How fares Sandia? State-of-Labs talk, employee dialogue sessions cover wide range of issues

Mission, budget, future among topics in Narath talks

By Ken Frazier

Lab News Managing Editor

If it seems a lot is happening at Sandia these days, you're right. Over three consecutive working days, Feb. 3-7, Sandia President Al Narath participated in two dialogue sessions with New Mexico employees, hosted a news conference for local media, and presented his second annual State-of-the-Labs address to Albuquerque-area and state leaders.

During the same period, the FY 1996 federal budget proposal was issued in Washington, and fallout from the Galvin report on the future of the national labs swirled about.

About 800 Sandians attended the two employee dialogue sessions, which included both question-and-answer time and previews of the State-of-the-Labs address. That address, Tuesday evening, Feb. 7, at the Technology Transfer Center (Bldg. 825), was attended by about 300 community and state leaders.

The Galvin issues are covered in a separate story below. Here are some selected points on other issues, drawn from all the presentations mentioned. All direct quotes are Al's. Some are from overview remarks, others are answers to questions.

Sandia's mission

The Labs' strategic intent is still "exceptional service in the national interest." There is no intention to change that. Technological leadership is the business Sandia is in — providing solutions to technology-based problems of national importance. "Defense is now, as it has always been, a core mission. I think of us as a laboratory dedicated to the security of our nation." With still "tens of thousands of nuclear weapons in the world, ready to go," Sandia's defense-program responsibilities in science-based stockpile stewardship, nonproliferation, counterproliferation, surveillance, and arms control remain crucial.

THIS IS SANDIA display in Bldg. 825 lobby is backdrop for Labs' President Al Narath at an afternoon news conference preceding his evening community State-of-the-Labs address. Albuquerque's two newspapers and three network-affiliated television stations attended the news conference. That's Bob Martin of KRQE-TV Channel 13 at the camera.

On the budget

The FY96 DOE budget shows a slight increase ($5 million) for Sandia, but its fate at the hands of the new Congress, even more so than in most years, is highly uncertain. "I don't know how any of us can know how the budget debate will affect us," says Al. Furthermore, approximately 25 percent of the Sandia budget originates with the Department of Defense and other agencies, and the DoD part has been in rapid decline. In addition, the nuclear weapons research and development (R&D) program is only half as big as it was two years ago. Signs that the new Congress will favor the nuclear weapon pro-

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Sandia National Laboratories

Sandia LabNews

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Reassuring, respectful, worrisome: Several sides of the Galvin report

What does it mean for Sandia, other labs, DOE?

By Ken Frazier

Lab News Managing Editor

The dust has barely settled from the hubbub over release of the Galvin report on the future of the national laboratories (*Lab News*, Feb. 3), but the task of assessing its consequences and reacting to its recommendations is well under way.

Sandia President Al Narath discussed the report in an interview with the *Lab News*. He also commented on it earlier in two employee dialogue sessions and subsequently in a news conference and in his second annual State-of-the-Labs address Feb. 7 to community leaders (see story above, "How fares Sandia?. . .").

In Washington, DOE Secretary Hazel O'Leary was quick to come out strongly in favor of many of the report's recommendations and in opposition to several others. Washington political figures checked in with their reactions too. There was widespread agreement — including from DOE — over the report's criticisms of DOE micromanagement of the labs, but its call for creating a radical new way of governance of the labs gained few followers and seemed stillborn.

Al went to Washington for the meeting of the Secretary of Energy Advisory Board at which the report was issued and then met the next day with directors of the other national

(Continued on page 6)

Labs Accomplishments 1994: Special 16-page section inside

Tech Transfer at Sandia is alive and well; see page four

Review concludes 'no adverse health effects' for employees bioassayed by CEP

An independent review team has concluded that "no adverse health effects are expected" for Sandians or contractors whose radiological bioassays were sent to a Santa Fe company for analysis between March 1992 and March 1994.

The US Attorney's office began investigating the company, Controls for Environmental Pollution (CEP), last November (*Lab News*, Nov. 11, 1994) following allegations that CEP provided inaccurate and unreliable data on urinalysis bioassays for more than 650 Sandia employees and contractors.

At that time, Sandia created its own investigative team, the Bioassay Review Team (BRT), headed by Dick Schwoebel, Director of Surety Assessment Center 12300.

Independant team of experts

As part of its investigation, BRT commissioned an independent subteam of five internal dosimetry experts from Los Alamos and Oak Ridge national labs to review the potential exposures to radiation of all individuals whose bioassays were performed by CEP.

The subteam concluded that there is no reason to believe any employee or contractor received an exposure to radiation that could cause adverse health effects. Whole body counts, dosimeter readings, and workplace surveys, including air monitoring, support this conclusion, says Dick.

To assess the validity of this conclusion, a small number of bioassays will be repeated for specific groups of individuals. For example, employees who returned from visiting a former

(Continued on page 5)

This & That

Sounds right – Something tells me Sue Hansen (6214) gave her mailing address to someone at the American Wind Energy Association over the phone. Sue received a package of information addressed to her at Sandy & National Labs. And, it contained another classic butchering of our fair city – Albecuque, NM.

* * *

Some serious talk – The Galvin report on the future of the DOE national labs, the President's budget recommendations, and some recent pronouncements by Secretary of Energy Hazel O'Leary all contain some real food for thought when it comes to the future of Sandia and the other DOE national labs. President Al Narath had lots to say about all of this in a special interview with *Lab News* Managing Editor Ken Frazier and me last week and at his New Mexico employee dialogue sessions two weeks ago. See Ken's stories on page one.

* * *

Our annual extravaganza – Observant readers have probably already noticed that this issue has about twice the usual number of pages. It contains our annual "Labs Accomplishments" special insert, summarizing the Labs' top 122 achievements during the past fiscal year. Our special thanks go to the many Sandians who submitted accomplishments (including those who didn't make the final cut); to the Sandia managers, directors, and VPs who reviewed all accomplishments submitted and selected the ones included; and to *Lab News* Writer Howard Kercheval who has coordinated this project for the past three years.

Many employees like to save the Labs Accomplishments section to show VIP visitors, customers, and other interested folks. We have a few extra copies; call 844-7522 if you need one or a few.

* * *

New title holders – Several folks are challenging some of the informal Sandia records that we've published lately.

Retiree Oscar Goodwin is now laying claim to the title for being in the same Sandia office for the longest time. Oscar, a photographer, says his office was in the south end of the basement of Bldg. 802 for 36 straight years before he moved temporarily for several years to Bldg. 880 while the 802 basement was under repair. He then returned to 802 for another two-year stint before retiring last year.

Several issues ago, Mike Ford (5822) asked if anyone at the Labs has had his or her Sandia desk any longer than he has – about 31 years. George Walker (12367), who has 46 years of Sandia service, says he's still using the desk that he got new in 1955, 40 years ago. Not only that, George is pretty sure he's using the same stapler he started with back in 1949. If that last part is true, they really *don't* make 'em like they used to.

