

# Sandia's vertical-cavity surface-emitting lasers achieve revolutionary 53 percent efficiency

**Dramatic advance gives VCSELs the advantage over edge-emitting devices for optical data links**

By Ace Etheridge

Media Relations Dept. 12621

Sandia researchers have announced what they say is a revolutionary advance in vertical-cavity surface-emitting lasers (VCSELs). The advance is expected to have a major impact on the manufacture and implementation of optical data links for computers and optical communications.

A team of researchers in Sandia's Center for Compound Semiconductor Technology led by Kent Choquette, Kevin Lear (both 1312), and Richard Schneider (1311) demonstrated a 53 percent electrical-to-optical power conversion efficiency from an indium-gallium-arsenide VCSEL emitting at 980 nanometers — in the near-infrared.

## Many doubted it could be done

In comparison, conventional tungsten light sources operate at efficiencies of only a few percent, and the common helium-neon gas laser operates with efficiencies of 0.05 percent. The Sandians report the new advance in the Feb. 2 *Electronics Letters*.

"Practically speaking, this achievement in VCSEL efficiency means that, for the first time, more than a milliwatt of pure light can be produced using less than two milliwatts of electrical input power," says Del Owyong, Manager



**INNOVATIVE LASER** — Kent Choquette of Photonics Research Dept. 1312 views an enlarged microscopic image on screen of one vertical-cavity surface-emitting laser (VCSEL) out of an array of hundreds.

of Photonics Research Dept. 1312.

Del says the achievement is a scientific feat that many researchers did not believe could be

accomplished with VCSELs. He says it moves this class of lasers ahead of conventional

*(Continued on page 5)*

## Lockheed Martin execs Tellep & Augustine will visit Sandia March 23

On Thursday, March 23, the two top officials of the new Lockheed Martin Corp. — Chairman and Chief Executive Officer Dan Tellep and President Norm Augustine — will visit Sandia and take part in two employee dialogue sessions. The main purpose of the visit is to discuss with Sandia employees the new corporation and any effect the merger of Lockheed and Martin Marietta will have on Sandia.

### Get tickets from directors' offices

Tellep and Augustine will talk with employees at 8:30 a.m. (MST) and again at 9:30 a.m. in the Technology Transfer Center (TTC, Bldg. 825). The presentations will be video simulcast to the Combustion Research Facility at Sandia/California. Employees at both locations will have an opportunity to ask questions. Tickets are required to attend and have been distributed to each center. Employees wishing to attend should request tickets from their center offices.

In addition to the employee dialogue sessions, a ceremony raising the new Lockheed Martin flag will take place at 8 a.m. in front of Building 800. All employees are invited to that ceremony.

# Sandia Sandia National Laboratories

## LabNews

Vol. 47, No. 6 March 17, 1995

## Possible budget cuts cause Labs to examine new ways of doing business

*DOE asks all lab directors to suggest cost-cutting measures*

Sandia and the other Department of Energy labs are currently examining how they can become more cost effective and reduce operating costs. Sandia President Al Narath and the other nine multiprogram DOE lab directors were asked at a meeting last month with DOE Under Secretary Charles Curtis to participate in this coordinated exercise and to report back to him this month.

The exercise is part of an overall DOE initiative to reduce costs by approximately \$10 billion over the next five years, a goal announced recently by DOE Secretary Hazel O'Leary. As part of this exercise to improve cost effectiveness, DOE has promised to examine its entire DOE Order system and to explore which ones it can eliminate or simplify to help the labs reduce their costs.

In an interview with the *Lab News* and

Radio Sandia last week, Sandia's Executive Staff Director Virgil Dugan (12100) said Sandia actually has two study groups looking at cost-reducing measures. Jim Ney (5003) and Mike Ebben (10600) are leading one study involving about a dozen other managers and directors looking at many cost-reducing possibilities in both technical and administrative areas. This study is in direct response to the DOE request.

### Turning over every rock

"There is no limitation on the scope or purview of this investigation," says Virgil, "but we are being careful not to suggest cost-cutting methods that could be detrimental to programs or to our technical commitments.

"We're in the middle of this exercise now so we have no definitive answers or recommen-

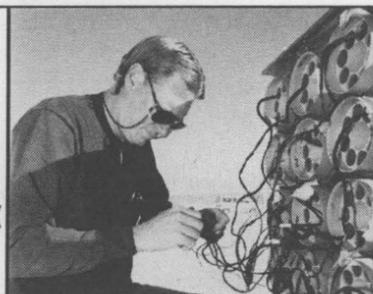
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The 'World-Wide Webolution' comes to Sandia — Info Day '95

# This & That

Howzat, again? - Andrew Lutz (8745) spotted this slightly confused piece of writing in a recent announcement: "People with confirmed appointments will be served first to facilitate long waits."

\* \* \*

How many "affordable" Sandians? - One of our March 3 stories discussed the tighter hiring restrictions and quoted Executive VP Jim Tegnalia saying that "...the affordable staff is now less than our earlier 8,500 estimate." A reader called to ask what "affordable staff" means and to question the 8,500 number, saying he thinks we actually have more employees. Well, maybe - it depends on who and how you count.

At the end of February, Sandia had 8,440 full-time equivalent (FTE) employees. This includes all full-time employees and permanent part-time employees prorated into FTEs. The number does not include "non-regular" employees - temporary full- and part-time employees - such as interns, student helpers, and postdoctoral employees. If you count every name on the payroll, regardless of their full/part time or temporary/permanent status, the total at the end of February was 9,090.

Jim used the term "affordable staff" in the context that Sandia management is now reevaluating how many employees (and contractors, too) the Labs can support in the future in light of new, lower revenue forecasts. Although many folks agree that we can gain some efficiencies through reengineering processes, if considerably less money flows to the Labs in the future, Sandia will not be able to afford as many employees. It's a simple concept, but a very tough problem. Sandia's Quality Leadership Council (SQLC) and other officials are wrestling with all of this now. They are taking the available information and working most-likely-case, best-case, and worst-case scenarios. Like many of you, we have heard various employee target levels bandied about for the end of this fiscal year and further down the road, but there's nothing official yet. We're in touch with the powers, and we'll continue to publish updated information as we receive it.

\* \* \*

It was answered, not flushed - A letter from a foreign land recently arrived at the Sandia President's office, requesting information about solar-energy teaching materials. It was addressed to "The Head, Sandia National Laboratories, Albuquerque. . ."

\* \* \*

Wrong address - Speaking of things executive and improper addresses, my e-mail address indicates that I'm on Sandia's "executive mail" system. Somehow that makes me feel like a pig in a tuxedo at a formal dance.

\* \* \*

Flying frozen chickens? - Our Media Relations Dept. 12621 has gotten some strange questions from reporters and the public over the years, but this one may be the topper. A writer for *Destination Discovery* magazine, published by the Discovery Channel, called to ask whether Sandia has ever propelled frozen chickens at Plexiglas materials being considered for helicopter windshields. After checking with several Sandians, Media Relations Manager Rod Geer assured the reporter that we have never used frozen chickens as test projectiles. Some of us, however, throw a little bull around every so often.

- Larry Perrine

## Sandia LabNews

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Larry Perrine, Editor .....505/844-1053  
Ken Frazier, Managing Editor .....844-6210  
John German, Writer .....844-5199  
Howard Kercheval, Writer .....844-7842  
Tammy Locke, Writer .....844-1860  
Randy Montoya, Head Photographer .....844-5605  
Mark Poulsen, Photographer/Production .....844-0421  
Janet Carpenter, Publications Administrator.....844-7841  
Nancy Campanozzi, Secretary .....844-7522  
Mary Hatheway, Writing Intern .....845-0845  
Barry Schrader, California Reporter.....510/294-2447  
Nancy Garcia, California Reporter.....510/294-2932  
Lab News 505/844-7841 fax 505/844-0645  
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LOCKHEED MARTIN

## Lockheed Martin merger approved

Shareholders of Lockheed and Martin Marietta corporations overwhelmingly approved the merger of the companies in separate meetings in Chicago on March 15. The new company, Lockheed Martin Corp., began operating yesterday.

"Together, Lockheed and Martin Marietta will be even stronger and better positioned to succeed in our rapidly changing business environment than either would be alone," said the Chairman and CEO Dan Tellep.

Speaking to employees of the new company, Tellep said the months since the merger plan was announced have been marked by uncertainty. "During this time, however, we initiated transition planning and consolidation studies necessary to prepare for the effective launch of the new corporation and the rapid realization of our goals for efficiencies and technical interchange," he said.

Tellep and Lockheed Martin President Norm Augustine will tour the company's major sites to speak with employees and answer questions about the merger. They will be at Sandia Thursday, March 23 (see story on page one).

## Sandia pension plans likely to retain assets

### Comments due from IG this week

DOE has recommended against trying to recover more than \$400 million in what an inspector general (IG) report last spring called "excess assets" in Sandia's pension plans (*Lab News*, April 29, 1994) and at last report was awaiting comment from the IG on that decision.

A position paper issued by DOE headquarters concluded: "Based on our evaluation, as supported by the independent analyses of Alexander and Alexander, Inc., and Schmeltzer, Aptaker & Shepard, P.C., we believe that recovering excess assets through plan termination or special legislation will not be to the government's advantage."

The report said that leaving the fund undisturbed, with all assets, would:

- Eliminate the need for DOE to contribute to the fund in the near future,
- Allow existing assets to be used as a cushion against any possible adverse investments,
- Avoid damaging employee morale and productivity,
- Avoid costly litigation,
- Avoid adverse publicity and the negative image of "raiding" an employee pension fund.

DOE's Albuquerque Operations Office developed the department's position and submitted it in November 1994. Under Secretary Charles Curtis notified members of New Mexico's congressional delegation in late February that, following careful study, this is the official recommendation to the IG.

As of *Lab News* press time, the IG's comments were not available for publication.

## New Sandia dental plan administrator April 1

Effective April 1, MetLife will administer Sandia's Dental Expense Plan. The plan is administered now by The Travelers Companies' Group Benefits Division, which has been acquired by MetLife. Dental benefits will not change, but the list of "Preferred Dentists" may, according to Sandia's Benefits organization.

Sandia employees and retirees will soon receive details. Information will be provided to employees via the office mail within the next week and in the March 27 *Weekly Bulletin*. Information will be mailed to retirees' home addresses.

Information will include commonly asked questions and answers, claim form processing instructions, new addresses and phone numbers, and a MetLife brochure. After receiving and reading the information, employees and retirees who have questions may call MetLife Customer Service on 1-800-554-3842 or the Sandia "benefits binder line" on 505-844-7575.

## Retiree deaths

Ruth Wood (92).....4315.....Feb. 1  
Robert Matthews (80).....3153.....Feb. 1  
William Shaffer (84).....8257.....Feb. 5  
Roger McKenzie (74) .....2340.....Feb. 8  
Alvin Kaping (72) .....3733.....Feb. 9  
Donato Lovato (82).....4514.....Feb. 10  
Norbert Molter (71).....2858.....Feb. 24

Organization numbers indicate retirees' positions at the time of retirement and may not correspond to present-day organizations.



# Black history: 'Building bridges to the future'

Keynote speaker assists African-American children and families

By Nancy Garcia

California Reporter

The saying that "it takes a whole village to raise a child" has a corollary — each child represents part of a shared future in that community.

