# Next-generation photolithography ready for launch

## *Barrier-breaking EUVL a reality for making next decade's computer chips*

By Nigel Hey

April 11 will be a red-letter day in Sandia's long history of collaboration with the private sector.

Some years ago, Sandia/California showed that extreme ultraviolet light (EUVL) could be used to "break the visible light barrier" and produce integrated circuit features that were smaller than previously possible. That demonstration — the creation of a single field-effect transistor — blossomed into a megascale research and development effort involving two other labs and the giants of the US semiconductor industry.

Today EUVL is a reality. The prototype, known as the Engineering Test Stand, is producing wafers successfully at its Sandia/California home, where a big labs-industry celebration of a major milestone is scheduled next week (see story above right).

It took a quarter-billion-dollar pledge of private capital to get the program under way in 1997, when DOE's three California national laboratories combined as the Virtual National Laboratory and teamed with top names in the electronics industry to produce the semiconductor chip of the new decade. It brought together two groups of sometime competitors to assure US strength in the new technology of the information age.

Next-generation EUVL technology will reduce still further the size of transistors, resistors, and other chip components. It is expected to turn out microprocessors that are 10 times more powerful than today's fastest chips, and memory chips that have 100 times more capacity. Faster computers will help increase the capacity of the information-processing infrastructure while accelerating the development of very high speed Internet access networks.

In his 2001 State of the Labs commentary, Sandia President Paul Robinson said that, with EUVL, "we found ways to extend this technology for at least another order of magnitude" [smaller] spacing. "We'll be approaching the 20-nanometer scale before this technology sees fundamental limits. More important than the limit, it keeps Moore's law, which is the engine driving the microelectronics industry, going for another 15 years."

Moore's law is an axiom that says the number of transistors that can be fabricated on a silicon circuit, and therefore the circuit's computing speed, is doubling every 18-24 months.

Rick Stulen, Director of Materials and Engi-

*(Continued on page 3)*

## Sandia hosting EUVL milestone celebration

Sandia/California VP Mim John is hosting some 250 members of industry, government, and the news media Wednesday, April 11, at a milestone celebration of the Extreme Ultraviolet Lithography partnership, announced in 1997.

The partnership between the Virtual National Lab (Sandia, Lawrence Livermore, and Lawrence Berkeley) and the EUV LLC (Intel, AMD, Motorola, Micron, Infineon, and IBM) has successfully integrated an early prototype tool to pattern microchips with extreme ultraviolet light, whose narrow wavelengths should enable ever-smaller feature sizes. Integrated circuit feature sizes should shrink to 1/1000th the width of a human hair, or less, with 100 to 30 micron features. As a result, smaller and more powerful devices are envisioned with speeds of more than 10 times faster than today's microprocessors and memory capacity up to 1,000 times those currently possible.

This next-generation lithography approach is now a leading contender for generations of commercial microchip production starting in 2005-6 through 2020.

Keynote speakers at the invitation-only event lauding this full-scale research tool at Sandia/California are Intel CEO Craig Barrett, DOE/NNSA Director Gen. John Gordon, Rep. Ellen Tauscher, D-Calif., and Sunlin Chou, Chairman of the EUV LLC Management Board and Intel senior vice president.

*— Nancy Garcia*

## Our job: 'Making sure no one gets hurt'

Members of Sandia's Rescue and Recon Team, which consists of experts in hazardous materials control and paramedics, has responded to more than 120 calls since it was established last October. Read all about this crack team in Chris Burroughs' **page 7** story.

Sandia LabNews

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Sandia National Laboratories

# Solution to some of country's energy woes might be little more than hot air

By Chris Burroughs

The solution to some of the country's energy woes might be little more than hot air.

That's a route Sandia researchers are helping explore in an inactive limestone mine in northeastern Ohio.

A Sandia team led by Steve Bauer (6113) has been working with Houston-based Haddington Ventures and its subsidiary Norton Energy Storage LLC to determine the feasibility of using a 2,200-foot-deep inactive mine near Norton, Ohio, as the storage vessel for a compressed air energy storage (CAES) power plant.

MINE CHECK — Sandian Steve Bauer (6113), on top of a scaffold in the Norton mine, runs a test to assess the mine's *in situ* permeability.

"The intent is to cycle air pressure into the mine using compressors during off-peak electrical power times like evening and weekends to increase air pressure in the mine," Steve says. "During the daily peak needs for electricity, air pressure will be bled off through modified combustion turbines to generate electricity. The energy is stored as pressure, but the mine must hold air to store the pressure." Working pressures in the mine will range between about 1,600 and 800 psi.

Sound impossible? Not to Haddington and Norton Energy. The goal is to have the plant on line in two years. In October 1999 Norton Energy purchased the site and the limestone mine, and in July 2000 Norton Energy signed an agreement with the City of Norton to cooperate to build the plant. The appropriate permits are currently being sought through the state's regulatory agencies. Norton Energy will build and operate the plant. On March 20, the Ohio Power Siting Board issued a staff report recommending approval of authorization to build the plant.

While the technological concept of com-

*(Continued on page 5)*

# Exact pension parity with UC not likely, Labs management says . . .

## *. . . but improvements will be pursued in new round of talks*

By Bill Murphy

Making the changes required to achieve exact parity between the Sandia pension plan for non-represented employees and the University of California pension plan (which covers Los Alamos and Lawrence Livermore national labs employees) "creates an unacceptable risk" to the soundness of the fund and the Laboratories' financial position.

"That's our view" based on months of exhaustive analysis, Sandia Executive VP Joan Woodard told employees during several special meetings scheduled to update staff on pension-related issues.

Joan's comments came after Ralph Bonner, Director of Financial Systems and Pension Fund Management Center 10300, walked an audience of more than 200 employees at the Steve Schiff Auditorium through a nearly hour-long briefing on the processes used in the pension fund analysis. In all, six briefings were conducted last week for employees in New Mexico and California.

While acknowledging that achieving "exact parity" is not in the cards, Joan asked, "Does that mean we're not going to propose to do anything" to improve the Labs pension plan? "No!"

Labs management, Joan said, "is facing some

*(Continued on page 6)*



# This & That

*Larry Perrine has been away; Editor Ken Frazier writes this time.*

Thunderbird pride — In a recent column, Larry noted the strongly positive community support Sandia enjoys. A stellar example happened shortly afterward, in the form of a wonderful lead editorial in the *Albuquerque Tribune*. Titled "Sandia deserves spotlight as nation's premier lab," the 586-word editorial praised "a 50-year 'can do' history that is admirable" and said Sandia is indeed well positioned to achieve Lab Director Paul Robinson's vision to become the lab to which the nation turns for solutions to its most vexing problems.

The editorial pointed out that Sandia has been on that course for a long time: "You can't help but applaud its work ethic, its commitment to excellence, and its relatively humble (as weapons labs go) aspiration 'to render exceptional service in the national interest.' Sandia has earned the spotlight. Adhering to these core values, it has returned significant dividends to Americans on their $1 billion-per-year tax investment in it."

Added the *Tribune*: "Name an urgent problem for which there ought to be a technical explanation or solution and you'll likely find Sandia's mythical, turquoise thunderbird symbol fluttering nearby."

What was so nice about this was not just that it said such supportive things (and gave well-informed examples), but that it exalted exactly those qualities about Sandia that Sandians themselves have always taken pride in.

* * *

Mir's fall, and a PR coup — Last week's column made a fleeting reference to a fast-food eatery. Say what you will, Taco Bell has just pulled off one of the great public relations coups of the new century. The company garnered millions of dollars worth of free publicity in news coverage of its offer of a free taco to every person in the US if a tiny 40x40-foot target floating in the South Pacific was struck by the Mir space station during its fiery controlled fall to Earth. There was almost no risk, but nearly all media reported the offer.

As for Mir, Russian space engineers rose magnificently to the challenge of bringing Mir down safely and without incident. Mir had its problems, but its 15 years in space established milestones for long-term habitation we can only hope crews of the International Space Station can surpass.

* * *

I think I'll pass — We're all practical sorts, but I'm always amused at juxtapositions of certain businesses sharing the same quarters. Many of you daily drive past a business on Zuni SE that features "Vietnamese cuisine" and "Auto emissions testing." My favorite such clash brought my wife and me up short when we saw it on a sign outside a restaurant a few years back in Pagosa Springs, Colo.: "Steakhouse" and "Taxidermy." We ate elsewhere.

*— Ken Frazier (844-6210, MS 0165, kcfrazi@sandia.gov)*

# Taking science to the people: $200,000 donation funds museum's outreach van

Lockheed Martin and Sandia have presented the National Atomic Museum Foundation with a check for $200,000 to fund the first two years of a new science and technology outreach van to tour the state of New Mexico.

The check was presented at the foundation's annual Einstein Society Gala March 9.

NATIONAL ATOMIC MUSEUM
Albuquerque, NM

The National Atomic Museum Foundation's outreach van will take interactive science and technology learning opportunities to rural New Mexico children.

The programs for students will be tailored to fit the needs of each community visited. As with the museum's other educational programs, the intent is to allow children to explore a fun and interesting science and technology learning environment and encourage them to pursue further study.

The van will be equipped with computers with access to the Internet and numerous science and technology web sites. The curriculum will include programs about science history, interactive simple machines, the science of flight, how rockets work, radiation and the environment, as well as a teacher training component.

The van can be sent to locations within an approximately 70-mile radius of Albuquerque, focusing on the east, west, and south including: Rio Rancho, Bernalillo, Grants, Socorro, Moriarty, Santa Rosa, smaller towns within the radius, and pueblos surrounding the middle Rio Grande region.

The audiences for the van will be school-aged children, teachers, after-school activity sites such as community centers, and summer programs. During the summer when the van is not used by schools, it can be booked by festivals and camps. The van will be available starting Oct. 15. For van scheduling information contact Jim Walther at 284-3233.

The National Atomic Museum is operated for DOE by Sandia (National Atomic Museum Dept. 12660). The museum foundation is a 501(c)(3) nonprofit organization that supports special programs and exhibits of the museum.


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LOCKHEED MARTIN


# Bontis to speak on information sharing April 10

## *Leading intellectual capital expert here for National Library Week*

Nick Bontis, described by *Fortune* magazine as "one of the world's leading intellectual capital experts," will speak to Sandians Tuesday, April 10, in a Knowledge Management event sponsored by Personal Computing, Library, and Records Center 9600.

*Tuesday, April 10.*
*Steve Schiff Auditorium 9 a.m.-12.*
*Exhibits and refreshments in the TTC lobby during the event.*

Bontis will explore concepts and techniques for framing and advancing information sharing within the workplace. He is Assistant Professor of Strategic Management at McMaster University and Director of the Institute for Intellectual Capital Research in Hamilton, Ontario, Canada.

The event is part of National Recorded Information Management Week and National Library Week.

Bontis will speak from 9-11:15 a.m., guiding the audience through:

• Framing and advancing the fields of organizational learning, intellectual capital, and knowledge management.

• Predicting the future state of a knowledge-rich workplace.

• Discussing best measurement practices in the field.

• Developing a strategic perspective on knowledge management.

• Determining what you can do tomorrow.

At 11:15, immediately following his presentation, a Sandia panel will discuss some of the Labs' current initiatives in knowledge and information management and strategize with the audience about where it should be headed.

# Employee death

Keith Brower of Infrastructure and Information Systems Dept. 6524 died March 21 after a long illness.

He was 64 years old.

Keith was a distinguished member of the technical staff and had been at the Labs since 1966.

He is survived by his wife Elizabeth, daughter Rebecca Martinez, and sons William and Hendrick.