* * *

Unclear on the concept – My wife Renae (6200) and I were reading the Sunday *Albuquerque Journal* several weeks ago when I noticed the special section advertising the annual Women's Trade Fair. When I asked her if she'd attend with me, she got this puzzled look until I explained that I wanted to see if I might be able to get a good used pickup truck for her. Thank goodness, the swelling has finally gone down.

– Larry Perrine

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MARTIN MARIETTA

Ethics training program begins next month

Though the concept is not quite as simple as going to the store to buy a bag of ethics, Ethics Center Director Jack Dickey (12700) and Ombuds Wendell Jones (12711) are about to launch a Labs-wide effort to impress on Sandians that ethics is as important in our work as finance, safety, regulatory compliance, and other tangible factors.

"Someone developing a program, project or event goes to our chief financial officer for financial advice, human resources for 'people' advice, and the ES&H folks for safety and related input," says Jack. "We're trying to make the Ethics Center the stop for some ethical dimensions for that project."

A problem he and Wendell have to overcome, though, is skepticism. He says a disturbing finding of a survey he sent to about 1,600 Sandians a few months ago was that only about a third of the respondents believed that if they reported an ethics incident it would be investigated fairly.

Part of the difficulty, Wendell says, is the intangible aspect of ethics, as opposed to

(Continued on next page)

InfoDay 95: Sandians invited to cruise the information superhighway

Sandia's involvement with the information superhighway will be explained through presentations and demonstrations at "InfoDay 95 — Sandians Navigating the Information Superhighway: Internally and Externally," on Tuesday, Feb. 28, 8 a.m.-4:30 p.m. in the Technology Transfer Center (TTC), Bldg. 825.

At InfoDay 95, made possible through the efforts of a grassroots community of Sandians, attendees will learn how accessing the information superhighway via Internet can assist them in their jobs. According to events coordinator Fran Current (13212), InfoDay 95 will show attendees "where we were a year ago, where we are now, and where we plan to be soon."

Also to be discussed is the World-Wide Web (WWW). This network allows the user to select highlighted and underlined words that link the user to separate but related data (hence, the "web"), explains Dru Popper-Lopez (4202), who will be conducting one of the InfoDay 95 sessions.

Separate morning & afternoon sessions

InfoDay 95 presentations will run throughout the morning, then will be repeated in the afternoon; Sandians can select the presentations they want to attend. PCs, Macs, and Unix workstations provided by several manufacturers and dealers will be set up in the TTC lobby for hands-on demonstrations of the various Sandia projects.

Mike Eaton, Sandia's Chief Information Officer (13100), will give the keynote address to be followed by a variety of presentations, including sessions on Sandia's Technology Transfer homepage, the Web External Architecture Team (WEAT), the Enterprise-information Viewing Environment (EVE) team, the Technology Information Environment for Industry (TIE-In), the Integrated Development Environment and Assistant (IDEA), the InfoServe-1000 project, WWW security concerns, and related WWW Department of Energy efforts. Ruth David, Director of Advanced Information Technology Center 1090, will present summary statements.

Schedule in Monday's *Bulletin*

The full InfoDay 95 schedule will be published in the Feb. 20 *Weekly Bulletin* for Sandia/New Mexico.

A similar InfoDay 95 will be scheduled at Sandia/California in March or April.

For more information, contact John Mareda (1425) on 845-8550 or Fran Current (13212) on 845-9693.

Employee death

HOWARD DEVANEY

Howard Devaney of Electromechanical Components Dept. 2641 died Feb. 2 after a short illness.

He was 71.

Howard was a senior member of the technical staff and had been at Sandia since 1948.

He is survived by his wife, Virginia, and son, Ray.

Sympathy

To Judy Wills (1144) on the death of her mother in Albuquerque, Jan. 15.

To Faye Woods (5831) on the death of her brother in Albuquerque, Jan. 25.

Sandia technologies provide signposts for advanced car of the future

Carmakers, engine companies review auto-related research at California site

By Nancy Garcia
California Reporter

Several groups made Sandia/California a major destination recently on their search for advanced transportation solutions.

In a conference room at the Combustion Research Facility, VP John Crawford (8000) chaired a national meeting of the Clean Car Coordinating Committee (C-4), a cooperative of government labs providing technical support for the Partnership for a New Generation of Vehicles (PNGV). The partnership between labs and industry will explore emerging automotive technologies.

At the same time, Bill Robinson (8702), who manages Sandia's automotive programs, arranged for PNGV Technical Task Force members to review Sandia research. Sitting on the PNGV Technical Task Force are executives from Ford Motor Co., General Motors Co., Chrysler Corp., DOE, the Department of Commerce, NASA, the Department of Defense and other federal agencies.

Also visiting the site at that time were diesel engine companies Cummins Engine Co., Detroit Diesel Corp., and Caterpillar Inc. The US Council for Automotive Research's Engine Support System Technology program also sent industrial partners, many of whom had never seen the California lab before.

Engine studies and energy research

Sandia's roadside attraction for PNGV members (who are traveling to all the government labs in search of applicable technology) features engine studies and related energy research.

The first PNGV goal is to improve US automotive manufacturing and reduce time to market. The second is to bring near-term design and materials innovations to conventional vehicles. The third is to develop, over the next eight or nine years, prototype vehicles that triple the fuel economy of today's cars without sacrificing comfort, convenience, and cost.

Bill says Sandia technologies support all three PNGV goals.

To advance manufacturing, Sandia is working with Detroit to improve welding, machining, casting, hardening, and coating technologies. In support of the second goal, Sandia is developing new catalysts, improved engine combustion systems, and new types of sensors and electronic controllers.

PNGV aims to end its R&D quest with a car that gets 80 miles per gallon, has extremely low emissions, and can comfortably carry six adults and 200 pounds of luggage for 380 miles before refueling. To support that goal, Bill says, Sandia is working on improved batteries, fuel cells, lightweight materials, and improved tires and airbags.

SEEING INTO ENGINES — John Dec (8362, left) and visiting researcher Christoph Espey of Cummins Engine Co. discuss the diesel engine combustion imaging system at Sandia/California.

Combination of power technologies?

Reaching that final milestone will probably entail a car powered by a combination of technologies, says Jay Keller, Acting Manager of Combustion in Engines and Furnaces Dept. 8362. Such a hybrid car may draw the energy to spin its wheels from an electric motor. The motor could double as a generator, recapturing energy that is normally dissipated during braking. Power could be supplied at different times by an engine, battery, ultracapacitor, or flywheel. Some energy supplies are better suited to quick acceleration, others to steady highway travel.

"No single technology can do it all, but different pieces can be assembled into a system that will work across a wide dynamic range," Jay says in describing possible power distribution within a hybrid vehicle.

The hybrid drive train may not eliminate fossil fuel altogether. Diesel engines' high performance is especially attractive to PNGV planners, who saw two ongoing diesel engine investigations at the California site. Cummins, Detroit Diesel, and Caterpillar were also on hand to review Sandia's diesel research.

John Dec (8362) showed the way lasers are helping visualize how diesel fuel mixes and burns while a diesel engine is running. Jeff Naber (also 8362) showed next-generation, high-pressure diesel engine research performed for the Advanced Research Projects Agency.