Recognizing this, the Black Outreach Committee at Sandia/California focused on children and the theme "Building Bridges to the Future" during Black History Month in February.

The eight Sandians who organized Black History Month activities in California began planning in December, the same month in which the Black Outreach Committee had brightened Christmas for black children awaiting adoption by raising \$400 to buy holiday gifts.

Gloria King, who heads the agency that received that donation, was selected as Black History Month keynote speaker. A professional counselor, she is executive director of the Black Adoption Placement and Research Center in Oakland. The private, independent agency is one of only two in California and just 10 in the United States that is dedicated, she said, "to placing African-American children in African-American homes."

*"This mission formalizes a cherished African-American tradition in which families have always been extended families."*

## Tradition of extended families

King said this mission formalizes a cherished African-American tradition in which families have always been extended families. Relatives, neighbors, and friends have always been willing to take in a child and raise that youngster as their own.

"Many of you know that we would always take care of our own," she said to a noon-time audience that included Sandia President Al Narath. "A child would be sent north to live with an uncle. Families didn't mind putting an extra plate on the table."

In these times, however, "even you who

came from stable homes know it takes more than love to raise a child," she added.

Founded by a group of social workers in 1983 and initially based in a black church in Oakland, the center has supervised more than 100 adoptions. Each takes from six to 18 months to finalize. The center, King emphasized, "is not in the business of selling kids." Instead, it especially promotes nurturing for children who are over the age of 2 and may have special mental, emotional, and physical needs. Staff members also act as advocates for foster children and train professionals about special-needs children.

## Partnerships in parenting

Since 1991, the center's services have been provided without charge to families. Support programs for families include a "Model Approach to Partnerships in Parenting," in which parents spend 30 hours reviewing what the children have experienced in the foster system. During her talk, King showed a short film of youngsters at play. It featured a bright and responsive 4-year-old boy. While awaiting adoption, she said, he had already been moved between five foster homes.

"These children need our support," commented Ron Brown (8272), the Black Outreach Committee chair, as he presented King with an honorary plaque at the end of her talk.

Beverly Kelley (8522) expanded on the theme of a bridge to the future in a specially produced presentation of images and music celebrating pride, endurance, and an indomitable spirit. The images blended moments of individual growth and social history. Beverly called the presentation "The Impossible Dream," explaining, "It's only because of those dreams that we are here, that we were able to build bridges that bring us to where we are." Bud Pelletier (8535) helped her produce the video presentation.

Next, Ron and Marvin Kelley (8007), the chair of the Black History Month Committee, recognized Clyde Taylor (8715), who served as a role model to many Sandians during more than 27 years of service before his recent retirement. Clyde had returned for the day to attend the event, and was surprised to receive a plaque of appreciation from Ron and Marvin. Looking to the audience, Marvin commented, "Many of you, in fact, will end up being a bridge for someone to the future."



CELEBRATING BLACK HISTORY month at Sandia/California, members of the Black Repertoire Troupe from the University of California at Davis performed jazz and interpretive dances.

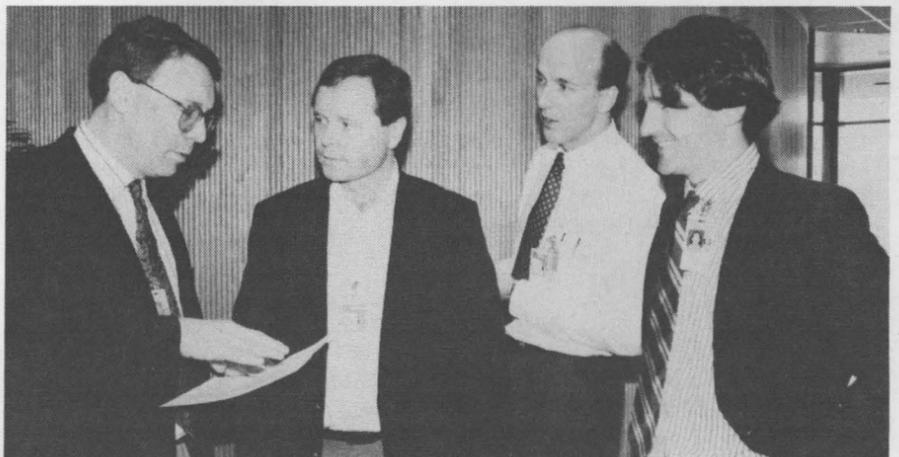
## This bowl team knows its history

The popular Jeopardy-like Black History Bowl expanded this year to pit teams from each center on the site in three rounds throughout the month, with Department 8300 emerging victorious on Feb. 28.

Led by team captain Jake McMichael (8305), the team answered questions about civil rights leaders, historic "firsts," and black scientists, inventors, and prominent women. Johnny Ellison of Facilities Operations Dept. 8615 organized the matches between eight teams of five or six persons.

Besides Jake, the winners were David Hahn (8366), Chuck Hartwig (8366), John Wirdzek (8366), and Lori Bradbury (8362).

## Sandia California News



DEBURRING DELIBERATION — Members of a recently formed consortium on deburring and edge finishing gathered last month at the Integrated Manufacturing Technologies Laboratory to exchange information. Discussing the sessions during a break are (left to right) David Dornfeld, professor of mechanical engineering at UC Berkeley; John Gill, from the Hayward branch of Michigan-based Autocam Corp.; Frank Reed of the United Technologies Research Center in Connecticut; and Andy Hazelton of Manufacturing Initiatives Dept. 8205. The consortium was formed to solve industrial manufacturing problems, including those at DOE production facilities, by applying research into models of burr formation and deburring techniques.



MORE THAN 100 adoptions, including sibling adoptions, have been supervised by the Black Adoption Placement and Research Center, whose executive director, Gloria King, was keynote speaker at Sandia/California during Black History Month.

# Sandia's innovative information system helps company design glass armor from afar

**TIE-In gives industry instant electronic access to Sandia design and test capabilities**

By Chris Miller

Media Relations Dept. 12621

Minneapolis is a fair distance from Albuquerque, but that matters little, given the way Sandia is helping a Minnesota company design an improved type of protective armor "real time" — just as though Sandia's powerful computers and testing equipment were next door to the company.

It's part of a software and hardware revolution through which US companies, universities, and government organizations have gained access to the wealth of science and technology that was amassed to serve the nuclear weapons program at Sandia.

Alliant Techsystems, a defense contractor based in Hopkins, Minn., just outside of Minneapolis, is using Sandia's Internet-linked system called TIE-In (Technology Information Environment with Industry) to conduct ballistics tests on glass to determine its suitability as an armor material.

TIE-In is a new Sandia service that can provide companies with technical solutions using specially packaged technologies. It allows users direct remote access to Sandia's computers, software, databases, rapid prototyping equipment, and test and diagnostic equipment. The system has a simple-to-use format designed for easy access.

Sandia conducted the actual ballistics tests in New Mexico, and Alliant logged onto an experimental impact physics application that allowed its researchers instantaneous access to the resulting data 1,500 miles away and in a format that was readily understandable.

## 'Helped speed up our work'

"It worked very well for us," says Tim Holmquist, a research scientist at Alliant. "It was convenient in that we could conduct a test and get the raw data transferred to us immediately, more efficiently, and it let us manipulate the data into any format that was appropriate. Getting the test result data immediately helped to speed up our work, and time is always of the essence."

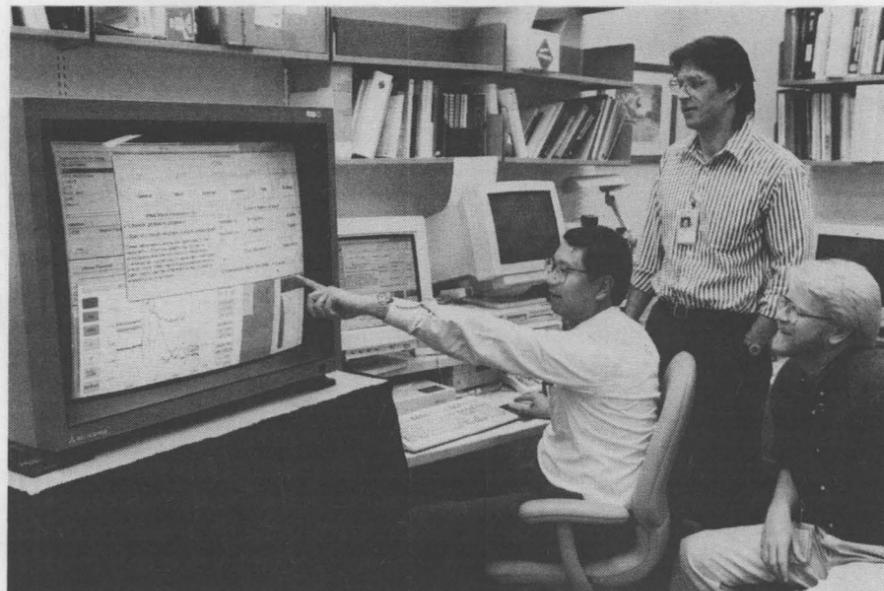
Alliant Techsystems develops and manufactures defense products and weapons such as tank ammunition, torpedoes, artillery systems, mines, and air-delivery systems. The company has about 4,000 employees and had annual sales of \$775 million in 1994.

But TIE-In is not just for large, high-tech companies. The low-cost, low-risk system is designed for easy use through "smart software" and easy accessibility.

"We wanted to make sure you don't have to be an application expert to use these tools," says Jim Ang (1404), TIE-In program manager in Computational/Computer Sciences & Math Center 1400. "What we've done is to take applications developed by scientists here at the Labs that were originally usable only by the application developer and make them very user friendly."

The service is designed to be of particular value to small- to medium-size businesses that are unable to invest the expertise or money to develop these types of technologies. It reduces the investment for companies of all sizes in hardware, software, maintenance, and in the cost of employing specialized analysts.

"As the cost of owning a complete capability becomes more and more expensive, the concept of selling technology by the drink will accelerate," says Ed Barsis, Director of the Computational/Computer Sciences & Mathematics Center. "And the widespread availability of high-speed networks is making this concept practical."



**TIED TO INDUSTRY** — Jim Ang (1404, seated left), Ed Marek (1434, standing), and Glenn Machin (13918) check a Sandia shock physics application (on screen) available to industry electronically through Sandia's TIE-In (Technology Information Environment with Industry) service. Jim and Ed are project managers of TIE-In and Glenn is the TIE-In architect.

In addition to incorporating smart software, the service includes education and training materials, on-line help documents, and guided software tools. TIE-In can be accessed through either dial-up modem or Internet using an MS-Windows PC, Macintosh, or Unix Workstation. The X/Windows protocol is used for graphical data transmission, allowing efficient use of communications bandwidth.

## It's a Sandia user facility

The TIE-In network is one of the Sandia resources identified by DOE as a user facility (*Lab News*, Nov. 11, 1994). This designation helps make it even more easily accessible by industry, universities, and other laboratories.

In contrast to traditional technology-sharing mechanisms, which can take months to establish and often involve the development of new capabilities over a period of years, TIE-In can link users to existing solutions quickly. In an economy where product life cycles are some-

*(Continued on next page)*

## Eight TIE-In applications

The initial set of TIE-In technical applications includes the following design, analysis, and database tools:

- **CTH hydrocode simulation** — Used to describe highly energetic events where the energy is expressed in either kinetic or potential form. It can be used to design armor, to determine optimum configuration of shaped explosive charges for the oil extraction industry, or to model accident scenarios that are triggered by explosions. The application was used recently to design debris shields for a future space station and to model the impact of Comet Shoemaker-Levy 9 on Jupiter.