# EUVL launch

*(Continued from page 1)*

neering Sciences Center 8700 and the VNL's chief operating officer, agrees. "The national labs are the leading national resource capable of filling the void left by the decline of the big corporate R&D programs," he says.

Rick serves with VNL Chief Executive Officer Jim Glaze (Lawrence Livermore National Laboratory), Don Sweeney (LLNL), David Attwood (Lawrence Berkeley National Laboratory), and Glenn Kubiak (Sandia) as the VNL program management team, coordinating activities at their respective laboratories.

*"It keeps Moore's law, which is the engine driving the microelectronics industry, going for another 15 years."*

The size of microelectronic features — transistors, resistors, etc. — had previously been reduced through optical lithography to the point that millions of these features can be created on a single computer chip. But the task of advancing the art much farther with conventional methods is like trying to paint a thin line with a wide brush. Physically, it can't be done. It's impossible to use conventional visible-light technology to produce features sizes smaller than the wavelengths of that light.

The first papers proposing EUV lithography were written by authors from LLNL and Bell Laboratories in 1988. In 1996, experiments with an EUV light source at Sandia/California produced the pioneering 0.1 micron field-effect transistor, but the lab lacked the resources to develop a complete system. Hence the creation of the Virtual National Laboratory.

The VNL, in turn, partnered with an industry consortium that now consists of Intel, Motorola, AMD, Infineon, Micron, and IBM. The group formed in 1997 as the EUV Lithography Limited Liability Partnership (EUVL-LLC). IBM, which had been involved for several years in developing a competing technology, joined the group as

SANDIA RESEARCHERS make fine adjustments to the Extreme Ultraviolet Lithography (EUVL) test stand, which was developed as a cooperative effort by Sandia, Lawrence Livermore National Laboratory, and Lawrence Berkeley National Laboratory in a partnership called the Virtual National Laboratory (VNL). The VNL developed the EUVL test stand as part of a cooperative research and development agreement with an industry consortium. EUVL technology allows microelectronic feature sizes in the nanometer range. (Photo by Randy Montoya)

recently as last month, a move perceived by many as a tacit acknowledgement of EUVL's technical and marketplace potential.

To date, three semiconductor tool suppliers are participating as licensees to EUV LLC — Silicon Valley Group (SVG) and USAL (Ultratech) of the US, and ASML of the Netherlands. Subsystem and component suppliers include TRW, UTS, Osmic, AES, 3M, SVG Tinsley, Shipley, Arch, and Veeco.

The federal government is currently considering approval of a merger between SVG and ASML.

The VNL is "owned" 45 percent by Sandia, 45 percent by LLNL, and 10 percent by LBNL. Its personnel are dedicated to the EUV program whether their paychecks come from Lawrence Berkeley, Lawrence Livermore, or Sandia.

The stakes are high. Worldwide, semiconductor revenues may reach almost $1 trillion per year by 2012. Of this, US manufacturers are projected to command a 50 percent market share or more. In 1997, the worldwide market for conventional optical lithography systems was approximately $4 billion, a figure that's expected to reach $7 billion by 2004. Japan currently controls about 60 percent of the semiconductor equipment market. The availability of EUV lithography tools is estimated to increase the annual market for lithography systems to $15 billion by 2010.

"These are $15 million machines," says Jim, "and they'll be produced at the rate of between 100 and 300 a year. You do the numbers: it's a market worth getting into, even if you don't get any profit for a few years."

## Starting the organization

Several techniques have been proposed to produce next-generation photolithography devices. But in a December 1998 vote of more than 70 international SEMATECH representatives, EUVL received by far the most votes as the "most likely to succeed" technology in the next decade, followed by SCALPEL, an electron-beam process being developed by Lucent.

In the days of federally funded government-

*(Continued on next page)*

Sandia CaliforniaNews

# Novel chip counts time intervals to the trillionths

## *'Pulse Stretcher' invented for flight tests and patented for commercialization*

Ken Condreva (8416) has built a better stopwatch. It's smaller than a dime, accurate to 125 picoseconds, and can be produced far more inexpensively than comparable devices.

The inspiration for his invention was the need to accurately record critical timing signals in weapon test flights, beginning 10 years ago. New telemetry systems required a compact, lightweight, and low-power device for this purpose.

"The only things I could find that had this resolution were table-top instruments packaged in a box," Ken said. "They were way too big, and used way too much power."

His invention became the FALCON, an integrated circuit that uses his patented "Pulse Stretcher" technique to increase resolution up to 200 times for a low-power electronic clock (using 300 mW at 40 MHz). The circuitry provides greater resolution by lengthening duration of the output signal, making it last from 64 to 200 times longer than the input signal. Although the input pulse is "stretched" in real time, the technique can be compared to recording a sporting event with fast-action film and replaying it at slow speed to clearly see what happened.


PULSE STRETCHER technique of Ken Condreva's FALCON integrated circuit, seen here larger-than-life-size next to a Roosevelt dime, makes it a high-resolution, low-cost timekeeper extraordinaire.

Reasoning that a compact way to count time intervals at high resolution with low power would be useful commercially, Ken obtained a patent in 1994.

Applications are in areas that rely on measuring distances accurately, such as land surveying; construction; testing, assembly, and manufacturing; liquid level measurements in chemical or petrochemical plants; and collision warning and avoidance in vehicles, says business developer Scott Vaupen (8709).

This timing device accurately operates not only in "normal" working conditions, but also in extremely rugged and harsh environments — high and low temperatures, high vibration and shock, as well as high and low humidity. Small and inexpensive battery-operated monitors could also be devised for future innovative uses.

The integrated circuit uses standard commercially available CMOS technology and could be inexpensively manufactured by most semiconductor businesses, Scott says.

Sandia is currently seeking commercialization partners with imagination to exploit what it considers to be a robust and innovative technology.

*— Nancy Garcia*

# EUVL launch

*(Continued from preceding page)*

industry partnerships, Sandia was working with Intel and AT&T on the development of photoresists and imaging systems, respectively. LLNL also had two separate CRADAs in partnership with Intel, AMD, Ultratech Stepper, Micron, and Jamar Technology. Then federal CRADA funding was killed by Congress, and for some it appeared that the promising EUV technology was about to die on the vine.

However, the two labs already had a joint Industrial Advisory Board. "Part of its purpose was to get the labs integrated and focused on what was needed for a commercial solution," says Rick. "It was in 1995 that Bill Brinkman [William Brinkman, an AT&T vice president and the board's chairman, and a former Sandia research VP] first went to the lab directors and said to John Crawford [Sandia] and Mike Campbell [LLNL], 'Let's get this thing going.'"

"With six months funding left, we thought, let's see what we can accomplish," recalls Don, who is VNL program leader located at LLNL. "So we got together [with the Industrial Advisory Board] for a final presentation in the spring of 1996. Those present included John Carruthers of Intel, Bill Brinkman, and probably a dozen people from our CRADA partners."

By the end of the presentations, Carruthers was suitably impressed. In a nutshell, the Intel executive said, "What you guys have done is unbelievable. We'll put together a consortium, but you must work together. You have to be one hundred percent in. Either you're in or you're out."

These were tough words for the lab-proud engineers and scientists who operated in quite different environments — Sandia under Lockheed Martin management and the Lawrence laboratories under the University of California. Yet as Rick says, "It was time for that transition. We had planned ahead of time that the government would get out of this, and it was time for industry to pick up. The mood of Congress shifted sooner than expected, but it was clearly something that we wanted.

*(Continued on next page)*

## *Proving the skeptics wrong*

Not surprisingly, many observers were dubious that two sets of competitors could get it together to create completely new ways of making integrated circuits. "At first, there was skepticism among the manufacturers that the labs could do it," says VNL CEO Jim Glaze with a hint of understatement.

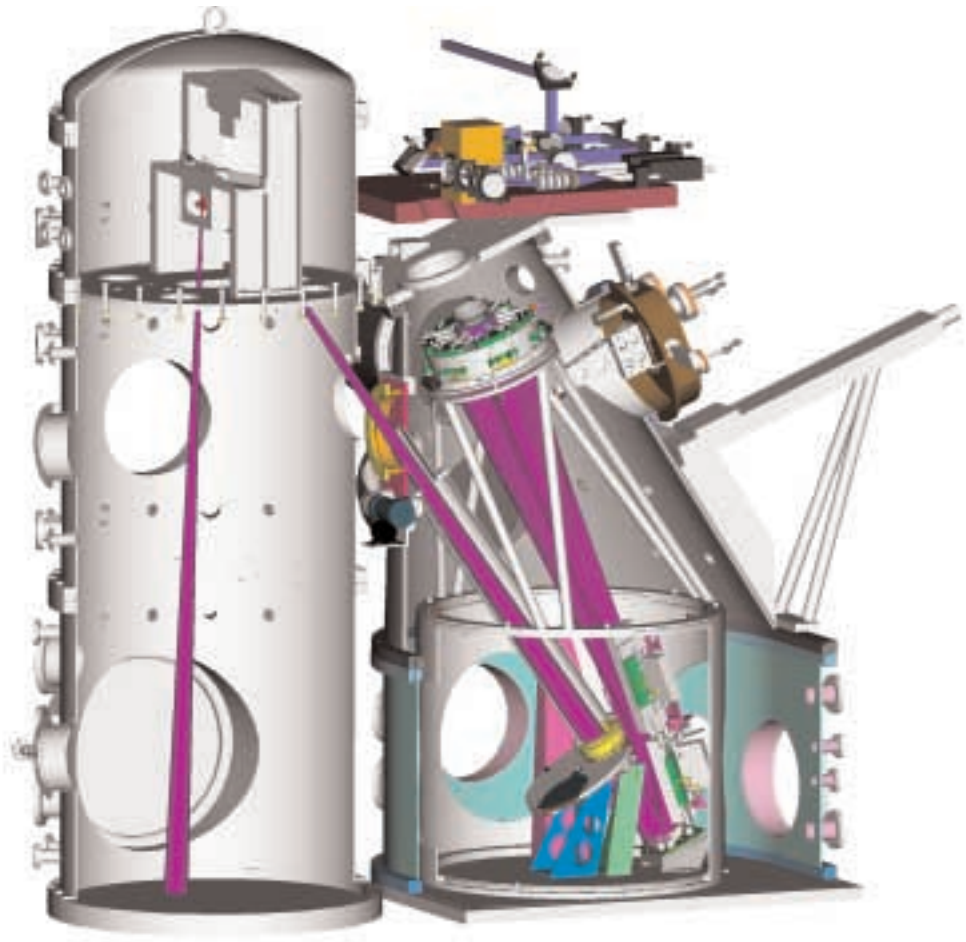
"The two labs [SNL and LLNL] are culturally very different," says LLNL's Don Sweeney, "but this collaboration brought out the best in both of us. We have complementary skills, complementary facilities."

"The main key was for the labs to adapt industry's management systems and make them their own," says Jim. "Another important key was to distinguish between what the labs do best and what industry does best. The labs are able to do more science-rich and high-risk technology that industry can't invest in. Also, all the EUV science resources are right here [located in and around Livermore and Berkeley]."

"Part of the challenge was that we had to create the whole infrastructure," says Sandia's Rick Stulen. "Everything had been in the national labs up to this point: up until 1996 there had been limited commercial involvement. Another difficulty was, and is, that the suppliers haven't done this kind of thing before — it wasn't an extension of their existing expertise. Some of them ask 'where's the business?' That's why the SEMATECH vote was so important — it gave them confidence to believe that the EUVL idea would thrive and prosper."

As the new enterprise developed, adds Rick, "the challenge was to keep together people who shared a common passion, had the technical know-how, and had the right personalities. If we hadn't had the right people involved, it could have destroyed the relationships."