Different energy-storage methods are also part of a PNGV package. Carbon-based batteries, fuel cells, or ultracapacitors based on research by Jill Hruby (8716) and Jim Wang (8713) might appear in a future vehicle. Their research area was also a stop on the technology tour.

Sandia CaliforniaNews

Ethics training program

(Continued from preceding page)

money, buildings, employees, and similar assets one can touch. "In many ways, ethics is a visceral sort of thing, and I sometimes compare behaving ethically to being in love," he adds, with a laugh: "If you are, you know it; if you aren't, you know it."

Sessions begin next month

The center's top priority right now is completing a training program on ethics that will include a video presentation. They have presented the pilot program for employees in Carlsbad, N.M., and Washington, and plan to present it one more time within the next few weeks — probably at Sandia/California — before launching into a months-long schedule of presentations to all Sandians.

The first full round of presentations, Wendell says, will begin in March and continue through June.

The video will include three basic elements, he says:

- Motivation, including some results from Jack's initial survey and the need for an ethics program to address some of those results,
- How to apply ethics to existing as well as potential problems and issues, and
- Resolution-management processes, including both an informal process worked through the Ombuds office and a formal process addressed through the Ethics Office.

Ethics training is for everybody

"We have a sincere desire for personal discussions about the ethics program in small groups, and look forward to meeting at the department level subsequent to this upcoming corporate training cycle," Wendell says. "This training is for everybody, not just managers, and we're asking managers and directors to invite us to all-hands meetings and other regularly scheduled meetings to reinforce the more formal training sessions."

Reasons for the latter, he adds, include the desirability of talking with small groups where more meaningful exchanges can occur, "and to avoid scheduling yet another independent meeting into everybody's schedule."

Obviously, he says, the ethics and ombuds offices don't do technical work that produces tangible things to shore up Sandia's future, but they do strive to help those who do hands-on technical work, and in that way contribute to the Labs' future.

"If we do our work right, we will steadily diminish the number of concerns showing up in our office," adds Jack. "So the long-term perspective is that we may be — and hope to be — working ourselves out of at least a concerns-resolution job." — *Howard Kercheval*

Retiree deaths

Kay Marie Graff (82)	4151	Jan. 3
Dorothy Crosby (75)	3212	Jan. 6
Salomon Hildalgo (75)	3612	Jan. 12
Charles Drummond (74)	8271	Jan. 18
Carl Schoenfelder (67)	8313	Jan. 24
Leroy Ramsey (69)	3462	Jan. 25

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

Technology transfer at Sandia: An impressive record

Galvin report may mislead some about program's future

By Larry Perrine
Lab News Editor

Alive, well, and full-speed ahead describes Sandia's record-setting Technology Transfer Program, despite some misperceptions that some people are getting as a result of information in the recently released Galvin report, according to Tech Transfer Center Director Warren Siemens (4200).

President Al Narath agrees. During a *Lab News* interview last week, he emphasized the necessity of maintaining and even increasing Sandia's interactions with industry and universities. He commented about some specific references to this subject in the Galvin report on the future of the DOE national laboratories (see separate story on page one): "There are some statements in the report that would lead you to conclude that the Galvin task force on balance did not see as much value in our industrial interactions as we do.

"The program we have created in Tech Transfer is totally consistent with the recommendations of the report," says Al. "For some time now, we've emphasized those industrial interactions that build on our core competencies. Since our core competencies support our core mission responsibilities, we're absolutely in harmony with Galvin and his task force."

Continuing interactions with industry

"But I would go beyond that," Al continues. "There's nothing I've seen or experienced or in what Bob Galvin has said that causes me to change my mind in regard to the critical importance of continuing to develop constructive interactions with the private sector. I've always believed that this can be done within the context of our mission responsibilities.

"Competitiveness we agree is a derivative mission. But it doesn't mean that it is of secondary importance. I think it is of primary importance. It's a way to gain greater value for the taxpayer both in what contributes to our own core mission success and also what we contribute to the private sector. Everybody wins. It's a central principle of our strategic thinking.

"We've experienced a very dramatic increase in funds flowing in from our industrial partners into the laboratory. We expect that flow to increase in the future."

Laboratory Development VP Paul Robinson (4000), Warren Siemens, Sandia/California Tech Transfer Director Mike Dyer (8800), and other tech transfer administrators gave Sandians a comprehensive update about Sandia's technology transfer accomplishments and plans at a "town meeting" late last month.

Impressive list of accomplishments

The accomplishments are many. As reported in the Feb. 3 *Lab News*, from FY91 through FY94 Sandia established 217 cooperative research and development agreements (CRADAs) with a total value of $652 million and with partners in 31 states. Sandia leads all other federally funded institutions in this measure of success.

Among Sandia's major FY94 accomplishments:

- Reduced processing time for new CRADAs by 67 percent, from 210 days to 70 days,
- Received the DOE Industrial Competitiveness Business Line Customer Service Award for Process Improvements,
- Increased the total number of CRADAs by 44 percent (92 new ones),
- Partnered with small businesses for 18 percent of the total value,
- Increased technical assistance 350 percent to 276 projects, one-third with woman- and minority-owned businesses,
- Increased invention disclosures by 60 percent to 215 and increased patent applications by 37 percent to 67,
- Established a technology transfer leave of absence policy for Sandians who want to start new businesses, and
- Established a program to encourage entrepreneurial activities with Sandians and provide support to the Technology Ventures Corporation.

Industry is paying more

Although these accomplishments are impressive, perhaps a better measure of the Labs' track record is the fact that more and more companies want to work with Sandia and they are increasingly willing to foot a larger part of the bill for joint R&D.

That's good, Paul Robinson pointed out in the Jan. 27 town meeting, but Sandia simply does not have enough tech transfer money to cover nearly all requests for CRADAs. He said Sandians, working in cooperation with industry partners in response to the last three calls for CRADA proposals, prepared eight times as many joint work statements as Sandia had funds to support.

That's the downside, but the upside is that industry is paying more of the CRADA costs. When CRADAs were first being established in FY91, it was envisioned that the Labs and industry would contribute approximately 50 percent each of CRADA costs.

When Bob Galvin and his task force visited Sandia last year, Paul says Galvin commented that it might be time for Sandia to "raise your prices."

Paul replied to Galvin that this was happening to some extent, telling him that CRADAs that were originally set up to be 50-50 government and industry funds have for Sandia been closer to 60 percent industry funds over the first three years.

"Well, three months later," says Paul, "we got the totals for the close of FY94, and what do you think the percentage of industry funds is to our program for all the CRADAs that we started last year, which is the largest number of CRADAs ever? Seventy-six percent industry funds. We have, in effect, accomplished Galvin's suggestion. Industry is increasingly carrying more of the load as well as putting funds into Sandia."

Paul emphasized that technology transfer is an integral part of Sandia's new strategic plan.

(Continued on next page)

For more information

Many other technology transfer accomplishments too numerous to mention here, along with the Technology Transfer Center's FY95 plans, are detailed in the center's FY95 Operating Plan. Interested Sandians can call Renee Zittel (4200) on 271-7814 for a copy.