- **Experimental impact physics** — This companion to the CTH hydrocode provides descriptions of Sandia's Experimental Impact Testing capabilities and supporting instrumentation and diagnostics. It also gives the user tools to design impact tests to be carried out at Sandia, to access and retrieve test results on-line, and to analyze and interpret test results.

Other technical applications expected to come on line this year include:

- **Three-dimensional CAD translation** — This application converts standard computer-aided design (CAD) descriptions of structures and shapes into a form that can be used to run more complex computer simulations such as thermal, fluid, and structural mechanics analysis or impact physics. The conversion helps to make Sandia's analysis tools applicable to a broader range of user models and component descriptions.

- **Glass-to-metal seal design guide** — Glass-to-metal seals are used quite often for the electrical connector industry. This application-

helps the seal designer determine the best design to ensure it is resistant to cracking and will provide proper insulation. The application includes Sandia references on fabrication processes, inspection procedures, and expertise in materials compatibility.

- **PEGA (Parameter Estimation with Genetic Algorithms)** — PEGA is a structural dynamics tool that helps to create a computer model to match experimental data. It can be used to design many different products, from a car door to, as has been the case at Sandia, a microlithography stage used in the fabrication of wafer chips.

- **Automatic Mesh Generation Application (CUBIT)** — This tool is used to take a solid model file representation of a component or product and automatically generate a mesh for subsequent finite element analysis. The solid model file can be uploaded directly from the user or it can be provided as an output of the 3D-CAD translation tool.

- **Integrated Circuit Failure Analysis Application (Fast Advice)** — This application is an expert system designed to guide users through the failure analysis of integrated circuits. Through a question-and-answer process, the test engineer is guided through the identification of a failure mode to a user-specified confidence level.

- **Parachute design and performance simulation** — This computational simulation application provides the user with an application developed by Sandia's parachute designers. A number of specialized simulation tools are available to analyze the performance and design of various parachute/payload systems.

## VCSEL lasers

(Continued from page 1)

semiconductor lasers for optical data link applications.

VCSELs, the next generation of semiconductor lasers, are expected to be key enablers for the high-speed, high-density optical data links of the future that should make electronic products that use lasers less expensive and more compact. In addition to uses in computers and fiber optic communications for both national defense and consumer applications, the Sandia VCSEL research also could lead to improvements in laser printing

*VCSELs are expected to be key enablers for the high-speed, high-density optical data links of the future.*

and scanning as well as applications ranging from chemical detection to image processing.

In contrast to the conventional semiconductor laser that emits light from the edge of a cleaved wafer, a VCSEL emits light perpendicular to the wafer surface.

### Suitable for variety of applications

"This ability to emit a nice round beam of light from the semiconductor surface makes VCSELs naturally suitable for a variety of applications in addition to rendering them easy to fashion into densely packed two-dimensional arrays of lasers on a single chip," says Del.

Sandia has been making pioneering contributions to the VCSEL field since the mid 1980s. That's when Paul Gourley (1112) and Tim Drummond (1322) demonstrated the world's first room-temperature monolithically grown optically excited VCSEL. In 1993, Sandia researchers developed the first visible-light-emitting VCSEL diode, and in May 1994 they announced the achievement of a 21 percent efficiency rate in an infrared VCSEL device. The new achievement is a 2.5-times improvement

over that record.

Del says the increase in efficiency to a 53 percent rate is particularly significant in that the high efficiency was demonstrated at the one-milliwatt range emission power levels that are required for data link applications.

Although some semiconductor edge-emitting lasers have been demonstrated to operate with efficiencies of more than 60 percent, these incidences have been at power levels of hundreds of milliwatts rather than the modest levels appropriate for data transmission.

### Ahead for first time

"In fact, the best edge-emitting lasers at the one-milliwatt level operate at about 40 percent efficiency. Thus, these VCSEL results place them ahead of edge-emitting lasers for the first time," he says.

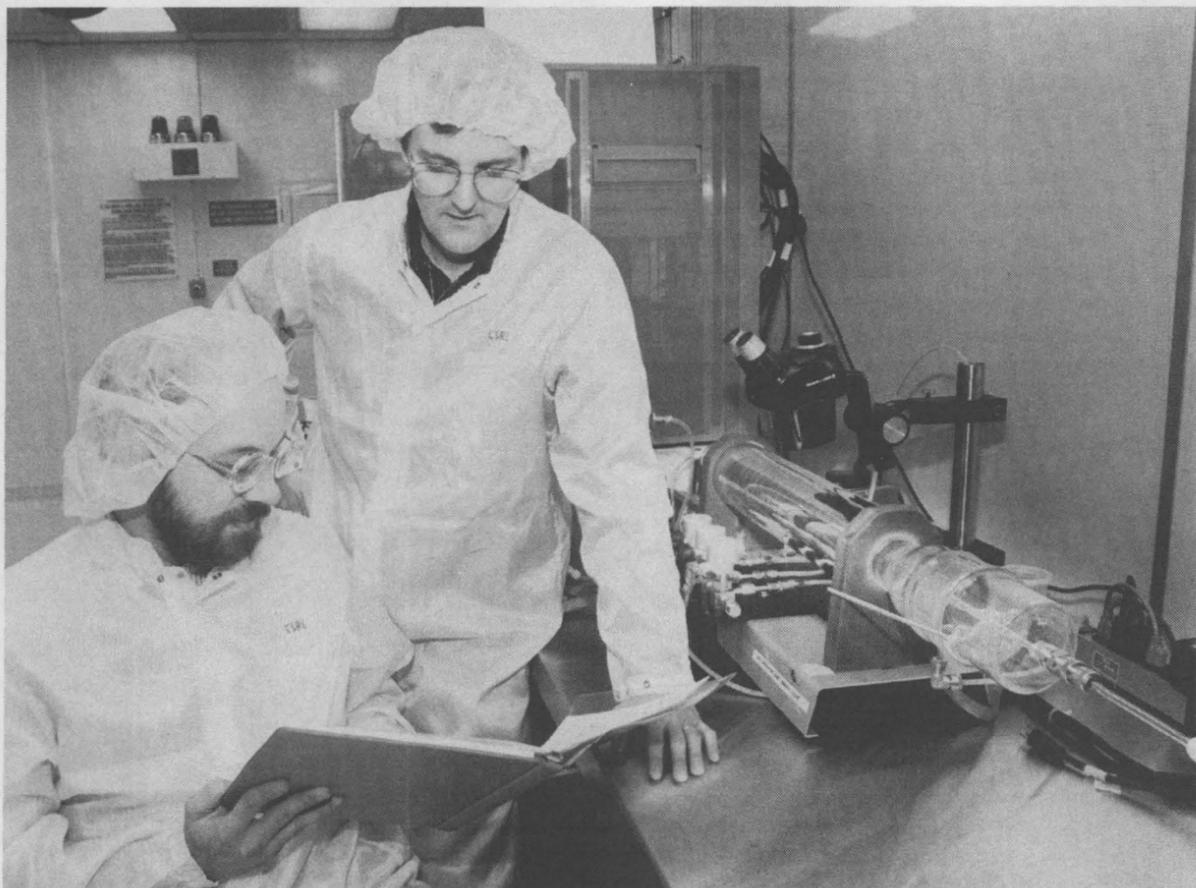
The increased efficiency at lower power levels also is expected to allow designers to pack two-dimensional arrays more densely for multichannel data-link applications without encountering the problem of overheating.

The Sandia team used a series of advances in the design and growth of the very complex multilayered device heterostructures, combined with a new "selective oxidation" fabrication technology, to realize the low electrical resistance and high optical and electrical confinement needed to achieve the high efficiency.

VCSELs are fabricated by sequentially layering atoms of semiconductor materials on a substrate. The center layer is the light-emitting optical cavity, and the surrounding layers are mirrors. Electrical charges approaching from the mirror layers above and below get trapped and recombine in the cavity to emit light. The mirrors reflect the emitted light, which is amplified in the central layer, to produce the laser beam.

The selective oxidation approach involves embedding specially designed layers of aluminum-gallium-arsenide in the VCSEL structure during the growth process. This is followed by the formation of mesas by dry etching. The layers are oxidized to form an aluminum oxide aperture that defines the current injection path for the VCSEL device as well as providing an enhancement to the optical confinement of photons in the device. The collective effects of the low electrical resistance combined with the oxide aperture results in the high operating efficiency of the devices.

Kent, Kevin, and Richard are supported in their research by contractors Jeff Figiel, Kent Geib, Sean Kilcoyne, and John Nevers.



**RECORD ACHIEVEMENT** — Sandia researchers Kevin Lear (1312, left) and Richard Schneider (1311) check records of experiments using vertical-cavity surface-emitting lasers made using a selective oxidation approach in the oxidation furnace behind them. The lasers have achieved record 53 percent efficiencies.

## TIE-In system

(Continued from preceding page)

times measured in months, that's important.

Another example of a TIE-In application is the Sandia-developed impact simulation computer code CTH, through which users may employ the enormous memory and processing speed of Sandia's Intel Paragon massively parallel computer — or a smaller machine if the problem demands less capacity. CTH models and generates images of events such as impacts of meteorites, collisions of orbital debris with space vehicle hull protectors, violent explosions when molten metal and water come into contact, acceleration of hypervelocity projectiles, explosive forging, and defense applications such as armor/projectile interactions and nuclear weapon safety.

Other TIE-In applications range from electronics design tools to the computer-aided assessment of building security (see "Eight TIE-In applications" on preceding page).

Sandia charges a fee to access the network. The fee is based on the type of TIE-In application the user accesses, the amount of time spent on-line, and whether collaborative sessions or consultation with Sandia staff are required.

Because TIE-In tools are user-friendly, the Sandia staff time required for support is minimized.

Users can access TIE-In via a system front-end server that provides authentication and resource utilization accounting. The front-end server also provides general information about Sandia and TIE-In, as well as a tutorial to teach the user how to navigate and use TIE-In.

The TIE-In tools are not just developed but maintained and upgraded by Sandia's technical experts, another advantage for users.

User response will be important to the future success of TIE-In. Sandia plans several methods to get user feedback, including activity accounting, electronic mail, and bulletin boards.

Although TIE-In is currently limited to Sandia-developed applications, plans are being made to include applications from other places, including federal agencies, laboratories, industry, and universities.