# EUVL: The technical dimension



THIS COMPUTER-GENERATED illustration shows extreme ultraviolet light (EUVL) as a beam (shaded dark gray) being generated from a plasma source in the top right hand side of the apparatus, which was assembled at Sandia/California. The prototype machine was built by Sandia, Lawrence Livermore National Laboratory, and Lawrence Berkeley National Laboratory as part of a CRADA with a consortium of industry partners to support development of EUV lithography.

Extreme ultraviolet lithography is a process through which shorter wavelength "light" is used to put more components on silicon chips than is possible by exposing them with conventional visible light sources.

Lithography is a process that starts by projecting chip designs onto silicon wafers from a negative image (mask) to a silicon wafer, much as a film negative is transferred to photographic paper. This exposure to light selectively toughens a film of photoresist material on the wafer, so that the desired design is left in relief when the wafer is washed with developer.

Visible-light (optical) photolithography has been the standard of the semiconductor industry for three decades but is nearing the end of its effectiveness. Nonetheless, light sources with wavelengths of 193 nanometers (nm), or 0.19 micron, in combination with other design and manufacturing innovations, are expected to extend optical lithography to chip feature resolutions of 0.15 micron or possibly 0.10 micron. Studies are just beginning to learn the feasibility of using 157 nm light to push optical lithography even beyond 0.10 micron.

### Shorter wavelengths = finer resolution

The technology developed by the Virtual National Laboratory and EUVL LLC builds on conventional optical lithography experience and infrastructure, uses 10- to 14-nm photon illumination, and is expected to support multiple technology generations below 100 nm (0.1 micron), down to 30 nm (0.03 micron). The image is reduced in size by a factor of 4 as it is printed onto the wafer. Because extreme ultraviolet photons have wavelengths that are much shorter than visible light rays, they achieve smaller or finer-resolution images during the exposure process.

Short-wavelength sources pose a special set of problems. Wavelengths shorter than about 1800 angstroms are not transmitted through traditional optical-lens materials; instead, they are absorbed. Therefore, reduction systems must use reflective surfaces instead of glass lenses. Even with reflective optics, EUV rays are strongly absorbed. To solve this problem, special multilayer coatings of synthetic materials were developed by LLNL to improve reflection. Using these, EUV rays bounce off a highly reflective mask that contains the IC pattern, and then are imaged by a camera containing four mirrors, which focus the image onto the wafer.

"Modeling and simulation were the keys to technical success," says Rick Stulen. "M&S gave us robust designs and saved time so that we could meet the SIA [Semiconductor Industry Association] roadmap."

### Modeling and simulation proves worth

A good example of effective computer modeling and simulation occurred early on, after the manufacturers looked at the labs' prototype design and said it wouldn't work — it would be hard to manufacture and its various parts were not adequately accessible.

"We had to settle on a design for what we call the projection optics box, which is the housing that holds the mirrors," says Rick. "We did four completely different revisions on that design within the space of just a few months, and after each we subjected the design to a complete modeling and analysis package, so that we were able to shorten the process by a factor of about four or five over what it would normally take. Otherwise it would have taken eight to 12 months."

The Engineering Test Stand (ETS) includes all the elements necessary for extreme ultraviolet lithography. Its main purpose is to offer all of the "system learning" necessary for commercial suppliers to begin manufacturing EUVL tools. It has a high-power laser-plasma source (LPS) and a 4x reduction camera with a print field area that is more than 10,000 times larger than the microstepper built some years ago in Sandia/California's Integrated Manufacturing Technologies Laboratory. Like its predecessor, the ETS uses a magnetically levitated stage to add extra precision to the wafer alignment system.

Sandia was also responsible for the development of the laser-plasma source (LPS) for generating EUV radiation. The LPS uses an Nd:YAG laser (6 kHz, 1500W) that focuses 5-nanosecond pulses of light onto a beam of xenon gas. The gas consists of weakly bound xenon clusters that contain many thousands of atoms each. The clusters are heated and vaporized as they absorb the laser energy. The vaporized plume becomes an extremely hot plasma, which produces a flash of radiation containing extreme ultraviolet rays.

# Compressed air

*(Continued from page 1)*

pressed air energy storage is more than 30 years old, only two such plants exist in the world — a ten-year-old-facility in McIntosh, Ala., about 40 miles north of Mobile, and a 23-year-old plant in Germany, both in caverns created in salt deposits. The Norton mine will be the first in a limestone mine.

Sandia's role has been to characterize the rock mechanics and air-flow properties of the limestone and overlying shale in response to pressure cycling. The characterization included *in situ* and laboratory testing and analyses to assess the existing geologic, hydrologic, and rock physics data. Without clear understanding of the behavior of the rock in the pressurized state, and the behavior of fluids in the rock, regulatory and funding agencies would have been reluctant to support the project. Sandia teamed with Hydrodynamics, a consulting group, in completing the characterization.

STEVE BAUER

Steve and other members of the Sandia team spent six months — November 1999 through April 2000 — in Norton studying the mine's geology.

"Most of that time we were underground taking core samples, completing a number of *in situ* measurements, and studying the physical nature of the exposed rock."

## Dense rock, few fractures

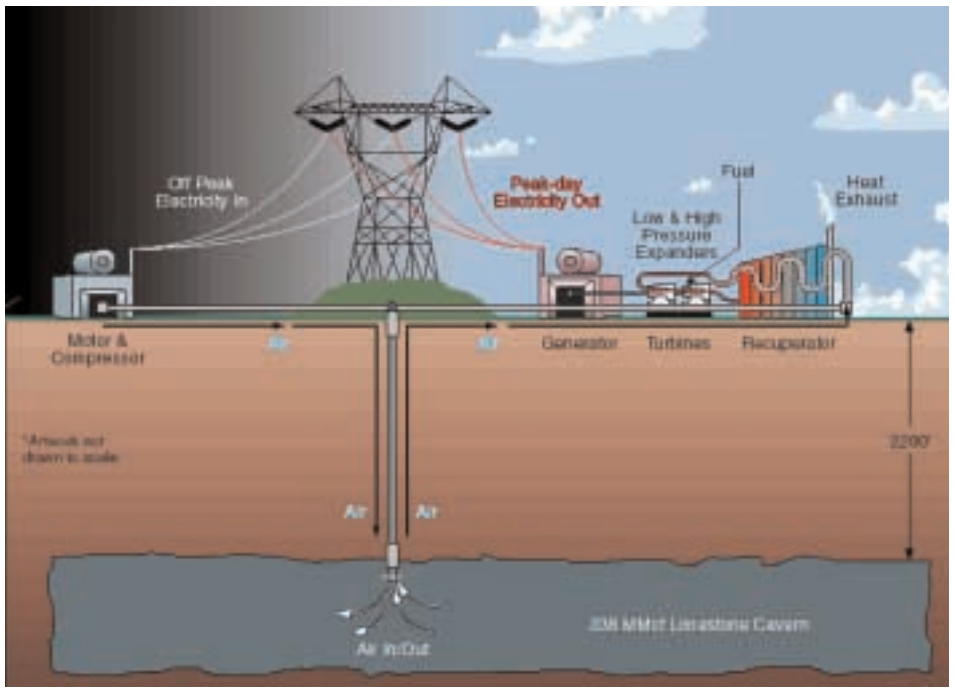
The Sandia team working on the project found that the mine consisted of a very dense rock with low permeability. It was stiff and strong and had few, if any, natural fractures. The absence of open natural fractures is uncommon in rock. The flow analyses indicated that pressurized air will move less than 100 feet in 50 years away from the mine — which will have almost no effect on the air compression and decompression cycling and, more important, on the economics of the project.

"This all led to the conclusion that the mine would likely hold air at the required storage pressures and would work well as an air storage vessel for a compressed air energy storage power plant," Steve says.

The team documented its findings in a series of six technical reports, which are being used to support permitting, licensing, and operation of the facility.

The Pittsburgh Plate Glass Company operated the mine between 1943 and 1976 for the production of synthetic soda ash used in the manufacture of glass. It covers an area about 7,000 feet by 4,000 feet (643 acres) and is built in a room and pillar mine configuration — rooms separated by pillars, leaving 338 million cubic feet of space. Despite being well below the water table, the mine is virtually dry.

The power plant will be built in continuous construction units brought on line in increments of 300 megawatts as units are completed. Ultimately up to about 2,700 megawatts will be built, which will be enough generating capacity for about one million homes.




CONCEPTUAL representation of the compressed-air energy storage concept. Off-peak (low-cost) electrical power is used to compress air into an underground air-storage "vessel" (the Norton mine), and later the air is used to feed a gas-fired turbine generator complex to generate electricity during on-peak (high-price) times.

The power from the plant will not be sold directly to consumers. It will generate wholesale electric power for sale to utilities and marketing companies for use during peak energy usage times.

In addition to providing more power during peak times — and possibly helping Ohio and the surrounding region avert blackouts and brownouts — the compressed air energy storage power plant has the advantage of being environmentally friendly.

"During electric generation, some gas will be burned to super-expand the compressed air," Steve says. "When it is at its full production stage of 2,700 megawatts it will be producing the same amount of emissions as a 600-megawatt gas-powered combustion turbine power plant."

Steve says Sandia has worked with Larry Bickle, a former Sandian and now a principal of Haddington Ventures, on several efforts that helped create new markets in the energy sector, especially for gas and storage services. Success in those projects has drawn on Sandia's unique ability to apply a wide breadth of technical capabilities to commercially viable ventures.

## Team to be recognized

The Sandia Norton Compressed Air Energy Storage team will be one of several recognized for the quality of their work during the May 12 Employee Recognition Award ceremony.

Team members include Steve Bauer, Darrell Munson, Christopher Rautman (all 6113), Moo Lee, James George, David Bronowski, Mark Grazier (6117), Stephen Webb (6131), Glenn Barker (3010), and Richard Beauheim (former Sandian).

# EUVL launch

*(Continued from preceding page)*

"Clearly what was important is commitment from the top — [Sandia Executive VP John] Crawford, [LBNL Director Charles] Shank, [LLNL Director C. Bruce] Tarter," says Rick. "They needed to understand that there's more benefit in the collective than the individual. There was no time for us to build our own EUVL competencies individually. With the VNL, whatever competency we need, we can bring it in from whichever lab has that expertise. We could not develop EUVL technology at Sandia without LLNL and LBNL, and they couldn't do it without us."

The first VNL team leaders consisted of Rick, David Attwood, Don Kania, and Rick Freeman (then with LLNL, now chairman of applied physics at UC Davis). Don Sweeney became LLNL's project manager when Kania left for Veeco.

"Basically we sat down and looked at our strengths," says Rick. "Sandia had been involved in imaging systems, [light] sources, and resists. We were doing the bulk of the systems work and imaging optics, but we didn't have the resources to continue with it all. It made sense to move the optics development work across the street [to LLNL]; they had the internal know-how to do that better than we did. Our remaining strengths were in systems integration, sources, and resist. Systems integration means designing and engineering the complete imaging and mechanical structures of the system — source, optics, mask, wafer — short of component development."

"Sandia is more of a systems integration, systems engineering place," says Don. "We're like to think of ourselves [at LLNL] as the technology innovators. For us, to produce a laser would cost a fortune." Sandia just went out and bought one. It gave TRW the specifications, and the machine was delivered at the end of March 1999.