Small business initiative awards announced

Technology Transfer and Commercialization Center 4200 recently announced the winners of its small business initiative awards. Four awards were presented based on the more than 500 technical assistance projects that have been initiated at Sandia.

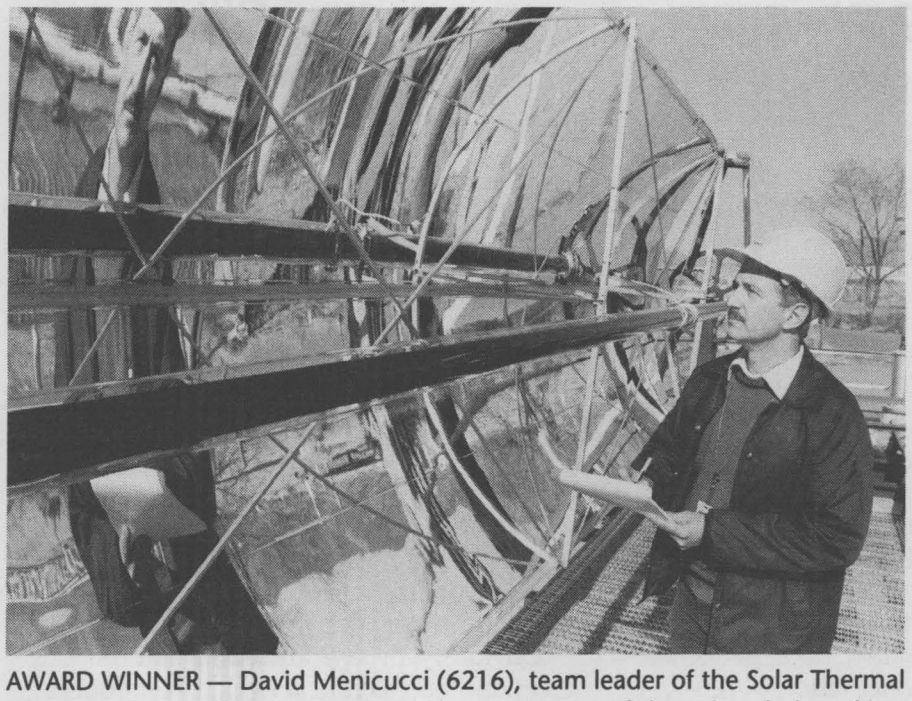
The awards were presented to "express the appreciation of the technology transfer organization and the small business community for outstanding support."

Research and Exploratory Technology Division 1000 received an award for participating in 106 small business technical assistance projects, the most for any Sandia division.

Materials and Process Sciences Center 1800 received an award for participating in 53 such projects, the most for any Sandia center.

Energetic and Environmental Testing Dept. 2761 received an award for participating in 19 such projects, the most for any Sandia department.

David Menicucci, Solar Thermal Technology Dept. 6216, received an award for participating in 14 small business technical assistance projects, the most for any Sandia employee.



AWARD WINNER — David Menicucci (6216), team leader of the Solar Thermal Design Assistance Center, monitors the movement of the azimuthal tracking (AZTRAK) rotating platform. David explains that the platform, built in the mid '80s, is used to test the viability of solar troughs. The platform rotates to track the azimuth of the sun, while the trough remains focused on the sun, enabling engineers to replicate varied solar conditions at any time of day. Combined funding from Technology Transfer's Small Business Initiative Program and the Solar Program enables the center to use the AZTRAK to assist small businesses and manufacturers in running performance and quality assurance testing that could otherwise not be performed. David recently received the award for participating in the most small business technical assistance projects at Sandia.

(Photo by Randy Montoya)

State of Labs

(Continued from page 1)

gram and basic science are welcome. The FY97 budget, a year from now, is the big worry.

Sandia's future

"Overall, I'm quite optimistic and excited about the future," Al said. "Our country needs us. Our missions are important. But we need to keep in mind that there may be very stormy weather ahead. We may sail around it or sail through it with the hatches battened down." Sandia's mission and strategic planning has served us well. "I believe that Sandia is as well situated as we possibly can be to weather the storm."

"Two or three years down the road," Al told local news media in answer to a question, "I'd guess we'll be slightly smaller, but I don't know what 'smaller' means."

Sandia started positioning itself for accelerating change several years ago. "We needed to become more agile, fast-moving, efficient. We've made a lot of progress, but there is still a long way to go."

"I know we have put you all under a great deal of stress," Al told employees. "But on the whole, you'll probably admit that as a result we're a far stronger organization than we were before."

Strategic Plan

The Sandia Quality Leadership Council recently issued "our first post-Cold War Strategic Plan" — Sandia's Strategic Plan 1994 document — "which points us in a very good direction," Al says. It emphasizes the Labs' core responsibilities, its commitment more than ever to partnerships with industry and universities, and a strong focus on its core competencies (basic science) of advanced manufacturing, electronics, information technology, and pulsed power.

Sandia research

Sandia's seven R&D 100 awards this past year (the most ever won by a single institution), its recent Gordon Bell Prize for large-scale scientific computing, and a variety of other scientific, engineering, and technological achievements that made the news reemphasize that "we put people and programs together for world-class research." Sandia is well positioned here because "we link our science closely to our engineering efforts," Al says.

Production

Sandia has established a new business unit — Organization 14000 — for its new production responsibilities. These responsibilities include making neutron generators, formerly done at DOE's Pinellas plant in Florida, and using the Annular Core Research Reactor in Area 3 to manufacture medical radioisotopes. Several hundred people are expected to be working in this new unit after another four years. Nevertheless, Al emphasized that it is important to keep employment figures for this new production responsibility separate from employment for Sandia's principal R&D function. He says Sandia has 400 fewer employees in R&D now than it did in 1990.

Lockheed Martin

Martin Marietta's merger with Lockheed to create the Lockheed Martin Corp. is expected to become final by mid-March. "We'll be flying a new flag," says Al. "The same contract provisions for Sandia's operation will remain in place, and thus we don't foresee any direct effect on how Sandia is managed."

Gateway Center

Sandia is working hard to get funding for a new user-friendly Sandia entrance and Technology Information and Outreach Center south of the present Air Force Eubank gate. Official visitors to most Sandia facilities would then no longer have to go through an Air Force gate. "This is an extremely important addition to our facilities," Al said. "We host 40,000 visitors a year. I hope this center will become a reality. It's important for visitors to come and access this laboratory in a user-friendly way. We need to be more accessible. The Gateway facility is the next step in the evolution of Sandia's relationship with the outside community."

Al is scheduled to participate in two employee dialogue sessions at Sandia/California today, Feb. 17.

STATE OF LABS — Sandia President Al Narath and Executive Staff Director Virgil Dugan (12100) talk with former New Mexico Lieutenant Governor Casey Luna (right) at reception preceding the State-of-the-Labs address.

(Continued from preceding page)

"The plan stresses that technology transfer in industrial partnerships should be a derivative mission," he said, "that is, the technology that we develop within our main missions should be leveraged to support industry . . . to achieve dual benefit. I think we already have a good success record in establishing dual benefits."