### **TIE-In important to DOE defense programs needs**

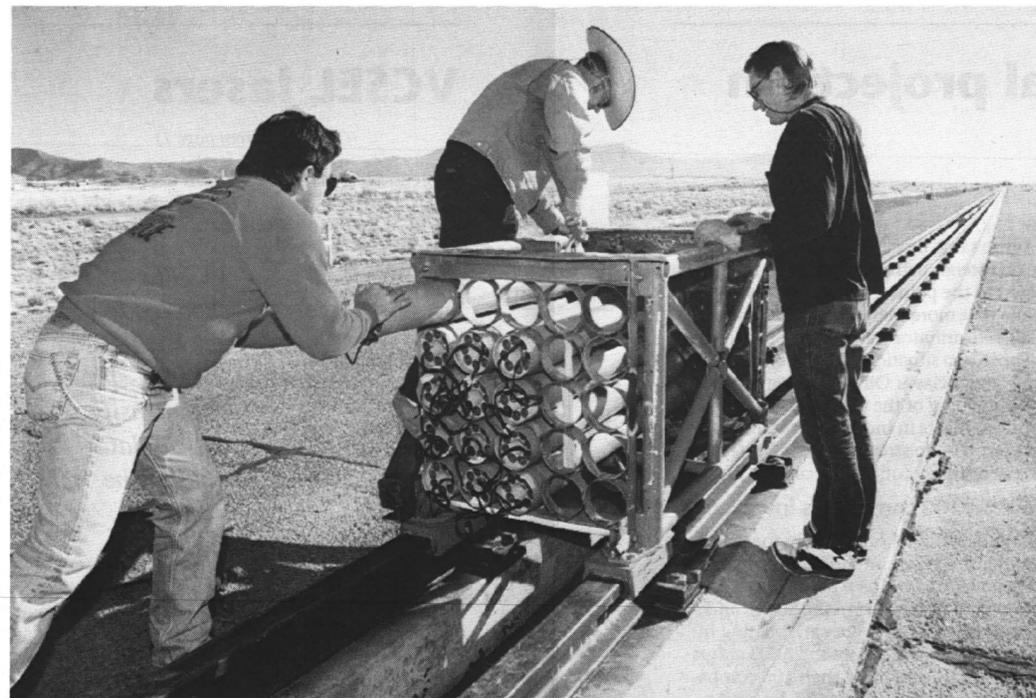
While it has a technology transfer role, TIE-In's primary role is to meet an important DOE need, says TIE-In program manager Jim Ang (1404).

He says the system demonstrates a key element in how DOE can meet its future Defense Program production needs from "non-captive" industrial production lines.

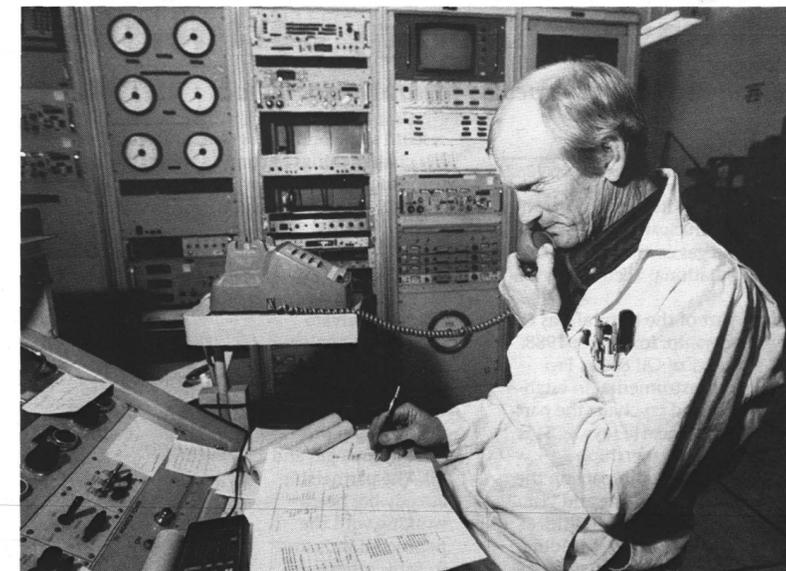
"TIE-In will support our ability to 'outsource' production of many weapon components to US industry, while retaining our ability to assure reliability of those components," says Jim. "This assurance comes from allowing our component suppliers to use Sandia's pedigreed simulation, design, analysis, and test resources."



Bolting a sled to the rails in preparation for an acceleration test are (clockwise from left) Bill Kampfe (2761), Dean Jacoby, and Peter Montoya (both contractors). Most sled vehicles are custom designed and built in Sandia's metal shops.



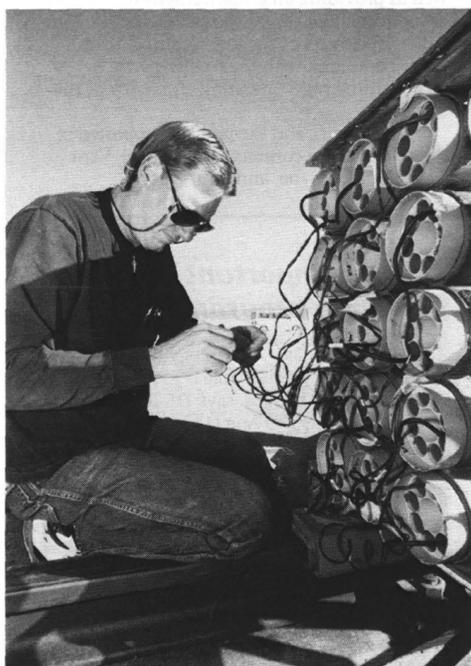
Loading five-inch-diameter rocket motors onto a sled are (from left) Peter Montoya (contractor), Bill Kampfe (2761), and Dean Jacoby (contractor).



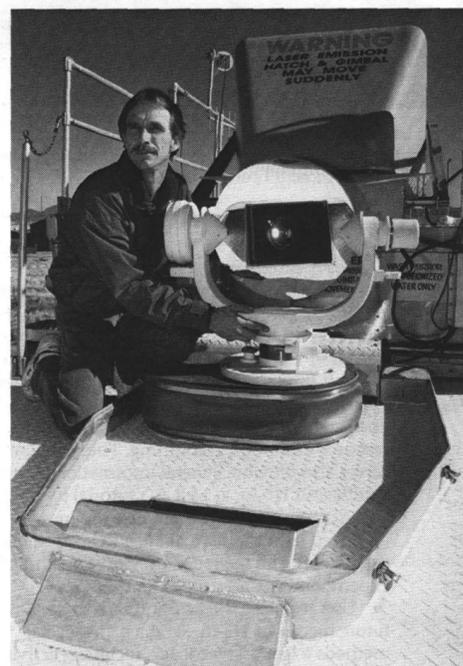
Test technician John Arnold (2761) informs Kirtland Air Force Base authorities about an upcoming test from the track's telemetry and control room, which serves as the facility's nerve center during a test.



Fifteen small rocket motors provide the thrust necessary to send this sled down the rails at a slow (by sled track standards) 190 feet per second.



Contractor Dean Jacoby wires rocket motors for firing.



Before an upcoming test, Duane Patrick (2761) adjusts equipment aboard the Laser Tracker 3 mobile tracking station. During a test, the rotating laser-and-camera setup mounted on the truck's roof tracks a sled across the horizon by following the laser's reflection, which is bounced off a piece of glass tape aboard the vehicle.

## Sandia's 10,000-ft sled track in Area 3

*Two miles in the blink of an eye*

So you want to see what happens when you slam a thingamajig into a concrete wall at 4,000 miles per hour. Or perhaps you'd like to accelerate a gadget to thrice the speed of sound in seconds.

The folks at Sandia's 10,000-ft sled track in Area 3 can help you. But don't blink.

Since the track's completion in 1967, it has hosted some 2,000 impact, vibration, and acceleration tests, most supporting development and safety of the nation's nuclear weapons stockpile. Other tests for NASA, DoD, the national labs, and others have tested the performance of such high-tech paraphernalia as parachutes, nosecones, penetrators, rockets, and spacecraft components.

In 1984 the track's length was doubled from 5,000 feet to 10,000 feet to accommodate higher speeds and a wider variety of tests. Today it can blast an object to more than 7,000 feet per second (4,700-plus mph), eject a one-ton projectile to an altitude of 250 feet, or accelerate a sled vehicle at rates approaching 200 g.

Over the years the track has hosted many a memorable test. In 1977, a 120-ton locomotive was slammed into a moving tractor-trailer rig containing a spent-nuclear-fuel shipping container. In 1989, an F-4 Phantom was hurled into a concrete target to simulate collision with a nuclear power plant. In 1992, quarter-scale models of DOE's Safe Secure Transports were slammed into concrete to simulate highway accidents.

And in 1987, a record impact speed of 15,000 feet per second (ft/s) was achieved by colliding a 6,000 ft/s

flier plate with a 9,000 ft/s test object moving in the opposite direction.

But work at Sandia's fastest facility has slowed down a bit in recent years, says 35-year track veteran Bill Kampfe of Energetic and Environmental Testing Dept. 2761.

During the Cold War, when testing facilities were among the Labs' most valuable commodities, the sled track was the centerpiece of Sandia's testing program. At times the track averaged nearly a test a day, he recalls. Nowadays only about one test per month finds its way down the rails, down from a Cold War average of one test weekly.

Mark Garrett, 2761 manager, says the slowdown can be attributed to the virtual cessation of nuclear weapons development work, which was once the track's staple, as well as the increased use of computer modeling and simulation.

Currently Sandia is conducting a series of tests for Los Alamos (see photos) in support of NASA's Cassini exploratory mission to Saturn, scheduled for launch in 1997. The tests, primarily impact tests on components relating to Cassini's nuclear power source, will help NASA determine what would happen if the space probe exploded on the launching pad or was destroyed in flight.

Other current projects include kinetic energy and penetrator tests for DoD, as well as smart submunition tests for the US Air Force and US Army.

For more information about Sandia's sled track facility, call Bill Kampfe on 845-3186. — John German



Los Alamos researchers Eric Swenson and Jim Hinckley examine a metal flier plate after it was ejected from a fast-moving sled vehicle at Sandia's sled track facility. The purpose was to test the integrity of material surrounding a spacecraft's power reactor in the event of a launch accident. The test was part of a series of safety tests Los Alamos is sponsoring in preparation for NASA's Cassini exploratory mission to Saturn, scheduled for launch in 1997.

# Sandia gets 10 advanced computational projects in oil and gas technology partnership

*Size, visibility of ACTI grants expected to have major impact*

By Ace Etheridge

Media Relations Dept. 12621

Continuing to expand its interactions with industry, Sandia is now participating in 10 projects with American oil and gas companies as part of the Advanced Computational Technology Initiative (ACTI).

The program is part of the Natural Gas & Oil Technology Partnership, formed in 1988. Dave Northrop, Manager of Oil & Gas Programs Dept. 6112, was instrumental in establishing the partnership and co-chairs the partnership's coordinating office. He says ACTI is the latest addition to the partnership.

"But ACTI has had a major impact on the partnership, both because of its size and visibility and because computational capabilities at the national labs and universities are leading-edge technology becoming appreciated by private industry," he says.

This appreciation is manifested by industry's willingness to contribute more than \$35 million into the 31 projects being funded in the first phase of ACTI grants, which were announced by DOE Deputy Energy Secretary Bill White on Feb. 8. DOE is putting in an additional \$27 million, with funding coming from the Offices of Defense Programs, Fossil Energy, and Energy Research. (Efforts in Congress to

rescind some of the program funds could possibly change things in coming weeks, but the information here is current as of the time of the DOE announcement.)

## Working together

ACTI provides an opportunity for DOE laboratories and American universities to collaborate with private industry in applying national computing power and technologies to find, develop, and produce natural gas and oil. The partnership already has been working with the petroleum industry in three other technology areas — borehole seismic technology, oil recovery technology, and drilling and well-completion technology.

"It is no secret that the US petroleum industry has been going through some tough economic times for more than 10 years now, and as a result of this downturn the amount of money being spent by the companies on R&D has declined significantly," Dave says.