Technically, the three labs' responsibilities were mapped as follows:

- Lawrence Berkeley — EUV interferometry, defect inspection analysis, and EUV scattering experiments
- Lawrence Livermore — Optics design, multilayer coatings, visible metrology, projection optics box engineering, and condenser
- Sandia — Systems engineering, source development, microstepper experiments, modeling, and resist development

"Another thing that Sandia is good at," said Don, "is bringing in teams of people to criticize their work." Rick explains: "Whenever there's a problem area, we'll identify a team of people and bring them into the laboratory — if they're not already here — and brainstorm, hopefully solve the problem."

Project leaders also had to tackle the question of intellectual property, with the result that more than a dozen inventions were licensed by EUVL-LLC from the two larger labs. "Previously, under DOE funding, the labs and DOE owned any of the inventions that they made," says Rick. "In the new CRADA, since it's entirely paid for by industry, they normally own the inventions. We define a field of use, lithography, for example, and the labs have rights to applications of inventions that fall outside that field of use."

It would be difficult to argue that EUVL is an unfit project for DOE's Defense Programs/National Security labs to take upon themselves. The three labs have a special interest in the technologies that will power future machines in the Accelerated Scientific Computing Initiative (ASCI) program, linchpin of science-based stockpile stewardship. And, on a day-to-day basis, EUVL modeling and simulation is helping extend and validate the complex DOE computer codes used in stockpile stewardship.

On a more strategic level, Sandia Senior VP Tom Hunter (9000) sees VNL's involvement with EUVL as an ideal way of meeting four challenging DOE needs:

- Establishing important design approaches that can be used in Defense Programs/National Security weapon engineering.
- Demonstrating world-class science and engineering and thereby attracting the best scientists and engineers.
- Stimulating partnerships and investments by industry to support the labs' primary missions.
- Getting the national labs to work together effectively.

Tom says changing needs within the DOE programs have made it necessary to enhance the kind of project management skills that are intrinsic to the EUVL project.

"Our design cycles require a more robust integration of modeling and simulation together with closer integration of a more diverse team of designers," Tom says. "Further, our interaction with our customers requires greater attention to incorporating unique requirements into design and production that are more functional and cost effective. Especially important is the application of cutting- edge technology into complex systems. EUVL provides an opportunity to demonstrate these skills like few other projects."

# Pension plan

*(Continued from page 1)*

tough decisions" on exactly how to change the pension plan in a way that keeps a balance among benefit improvements, financial security of the plan and potential impact on Sandia Corporation's financial position.

The next steps, Joan said, are to:

• Develop a proposal that strikes that balance.

• Seek input from and negotiate with DOE and Lockheed Martin to finalize a proposal.

• Present a final version to the Sandia Corporation Board of Directors.

Ralph said step one — developing a proposal — should be completed in the next 30 days. "There's no desire to have this drag on," he said.

Joan opened by acknowledging that the pension fund — particularly its comparability to the University of California (UC) fund — is a "hot topic" around the Labs. She noted that "the issue has been worked for a long time," adding that senior management wants to be "as forthcoming as possible" about its efforts to improve the plan.

Joan said Labs President C. Paul Robinson had established a "wish list" of some "design principles" to be applied in the review and analysis of Sandia's pension plan. Briefly, they were:

• Design a plan that achieves comparability, on average, with the UC plan.

• Incorporate into the analysis the relative value of Sandia's 401(k) match.

• Design a plan that encourages/fosters employee retention.

• Incorporate into the plan some sort of cost-of-living protection.

• Maintain a financially sound pension plan after any changes.

Ralph then took the stage. Noting that Joan had recently spent time in meetings about polygraphs and pension plans, Ralph said the test for the briefings' effectiveness would be whether "we can pass the polygraph on pensions."

## Benchmarking analysis

Ralph said the analysis started with a benchmarking comparison of salaried employees prepared by Hewitt Associates, a highly regarded consulting firm. The Hewitt study looked at plans from peer companies with comprehensive benefit programs, including AT&T, Eastman Kodak, IBM, Xerox, GE, Motorola, Lawrence Livermore National Laboratory, Pacific Northwest National Laboratory, and Lucent Technologies. The businesses and labs in the comparison group were selected by Sandia and approved by DOE. The benchmarking is required by a DOE order that requires a company's benefit values to be no more than 5 percent above the average for its peers.

In the Hewitt analysis, Sandia's pension plan, not including the 401(k) match, ranked between 2nd and 3rd — behind the LLNL plan.

The companies in the Hewitt study all offer a so-called "defined benefit" pension plan. In a defined benefit plan, the company retiree is guaranteed a benefit; the company assumes all the risk associated with delivering on the guarantee. Many companies in the "new economy" don't offer a defined benefit pension; they offer only 401(k) plans, stock purchase plans, and other alternatives to traditional retirement programs. In this approach, the employee, not the company, assumes the investment risk and the company offers no guarantees. Sandia's benefits — including its pension benefit – were compared to many new-economy companies' benefits in the Towers Perrin High Technology BENVAL study. In that study, Sandia's pension plan — that is, its defined pension benefit — ranked first. Its saving plan — the 401(k) that passes investment risk along to the employee, ranked 22nd out of 32 reviewed companies. The Labs' pension and savings plans, when weighed together, ranked 6th among the 32 companies.

Ralph went through a comparative analysis between the Sandia plan and the UC plan. The analysis team developed an "example employee," a 30-year veteran MTS earning about $80,000 at retirement, with representative increases in salary over the years and participation in the 401(k) plan at a rate of 6 percent, which was adequate to earn the full company matching contribution of 4 percent of the employee's compensation. (The assumption was that the company match money of 4 percent in the Savings Plan grew at an annual rate of 8 percent.)

## 78 percent of UC plan at age 65

Ralph spent a few minutes explaining the Labs' logic in including the 401(k) company match as a retirement benefit and then explained how his team converted that benefit to a pension formula equivalent.

Ralph's team ran the example numbers — including the conversion of Sandia's high five-year salary average to a high-three year salary average, to be comparable to UC's plan, and adding in the Savings Plan company match as part of the retirement benefit — through a comparative analysis. It asked, how does this employee's retirement benefit fare if he or she had worked at a UC lab? Then, how would the same individual fare in retirement based on the combination of Sandia's pension and 401(k) match?

The results: If the individual retired at age 65, the Sandia benefit would be about 78 percent of the UC benefit. Leaving at age 60 after 30 years, the benefit would be about 75 percent of the UC benefit. In contrast, because of the UC pension formula's age factor, a Sandian retiring at age 54 with 30 years of service would get about 109 percent of the benefit of a UC employee retiring at the same age. (See chart below left.) None of this analysis includes the value of the UC's automatic cost of living increase.

Ralph went through an analysis of what would be required to achieve parity with the UC plan, noting that certain federal laws constrain the Labs' options, since it is a private employer plan, originating with AT&T and managed by Sandia Corp. For example, the Employee Retirement Income Security Act of 1974 requires Sandia to make a contribution when dictated by its enrolled actuary. As a public entity, UC is not subject to the same federal laws.

The analysis showed that as of Jan. 1, 2000, Sandia's actuaries estimated the Retirement Income Plan had a surplus — the difference between actuarial value of its assets and its actuarial accrued liabilities — of about $927 million.

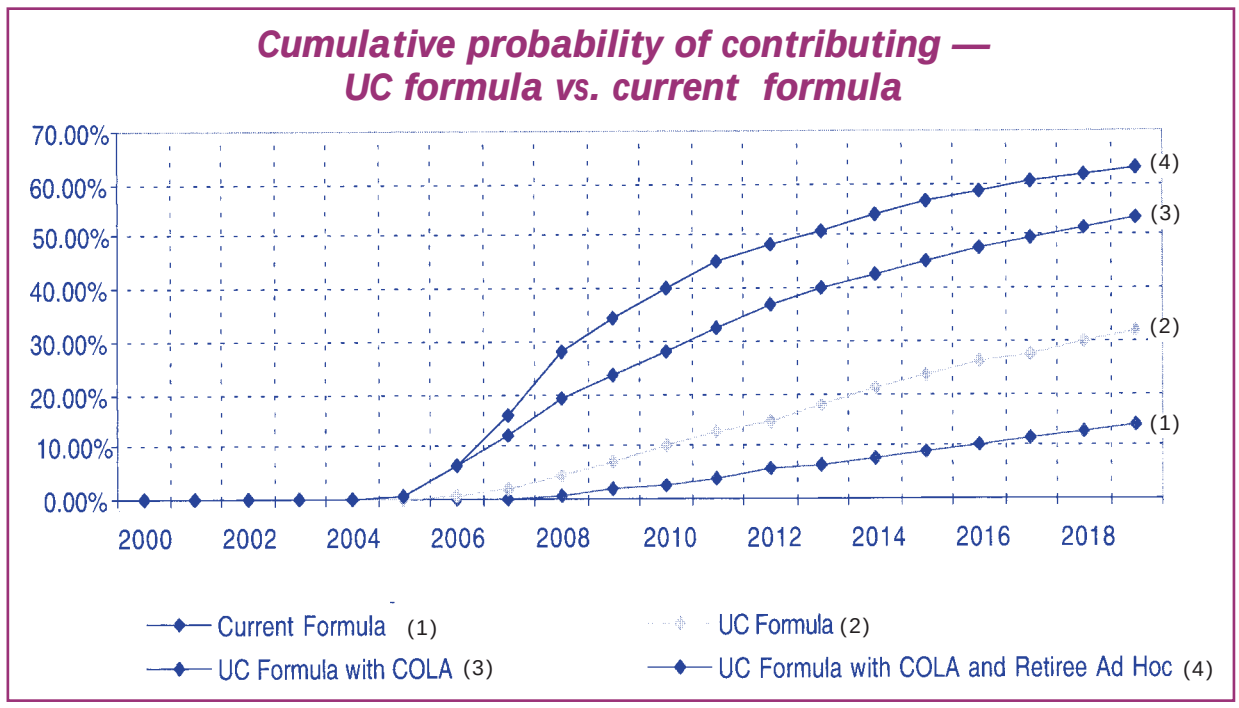
Those assets and liabilities were plugged into a sophisticated, industry-standard computer model developed by former Harvard professor Irwin Tepper. The model makes 2,500 independent runs that generate expected portfolio returns and actuarial liabilities for the next 20 years. The data generated by the model can be used to determine a range of probabilities that Sandia will have to make a contribution to the pension fund sometime during the next 20 years. (See chart above.) The Tepper model, Ralph said, is the best available tool for determining the amount of risk the Labs would be taking on by changing from the current pension plan to a UC plan.

Based on the model's results, the Labs has about a 14 percent chance of having to make a contribution to the pension fund sometime in the next 20 years to meet obligations — using the current Sandia pension formula. However, using the UC pension formula, the Labs would have a more than 30 percent likelihood of having to make a contribution. The risk of a contribution jumps to 53 percent if an automatic cost-of-living adjustment, or COLA, formula is included with the UC formula. ("That's why you don't often find COLAs in private pension funds," Ralph said. "They cost too much.")

The Tepper model, in sum, demonstrates a significant likelihood that adopting the UC plan in its entirety would require the Labs to make a substantial contribution to the fund in the foreseeable future.

That high risk, Joan concluded after Ralph's briefing on the analysis, is more than would be prudent for the Labs to assume.