Speaking about the future of Sandia's programs in light of the changing national political climate, Warren Siemens said the Labs will move increasingly and faster into some areas in which Sandia has a strong beginning.

A revenue-generating business unit?

"A strategic response to all the changes in Washington is to begin to think of ourselves as a revenue-generating business unit," said Warren. "We are going to encourage more funds-in from industry on CRADAs. We're going to pursue more user-facility funds and agreements, accelerate the licensing of intellectual property, and generate royalty income. And we have just initiated a technical assistance funds agreement. We have been doing that for small business for some time; we can now do it for medium and large businesses.

"We have what some people consider rather optimistic projections," Warren continued, "but we are shooting for $100 million of funds-in from industry in the year 2000. We think that we will get about $20 million this year. We are just starting some new mechanisms and some growth in a lot of these areas. We're projecting about $25 million in income from royalties in the year 2000 and about $20 million from user facilities."

Sympathy

To Bryan Spicer (2345) on the death of his wife, Lisa, in Albuquerque, Dec. 26.

Health effects

(Continued from page 1)

Soviet Union nuclear facility will be among the individuals retested, says Dick.

In the large majority of cases, he adds, bioassays were sent to CEP as part of routine testing, or were baseline or termination surveys. While BRT is not recommending repeat bioassays for most employees surveyed by CEP, any employee or contractor who is concerned about a possible exposure may have a retest.

Each employee or contractor bioassayed by CEP will soon receive a letter or phone call explaining the review team's findings and indicating whether a retest is needed. Team members also will meet with certain groups to discuss the team's findings for that group.

The team expects to issue a report in March describing all its activities, including recommendations for several policy and process improvements.

Employees who have questions or need more information may call Sandia's non-emergency hot line on (505) 844-6515.

— John German

Members of Sandia's Bioassay Review Team:

Dick Schwoebel, chairman, Director of Surety Assessment Center 12300

Stephanie Ball, MD, Occupational Medicine Center 3300

Michael Patton, Protective Force Dept. 7435

Ken Reil, Manager, Reactor Safety Experiments Dept. 6423

Glenn Murphy, Martin Marietta Energy Systems

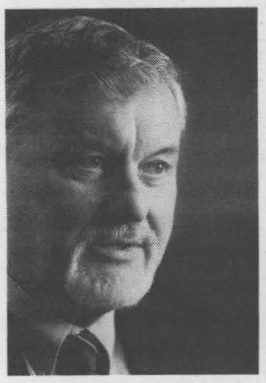
Galvin report

(Continued from page 1)

labs. The perspectives that follow come mainly from our interview with him.

Reflects respect for labs

One thing that's clear is that chairman Robert Galvin and other members of the DOE-commissioned task force did a conscientious job of assessing the role of the national labs. "Bob Galvin visited every lab and spent countless hours involving himself in what the labs are doing," says Al. "He showed a tremendous commitment that reflects a great deal of respect on his part for the labs. I know that he personally walked away from the study convinced that these labs not only have been of great value to the nation but will continue to deliver value in the future."



AL NARATH

The good thing for Sandia is how closely the report — with its emphasis on the core missions of national security, energy, environmental technology, and science — resonated with Sandia's own strategic goals and missions. "There was a close parallelism between the principal themes of his findings and recommendations and the course that we at Sandia have been steering for some years," says Al. "It's not that I'd say we've been totally successful yet in what we've set out to accomplish, but we have made considerable progress, and we really have followed a track that is amazingly close to the central theme of the Galvin report. So that's very reassuring."

Troubling aspects

But there are troubling aspects, too. "Despite all these positives, there are things in the report that I frankly find worrisome," says Al. "For example, I would have been happier had the report provided some support for expansion of the DOE mission. In fact, the report says go back to your knittings, emphasize your core missions. And furthermore it also emphasized the notion that we [the national labs overall] are too big."

Right after the report came out, Al says that Bob Galvin, in talks with Congressional staffers, used figures like 30 percent to 50 percent cost-reduction opportunities at the labs. "In our Sandia reengineering program, we've set a target for reducing our *overhead* costs by 20 percent," says Al. "That's a far cry from a 30-50 percent *total* cost reduction. It's clear that you cannot do that simply through efficiency improvements. It would have to involve elimination of a lot of work."

There are other concerns, too, he says, including the report's reservations about the value of industrial interactions. Al emphasized the necessity of maintaining and even increasing Sandia's interactions with industry and universities, and said: "We've experienced a very dramatic increase in the money flowing from our industrial partners into the laboratory. We expect that flow to increase in the future." (For more of his comments on this topic, see "Technology transfer at Sandia: An impressive record," page 4.)

While the report had high praise for the national labs, it also said they are oversized and overfunded. "You've got to remember that Bob Galvin and many on his committee looked at the labs through private-sector eyes," says Al. "If you look around the private sector, what you find in recent years is massive downsizing — a *right*sizing — even among institutions that have outstanding records of accomplishment. There has been a real need to achieve higher efficiencies throughout the private sector, and it's not surprising that Galvin concluded the same kind of streamlining is needed on the government side.

"I think we need to distinguish issues pertaining to size from issues pertaining to technical excellence. They're not one and the same."

Streamlining the DOE-Labs interface

Al says he and almost everyone else welcome the report's recommendations for improvements in the interface between DOE and the national labs, particularly those calling for less micromanagement and compliance-based oversight. "Both the labs and DOE at this point are in total agreement that there's a need to streamline the interface between the Department and its laboratories."

He says he expects DOE to act on many of the suggestions in Appendix B of the report. Key recommendations there include:

- Replace compliance-based directives with simple, well-defined performance measures,
- Eliminate DOE approval of labs' internal procedure documents,
- Eliminate approval of individual transactions,
- Base audits and appraisals on serious risk,
- Eliminate duplication of audits, appraisals, and reviews, and
- Challenge the labs to reduce costs.

The national labs were set up to be GOCO (government-owned, contractor-operated) institutions. "We're sort of halfway between the private sector and the federal sector, by design," says Al. "You'll notice that one of the criticisms leveled at DOE by the report is that we have tended to become GOGOs — government-owned, government-operated. We need to strike a proper balance."

Nevertheless, Al says this isn't the time for any divisiveness. "I personally think it's very important that we close ranks at this point, that we resist any temptation to think of ourselves as being outside of DOE. As DOE goes, we go, and vice versa. Anything that harms that relationship is not in the best interests of the nation. We need to recognize that there is a very high degree of interdependence."

Where from here?

What next? In her statement, Secretary O'Leary pledged to act aggressively on the overwhelming majority of the task force's recommendations. She said DOE would work toward an ever-more efficient and cost-effective laboratory system. She welcomed the report's validation of the importance of its R&D missions, its "bullish stance" on DOE's fundamental science mission, and its support for DOE's science-based stockpile stewardship program. She said she concurs with the report's criticisms about "creeping micromanagement" and "excessive oversight of the labs by Congress, the Department, and multiple review bodies." She said those criticisms provide "new urgency to our efforts, already well under way, to reduce and eliminate DOE orders and to strip away non-value-added layers."