*The amount of money being spent by oil and gas companies on R&D has declined in the last 10 years.*

"At the same time, the nation's dependence on foreign petroleum supplies has increased to the point that last year was the first time that more than 50 percent of our daily oil consumption came from other countries. Those two situations are reason enough for the Natural Gas & Oil Technology Partnership — a melding of the capabilities of scientists and engineers in industry, government, and academia — to strengthen the United States' energy and economic security," he says.

## More than 100 companies involved

To the skeptics who might say the private energy industry is not interested in working with the government, Dave points out that approximately 50 petroleum producers and service companies already were participating in more than 20 projects before the ACTI grants were announced, and more than 100 companies are participating in the ACTI projects along with 25 universities, six trade associations, four state agencies, two federal agencies, and nine DOE labs.

The ACTI area of the Natural Gas and Oil Technology Partnership brings a total of nine DOE labs into the partnership, which began in 1988 with just Sandia and Los Alamos. Last year Lawrence Livermore and Lawrence Berkeley came into the partnership, and this year Oak Ridge, Pacific Northwest, Brookhaven, Argonne, and Idaho National Engineering Lab joined.

Dave says the decision to add computational technologies to the partnership was made last spring and a call for project proposals was issued in September, with the proposals being due in November. A 13-member industry panel evaluated 122 proposals. The National Lab Partnership Office, the coordinating board which Dave co-chairs, reviewed the results and forwarded recommendations to DOE.

## Industry funding up sharply

Industry interest in ACTI also is shown by the increase in funding for the partnership, which went from approximately \$6.6 million in 1994 to \$48 million in 1995.

Sandia will be the lead R&D institution for six of the 10 projects in which it is participating (see box at left). Approximately \$6.5 million will come into Sandia from all 10 projects, which are spread among researchers in several different centers.

"Not only is the teaming among Sandia's centers outstanding, but ACTI projects provide the opportunity of focusing traditionally separate Defense Programs, Fossil Energy, and Energy Research interests on a common customer — the nation's petroleum industry," Dave says.

## Sandia has the lead role in six projects

Here is a listing of the Sandia ACTI projects, participants, Sandia project managers, and the amount of DOE funding for each project. Some of the funding listed for the projects that Sandia will manage will go through Sandia to other research partners, but most funds will go to Sandia.

- Advanced computational models for deep water oil and gas production. Participants are Sandia and DeepStar Consortium, which consists of 19 oil and gas companies, more than 40 service companies, and 12 consulting agencies. FY95 funding is \$650,000. Bob Thomas (1562) is project manager.

- Three-dimensional seismic imaging of complex geologies: remote and rapid prototyping processing of terabyte data sets. Participants are Sandia, the University of Texas at Dallas, Arco, Conoco, Oryx, PGS Tensor, Golden Geophysical, Providence Technologies, Cray Research, and Intel. FY95 funding is \$900,000. Sudip Dosanjh (1402) is project manager, but work on the project also is being done by researchers in Center 1500.

- Computational geomechanics for geologic structure and reservoir mechanics. Participants are Sandia, Amoco, Arco, Chevron, Conoco, Exxon, and Mobil. FY95 funding is \$1.25 million. Hal Morgan (1561) is project manager, but Center 6100 researchers also are working on the project.

- Single-well seismic imaging of salt dome flanks. Participants are Sandia, Massachusetts Institute of Technology, the University of Utah, Advance Geophysical, Amoco, Arco, Chevron, Conoco, Exxon, Mobil, Schlumberger, Texaco, and Unocal. FY95 funding is \$1.55 million. Chad Harding (6114) is project manager, but work also

is being done by researchers in Centers 1400 and 8900.

- Increased effectiveness of hydraulic fracturing through advanced computational technology. Participants are Sandia, Los Alamos, the University of New Mexico, TerraTek, Amoco, Arco, BP Exploration, Chevron, Shell, Unocal, and Dowell-Schlumberger. FY95 funding is \$825,000. John Waggoner (6114) is project manager, but work also is being done by researchers in Centers 1400 and 1500.

- Near-wellbore mechanics. Participants are Sandia, New Mexico Tech, Massachusetts Institute of Technology, Michigan Tech, Amoco, Chevron, Conoco, Oryx, Phillips, Texaco, Dowell Schlumberger, Halliburton, Halliburton Explosives Products Center, and Terralog Technologies. FY95 funding is \$1.5 million. Dale Preece (6117) is project manager, but the work also is being done by researchers in Centers 1400, 1500, and 2600.

Here are the ACTI projects in which Sandia is a participant but does not have the lead role:

- Large downhole seismic sensor array. FY95 funding to Sandia is \$300,000. The Sandia contact is Marion Scott (1306).

- Coupled rock/fluid mechanics numerical simulations applied to well completions. FY95 funding to Sandia is \$200,000. The Sandia contact is Lisa Mondy (1512).

- Locating geopressured hydrocarbon reservoirs in soft clastic sediments through identifying associated pressure seals. FY95 funding to Sandia is \$50,000. Larry Teufel (6117) is the Sandia contact.

- Oil and gas infrastructure project. FY95 funding to Sandia is \$245,000. Ray Cline (8920) is the Sandia contact.

## Welcome

**Albuquerque** — Araceli Domingo (13414), Stephen Evans (13314), Floyd Galegar (7311), Kim Gallagher (10406), Ellen Gallegos (11010), Hahn Le (10246), Jennifer Powell (5513), David Robinson (6613), Michael Schuhen (6306), Michael Smith (1812), Daniel Staelzel (6341)  
**California** — Christopher Deeney (1273), Ronald Goeke (2471)  
**Idaho** — Nancy Linarez-Royce (6306)  
**Tennessee** — Robert Moore (6348)  
**Texas** — Lisa Trainor (13314)  
**Virginia** — Peter Merkle (6312)

# Adopt industry-proven methods to manage the national labs, Narath testifies

House subcommittee hearing addresses Galvin and GAO reports

Labs President Al Narath appeared before members of two House subcommittees March 9 to give his views on two recent reports that criticized DOE's management of the national labs and recommended major laboratory mission changes.

The joint hearing, called by New Mexico Rep. Steve Schiff, included members of the House Science subcommittees on basic research and on energy and environment. Schiff chairs the basic research subcommittee.

Also testifying were Energy Secretary Hazel O'Leary; Bob Galvin, chairman of the Task Force on Alternative Futures for the DOE National Laboratories; and the directors of DOE's nine other national labs, including Los Alamos and Lawrence Livermore.

The subjects of the hearing were the Feb. 1 Galvin report, which recommended major management changes and a sharper mission focus for the national labs, and a recent Government Accounting Office (GAO) report that criticized DOE for "micromanaging" the labs, for failing to clearly define laboratory missions, and for managing the labs separately rather than as an "integrated system of laboratories."

In prepared testimony, Al told subcommittee members that he agrees with many of the findings contained in the two reports, including their common assertion that the DOE labs should concentrate on their traditional mission areas rather than seek new ones. He also pointed out that the established DOE missions are extremely broad in scientific and technological scope.

But he noted that both reports rejected industrial competitiveness as a primary mission of the DOE labs. Industrial competitiveness, when tied to lab technical competencies, can and should be a derivative role of the national laboratories, he asserted.

"There should be no misunderstanding that [industrial] collaboration is essential to the laboratories' ability to accomplish their DOE missions now and in the future," he said.

He added: "Many technical advances origi-

*"The multiprogram, multidisciplinary environment is absolutely essential for excellence. . ."*

nating in the DOE laboratories have had a profound impact on whole industries." Supercomputing, the vertical laminar-flow clean room, synthetic diamond drill bits, and solar energy technologies are examples of historic laboratory that have had profound effects on whole industries, he said.

He said large-scale alliances with industry groups, user facilities, and technical assistance to small enterprises are other important ways the national labs support industry.

## Clearly defined missions

Al said he was puzzled by a statement in the GAO report that the DOE labs don't have clearly defined missions. "It seems self-evident to me that the laboratories' mission, collectively, is to support DOE's mission objectives." He said those objectives are properly enumerated in the Galvin report: "national security, energy, environmental science and technology, and the fields of fundamental science, which underpin these missions."

He also noted Sandia's Strategic Plan, which he said clearly delineates Sandia's mission areas, as well as Sandia's stated core competencies and strategic initiatives.

He took issue with the GAO's finding that DOE should assign laboratory missions with more specificity to achieve a greater degree of coordination among the labs. "To do so will exacerbate the micromanagement problem that has been so strongly criticized by both GAO and Galvin," he said.

He added that the Galvin Commission and GAO were wise to promote the lead laboratories and centers of excellence concepts. "The multiprogram, multidisciplinary environment is absolutely essential for excellence in most of DOE's missions," he said.

Al questioned the Galvin recommendation to "de-federalize" the labs by managing them through a not-for-profit R&D corporation with a board of trustees appointed by the President. "As proposed, [the approach] does not seem to me either practical in the near term nor necessarily sustainable over the long term."

His primary reasons, he said, are that a weak link between the labs and the executive branch would cause the labs eventually to lose their mission focus and become "R&D job shops for small, discrete projects." He also predicted the board of trustees wouldn't be able to allocate resources or coordinate work effectively unless it created a bureaucracy of its own similar to DOE's.

## Rejuvenate the GOCO model

Instead he recommended "rejuvenating" the GOCO (government-owned, contractor-operated) model and creating a Laboratory Operating Board, as DOE is now planning. To reduce costs and micromanagement, he suggested employing Total Quality Management and reengineering principles on a wide scale.

"With your support, I believe DOE's leadership can do much to restore the health and vigor of the GOCO model," he told the panel. "Before embarking on a risky and uncertain course of action, I would look for ways to accommodate the needs of tomorrow using a management approach that has been effective in the past."

For a copy of Al's prepared testimony, call the Lab News office on 844-5199.

— John German

## Cost-cutting

(Continued from page 1)

dations yet," he continues, "but this group is turning over every rock you can think of and probably even some you wouldn't think of."

The other study, which Sandia has undertaken on its own, is part of the reengineering effort coordinated by the Reengineering Center 10600. This effort is using a group of private experts from Ernst and Young working across the Labs to benchmark Sandia relative to respected industrial organizations.

"The idea is to compare support and service operations at Sandia with some of the better-performing entities in industry and to see how we stack up with them," Virgil explains. "Are we about in line with them or are we more expensive? If we are more expensive, we need to find out why."

Both studies will be integrated to provide a prioritized list of cost-reduction opportunities for management to include in its future reengineering plans.

In addition, Virgil says a special subgroup headed by Tom Palmieri (5004) is looking specifically at DOE Orders and the cost of their administration. "If some of the more time/money-consuming orders were set aside or altered significantly, how would that in itself affect our costs of operation?"

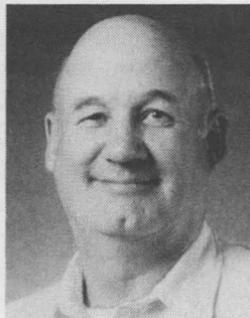
The Lab News will report information on these initiatives as it becomes available.