**The *Lab News* will continue to cover pension plan developments as they occur.**




**Comparison with the UC plan for a representative 30 year employee**

| Age | SNL High-3 equivalent w/ 401(k) | UC age factor | Ratio of SNL/UC |
|---|---|---|---|
| 65 | 1.91% | 2.45% | 78% |
| 64 | 1.90% | 2.50% | 76% |
| 62 | 1.89% | 2.50% | 76% |
| 60 | 1.88% | 2.50% | 75% |
| 58 | 1.87% | 2.22% | 84% |
| 56 | 1.86% | 1.94% | 96% |
| 54 | 1.81% | 1.66% | 109% |
| 52 | 1.72% | 1.38% | 124% |
| 50 | 1.63% | 1.10% | 148% |

# New emergency team comes to Sandia's rescue

## *Rescue and Recon Team has responded to more than 120 calls since October*

By Chris Burroughs


RESCUE AND RECON — Marie Goldberg (9501) volunteers to be a mock patient as Rescue and Recon paramedics Dale Claycomb, left, and Jim Romero (both 3333) treat and prepare her for ambulance transport. (Photo by Randy Montoya)

What happens if there is a large release of a hazardous material, a dangerous gas leak, or bomb threat?

A person in a red shirt most Sandians already know as the Incident Commander from Emergency Management Dept. 7137 will be there within minutes to take charge of the situation. But so will be a group they may not recognize — the new Rescue and Recon (Reconnaissance) Team.

The group, which consists of experts in hazardous materials control and paramedics, was established last October.

"Our job is to make sure no one gets hurt and to eliminate the dangerous situation," says Chris Mullaney (7137), team leader. "We are involved in rescue, reconnaissance, rapid mitigation, and transportation of injured or affected people."

Over the past six months they have responded to more than 120 calls, ranging from a dangerous leak of a pyrophoric gas, to finding the source of mercury deposited on a sidewalk, and from cleaning up a three-quarter-mile oil spill left on a street by a forklift to tracing a burning smell in a building to a smoldering 50-amp line.

The team consists of three experts in the area of hazardous materials, which they refer to as HazMat — Chris, Gary Baldonado, and Marvin Garcia (all 7137). Also on the team are six paramedics, including two who are full-time — lead paramedic Dale Claycomb and Kathy Baca and four who are part-time, Rick Romero, Jim Romero, Lloyd Rantanen, and Vic Padilla (all 3333). All the paramedics report to Dr. Ed Cazzola (3333), Emergency Medical Services director.

Incident Commanders who work closely with the team are Bill Wolf, Steve Heaphy, Carol Bonney, Dennis Cavalier, Maurice Sandoval, and Johnny Montano (all 7137).

The HazMat members are trained rescue technicians, meeting standards set by the National Fire Protection Association. They are specialists in rope rescue — being able to use extremely expensive and strong ropes to rescue people — and confined-space rescue — getting people out of small spaces. They are all also qualified emergency medical technicians (EMT-basic).

The paramedics are licensed by the state. Several members of the team are full-time firefighters with the Albuquerque Fire Department and work part-time for Sandia. The lead paramedic, Dale, spends his weekends assisting patients on the University Hospital's Lifeguard 1 helicopter that flies throughout the state picking up seriously injured or ill patients and transporting them to the hospital.

Hue-Su Hwang, Manager of Dept. 7137, says the Rescue and Reconnaissance Team was created out of need.

"We realized about a year and a half ago through our exercises that we needed a full-time team to be involved in hazardous materials rescue and reconnaissance," she says. "Before, we always relied on volunteers — which sometimes meant that the response would be slow. That was not adequate because some instances require an immediate response. We wanted to be proactive."

She proposed the idea of a Rescue and Reconnaissance Team to Sandia management and received immediate support, which included a budget to hire and train a staff and for equipment.

Chris says that while the team is the first to respond to emergency situations, the Emergency Response Organization still uses volunteers.


CROSS-TRAINING — Paramedic Dale Claycomb (3333) and HazMat specialist Marvin Garcia (7137), both on Sandia's new Rescue and Recon Team, work together as they enter a hazardous waste area for training. Paramedics on the team are cross-trained as HazMat technicians while the HazMat specialists are cross-trained as emergency medical technicians. (Photo by Randy Montoya)

"We have about 100 volunteers from throughout the Labs whom we call on for help," Chris says. "Many of them are experts in different types of hazardous materials and can offer advice on how to handle the materials. Some help run the supporting Emergency Operations Center, do plume modeling, help with communications, do planning, prepare public information releases, provide logistical support, monitor safety, provide security advice, offer family assistance, and more."

Gary says one aspect that makes the team effective is that it is well-equipped.

"Management has given us tools and proper training to do our job," he says. "We told them our needs and they met them."

The team has a first-response truck that contains basic rescue and reconnaissance equipment — rescue rope, protective gear, barrels for packaging hazardous materials, and a library of hazardous materials references.

For serious situations, the team members, together with the incident commander, have at their disposal an RV that can serve as an on-site command center. They also have two trailers of sophisticated rescue equipment. One contains hazardous-materials control equipment — waste containers, air tanks, kits to stop leaks, and protective gear. The other holds rescue equipment, including ropes, harnesses, jaws of life, hydraulic equipment.

CHRIS MULLANEY

Equally equipped are the paramedics who drive an advanced life support ambulance. They are at the scene of hazardous materials emergencies, but also assist people at Sandia experiencing a medical emergency, like a heart attack.

The special training the team members undergo is also proving valuable, Chris says.

One example is critical training they received in dealing with pyrophoric gas releases. Since the team was established, there have been two such incidents. During the first the team had to call in the Kirtland Air Force Base fire department and the entire Corporate HazMat Response Team to help contain the situation.

After that, team members attended a school where the gas is made and learned how to control it. During a second accidental pyrophoric gas release at Sandia following the course, the group was able to rapidly handle the incident themselves at a reduced risk and cost.

Depending on the type and magnitude of emergency, the entire team may not be on hand. Usually there are two paramedics and two HazMat specialists on duty. The team works during the days and is on call on weekends and nights.

The team members emphasize one important point.

"Don't be afraid to call 911," Gary says. "If you think you are in an emergency and need to call 911, you probably do. And we'll be there to help."

# US-Mexico border lab would address problems, eliminate barriers between countries

## *Sandia technology exploitation key to economic, social sustainability*

By Howard Kercheval

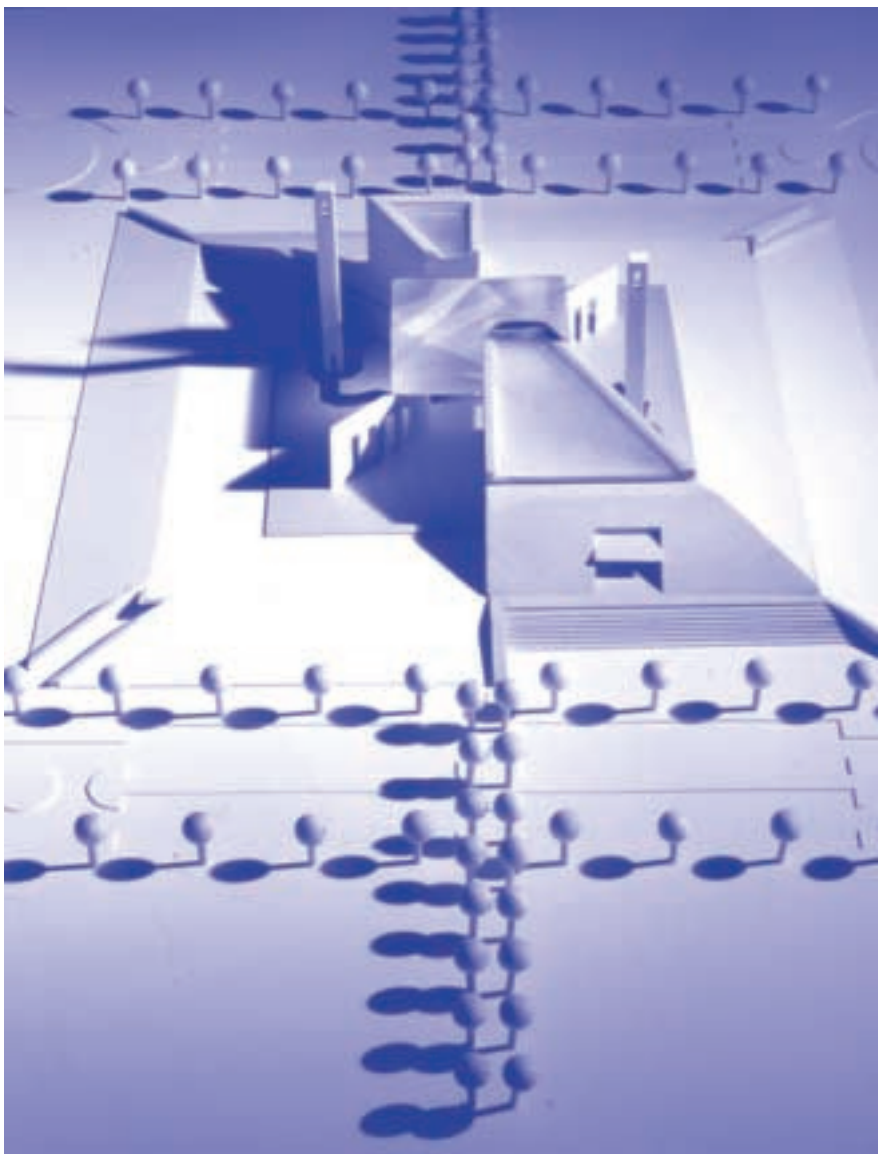
Members of Sandia's Advanced Concepts Group (ACG), whose job is "thinking outside the box," have come up with a concept well beyond their own parameters: It's halfway "outside the country."

They visualize creation of a Bi-National Sustainability Laboratory (BNSL) to be built literally on the border near Santa Teresa, N.M., and the Juarez municipality of San Jeronimo, Chihuahua. The BNSL would be staffed with specialists from the US, Mexico, and elsewhere and committed to fostering economic development as the means of eliminating barriers between the two countries.

Their concept is based on the conviction that open borders come from a sustainable economy that creates wealth through the application of advanced technologies to industries and manufacturing processes.

The US-Mexican border is one of the longest in the world separating one country of extreme wealth from another with an emerging economy. It has a long history of depressed economics and infrastructure stress on both sides.

The BNSL will be an applied technology laboratory that will spawn new industries to grapple with energy, water, air quality, infrastructure, and economic development issues. The resultant prospering industries will generate new technologies that, in turn, will create new industries to export products worldwide.



ARCHITECT'S RENDERING of the Bi-National Sustainability Laboratory (BNSL) to be built on the border near Santa Teresa, N.M., and the Juarez municipality of San Jeronimo, Chihuahua.

### Business creation key to success

Teams of experts in technology development and deployment, business development, marketing, and finance — all working together — will concentrate on business creation in several fields. The targeted areas include:

- Water and agriculture
- Advanced manufacturing technologies
- Health care
- Energy, air, and transportation
- Workforce development
- Information technology and communications

VP and Principal Scientist Gerry Yonas (16000), who leads the ACG, and other members of the project group — Maher Tadros, Vipin Gupta (both 16000), and Gary Jones (1313) — are already at work seeking support and funding for the project. Vipin has moved to the Paso del Norte area — El Paso, Juarez, Las Cruces — to work with the border universities and local organizations in establishing the BNSL.

MAP OF SANTA TERESA, N.M., area, including El Paso, Texas, and Mexico's Ciudad Juarez.

"Through the Cooperative Monitoring Center and other groups, Sandia has been studying the application of technology to prevent or resolve conflict for some time," says Gerry. "The BNSL will pull together much of what we've learned and put it into practice, and that will yield results that we can apply worldwide."

Already attending conferences and other meetings focused on border issues, he says efforts of the next few months will be concentrated on developing a series of projects and forums in both countries to bring together members of federal, state, and local organizations who can play key roles in establishing and funding the BNSL.

