean's Eleven*, starring George Clooney as Danny Ocean, features the "Pinch," a take-off of Sandia's Z (pinch) accelerator. (Photo courtesy Warner Brothers Studios)

a few billionths of a second as it fires.

"We discussed Z's possibilities as a plot mechanism," he says. "I explained it might be hard to move the 100-foot-diameter Z machine to the top of a stationwagon and fire it off in mid-Vegas; that didn't stop them, obviously."

At least the characters ultimately fitted the pinch device in a van rather than a stationwagon.

The pinch is "a poor EMP source," says Jeff. "We have on occasion interfered with the sensitive electronics in cameras and computers located in the same laboratory space, but to my knowledge have never caused a problem with any electronics or electrical system outside the accelerator building itself."

The Z pinch gets its name from the fact that an initial burst of electricity creates a magnetic field that compresses or "pinches" a gas of charged particles along the vertical direction, denoted by scientists as the "z" direction.

Like the con-artist plot itself, the movie's pinch device is a well-executed deception. According to a news release by Ben Stein from the American Institute of Physics, which sees the movie as a chance to teach some physics, "But perhaps even the filmmakers themselves did not realize that the pinch pulls off

the ultimate swindle. . . . The movie's pinch violates the most fundamental principle of physics, the conservation of energy, which says that energy can be converted from one form to another, but never created out of thin air. Any van-sized electricity source, not just a pinch, is just too small to store the energy required to produce a blackout-generating EMP."

— Neal Singer

Lab News Reader Service information

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

Retirees (only):

To notify the Labs of changes in address, call or write Carol Wade, Benefits Dept. 3341, at 505-845-9705, Mail Stop 1021, SNL, Albuquerque, NM 87185-1021.

Others:

To receive the *Lab News* or to change the address (except retirees), contact Iris Aboytes, Media Relations and Communications Dept. 12640, telephone 505-844-2282, e-mail ioaboyt@sandia.gov, or Mail Stop 0165, SNL, Albuquerque, NM 87185-0165.

Coronado Club

The Coronado Club has resumed its Friday lunch schedule and after-work events (SERP events, lounge). SERP events that have begun again are: aerobics (T&Th at 5), chess (Wed at 5:30), yoga (Th at 5) and bridge (Th at 7).

Jan. 13 & Jan. 27 — Champagne Sunday brunches, 11 a.m.-1 p.m. Music by Roger Burns Trio, 1-4 p.m.

Jan. 16 — "Singles Mingle," 5:30-8:30 p.m. The last function had more than 40 attendees.

Jan. 18 — Seafood Buffet, 6:30-7:30 p.m. Music by Spinning Wheel, 7:30-10:30 p.m.

Jan. 23, 30 — Ladies Night in the Lounge.

Valentine's Day — Special dinner. More details to come.

Retiree deaths

Floyd L. Irwin (age 95)	Sept. 9
Piffie R. Chavez (86)	Oct. 7
Dorothy H. Raper (89)	Oct. 7
Joseph A. Abbott (66)	Oct. 8
Gerald A. Villane (69)	Oct. 11
Lamar D. Treadwell (84)	Oct. 12
Ramon R. Aguilar (78)	Oct. 13
Robert L. Thomas (87)	Oct. 14
J. D. Jones (73)	Oct. 14
Johnnie M. Garcia (73)	Oct. 23
Gary C. Tisone (63)	Oct. 25
William McConnell (92)	Oct. 28
Roy O. Dell (86)	Oct. 29
Henry R. Aira (69)	Oct. 30
Cecil L. Page (83)	Nov. 1
Emma D. Quintana (68)	Nov. 2

Don F. Ritter (77)	Nov. 5
Eloy S. Montoya (71)	Nov. 6
Louis F. Fisher (87)	Nov. 7
Demetrio P. Gallegos (57)	Nov. 8
Alex A. Ruff (88)	Nov. 9
Paul A. Chavez (78)	Nov. 11
Delbert E. Houser (72)	Nov. 17
Salvador Armijo (75)	Nov. 18
Leon Filvin (89)	Nov. 20
Melvin E. Brown (64)	Nov. 21
Mary W. Clay (79)	Nov. 23
John B. O'Meara (89)	Nov. 24
Joseph P. Keiner (72)	Nov. 24
John E. Marion (69)	Nov. 25
Harvey N. Pouliot (82)	Nov. 26
Colletta B. Thomas (85)	Nov. 27
Bruce E. Ercole (72)	Nov. 29
J. Peter Wakeland (79)	Nov. 30

Nominations sought for this year's Employee Recognition Awards

Nominations for the Ninth Annual Employee Recognition Awards program are being accepted via the ERA web site from Jan. 14-31. The ERA program, launched by Lockheed Martin soon after it assumed management of the Labs, commends superior results in four general categories, one for teams and three — technical excellence, exceptional service and leadership — for individuals.

Nomination forms with detailed instructions are available from the web at Sandia's Internal Web Homepage or at <http://www-irn.sandia.gov/era/02era.htm>.

The primary requirement of the nomination process is that the nominee's accomplishments be described in 250 words or less.

An optional one-page supplement may be added for supporting evidence. Individual nominees must be current, regular, Sandia employees on roll since Oct. 1, 2000. Team members may include non-regular employees and contractors.

Anyone may nominate individuals or teams. A separate nomination form must be submitted

for each individual and team nomination.

The review process and final selections take place in each Division. Divisions are allocated slots for awardees based on their division on-roll population as of October 2001. A combined total of 122 individuals and teams will receive corporate Employee Recognition Awards.

ERA Individual winners and designated representatives from winning teams will be recognized at the Corporate Employee Recognition Night, Saturday, June 29, 2002.

NOVA awards, too!

From Sandia's 2002 ERA winners, Paul Robinson and Joan Woodard will select the two nominees that will represent Sandia in the Lockheed Martin NOVA awards program.

This prestigious annual awards program honors 50 individuals and teams across the Lockheed Martin Corporation who have made outstanding contributions to Lockheed Martin Mission Success.

NOVA awardees will attend a Lockheed Martin Corporate celebration in Washington, D.C.