— Larry Perrine

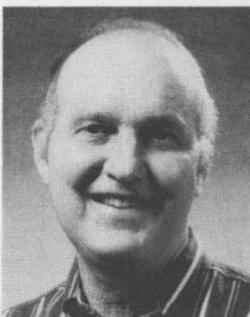
## Recent Retirees



Irene Myers 10  
5166



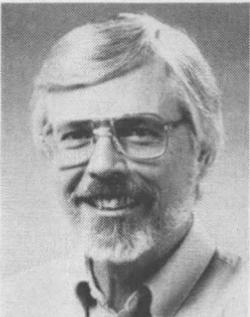
Mike Kmatz 31  
5831



Louis Cropp 32  
2643



John Matsko 32  
2476



Ned Keltner 30  
2761



Wil Vandermolten 37  
2653

## Sympathy

To Gerrie (7616) and Ruben (7435) Garcia on the death of her mother and his mother-in-law, Pearl Jaramillo, in Belen, Feb. 14.

To Peter Mattern (1010) on the death of his mother, Jeanne Marie Poitras Mattern, in Hamilton, Mass., Feb. 18.

To Sandra Harris (7815) on the death of her mother, Verdine Jewell, in Albuquerque, March 4.

## ★ Congratulations

To Linda and Kevin (5808) Linker, a son, Taylor, Feb. 20.



# Info Day '95 marks new era for info access at Sandia

**From South Dakota to Singapore: It's nothing less than a 'World-Wide Webolution'**

Hundreds of Sandians were introduced to a new way of accessing and sharing information on the Internet Feb. 28 as part of a Labs-sponsored program at the Technology Transfer Center (TTC).

Info Day '95, as the event was called, featured a full day of presentations and demonstrations about Sandia's forays along the so-called information superhighway.

In the TTC lobby, employees milled about displays sponsored by local computer vendors and Internet service providers. Inside the auditorium, presenters discussed the Internet, computer security, e-mail, and other information-related issues.

But the event's main attraction was the World-Wide Web — a relatively new method

of accessing and viewing information on the Internet employing user-friendly "point-and-click" interfaces. The Web differs from other Internet standard protocols in that Web information is linked irrespective of cyberspace location, says Ed Marek (1434).

In other words, by clicking on a highlighted word or icon, the Web can take you from a data site in South Dakota directly to related information in Salt Lake City or Singapore.

Also, the Web employs multimedia interfaces, meaning information can be, and often is, in the form of full-color graphics, sound, or animation, as well as text.

Already some 2,000 Sandians have access to the Internet via the World-Wide Web, and that number is growing. By October, Sandia's

Chief Information Office 13100 hopes to have 6,000 to 8,000 employees and on-site contractors "on the Web."

"The goal is to get the Web to every person's desktop if they have a computer," says Fran Current (13212).

"This is going to become the corporate information system."

The Web is part of a renewed corporate commitment to developing a common communications infrastructure at Sandia, said

Chief Information Officer Mike Eaton (13100) during an Info Day presentation. Part of that effort is to ensure that all Sandians have access to corporate information at their desktops, he said.

Currently, Sandia's presence on the World-Wide Web includes two facets — an internal Web site for use by Sandians only, and an external site accessible to Sandia customers and anybody interested in Sandia's work.

An upcoming *Lab News* will feature the World-Wide Web and Sandia's participation on this fast-growing communications medium.

Info Day was sponsored by Sandia's World-Wide Web Working Group, chaired by John Mareda (1425), and presented by employees in organizations 1000, 2000, 4000, and 13000.

A similar Info Day is planned for Sandia/California in April. Watch the *Lab News* for details.

— John German



## Sandia News Briefs

### Hazel O'Leary congratulates Sandia's Gordon Bell Prize winners and finalists

In a recent letter to Al Narath, DOE Secretary Hazel O'Leary congratulated a Sandia team (David Womble, 1422; David Greenberg, 1423; Stephen Wheat, 1424; and Robert Benner, 1424) for winning the Gordon Bell Prize for excellence in high performance computing, awarded for the team's paper on "Applications of Boundary Element Methods on the Intel Paragon." O'Leary says, "The Department appreciates the significance of the effort and the magnitude of the achievement in winning this prestigious award." O'Leary also congratulated a second Sandia team (John Shadid, 1421; Scott Hutchinson, 1421; Harry Moffat, 1126; Bruce Hendrickson, 1422; and Robert Leland, 1424) for finishing as a top-four finalist team in the Gordon Bell competition.

### O. B. Crump honored for invention at Black History Month luncheon

O. B. Crump, Jr. of Firing Set and Mechanical Design Department 2674 was honored last month at a DOE-sponsored Black History Month luncheon, "A Tribute to African-American Inventors," for his 1993 co-invention, the "fixed-cavity VISAR." The luncheon honored African-American inventors who, between 1800 and 1900 alone, patented 1,500 inventions. Crump's invention, now used throughout the world, simplified the operation of the older VISAR (Velocity Interferometer System for Any Reflector), which measures high-pressure shock waves in solids.

### Quality New Mexico will host conference April 30-May 2

The 1995 Quality New Mexico Conference and Awards Ceremony will be held Sunday, April 30, through Tuesday, May 2, at the Albuquerque Convention Center. Participants can meet local and national leaders who are implementing quality practices in business, education, and government by using the Malcolm Baldrige criteria. Scheduled Quality Award presenters include Governor Gary Johnson, Senators Pete Domenici and Jeff Bingaman, and Representatives Bill Richardson, Steve Schiff, and Joe Skeen. The registration fee is \$170 if received by March 31, or \$195 later. For more information, contact Quality New Mexico on 242-7903.

### Sandians receive award for excellence in technology transfer

The Federal Laboratory Consortium (FLC) has selected Carol Ashby (1322), Thomas Plut (1322), and David Ginley (former Sandian, now with the National Renewable Energy Laboratory) to receive an FLC Award for Excellence in Technology Transfer for 1995 for their Sandia-patented decarbonated chelating etch process. This process has become the industry standard for fabricating devices and circuits in high-temperature superconductors. The FLC awards "recognize Federal Laboratory employees who have done an outstanding job of transferring technology developed in a member laboratory to outside users, primarily to the private sector." The competition is open to all federal labs, and awards are based on evaluation by a panel of judges from the FLC.

### Sandia and Thermogenics to develop waste-to-energy unit

Sandia and Thermogenics, Inc., of Albuquerque, will work together to develop a low-cost waste processing unit that turns organic waste into clean energy. Thermogenics hopes to bring the new unit to market in 1996. It will combine Thermogenics' Biomass Gasifier, which disposes of solid organic wastes and produces combustible gas energy, with Sandia's Passive Afterburner, which cleans the gas stream produced by Thermogenics' Biomass Gasifier. The new unit will process organic materials such as wood waste, agricultural waste, and poultry litter to produce clean, hot exhaust air. Sandia's Energetic and Environmental Testing Dept. 2761 developed the Passive Afterburner to virtually eliminate visible emissions from fire tests.

### Carter Grotbeck wins Optical Society of America's 1995 Allen Prize

Carter Grotbeck of Optics and Exploratory Technologies Dept. 9225 (post-doc) will receive the Optical Society of America's 1995 Allen Prize, awarded "for outstanding contributions to atmospheric remote sensing while a graduate student." Carter is being recognized for his initiative and proficiency in developing a solar aureole camera and the associated inversion algorithm for reducing the camera data. The award will be presented at the Optical Society of America's Annual Meeting Sept. 10-15 in Portland, Ore.

Send potential Sandia News Briefs to Lab News, Dept. 12622, MS 0413, fax 844-0645.

## Fun & Games

**Softball** — The Sandia Labs Softball Association (SLSA) registration deadline for the 1995 summer softball season is Friday, March 24. Information is available at the SERP office.

The SLSA is also sponsoring the 2nd Annual Presidents Preseason Softball Tournament on April 22-23 at the Airguard and Manzano fields. Depending on the number of teams entered, this round-robin tournament will include men's high, men's low, ladies', and coed divisions, and is open to all teams, including those not in the SLSA league. The deadline to register for the tournament is Monday, April 17, at the SERP office. The cost is \$60 per team; make checks payable to SLSA. For more information, call Don Wrobel, league president, on 891-8409.

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**Boating** — A Boating Skills and Seamanship course, taught by members of Flotilla 21 of the Coast Guard Auxiliary, will be held Saturday, March 18, starting at 9 a.m. at the Bernalillo County Fire Station No. 5, 11700 Paseo del Norte, NE. Some class topics will include boat handling, marine radio, weather, and rules of the road. A \$15 fee will be charged for a textbook and other materials. For more information, call 892-4107.

## Take Note

The "Working Women Count!" conference, sponsored by Duke City Business and Professional Women, MANA de Albuquerque, and the US Department of Labor's Women's Bureau, will be held Friday, March 24, 8 a.m.-3:30 p.m., at the Sheraton Old Town Hotel in Albuquerque. The conference will focus on a Women's Bureau nationwide survey of working women, which found a strong consensus for change among women in the areas of compensation, work and family policies, and the undervaluing of women's work. For more information, call Berta Rodriguez (11500) on 296-6987 or Christine Trujillo on 265-4208.