"It's important that this not be perceived as just a Sandia project, or even just a US project," he says. "Success hinges on both Washington and Mexico City thinking of the BNSL from its establishment as a 50-50 partnership, with equally shared participation. Both sides of the border will benefit, but the key is that we need solid commitment from both sides if we are to succeed.

"I'm going to Mexico this month, and while I'll be looking for help from any responsible quarter, I'll be looking mostly for a sort of 'soul-mate' — someone who will be as ardent a supporter of the lab in Mexico as I am here," he adds.

### Senators support concept

Sen. Jeff Bingaman, D-N.M., ranking minority member on the Senate Energy and Natural Resources Committee, which oversees Sandia and other DOE facilities, praises the notion behind the project.

"The Bi-National Sustainability Lab is a truly innovative idea, and one I would expect from a world-class institution such as Sandia," Bingaman says. "Through its focus on key scientific, economic, and social issues, this lab has the potential to spur economic development and create a better life for people on both sides of the border.

"But moving this effort forward is going to take support from government and other organizations on both sides of the border," he adds. "I look forward to working with Sandia and others to get this bi-national initiative off the ground."

That support is echoed by Sen. Pete Domenici, R-N.M., also a member of the Energy and Natural Resources Committee, and chairman of the Senate Budget Committee.

"I give credit to the Labs and the others involved in organizing this collaboration to further economic development in the border region, an issue that is of great interest to me," says Domenici.

Labs Director C. Paul Robinson touched on the problems the BNSL is aimed at addressing during his recent State of the Labs assessment to state and city leaders.

"We want to become the laboratory that the US turns to first for technology solutions to the most challenging problems that threaten peace and freedom for our nation and the globe," he said. And, he added, "This year the Lab's executive team spent considerable time defining our core vision. . . . We defined our core purpose as 'Helping Our Nation Secure a Peaceful and Free World Through Technology.'"

Paul said of the BNSL, "This is exactly the kind of initiative that will give witness to Sandia's commitment."

### Skeen lauds possibilities

Rep. Joe Skeen, R-N.M., who is a member of the House Appropriations Committee and chairs its subcommittee on Interior, and whose Second Congressional District includes the area that will be home to the BNSL, also sees the Labs' technological expertise as key to the project.

"Development along the US-Mexico border is vital to the economic success of both nations," Skeen says. "Utilizing our resources and maximizing the technologies available will support our efforts to develop this area in the most efficient and environmentally acceptable manner possible."

And, he adds, "The effort by Sandia National Laboratories to develop and implement a comprehensive approach for the border certainly merits consideration."

Gerry points out that one of the urgent problems is public health along the border area. The federal government has designated 28 of Texas' 32 border counties — and all six New Mexico border counties — Health Professional Shortage Areas.

Of even greater concern is water supply. Almost 90 percent of the fresh water available in the US-Mexican border region is currently used for agriculture; the remaining 10 percent is allocated to municipal and industrial use.

But with the growth of urban areas along the border, municipal and industrial water needs are expected to double over the next 50 years, and in Juarez — just across the border from El Paso, Texas, and Mexico's eighth-largest city — water demand is expected to triple over the next 15 years.

"As long as we have these problems in the US and Mexico, we'll have a troublesome border," Gerry says. "A successful BNSL would solve many problems. We have an unprecedented opportunity to enable people in both countries to improve the quality of their lives."

# All aboard! Doug Drumheller's Dream Express

When was the last time you had a dream that you made come true? Doug Drumheller did. In secluded woods east of Albuquerque, reminiscent of a Norman Rockwell painting, Doug built a toy train. The quiet 2-1/4 acres with mountain spring is interrupted only by the distant ringing of a shiny brass bell.

***Story by Iris Aboytes***
***Photos by***
***Randy Montoya***

The train includes a four-foot-long engine weighing about 600 pounds, a five-foot riding car, and a five-foot flat car. It runs on a 7-1/2 gauge, 800-foot track, which Doug expects to grow to about 1,500 feet when completed. The track currently includes two trestle bridges and two viaducts. His plans include several more bridges to allow the track to snake up an arroyo.

Doug, a wave-propagation guru from Geothermal Research Dept. 6211, is an unassumingly talented individual. His matter-of-fact attitude and the deceptive mischief behind his smile reveal only his dry sense of humor. When talking about his hobby he never describes it as work. He compares it to playing golf. In the same breath, he also quotes Dave Barry, who says about hobbies: "There is no difference between a hobby and insanity."

After revealing to his wife, Phylis, that he was tired of being an adult and wanted to be a child again, Doug began work on his dream. But the work actually began after the design, the research, and the all-important commitment — mutual commitment.

With Phylis, his partner, consultant, and full-time laborer, he excavated rock and soil and transformed a seemingly perfect landscape into a little piece of heaven. The tall piñons and peaceful mountain spring provided the canvas to which Doug and Phylis added toil, sweat, and a lot of heart.

It took him six months to build the electric engine from scrap steel. It is no ordinary engine. It has a controller that makes it run at an almost impossible crawl, or at full speed. The track has steep grades and several sharp turns — one called the "irrational radius — that are normally hard for a train to maneuver through," he says.

Except for the actual rails, Doug and Phylis machined and built everything themselves. There were retaining walls to be made out of rock, trestles to be erected out of treated lumber, redwood to be curved for walkways over the bridges, and lots and lots of track to be built. Doug excavates soil on one end, and with the help of the General (the name of the engine), fills the other end.

THE GENERAL'S shiny brass bell

Besides Phylis his only help came from a 1953 milling machine and a 1922 lathe with overhead flat-belt spindles. What he calls "blasting" came from a pick and shovel with the Drumhellers providing the explosive power.

With neighbors and onlookers, to say nothing of the visitors from the church down the hill, work has been measured a weekend at a time. Phylis says they welcome weekend visitors especially when they bring a shovel with them.

The only thing obviously missing from this picture is a railroad crossing sign. When asked, Doug only mumbled, comparing it to a rubber tire and pink flamingos (retro fifties). So, I guess that means no sign.

With my eyes closed while riding the train through the peacefulness of the tall pines, I felt what Doug wanted to achieve: "Being a child again."

# Mileposts

*California photos by Lynda Hadley*
*New Mexico photos by Iris Aboytes*


Florencio Aragon
30 12336


Jeanne Bando
25 9125


Frederick Blottner
40 9115


Dennis Beyer
25 2267


Robert Carling
25 8360


Martin Molecke
25 6113


Mary Rivenbark
25 8523


Steven Romero
25 6536


Dennis Siebers
25 8362


Alan Smith
25 5851


William Ballard
20 8418


Elizabeth Coleman
20 8523


John Hinton
20 8114


Samuel Johnson
20 2266


Quenton McKinnis
20 2266


Laurence Cox
15 9624


Rose Ketchum
15 8521


Richard Wavrik
15 1745


David Westgate
15 2951

# Feedback

## Readers ask questions about tuning to CNN, seniority lists, US Bank

***Q:*** *On the televisions around the area, when LM or Sandia programming is not being shown, they are tuned to CNN. Would it be possible to tune them to Fox News, a news source that many prefer?*

**A:** There are several reasons why we selected CNN Headline News to broadcast. The main reason is CNN Headline News is the news most people say they prefer to watch. I realize we are not able to satisfy everyone, so we try to satisfy the most people by broadcasting CNN Headline News. Some of the other reasons we have used CNN Headline News are because it repeats every 30 minutes, so it covers the headlines more frequently. CNN Headline News also does not do lengthy news stories or programs like the other networks such as CNN, CNBC, MSNBC, or Fox News.

Another reason is CNN Headline News is viewed by industry as being politically neutral, not conservative or liberal, and we like that.

I do thank you for your question and hope you will accept my reasons for using CNN Headline News for the time being. We will ask the question about which news people prefer on our next survey and see if that is still what people prefer. *— Don Carson (12600)*

* * *

***Q:*** *Is there a current seniority list on the Sandia network that is readily available? The lists generate much employee interest. It always seems to be a pass-around thing. Some employees keep their own programs to track seniority. Seems like an available list would improve morale and reduce wasted time.*

**A:** As a result of your suggestion, we are exploring the possibility of putting an attribute in HR Queries where you, as an individual employee, could view your position of company service relative to others at Sandia. Until such time as a Web-based tool is available, seniority lists will continue to be provided to the *Lab News* periodically for their general distribution. *— Don Blanton (3000)*

* * *

***Q:*** *Based upon the address on recent junk mail that I have received, US Bank (the supplier of our corporate credit card) has included my name and address in a mailing list they sold. I feel that their release of my name and address is not appropriate, especially since Sandia requires me to maintain an account with them. We should reconsider our contract to supply corporate credit cards with this company. And, at the very least, ensure that they do not sell the mailing list from Sandia accounts.*

**A:** Because of your question, we called our US Bank national representative and expressed Sandia's strong concerns about the sale of customer information. We were assured that US Bank holds all customer information in the strictest of confidence. Our representative verified that customer information is not distributed to other companies. If you continue to have doubts and additional evidence that this is not the case, please contact us and we will investigate further. *— Bonnie Apodaca (10500), Controller*

# Recent Retirees


George Kolesar
39 5744


Mary Kolesar
37 9103


Kenneth Kimball
38 2125


James Young
29 7140


William Lovejoy
17 1320


Gerald Weber
15 1630

# Sandia Classified Ads Sandia Classified Ads Sandia Classified Ads Sandia Classified

## MISCELLANEOUS

QUEEN-SIZE WATERBED, w/feminine headboard, storage drawers, $50. Whitley, 293-2807.

BOOKS, COLLECTIBLE NEWSPAPERS, & MAGAZINES, thousands, all categories, April 7-8, 8 a.m. to 4 p.m., 1500 Soplo Road SE, Four Hills, follow signs. Hollister, 323-1659.

FIVE-DRAWER DESK, very good condition, nice for student. Romero, 844-0966.

SECTIONAL COUCH, 3-piece, curved, oak wood, button-tufted back, denim blue, w/small flowers, $100. Hebron, 281-2901.

WOMAN'S GOLF CLUBS, excellent condition, oversized heads, steel shafts, Excalibur Prelude, 3-PW, woods & bag, $150. Sandoval, 866-6991.

HABITUATE HAMSTER CAGES, 2 sets, w/many accessories, tubes, feeders, food, etc., occupants gone home, $50 for all. Shorty, 821-3952, ask for Pat.

SEGA GENESIS, includes 2 controllers & 5 games, $75 OBO. Lippert, 299-6594.

HEADACHE RACK, for full-size pickups, covers bed rails & rear window, white painted steel, $80. Fatherley, 891-3675.

LATHE/MILL, combination machine tool, 12-in. swing, 20-in. bed, good condition, $300. Spletzer, 294-4601.

BUNK BED, $50; portable crib, $30; aquarium, w/accessories, $15; Isuzu manual, $10; chainsaw sharpener, $15. Axness, 332-9769.

DRILL PRESS, like new, heavy, Rockwell 5-1/2 ft.-high floor model, 1/2-hp motor, 1/2-in. chuck, 4 speeds, 11-in. table, $170 OBO. Dybwad, 296-9047.

UNITED AIRLINES VOUCHERS (two w/$300 face value), $200 each, must be used by mid June. Hertel, 345 1088.

AUTUMN WOOD FURNITURE, 5 pieces, good condition, $650 OBO; girl's bedroom set, like new, $500 OBO. Bartberger, 856-0583.

PILLOWTOP MATTRESS, & box springs, Sealy Kingsford, 2 yrs. old, excellent condition, $350. Underwood, 246-8281.

MAC PERFORMA POWER PC, Model 6400/180, including extra external HD & CD drive, $200 OBO. Silverman, 298-1308.