Al says DOE has added an extra day to a regular quarterly meeting of the national lab directors in Washington this month for discussion of a response to the Galvin recommendations.

DOE said it will submit a full analysis and implementation plan to the National Science and Technology Council by March 7. At that time, the Galvin report, with DOE's response, is to be included in a report to the President that reviews the laboratories of the DOE, Department of Defense, and National Aeronautics and Space Administration. It had earlier been agreed that the Galvin study would constitute the larger study's assessment of the DOE labs.

California site 'a strategic advantage'

With the Galvin task force recommending that certain Lawrence Livermore National Laboratory weapons-related work shift gradually to Los Alamos National Laboratory, is any effect on Sandia/California likely?

No, says Al Narath.

"I don't think it would have any impact on Sandia," says Al. "Our long-range strategy for our California site has been decoupled from the question of whether Lawrence Livermore stays or does not stay in the weapons program. That has been by design."

"We are a single, unified national laboratory at multiple locations. I'm absolutely committed to maintain the California location. It's a strategic advantage to us."

A good example of that is the fact that 58 of Sandia's 217 cooperative research and development agreements established with industry from FY91-FY94 are with California companies.

Welcome

Albuquerque — Drucilla Aragon (3512), Laurel Blackmon (10248), Michel Bode (7572), Joel Carlson (9614), Timothy Hobson (10233), Nancy Irwin (9411), Maryann Krauss (7732), Kathryn Kuhlmann (12621), Charles Loeber (14509), Karen Lowden (7906), Edward Mader (9819), Leonard Martinez (14000), Martin Montoya (1815), Patrick Moore (13221), Stephanie Oborny (10504), Phillip Ortiz (10232), John Rebstock (7906), Ernest Sanchez (7733), Thomas Togami (2742), Peggy Warner (13213), Ruth Weiner (6347); Mona Anderson, Barbara Cain, Diane Cline, Pearl Garcia, Marceline Jordan, Kathryn Leonard, Julie Ludwig, Felicia Senigo, Wendy Simms, Mary Evelyn Stewart, Heidi Welberry (all 12111)

Other *New Mexico* — Teresa Bohuszewicz (1846), Timothy Cohen (7258), Kelly Lamb (7901), Brett Locke (7903), Carole McDonnell (13314), Karen Pounders (12111), Michael Rye (7714), Norbert Tencza (6700), David Walsh (1111), Victor Weiss (6306), Sherry Wright (12111)

Alabama — Leslie Interrante (6913)

Arizona — Lisa Kennicott (2336), William Sims (2611)

Georgia — Nicholas Francis (6312)

Idaho — David Bullock (6306)

Indiana — Christopher Lewis (2121)

Minnesota — Mary Ortega (7600)

North Carolina — Ralph Hager (9614)

Pennsylvania — Laura Painton (6613), Anita Reiser (6347)

Texas — Michelle Gavin (7611), Jeffrey Jarry (7577), Jesus Lopez (6621), Alfred Romo (10246), Donald Wesenberg (9403)

Congratulations

To Yvette and Steve (10204) Nichols, a daughter, Sarah Ann, Jan. 26.

Sandia Classified Ads

Sandia Classified Ads Sandia Classified Ads Sandia Classified Ads

MISCELLANEOUS

DOWN SKI JACKET, Pioneer Wear, size medium, light beige w/western-style suede leather accents, new $160, asking $40. Schkade, 292-5126.

DASH COVER & FLOOR MATS, charcoal gray, for '92 Dodge Shadow, $20. Ottinger, 275-2348.

CAR DOLLY, swivel base, lights, wench. Campbell, 856-9195.

RECLINER COUCH, (2 of 3 seats recline), $525; green recliner chair, $150; king-size Ethan Allen headboard, (book-shelf), $200. Newman, 266-6928.

PIT GROUP SOFA, w/corner table, 1 yr. old, doesn't fit in new house, gray & mauve color. Savage, 890-4796.

BIG BERTHA DRIVER, graphite shaft, 11 degrees, about 6 months old, great condition, $170. Perrine, 293-1429.

RECORD PLAYER, Zenith, RCA Victor/Decca records, Gershwin, Lombardo, 78s, albums, excellent condition, reasonable. Matlack, 256-7371.

SET OF FOUR RIMS, w/hub caps, for '79 Olds Salon, $50. Shorty, 821-3952.

JOINTER, small, w/heavy stand, no motor, $20. Clancy, 281-4469.

RACE TICKET, & Southwest Airlines ticket to Indy car race, in Phoenix, Apr. 2, group hotel rate available. Jackson, 275-2524.

FOUR TIRES, MTS-rated, Pirelli P4000, Super Touring 195-65HR15, 5,500 miles, make offer. Phipps, 299-8490.

DRUM SET, 9-piece w/cymbals, $600; keyboard synthesizer, $300. dePalma, 255-2263, evenings.

EXERCISE BIKE, Healthmaster 150, dual action, very good condition, $40. Anderson, 265-7460.

BORDER COLLIE/LAB, free to a good home, moving. Padilla, 296-6455, after 5 p.m.

WATCHMAKER'S BENCH, good condition, price negotiable. Wright, 256-9210, after 6 p.m.

CHILDCRAFT CRIB-TO-YOUTH BED, w/chest of drawers, changing table/dresser, oak finish, $400; table, 49" x 27", $100. Kaye, 292-4242.

HOT TUB/SPA, seats 4-5, insulated cover, $1,500. McKenna, 899-4218.

LASER PRINTER, Epson Action, $350; Eureka family tent, w/net enclosure, $200; sewing machine cabinet, $35; large microwave, $95. Eichel, 292-5795.

PARROT, orange-wing, Amazon, tame, gives kisses, beautiful condition, w/cage, $475. Babcock, 296-2729, leave message & number.

MICROWAVE, Tappan, 700 watts, turntable, auto defrost, programmable, black front & woodgrain sides and top, $85. Hatch, 281-0543.

MAYTAG DRYER, almond, $75; Kenmore heavy-duty washer, white, $75; both in good working condition; H&K P7M8 9mm hand gun, never fired, $800. White, 255-9586.

TWO TABLE LAMPS, white, 34-in. high, w/shades, like new, $45; two self-taking blood pressure monitoring kits, $15 ea. Burstein, 821-6688.

AIRPLANE, Mustang II experimental, 130 hrs. TTAF, 1,300 hrs. SMOH, two-place, 165 mph. cruise, $16,000. Cox, 299-5212.

ZENITH 25-IN. TV, nice cabinet, good picture after warmup, free to good home, you pick up. Campbell, 281-0744.

SEGA GENESIS, w/4 games, plus add-on controller, $80. Orand, 275-2255.

REFRIGERATOR, $35; dishwasher, $15; Canon copier, $100; NEC-IT Multisync, $165. Dean, 299-3281.

QUARTER HORSE, mare, beautiful bay, registered, 8 yrs. old, for experienced rider, $2,200 OBO. Miller, 292-5634 or 293-6560.

WATERBED, Simmons, soft-side, no side rails needed, amount of water in the tubes controls firmness, $75. James, 298-0709.