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

## MISCELLANEOUS

- LABS T-SHIRTS, \$9; caps, \$8; coffee mugs, \$8; proceeds to South 14 Village Project, Lab News office, MO172, NW corner of Tech Area. Shunny, 265-1620.
- CHINA CABINET, oak, half-round, stained glass accent on front, \$350. Grotbeck, 266-2511.
- FIFTH-WHEEL TRAILER, '87 Alpenlite, 28-ft., includes solar pkg/hd & inverter batteries. Upchurch, 296-8591, leave message.
- APPLE PRINTER, StyleWriter 2, B&W, used very little, replaced ink twice, includes new ink, \$300 new, asking \$190 OBO. Mooney, 281-2612.
- FRAM AIR FILTERS, Model CA2740, fit Mazda & Honda cars, Mazda & Ford trucks, \$4 ea. or 2/\$7. Schkade, 292-5126.
- WOODEN BUNK BEDS, w/mattresses, good condition, \$100. Carroll, 277-6045 or 293-1564.
- ANTIQUA DROP-FRONT DESK, w/stool, \$350; waterbed, king, w/12-drawer underdresser, mattress, rails, heater, \$250. Snyder, 281-3822.
- ORGAN, Baldwin Funster, 2-keyboard spinet, 30-tone combinations, will deliver, \$350 OBO. Naru, 821-7490.
- ALUMINUM RACING WHEELS, 4 ea., 15" x 10", less than 1 yr. old, for 4WD Ranger, \$400. Duran, 867-0840.
- MOTORCYCLE QUARTER FAIRING, fits rectangular headlight, black; 3-drawer video tape cabinet, holds 36, both \$10 OBO. Armstrong, 266-2334.
- AUSTRALIAN SHEPHERD-CHOW, male, 5 mo., shots, free to good home, loves children, daughter moving. Wilson, 292-2228.
- BACKPACK, Mountainsmith Frostfire III, 6037 to 7213 cu. in., used 1-1/2 yrs., \$150. Levenhagen, 291-1229.
- MODERN OAK COMPUTER DESK, matching printer table, 2-drawer, letter-size file cabinet, standing bookshelves, \$550. Dennis, 299-3763.
- SAPPHIRE-DIAMOND EARRINGS, new, never worn, from jewelry store closure, 60% off new, asking \$300. Eikelberg, 296-0899.
- FLAGSTONE, red-tan, \$0.95/ft.; fill dirt, great price delivered. Vigil, 345-9590, ask for Sandoval or Vigil.
- CHROME DAYTONS, w/adaptors & tires, both sets are in excellent condition, \$3,300/both OBO. Archibeque, 877-8818.
- TURQUOISE NECKLACE, \$600 new, asking \$100. Ryburn, 237-0600, ask for Michael.
- PRINTER, Mannesmann Tally CFC9TO, Spirit 80, \$50. Alexander, 291-8028.
- REFRIGERATOR, apartment size. Lorene, 281-9321.
- TWO BARSTOOLS, 24-in., blue & mauve, brass nails w/walnut trim, like new, \$65 ea. West, 292-2271.
- MATTRESS, full, 53" x 75" x 7", firm innerspring, Sleep'nAire, firmopedic, like new, \$70. Ré, 298-0290.
- 3-PIECE SECTIONAL SOFA, like new, gray peach ivory, \$600; complete king-size bed, w/headboard, good condition. Bronkema, 291-1323.
- AKITA PET DOG, 11 mos. old, limited yard space, must go to good home. Monnet, 865-7941.
- PRESSURE WASHER, 3,500 psi, 18-hp, Briggs/Stratton twin cylinder, IC engine, 200' pressure hose, like new, \$1,995 OBO. Sprague, 828-0940.
- ELECTRIC STOVE, Roper, 30-in., gold w/matching hood, \$75. Skinner, 292-6329.
- MICROWAVE, Kenmore, 650 watts, used 2 mos., 3-stage defrost, memory recall, removeable glass tray, many features, instruction book, \$85. Bur, 899-8408.
- REFRIGERATOR, Amana, frost-free, 19 cu. ft., \$125; Simmons Beautyrest, queen mattress/boxframe, \$150; Fisher dual cassette, \$50; flagstone, 1/3-ton, \$60. Wilson, 275-1059.
- TRAMPOLINE, 14-ft., \$150; Tektronix oscilloscope, \$35; gas weed cutter, \$50; new mulcher, \$350; Stihl chainsaw, \$150; assorted furniture. Axness, 296-4691.
- NEC LASER PRINTER, 6 mos. old, Adobe Postscript Level 2, AppleTalk interface, 300 dpi, 6 ppm, \$440 (\$720 new). Lober, 898-6761.
- QUEEN CANOPY BED, w/hand-crocheted top; Simmons light maple crib; stair stepper. Kallio, 856-1350.
- REFRIGERATOR, \$185; Kenmore washer/dryer, \$175; king-size bed, teakwood headboard, end tables, \$650; other furniture & artwork. Sanchez, 296-7784.
- STEREO PREAMPLIFIERS, Coda FET 02b, mint, \$1,350; Aragon 24k MkII w/phono, P&G pot, IPS, \$950. Miller, 281-3655.
- WEDDING DRESS/VEIL, size 8, semi-formal, white lace over satin, 3/4-length handkerchief hemline, \$50/both. Griego, 864-2624.
- WINDSURFERS, Bic, excellent stability, \$165 ea., buy both, will add extra booms, double sail bag. Gage, 293-1707.
- AUTO BOOSTER, Gerry double guard, auto-adjust lap belt, large reversible shield, for children 40-60 lbs. Korbin, 299-9088.
- SKS, Chinese paratrooper, Zytol stock, 3x9 scope, 5 & 10 round mags, \$325; SKS folding stock, \$50; ammo \$6/box; shoulder holster, \$50. Mann, 343-0524.
- BEDS: full, \$150, twin, \$125, both have headboards & footboards; electric oven, \$125; B&D electric lawnmower, \$100. Newman, 266-6928.
- CHAIN-LINK DOG RUN PANEL, 6' x 6', new would cost \$60, selling for \$30. Gomez, 291-0691.
- STEREO CABINETS, dark wood, contemporary styling, 30"W x 20"D x 51"H, 4 shelves, 1 drawer, good condition, \$70. Meeks, 828-9825.
- OVEN/STOVE, electric, Corningware stovetop, microwave above, oven below, olive green, \$125. Olson, 823-9119.
- PEDESTAL DINING TABLE, chairs, leaf, oak, country, \$700; cream, iron day bed, w/mattress, 1 yr. old, \$240. Harris, 822-0236.
- COLLECTOR'S DOLLS: 21-1/2-in. Prince Charles, 20-in. Diana in wedding clothes, 10-1/2-in. flower girl & book, \$300. Williams, 298-2624.
- TWO LA-Z-BOY RECLINERS, blue, like new, \$150 ea.; three coffee/end tables (square, octagonal, rectangular), wood, \$50 ea. Daniel, 821-2935.
- KING-SIZE WATERBED, w/12-drawer pedestal, \$150; oak dresser & mirror, like new, \$250. Koester, 899-8876.
- FRAMED ATKINSON PRINT, limited edition, Fulton Mansion, double mat, non-glare glass, \$225; oak antique muffin stand, \$85. Biffle, 293-7043.
- AUTOMATIC SPRINKLER CONTROLLER, 4-station, Rainbird model RC-4bi, professional style (electro-mechanical), 1 yr. old, \$25. Kelly, 821-1252.
- BOAT CAPTAIN'S CHAIR, upholstered, adjustable, aluminum pedestal, like new, \$65. Meikle, 299-4640.
- CAL SPAS, 7-ft. square, 35-in. high, seats 6, 4 jets, Rovel redwood, good condition, \$1,600. Simons, 821-9343.
- QUEEN-SIZE BED, Broyhill, four-poster, w/mattress & box spring, 1 yr. old, \$500 OBO. Miles, 296-5767.
- '86 JET SKI, JS550, lots of extras, \$2,000 OBO. McDuffie, 292-0459.

**Deadline: Friday noon before week of publication unless changed by holiday. Mail to Dept. 12622, MS 0413, or fax to 844-0645.**

**ATTENTION: Department 12622 is now on cc:Mail. You may send classified ads to Nancy Campanozzi. Any questions, call Nancy on 844-7522.**

### Ad Rules

1. Limit 20 words, including last name and home phone (the Lab News will edit longer ads).
2. Include organization and full name with each ad submission.
3. Submit each ad in writing. No phone-ins.
4. Use 8 1/2" by 11-inch paper.
5. Use separate sheet for each ad category.
6. Type or print ads legibly; use only accepted abbreviations.
7. One ad per category per issue.
8. No more than two insertions of same "for sale" or "wanted" item.
9. No "for rent" ads except for employees on temporary assignment.
10. No commercial ads.
11. For active and retired Sandians and DOE employees.
12. Housing listed for sale is available for occupancy without regard to race, creed, color, or national origin.
13. "Work wanted" ads limited to student-aged children of employees.

EXERCISE BIKE, \$25; fireplace tools, \$15; wooden sewing cabinet, \$20; Polaroid Impulse camera, \$15. Parson, 291-8394.

ROTOTILLER, 7-hp Troy-Bilt, Kohler engine, bumper guard, transferrable lifetime warranty, rebuilt tine & shaft assembly, runs well, \$1,000. Berry, 897-3652.

TABLE SAW, 8-in. Dewalt benchtop, \$50; couches, good for student, \$20 ea.; moving boxes, wrapping paper, \$50. Stone, 298-3341.

DINING SET, Mediterranean style, table, 6 chairs, server, china cabinet, \$1,300. Norwood, 266-2717.

EPSON LX-800 PRINTER, graphics capability, new ribbon, \$100; cedar chest, padded seat, dark oak finish, 47" x 16" x 11" deep. Sandoval, 275-0904.

TWIN MAPLE BEDROOM SET, nine-drawer, double dresser, landscape mirror, brass headboard, spring & mattress, \$450. Gorman, 268-1606.

SOFA, 94-in. pillowed, desert sand, excellent condition, \$150. Benjamin, 294-3228.

FIVE-PIECE SECTIONAL, end chairs are recliners, cocoa, great shape, \$350; 27-in. Sony Trinitron TV; MTS stereo monitor receiver, \$350. Anderson, 883-2647.

IGUANA, (16-in.), needs TLC, free; two 55-gal. tanks w/wrought iron stand, \$150 OBO; collapsible cage, 15" x 24" x 20", \$40. Dubicka, 296-6557.

SOLID BUNK BEDS, w/mattresses, 1 yr. old, \$200; twin bed, w/mattresses, \$75. Rochester, 296-1350.

CONSOLE COLOR TV, 24", Sears, works great, \$100. Lundgren, 281-1564.

NINTENDO ENTERTAINMENT SYSTEM, w/11 games, including instruction booklets, \$100 OBO. Sanchez, 343-0303, leave message.

EXERCISE BIKE, Pro-Sport air resistance, excellent condition, \$40. Langwell, 293-2728.

STAND MIXER, Sunbeam, \$15; toddler boy's clothes, size 2-3T. Forster, 293-7231.

1MB SIMMS, \$30 ea.; 3-1/2" HD disk drive, \$35; 5-1/4" HD disk drive, \$35. Forster, 293-7231.

1990 CONSOLE TV, Zenith, 25", stereo, on-screen menu, \$250; sofa & loveseat, beige tones, excellent condition, \$250/both. Fitzgerald, 275-0521.

MOUNTAIN BIKE RACK MOUNTS, Yakima, 2 ea. GT, \$70 ea. or \$130 both; Loadwarrior, \$30, all \$150. Weirick, 281-1462.

ESTATE SALE, 4211 Marquette NE, (west on Lomas to Washington south, then west on Marquette), 8-4 p.m., Mar. 18-19, furniture, household items. Schulz, 256-9341.

INVERSION TABLE, \$125. Greer, 281-4688, leave message.

TRANSPORTABLE CELLULAR PHONE, Nokia LX12, 3 watts of power, 2 rechargeable batteries, soft carrying case, \$100 OBO. Armstrong 266-2334.

## TRANSPORTATION

PORTABOAT, 12-ft., 2 yrs old, Mercury 5-hp outboard, like new. Upchurch, 296-8591.

'86 TOYOTA TERCEL, red, 2-dr. hatch, 4-spd., excellent condition, one owner, 40-mpg., \$2,800 OBO. Case, 293-5466.

'77 FORD RANCHERO, V8, 400 engine, restored, outstanding condition, PS, PB, cruise control, AM/FM cassette, rally wheels, must see, \$5,300. Avila, 275-9572.

'81 ITASKA MOTORHOME, 21-ft., fully self-contained, 46K miles, \$7,500 OBO. Pierson, 299-9693.

SAILBOAT, Montgomery 10, plus Johnson outboard, trailer, cover, oars, \$1,050. Gardner, 293-8617.

BOY'S BIKE, (Diamond Back), \$25. Ryburn, 237-0600, ask for Michael.

'90 CHRYSLER LEBARON, loaded, 6-cyl., AT, only 37K miles, excellent condition, must see & drive, \$8,500. Brown, 271-1141.

'87 FLEETWOOD SOUTHWIND, 25-ft., immaculate, non-smoker, sleeps 4, shower/bathtub, double rear bed, low mileage, good tires, \$16,900. McDonnell, 865-0823.

'88 DODGE 600SE, 4-dr., all power, low mileage, excellent condition, \$3,200 OBO. Bentz, 857-0728.

'89 CHEV. CAVALIER, rims & custom-patterned paint, stereo system, all Kenwood Rockford Fosgate, \$5,500. Bouchard, 831-4766.

'87 CADILLAC, white, blue-leather interior, 76K miles, new Michelin tires, memory power seats, electronic climate control, security alarm. Ielacqua, 864-3037, leave message.

'86 SUBARU WAGON, 4x4, GL-10, fully loaded, AT, new tires & exhaust system, 117K miles, \$2,800. Hermansen, 281-2942.