FISHER DVD PLAYER, only 1 year old, excellent condition, includes manual & remote control, $100 OBO. To, 797-1309.

SOFA & LOVE SEAT, multicolored pastel, $300; Sears refrigerator w/icemaker, $200; 35-mm slide projector w/carousels & screen, $30. Schnetzer, 292-0733.

PATIO SWING, unique western style, wagon wheels, lanterns, etc., free-standing, handmade, difficult to describe, $425 OBO. Hole, 255-1444.

COSCO BABY HIGH CHAIR, $15; 2 wooden safety gates, $5/ea; baby monitor, $15; folding stroller w/umbrella, $5. Romancito , 857-0840, leave message.

WASHER, electric dryer, white, $100. Nicolaysen, 275-9657.

GUITAR, Epiphone Emperor electric arch-top, w/hard case, like new, $500; 30-watt amplifier, $75. Carson, 858-1460.

HOLTON TRUMPET T602, good condition, $250; Yamaha YTS23 tenor sax, excellent condition, $800. Lujan, 822-0205.

TWO REAR TUBE BUMPERS, brand new, chrome, for CJ jeep, $150 each. Garner, 286-4352.

SOFA, light blue, 84-in., excellent condition, $150 OBO. Peters, 293-6356.

PIANO, Yamaha upright model U1, ebony finish, 3 yrs. old, $5,300. Scharrer, 856-0960.

TENNIS RACKETS, Wilson "Sting" oversize graphite, 4-1/4, 4-3/8, 4-1/2 grips, new, $20 each. Kinoshita, 299-6491.

TIME-LIFE BOOKS: *Encyclopedia of Gardening*, 14 volumes, $15; *Library of America* (states and territories), 13 volumes, $15; *The American Wilderness*, 27 volumes, $25. Linnerooth, 299-6558.

BROILER/BAKER OVEN, Toastmaster, full family-size, excellent condition, $35; large standing hose reel, $10. Burstein, 821-6688.

BOY'S ROLLER BLADES, man's size 6-1/2, $20; boy's bike (fits age 7-9), $20, excellent condition. Wallace, 256-1643.

GIRL'S BICYCLES, 18-in., 16 in., & 12-in., $25, $20, & $15, respectively; Tough Traveler kid carrier backpack, $125. Sjaardema, 856-6139.

PIANO, Yamaha upright, $1,500 OBO; classic Nordictrack, $200; trundle bed w/mattresses $50; Mac HP deskwriter, $25. Butler, 292-8823.

NORDICTRACK PRO, total body cardiovascular exerciser, good + condition, $200 OBO. Powell, 268-8607.

WATERBED MATTRESS, king-size, extra firm, 4 yrs. old, $150; 14-ft. aluminum boat, trailer, trolling motor, oars, $600. Zirzow, 281-9896.

SANDING CENTER, w/stand, Woodtek, 9-in. disk & 6-in. x 48-in. belt, 3/4-hp motor, $180. Reuter, 884-8347.

LOVESEATS, pair of antique (1940's), unique set, great condition, $200 ea. Mercier, 294-9334.

WASHER, 3 yrs. old, Whirlpool, white, 8-cycle, great condition, $175. Clement, 293-1416.

SOUTHWEST AIRLINES, roundtrip vouchers, expiring 7/01/01 & 12/01/01, $290 each or $560 both. Benjamin, 869-9922.

DELTA SCROLL SAW, 16-in., variable speed, excellent condition, $90. Crow, 821-0956.

VINYL WINDOWS, various sizes from new home March 2000, great for garage, barn, shed. Weagley, 821-4263.

DACHSHUND MINIATURE PUPPIES, 7 weeks old, red, smooth coat, 1st shots & wormed, available, $250. Bauer, 281-5036.

TWO TOWER SPEAKERS, $40 each; 2 custom bookcases, 7' x 32", $75 each; 2 table lamps, 3-ft., $50 each. Record, 243-5103.

RADIAL ARM SAW, Craftsman, 10-in., 2.75-hp, digital display, base w/storage drawers, various blades & accessories, $420. Hietala, 867-9577.

TWO LAWN MOWERS, Sears, self-propelled, 5.0-hp, 22-in. rotary, rear bag, $80; Montgomery Wards, 3.5-hp, 26-in. rotary, $60; 3 pet porters, medium, $50, 2 small, $25 each. Stang, 256-7793.

PIANO, Wurlitzer console, excellent condition, well maintained, beautiful sound, $1,100 OBO. Sullivan, 298-4880.

DAYBED, w/trundle, black pipe frame, mattresses in very good condition, $75 OBO. Herrera, 884-4925 or 238-6334.

FUTON, natural wood, w/nice thick queen-size mattress, cover is navy, $285. Montano, 821-1235.

FLEECE FABRIC, "Northern Lights," many colors, some prints, $3/yd. Spraggins, 256-7408.

## TRANSPORTATION

'97 SEBRING LXI CONVERTIBLE, every option available, 61K miles, one owner, transferable warranty, excellent condition, $14,900. Wickham, 898-7601.

'96 HONDA ACCORD EX, excellent condition, 4-dr., fully loaded, emerald green exterior, tan interior, PS, PB, sunroof, AC, $11,000 OBO. Serna, 865-8674.

'89 525I BMW, great condition, AT, 4-dr., fully loaded, black exterior/gray interior, $7,000 OBO. Thomas, 899-2905.

'93 FORD CROWN VICTORIA LX, beige, all-leather, 4-dr., 96K miles, garaged, one owner, all records, $5,200. Knirk, 292-1184.

'93 SAAB 9000 CDE, loaded, deep blue, AT, heated leather, beautiful classy car, 93K miles, $8,850. Keegan, 323-8823.

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

### How to submit classified ads

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

- **E-MAIL: Sandy Smallwood (sksmall@sandia. gov)**
- **FAX: 844-0645**
- **MAIL: MS 0165 (Dept. 12640)**
- **DELIVER: Bldg. 811 Lobby**
- **INTERNAL WEB: On Internal Web homepage, click on News Center, then on Lab News frame, and then on the very top of Lab News homepage "Submit a Classified Ad." If you have questions, call Sandy at 284-3704. 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.**

'97 KIA SEPHIA, 4-dr., AT, AC, PS, PB, CC, stereo, 22K miles, $5,950. Lenberg, 238-0362.

'00 F-250 POWERSTROKE, super cab, loaded, 6-spd., 3.5-in. lift, 35-in. bfg's, extras, $32,000 OBO. Quintana, 298-3491.

'90 CHEVY SPORT TRUCK, 20K miles on new V6/clutch, 4-spd., 4x4, & more, $5,000 OBO. Whittet, 281-2216.

'99 GMC YUKON, SLT, 4D, 4WD, 27K miles, rear air, leather, every available option, $24,900. Krause, 858-1289.

'88 CHEVY CORSICA SEDAN, 4-dr., white, clean, well-equipped, $2,100 OBO. Pierson, 332-2487.

'00 CADILLAC ESCALADE, silver, under 3K miles, $38,825. Hayden, 831-3226.

'95 TOYOTA SUPRA, 2-dr., AT, AC, CD/cassette, all power, alloy, 65K miles, pearl white, $17,800. Brown, 262-1998.

'83 HONDA CIVIC, 200K miles, runs well, AM/FM/tape, $600 OBO; '81 Honda Accord, 150K miles, $200. Siegal, 821-5766.

'98 TOYOTA 4-RUNNER LIMITED, white /silver, completely loaded, coming upon end of lease, immaculate condition, asking book value $25,995. Dobbs, 281-1958.

'94 BMW 318IC CONVERTIBLE, black, only 52K miles, PW, PL, AC, leather, CD changer, book $19,500, asking $17,900 OBO. Heise, 823-6355.

'89 HONDA CIVIC LX, 4-dr., smoker's car, needs AC & brake work, 180K miles, $2,300 OBO. Noack, 828-1180.

'85 VOLVO 240GL, runs excellent, very solid & reliable, auto shop used car lot, $1,900 OBO. Sanchez, 343-8522.

'99 MERCEDES BENZ, series C280, one owner, low mileage, super clean. Yoder, 821-7019 or 463-4646, ask for Sandy.

'89 FORD FESTIVA, standard transmission, 2-dr./hatchback, AM/FM, excellent gas mileage, excellent condition, 138K miles, one owner, $1,700 OBO. Klein, 797-2407.

'95 MAZDA MIATA, 1.8I, AC, PS, AM/FM/cassette, dual air bags, only 13,700 miles, excellent condition, $12,000. Lanes, 856-7738.

'79 TRIUMPH SPITFIRE MARK IV, daily driver, excellent condition, new tires, brakes, carburetor, etc., $6,000 OBO. Larsen, 292-7896.

'97 HONDA CRV, 19K miles, silver, 4-dr., AWD, keyless entry, roof rack, fully loaded, extended warranty, excellent condition, $15,875. Thompson, 823-4567.

'90 FORD TEMPO, AT, PS, PB, 87K miles, $1,800 or offer. Rudolph, 298-0941.

'96 MERCURY MGE MYSTIQUE, 4-dr., approximately 62,385 miles, AT, AC, red exterior/gray interior, AM/FM/cassette, 4-cyl., PW, bids accepted through 04/10/01, right to refuse bids, sold as is.Sandia Labs FCU, 237-7254, 7384, or 7386.

'98 GRAND PRIX SE, low miles, loaded, new tires, excellent condition, must see, $11,299 OBO. Veres, 797-4714.

'93 CHEVROLET S-10 BLAZER, 4WD/dr., Tahoe LT, 4.3Vortec V6, AT, leather, loaded, $6,500. Jaramillo, 864-9202.

'74 VW BEETLE, 19K miles on engine, good body/interior, great mechanically, AM/FM/tape, great deal, $2,500 OBO. Montemerlo, 256-4560.

'87 FORD TAURUS, 113K miles, garaged, new paint, tires, brakes, more, book price $1,850, asking $1,500. Cocain, 281-2282.

'91 HIGH-TOP CONVERSION VAN, Chevy G-20, extended body, V8, 67K miles, rear air, runs great, $5,795. Graham, 896-2231.

'89 PLYMOUTH GRAND VOYAGER, good motor but needs transmission, great condition, 110K miles, $1,000 OBO. Tapia, 280-8888.

'96 TOYOTA 4RUNNER SR-5, V6, 4x4, excellent condition, AM/FM/CD/cassette, 48K miles, dash/cargo covers, alloy wheels, new tires, $18,500 OBO. Hassan, 822-9544.

'90 BUICK SKYLARK, sapphire blue, fully loaded, custom wheels, light-duty detachable hitch, $2,000 OBO. Bonsack, 872-1102.

'77 BUICK RIVIERA, 2-dr., V8, AT, power accessories, good tires, AM/FM/cassette, good dependable transportation, $1,500 OBO. Montoya, 265-6874.

'98 DODGE RAM, turbo diesel, 4x4, quad cab, low miles, loaded, excellent condition, sacrifice, $28,000 OBO. Yip, 294-8124.

## RECREATIONAL

'93 PACE ARROW, 35-ft., 42K miles, loaded, garage kept, tow car available. Campbell, 856-9195.

'88 JAYCO POP-UP CAMPER, sleeps 8, table inside/outside, propane 3-burner stove, canopy, great condition, $2,200. Gallegos, 821-3611.

'99 KAWASAKI KX60, like new, $1,650 OBO; winch mount for Polaris ATV, $30. Brown, 869-0704.

'95 MALLARD TRAVEL TRAILER, 22-ft., w/hitch, self-contained, mint condition, $7,500 OBO. DeLosSantos, 266-7307.