TIRES, two Michelin, XGTV 225/50VR16, used but some tread left, good spares, $10 ea. Adelmann, 899-8699.

WEDDING GOWN, size 6/8, chantilly lace collar & train, empire waist, full-length mantilla veil, simple but elegant, $100. Seyfer, 292-0179.

CRIB, medium oak finish, $75. Hopkins, 821-3641.

LAS CRUCES WHOLE PECANS, 150 lbs., $1.50/lb. Farmer, 857-0503.

HAMMOND CHORD ORGAN, Leslie animations, $450; king-size Stearns & Foster mattress & box spring, w/frame, $350. Brooks, 864-4246.

BABY CRIB and mattress, very good condition. Franks, 275-9588.

MULE, red roan mare, good for riding or packing, just out of the Gila, $500 OBO. Simpson, 246-2014, leave message.

BOY'S COWBOY BOOTS, size 12-1/2, tan leather, like new; gray Acme cowboy boots, size 13-1/2, $15 pair. Mayer, 299-8524.

FORMAL DINING TABLE, 2 leaves, table pads, six chairs, matching server, beautiful, $750 OBO; Italian crystal chandelier, $100. Cocain, 281-2282.

SOLID OAK TABLE, 42" x 42", w/o leaf, 42" x 72" w/leaf, $300. Martin, 294-8387.

PERSONAL COMPUTER HARDWARE, sound blaster card w/all software, $12; 5-1/4-in. high-density (1.2 MB) floppy drive, $10. Lagasse, 298-0977.

EXERCYCLE, Lifestyle dual-action ergonometer, excellent condition, $100 OBO. Meloche, 296-1452.

PHILLIPS CD880, remote control CD player, $350; Adcom GFA-555a, 200-watt stereo amplifier, $400; Adcom GFA-555 series 1, 200-watt stereo amplifier, $475. Norton, 299-3763.

TUB ENCLOSURE, extra-heavy, amber glass, excellent condition, $100; Peerless chrome tub, shower faucet, $35. Biffle, 293-7043.

ELECTRIC TYPEWRITER, Smith-Corona, portable w/case, excellent condition, $50. Hall, 256-3665.

ADDING MACHINES, $5 ea.; Canon P21-D & Royal W2-TD; man's black leather boots, size 9; Coors satin-like jacket, X-large. Armstrong, 266-2334.

BEDS: full, $150, twin, $125, both have headboards & footboards; electric oven, $125; B&D electric lawn mower, $100. Newman, 266-6928.

TABLE SAW, w/stand, Sears Craftsman, very good condition, $80. Ghanbari, 883-3819.

LHASA APSO DOG, w/papers, friendly, good w/kids, must find new home, $50. Chadwick, 294-3493.

ELECTRIC STOVE, Whirlpool, 30", almond, continuous cleaning, clock, oven light, black glass door, drawer, upper broiler, $200 OBO. Olson, 299-0483.

PIANO, antique, Henry Ward, Bloomsbury London, small upright, needs tuning, $400. Davis, 293-7457.

ENTERTAINMENT CENTER, dinette set, twin mattress set, 10-gal. fish tank & accessories; two stereos. Barbour, 254-0562.

CAMPER SHELL, $100; tires, 2-10.50 x 16.5 Goodyear, $50; color monitor, $20; skis, boots, poles, $40; two Pioneer 150W speakers, $125. Jaspersen, 298-1946.

VICTORIAN BEDROOM SET, red mahogany, bed w/headboard & footboard, 2 night tables, dressing table w/mirror, $500. Bullen, 281-0142.

CHEST OF DRAWERS, matching dresser w/mirror, dark wood, good condition, $150. Deller, 298-5705.

BRIEFCASE, by Jack Georges, NIB, leather w/5 suede-lined compartments, detachable strap, $225 retail, best offer. Mann, 343-0524.

FLAGSTONE, only $0.95/ft. delivered. Sandoval, 345-9590.

FILL DIRT, you pick up or we deliver, great price. Sandoval or Vigil, 345-9590.

TUNTURI EXERCISE BIKE, w/arm poles for upper body, computer monitor, like new, $250; stepper w/computer monitor, $50. Gabel, 296-9205.

PRO SPORT ERGOMASTER AERO II, air resistance bike, $60; AKAI stereo receiver, $35. Langwell, 293-2728.

ELECTRONIC STAIR STEPPER, Lifestyler. Rivers-Stroup, 836-6304.

TOPO MAPS OF NM, USGS, 184 of 7-1/2' series, 22 of the 15' series, all for $75 OBO. Caskey, 294-3218.

HYBRID WATERBED, normal queen-size mattress w/bladder, headboard, box spring & frame, $100. Henderson, 281-8271.

WEDDING DRESSES, (white or ivory), size 5, $175 ea. Clavey, 292-7667, leave message.

T'AI CHI CHIH, videotape, 81 minutes, 17 movements & full practice session, $20; audio cassette, music for practice, $5. Caskey, 298-6428.

BABY CRIB & MATTRESS, $120; playpen, high chair, stroller, $45 ea. Chavez, 899-9744.

OFFICE CHAIR, $35; small wood desk, $35; Springcrest drapery rods, $25 ea. Gibson, 294-6831.

COMPOST, we load, $5 per pickup load, located in Bosque Farms. Kallenbach, 869-5237.

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

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 8½- 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.

TRAIN SET, N-scale, w/layout on 3' x 4' board, $40. VanDenAvyle, 898-6974.

SEARS X-CARGO, 15 cu. ft., good condition, only used once, $65. Sinclair, 821-0832.

MANTIS ROTOTILLER, gas weedeater, Walther 7.67mm semi-automatic; Geisha lladro, oriental rug; baseball cards. Truitt, 294-5349.

NORDICTRACK, Excel model, excellent condition, $375. Hubbard, 293-2819.

DOUBLE STROLLER, Petius, reclining seats, removeable seat, covers, canopy w/window, excellent condition, $60. Meeks, 828-9825.

EXERCISE ROWER, $100; stationary bike, $50; multi-use exercise bench, $50; brass bed, mattress & box spring, $225. Sleeter, 299-3347.

OSCILLOSCOPE, Tektronic 531, w/two pre amps, I probe, $150; Wavetek 4-function wave generator, $50; Heathkit bar & dot generator, $50. Meyer, 292-6802.

MAINFRAME COMPUTER, IBM system 1, damaged by lightning, 2 line printers & terminal, free to first taker. Kral, 298-6699.

NINTENDO, complete system, 9 games w/instructions, extra joystick, $100. Delinger, 821-2042.

BUMPER POOL TABLE, Brunswick, w/cover, slate bed, cues & rack, balls, $250 OBO. Bolin, 299-5880.

VINTAGE SOFA & CHAIR, matching, super condition, fine quality, off-white fabric, wooden frame & trim, heavy, $1,200. Ross, 299-3023.

HITACHI TOWER SPEAKERS, 120 watts, 8 ohms, $50 for pair. Biggs, 265-3036.