'86 GMC SAFARI 468, 8 passenger, 4.3 liter, new tires, AC, PC, AM/FM cassette, \$6,000 OBO. Rodriguez, 892-5584.

'92 GEO METRO LSI, 5-spd., AC, stereo, 32K miles, excellent condition, \$5,000. Greer, 281-4514, evenings or leave message.

'85 CHEV. PICKUP, Silverado, 1/2-ton, 2-WD, one owner, 66K miles, AT, AC, tilt, cruise, excellent condition, \$5,200. Clevenger, 888-0209.

'94 JEEP GRAND CHEROKEE LAREDO, AT, AC, Command Trac 4-WD, all maintenance records, excellent condition, \$22,500. Vandenberg, 281-1791.

'80 FORD GRANADA, good condition, 140K miles, \$1,000. Gardner, 296-0274, evenings.

'69 PONTIAC FIREBIRD, hi-perf. 400, news transmission, tires, paint, radiator, exhaust, many extras, nice car, \$5,400 OBO. Graf, 281-1533.

'88 HOLIDAY RAMBLER IMPERIAL MOTORHOME, 34-ft., tag axle, Chev. 454, loaded, 66,250 miles, \$40,570. Anderson, 884-8652.

'93 SATURN SL2, 4-dr., AT, AC, ABS, 20K miles, one owner, \$12,000. Schulz, 294-5195.

MOUNTAIN BIKE, GT Timberline, f5, lots of extras, 1 yr. old, \$500 OBO. McDuffie, 292-0459.

'91 TOYOTA CAMRY, 4-cyl., AT, white-blue interior, high hwy. mileage, 101K, looks & runs excellent, \$6,900 OBO. Rhoden, 293-9468.

'77 INTERNATIONAL SCOUT II, 304 V8, AT, AM/FM cassette, lots of new & rebuilt parts, runs well, \$2,000 OBO. Salmen, 881-8612.

BIANCHI BICYCLE, Shimano 600, extra components, skinny-tire road bike, super condition, \$150. Anderson, 883-2647.

'87 NISSAN PICKUP, standard bed, good running condition, AC, new tires, \$1,300. Davis, 294-1378.

'75 HARLEY DAVIDSON FLH, 1200cc Shovelhead, runs great, straight pipe, easy start and ready, "In The Wind," \$8,200 OBO. Gallegos, 821-7351.

'73 OPAL GT, standard transmission, \$2,150. Lee, 892-8154.

## REAL ESTATE

3-BDR. MOBILE HOME, 2 full baths, lots closets, pantry, fully carpeted, stove, refrigerator, laundry hookups, steps, \$13,000. Nielson, 873-9235.

3-BDR. CUSTOM HOME, 1-3/4 baths, formal living/dining rooms, large family room w/fireplace, eat-in kitchen, pantry/washroom, 2-car garage, 2,060 sq. ft. Garavaglia, 292-2536.

3-BDR. HOUSE, beautiful neighborhood (Paseo & Coors area), brick, approx. 1,500 sq. ft., 2-car garage, 2-yr. old, \$123,000. Nutt, 897-4979.

## WANTED

DOUBLE BABY JOGGER, racing stroller, w/canopy. Swanson, 281-2735.

SUBARU 4X4, '89 or older. Roeschke, 266-8988.

TOY KITCHEN, child-size, prefer stove, oven, sink, refrigerator combo, or Fisher Price Party Kitchen. Hopkins, 821-3641.

WATERBED, single or double, w/all accessories. Greer, 281-4688, leave message.

FEMALE to share new house w/2 fireplaces, wet bar & city-mountain views, in North Albuquerque Acres, \$450. Arnold, 821-1161.

FEMALE live-in, to aid visually-impaired woman, prefer mature, non-smoker. Jeri, 291-1988.

DRILL PRESS, medium to large; oxy/acetylene welder. Harris, 822-0236.

AUTO ROOFTOP LUGGAGE POD, Yakima or Thule-type, narrow, 2-ft. wide, any length, any condition. Tschida, 898-8691.

STUDENT, w/own transportation, to watch children (6 & 9), Wed-Fri. from 10 a.m. to 3 p.m., for summer. Jennings, 268-8789.

PUSH MOWER, Bouchard, 831-4766.

SUMMER HOUSESITTING, newlywed couple, responsible, references. Available mid-June. Wad-doups, 865-7952.

SPANISH CONVERSATION TUTOR, Lorence, 275-3586.

WALKING/BEGINNING TENNIS partner. Early mornings, evenings, and/or weekends. Near McKinney & Harper NE. Cady, 823-2013.

## LOST & FOUND

FOUND: flashing light. Bodette, 275-9722.

LOST: black, lined Isotoner glove, approx. Feb. 10 & wood body mechanical pencil on March 2. Christensen, 823-6653.

## Sandia in the News

This is a periodic column listing a selection of recent print and broadcast news reports about Sandia. It is provided by Media Relations Dept. 12621 to give Sandians a sense of what is being said about Labs work in national and international media.

A key topic at the recent Illinois Association of Chiefs of Police Conference was how technology can help police do their jobs better, reported the *Chicago Sun-Times*. Doug Weiss (2314), a conference speaker, brought a prototype of a .45 caliber revolver controlled by a radio frequency signal and discussed other technology being explored for firearms application.

The *Washington Post* reported on the "less-than-lethal" weapons that had been issued to the Marines overseeing the United Nations withdrawal from Somalia. In particular, the article talked about "perhaps the most exotic munition" being the sticky-foam gun, "developed by Sandia National Laboratories in 1992 under sponsorship of the National Institute of Justice."

Two London newspapers reported on less-than-lethal weapons in Somalia. The *Sunday Telegraph* mentioned the "toffee gun and bubble machine" developed by Sandia. The *Guardian* quoted Tom Goolsby (9611) in its article about sticky foam and the smart gun and their possible law enforcement applications.

The magazine *Cleanrooms* did a major article on Sandia's Contamination Free Manufacturing (CFM) center, discussing its work with universities, suppliers, other national labs, and industry to keep the US competitive in advanced electronics technology. Several CFM employees were quoted— Charles Gwyn (1302), Anthony Geller (1512), Robert Blewer (1305),

Steven Thornberg (1823), and Carol Adkins (1815) — and there were photos of several people working on projects, including Manny Gonzales (1141). There was also an article and photo of Willis Whitfield, retired Sandian and inventor of the laminar air flow cleanroom, and a discussion of this invention.

The *San Jose Mercury News* had an article on Sandia's work with AT&T Bell Labs developing a laboratory version of a lithography tool that could be used to print circuits five times smaller than the current technology. Rick Stulen (8342) was quoted.

KGW-TV, an NBC affiliate in Portland, Ore., used Sandia's accurate supercomputer predictions of what happened when the Shoemaker-Levy comet collided with Jupiter as an example of how supercomputers can add to scientific knowledge. The Sandia references — our simulations of the collision and comments by researcher Mark Boslough (1433) — served as the foundation for one of the installments for this four-part series on Intel.

The "world's fastest engine" was written up in *R&D* magazine. The article reported on the Sandia engine's record speeds of up to 500,000 rpm and its possible future technological applications in powering microsurgical tools and in microsafety devices for nuclear weapons. This microscopic engine was also reported in *New Scientist*. The article quoted Ernest Garcia (2643) and Jeff Sniegowski (1325).

Sandia's Primary Standards Laboratory was reported "open for business" by *Mechanical Engineering*. The lab is staffed by 50 metrologists and provides computer-aided standards and calibration services to private enterprises, universities, and government organizations.

Sandia's Don Schroeder (2605) appeared on Albuquerque's KDEF-AM afternoon talk show to discuss Labs' R&D to develop technologies that can be used to help reduce drunk driving. The work is in concert with the State's Alliance for Transportation Research; Sandia is a participant in the alliance.

Tom Massis (2652) was quoted in *New Scientist* on the danger posed by stockpiled chemical weapons. The article is based on a government report saying that stockpiled rockets contain the nerve agent sarin, which over time can become highly corrosive. — Kathy Kuhlmann (12621)

## Coronado Club

March 17 (tonight) — St. Patrick's Day dinner/dance. Dinner served 6-9 p.m. All-you-can-eat buffet plus corned beef and cabbage. Music by Joe Sais & Showcase, 7-11 p.m. Reservations required.

March 19 — Sunday brunch buffet, 10 a.m.-2 p.m., \$7.95. Tea dance, 1-4 p.m., music by Los Gatos.

March 23, 30, April 6 — Thursday bingo nights. Card sales and buffet start at 5:30 p.m., early birds' bingo at 6:45 p.m.

March 24 — Kids' bingo night. Buffet, 5 p.m., with cartoons and movies. Bingo starts at 7 p.m. Free hot dog and soft drink for all kids playing bingo.

March 31 — Friday night dinner/dance. Dinner, 6-9 p.m. T-bone steak or fried shrimp, \$11.95; all-you-can-eat buffet, \$7.95. Music by Isleta Poorboys, 7-11 p.m.

## New Labs phone directory issued in binder form

The new Sandia telephone directory was distributed to employees last week in a new format. The Recycling Steering Committee, the Secretarial Quality Process Committee (SQPC), and the Affirmative Procurement Team coordinated efforts to make the directory totally recyclable by eliminating colored pages and glue binding.

Maxine Norton (12615), the new Sandia telephone directory coordinator, notes that some people at Sandia preferred the old, bound format, but a DOE mandate, an Executive Order by President Clinton, and the recent closing of the Kirtland Air Force Base landfill all encourage Sandians to produce and use recyclable printed products.

An updated directory will be distributed quarterly, without piecemeal revisions to insert. The white pages are completely recyclable and are punched to fit three-ring binders.

Employees are reminded that the directory is for internal use only and should not be distributed outside the Labs.

## this month in the past...

### Sandia LAB NEWS

45 years ago...The advantages of borrowing from the Laboratory Federal Credit Union instead of financing through one of the "national general merchandise stores" were listed in a 1950 article: If you borrowed \$90 from the Credit Union, the interest rate would be only one percent per month on the unpaid balance. If you borrowed \$300, your savings "would buy Junior a new suit, perhaps even mama a new chapeau..."

40 years ago...In a 1955 *Lab News* column called "Around the Departments," the following "newsworthy" notices were included:

William Perea, 2113, vacationed early this month, spending his days landscaping his yard.

When Amy White's little dog, "Girlie," became the mother of twins, Amy prepared an announcement card and passed out candy to her fellow employees in 2323. The card noted that the canine papa was "A. Neighbor."

30 years ago...Sandia's laminar down-flow clean room housed a full-scale conceptual model of a NASA-designed planetary lander vehicle to study biological contamination during assembly operations. Goddard Space Flight Center was considering the design of various contamination-free facilities for assembling and sterilizing spacecraft.



HONORS FROM THE NAVY — These three Sandians have been honored by the Navy with the Fleet Ballistic Missile (FBM) Achievement Award for their "significant contributions in the design and development of the MK5 radar fuze and the integrated arming, fuzing, and firing system." All three received their awards from Rear Admiral George Nanos at a special awards luncheon Feb. 8 in Arlington, Va. The recipients are (from left) Rick Heintzleman (2343), Chuck Williams (retired), and Rick Knudson (2345). The FBM award recognizes personal contributions pivotal to the development and success of the FBM Strategic Weapon System.