POP-UP CAMPER, sleeps 6, in/out stove, heater, fridge, porta-potty, storage, awning, supplies thrown in, $3,500 OBO. Morrison, 299-4757.

'94 HONDA MAGNA 750, black, approximately 12K miles, windshield, engine guards, saddle bags, $3,700. McRee, 898-5030.

'00 SUZUKI SV650, blue, excellent condition, 17 original miles, $5,250. Dobias, 856-7841.

FISHING BOAT, 10-ft., w/electric trolling motor, $400; circular saw, Skilsaw model 5155, $30. Brannon, 296-6674.

'90 KAWASAKI KX80 MOTORCYCLE, runs great, $700 OBO; Haro 540 Air BMX bike, like new, $175. Vieth, 281-2003.

'92 LONGBED POP-UP CAMPER, Palomino Philly, refrigerator, porta-potty, queen & double beds, awning, new battery/tires, $2,450. Potts, 292-5697.

'99 POPUP CAMPER, Palamino Pinto, sleeps 6, 4-in. lift, new tires, new battery, stove, refrigerator, heater, awning, lightweight, $5,400 OBO. Garcia, 899-3028.

## REAL ESTATE

2-BDR. PATIO HOME, NE Heights, 1,444 sq. ft., 2 baths, large great room, atrium, kiva fireplace, 6 skylights, 2-car garage, corner lot, $104,900. Luther, 822-1187.

1-BDR. CONDO, Angel Fire, Mountain Spirits, just down hill from lodge & lifts, covered parking, $55,000. Layne, 857-0989.

3-BDR. BRICK HOME, great condition, remodeled, landscaped, very private, NE Heights, $92,800. Lewis, 294-0766.

3-BDR. HOME, 1,200 sq. ft., NE heights, newly remodeled bath, kitchen & den, 1-car garage w/carport, on large, fenced corner lot, $110,000. Dytzel, 296-1900.

1-ACRE LOT, North Albuquerque Acres, one lot from corner Eubank & Wilshire, flat, no flood plain, $90,000. Benham, 856-2739.

4-BDR. HOME, 2-1/2 baths, 2,800 sq. ft., all brick, brand new roof, new heater & AC, Glenwood Hills neighborhood, market appraisal $239,000, asking $219,000 without realtors. Dwyer, 271-0741.

'89 2-BDR. MOBILE HOME, Prestige, 16' x 60', 2 baths, lots of extras, set-up in adult park, $16,000. Rosenberg, 296 1346.

'85 2-BDR. MOBILE HOME, K&B Baywood, 14' x 56', 1 bath, Four Hills Park, vaulted ceilings, refrigerator, washer/dryer, $14,000. Haushalter, 275-6772.

## WANTED

HIGH SCHOOL OR COLLEGE STUDENT, to teach novice the mysteries of basic computer science. Rockwell, 884-4206.

ROTOTILLER, 5-hp or similar, good condition, reasonable price. Ritchey, 299-7082.

RV/TRAILER refrigerator. Bailar, 865-1518.

RESPONSIBLE INDIVIDUAL, w/driver's license to care for sweet boys, 8 & 12, for select summer weeks, Glenwood Hills. Romero, 299-3595.

SINGERS, community service chorale (sing for hospice, Alzheimer's patients, children in crisis, etc.), Monday night rehearsals. McKenna , 293-0287, ask for Christine.

HOUSEMATE, private bedroom & bath, completely furnished, non-smoker. Taylor, 822-9818.

LIGHT YARD WORK, need help in Bosque Farms, good job for teenager. Walsh, 869-0250.

YARDWORK, students interested in flowerbed weeding, $8/hr., must do quality work unsupervised. Shepherd, 296-1238.

RESPONSIBLE PERSON, to housesit in Algodones for dogs & cats, from May 20 to June 3. Putelli, 867-6653.

## SHARE-A-RIDE

EAST MOUNTAIN VANPOOL, has openings, no need to drive, Frost Rd., N-14, Tijeras. Burns, 281-3922 or Brocato, 286-8031.

### *Reader Service information*

**Retirees (only):**
To notify the Labs of changes in address, call or write Diana Mares, 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, at telephone 505-844-2282, e-mail ioaboyt@sandia.gov, or Mail Stop 0165, SNL, Albuquerque, NM 87185-0165.

# Sandia News Briefs

### Corina Gallegos receives purchasing association's award

Corina Gallegos (10205) has been selected to receive the National Association of Purchasing Management's 2001 Charles J. McDonald Minority Business Advocate Award. Corina was selected as the sole recipient of the award from a field of highly recommended NAPM members by a selection committee of NAPM professionals. The award will be formally presented in front of about 3,000 NAPM members at the International Conference in Orlando on April 30.

### Ron Loehman elected to the American Ceramic Society board

Ron Loehman, a senior scientist in Ceramic Materials Dept. 1843, has been elected to the American Ceramic Society (ACerS) board of directors. ACerS is a 100-year-old nonprofit organization that serves the informational, educational, and professional needs of the international ceramics community. The Society's more than 10,000 members comprise a wide variety of individuals and interest groups including engineers, scientists, researchers, manufacturers, plant personnel, educators, students, marketing and sales professionals, and others in related materials disciplines. Ron has a degree in chemistry from Rice University and a PhD in solid-state chemistry from Purdue. His work at Sandia has been focused on ceramic joining and ceramic-metal composites.

### Take Our Daughters To Work Day is April 26

The Women's Program Committee is sponsoring the April 26 Take Our Daughters to Work Day this year. The 2001 registration form and participant information are now available on the web from the TODTW Day home page. And watch for a teaser on the TechWeb home page. An 8-9:15 a.m. opening general session in the Steve Schiff Auditorium will be followed by a day of job shadowing. Individuals or organizations that would like to volunteer time or advertise presentations or demos should contact Robin Jessen at rkjesse@sandia.gov or K.C. Sparks at kcspark@sandia.gov, or call 845-8715. Refreshments will be served.

### Weapon Intern Program video available on-line or on VHS tape

Weapon Knowledge Management Dept. 2951 has completed a seven-minute promotional video for the Weapon Intern Program that documents the importance of the program from a variety of people's viewpoints, including Labs Deputy Director Joan Woodard, Weapon Systems Engineering Center Director Steve Rottler, Senior Scientist/Engineer John Hogan, and program senior mentors Leon Smith, Ben Benjamin, Harold Rarrick, Bill Patterson, and Tom Schultheis, and others. The video was created by Myra Edaburn of Video Services Dept. 12610. Anyone who would like to have a VHS copy of the tape should call Andy Rogulich at 845-9677. It can be played from the intern web site at http://www-irn.sandia.gov/organization/div2000/ctr2900/grp2910/kmp/intern/index.htm.

### Kirtland AFB Motor Vehicle Division convenient for Sandians

Tired of waiting in line to get your drivers license or plates? Come to the Kirtland AFB Motor Vehicle Division, which is located in the Consolidated Support building (west of Wyoming between F and G Streets). It's open from 9 a.m. to 4:45 p.m., Monday through Friday. Call 846-8390 for more infomation.

# Back to school: Volunteer program seeks ready, willing Sandians to pitch in at local schools

## Bellehaven, Tomasita, Sandia Base, and McCollum schools on list

For its annual spring volunteer project, Sandia's Volunteer Program (a part of Corporate Outreach Dept. 12650) is partnering with several local elementary schools during National Volunteer Week, April 22-28.

Here's a list of the schools involved and a description of some of the volunteer skills that are needed:

### Bellehaven Elementary School 8701 Princess Jeanne NE

• Paint four hallways halfway down so older building matches new addition. **Needed:** 40 volunteers on Saturday, April 28, 8 a.m.-4 p.m. or until done

• Tape around doorways, etc. for painters. **Needed:** five volunteers on Saturday, April 28, 8 a.m.-noon or until done

• Landscape an atrium planter or a pocket garden. **Needed:** nine volunteers on Saturday, April 28, 8 a.m. until done.

### Sandia Base Elementary KAFB near Wyoming Gate

• Do a mini science project with students; read a corresponding story, check science project, and discuss on Friday, April 27, for approximately two hours. **Needed:** two to six volunteers. You don't need a science degree for this project, emphasizes Volunteer Coordinator Darlene Leonard. "It's easy."

• Paint a large (19'x35') blue rectangle on concrete with rollers in preparation for map painting following Saturday. **Needed:** four to five volunteers on Saturday, April 21, 9 a.m.-noon (probably not that long).

• Paint a large (19'x35') map of the US. **Needed:** 10-15 volunteers on Saturday, April 28, 9 a.m.–4 p.m. or until done.

Mostly roller work although some brush work around states is needed.

### Tomasita Elementary School 701 Tomasita NE

• Spring clean-up (leaves around bushes, edging around fence, re-spreading bark, pruning small bushes/planting flowers, weeds under steps of portable buildings, etc.). **Needed:** 15-20 volunteers, Saturday, April 28, 9 a.m.-1 p.m.

### McCollum Elementary 10900 San Jacinto NE

• Do a mini science project with students; read a corresponding story, check science project and discuss on Friday, April 27, for approximately two hours. **Needed:** two to six volunteers. (You don't need a science degree for this project.)

* * *

To find the sign-up form, go to the following url: http:// www-irn.sandia.gov/organization/ div12000/ctr12600/SpringProjects.htm or call Darlene Leonard at 844-8024. The deadline to sign up is April 13.

# Take Note

Retiring and not seen in *Lab News* pictures: **John Bell** (7843), 21 years; **Clyde Cano** (9325), 32 years; **Susan Fischer** (2554), 20 years; **Ronald Gasser** (6415), 17 years; **Richard Gido** (6415), 10 years; **Tommy Guess** (14172), 36 years; **Gary Mauth** (5730), 35 years; **Max Morris** (6433), 34 years; **Lil Radtke** (7102), 29 years; **Robert Romero** (2541), 15 years; and **Frank Whiston** (2993), 33 years.

## Coronado Club

*April 5, 12, 19, 26* — Bingo, buffet. Card sales, buffet line, 5 p.m.; early bird games begin at 6 p.m.

*April 6* — Country-Western night/ western buffet. Music by Spinning Wheel. Dining (barbecue chicken, ribs, roast beef), 6-9 p.m.; dancing 6:30-10:30 p.m.

*April 14* — Easter Sunday Brunch. 10:30 a.m. and 1 p.m. seatings. Call for reservations (265-6791).

*C-Club specials* — For members only, discount movie tickets at United Artist theaters, discount tram tickets, and more. Check your C-Club newsletter for info.

# Retiree deaths

Vernon D. Smith (age 78).....Jan. 2
F. Arthur Hasenkamp (80).....Jan. 2
J. Edward Vavro (83).....Jan. 7
Harold J. Wild (87).....Jan. 18
Otmar M. Stuetzer (88).....Jan. 20
John Q. Toler (81).....Jan. 25
John W. Carroll (80).....Jan. 28
Michael D. Adams, Jr. (82).....Jan. 29
Robert F. Thomas (77).....Jan. 29
Cid H. Dalin, Jr. (73).....Feb. 7
John A. Roach (83).....Feb. 10
Robert L. Hostetler (67).....Feb. 12
Abel S. Lucero (68).....Feb. 13
Lester O. Wicke (90).....Feb. 15
John W. Gumm (86).....Feb. 19
Charles Z. Stuart (84).....Feb. 21

# Sympathy

To Jim Tegnelia (15000) on the death of his father, James Anthony Tegnelia, Sr., in Monessan, Pa., on March 15.

To Nancy Schofield (SLFCU) and Joe Schofield (9510) on the death of her father, and his father-in-law, James Romero, in Albuquerque, on March 24.