QUEEN ASH BED, complete, $500; Cost Plus furnishings; vacuum; microwave; many other household items, fairly new. Vang, 268-5417, evenings.

POOL TABLE, Brunswick, 3-1/2' x 7', w/rack & balls, $250; 4-piece maple bedroom set w/full-size mattress & boxspring, $200, all in good condition. Szklarz, 292-3995.

FIREWOOD, oak & cedar, split & well seasoned, 1/2 cord, $60. Lott, 856-5956.

FIVE-PIECE SECTIONAL, rust color, $200; 40-in. square coffee table w/glass panels, $50. Fenstermacher, 298-9050.

SOFA/SLEEPER, large, brown, wood trim, good condition, $150; stepper w/upper body exerciser, almost new, $100. Hubbs, 891-2846.

FIVE-PIECE BEDROOM SET, $350; desk, $50; rolltop desk, $75; full waveless mattress w/frame, $60. Lopez, 291-1091.

REFRIGERATOR, Hotpoint, 24.8 cu. ft., excellent condition, $450; computer 486 DX/33, w/2 floppy drives, monitor, 4MB RAM, 120 HD, $1,000. Chen, 822-0189.

KEYBOARD, Casio M-10, 32 keys, $25; computer, Toshiba T-3200 laptop, 286/16, 2400 modem, 3-1/2 floppy disk, 40MH/D, $275; 2 motorcycle helmets, $20. Leslie, 299-4159.

FISHER-PRICE CONSTRUX SET, 1,000+ pieces, $40; country estate doll house, for 11-1/2-in. dolls, $50. Smith, 281-9360.

TRANSPORTATION

'92 PLYMOUTH VOYAGER, luggage rack, cruise, PL, 3.0L V6, AC, built-in baby seats, 48K miles, $13,000. Atencio, 897-2189.

'81 HONDA GOLDWING, 20K miles, fairing & luggage, stereo cassette, new battery, fork seals/springs, excellent, runs great, $2,300 OBO. Roybal, 836-5062.

'83 FORD TRUCK, F-150, 302 engine, AT, PB, PS, low mileage, plus extras, $3,900. Castillo, 294-5182.

'81 MERCURY CAPRI, 4.2L V8, 165K miles, good transportation, best reasonable offer. Crumley, 299-5293.

'91 MAZDA 626, 4-dr., 5-spd., AC, AM/FM cassette, cruise, anti-theft, low mileage, below book, runs great. Clauss, 822-8101.

'73 CHEV. EL CAMINO, classic, new 350, AT, clean body w/original Rallye wheels, will pull trailer, dependable, $3,000. Marozas, 281-8609.

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

10-SPD. BICYCLE, 19-in. Raleigh, lightweight, 25-in. aluminum quick-release wheels/hubs, end shifters, $70 OBO; 14-in. Huffy girl's bike, $40 OBO. Miller, 292-5634 or 293-6560.

'81 CHEV.TRUCK, 4x4, less than 10K miles, rebuilt V8 engine & transmission, $3,500. Jacobs, 281-9483.

'87 PLYMOUTH RELIANT, 2-dr., AT, AC, 86K miles, new brakes, timing belt, transmission, $1,200. Plomp, 296-2647.

'83 FORD ESCORT GL, 2-dr., 5-spd., 92K miles, passes emissions, $1,000. Suderman, 265-1786.

'78 MONACO MOTORHOME, Class C, 23-1/2' Chev. 400, good Michelins, 54K miles, generator, AC, furnace, self contained, sleeps 6, $9,500 OBO. Branscombe, 881-4589.

GIRL'S BIKE. Barbour, 254-0562.

'75 PORSCHE 911S, coupe, silver anniversary model, AM/FM cassette, 64K miles, excellent condition, complete service records, $12,000. Stephens, 265-5341.

'89 CHEV. ASTRO CL, 8 passenger, PW, PS, PL, front/rear AC, AM/FM cassette, towing pkg., excellent condition, $8,500. Fitzgerald, 275-0521.

'87 HONDA SHADOW 1100, low mileage, excellent condition, extras. Bouchard, 831-4766.

'66 MUSTANG, 2-dr., 6-cyl., AT, needs work, $1,000. Gabel, 296-9205.

'93 TOYOTA PICKUP, 4x4, 4-cyl., 5-spd., alarm, pull out AM/FM cassette, excellent condition, $10,000. McKenney, 892-5184.

'82 MOBILE TRAVELER, 25-ft. Ford 350, excellent condition, roof, AC, radials, air-ride, microwave, $10,900. Castle, 293-8379.

'91 CHEV. BERETTA, red, 4-cyl., AT, AM/FM, AC, sky-lite, new tires, 48K miles, excellent condition, $7,800. Shoemaker, 869-2775.

'83 ALFA ROMEO SPYDER, 87K miles, PW, PM, PA, AC, 25-mpg, excellent condition, $4,950. Underhill, 294-5774.

'89 TOYOTA PICKUP, 4x2, 4-cyl., 4-spd., AC, PB, AM/FM cassette, cloth seat, tint, shell, 68K miles, super clean, $5,900. Schell, 237-9145.

'84 DODGE CONVERSION VAN, 4 captain seats, fold-out back bed, stereo, dual air, PW, PB, running boards, 83K miles, $5,500 OBO. Salas, 294-5863.

'93 FORD MUSTANG GT, 5.0 liter engine, 5-spd., AC, PS, PW, Power seats, CD player, book at $15,000, negotiable. Konkel, 866-0304.

'92 GEO STORM, (below book value), alarm, AC, AM/FM cassette, bra, tinted windows, low, low mileage, excellent condition, $7,000. Flores, 298-3211.

'86 GMC CONVERSION VAN, 70K miles, Highton, AT, dual-air, V8, 3/4-ton, 305 engine, great condition, $6,500. Aragon, 897-3878.

'78 CHEV. TRUCK & CAMPER, 8', 3/4-ton, 4-spd., truck, clean, excellent condition, one owner, $3,950. Cericola, 298-2426.

'88 PATHFINDER SE, 4WD, AT, PB, PS, PW, PM, AM/FM cassette, AC, 101K miles, $9,800. Braaten, 293-0709.

'83 AMC JEEP EAGLE SX-4, 4WD, very sporty, clean, runs great, 73K miles, $1,750 OBO. Hoover, 281-8644.

'77 280Z COUPE, '79 engine, good compression, AM/FM cassette, AC, tinted windows. Pierce, 299-2801 or pager 857-1844, ask for Greg.

'86 GMC JIMMY, 4WD, AT, PL, PW, 75K miles, excellent condition, $5,800 OBO. Hubbs, 899-4424.

'74 MAVERICK, AT, AC, 302 V8, 2-dr., $800. Baker, 888-4220.

'94 SATURN SL2, AT, 8K miles, power pkg., ABS & traction control, AM/FM cassette, blue/green, $15,000 OBO. Heustess, 256-4350.

'69 PONTIAC FIREBIRD, recent paint, hi-perf. 400, new transmission & tires, many extras, very sharp & fast, $6,200 OBO. Graf, 281-1533.

'84 MAZDA PICKUP, w/shell, clean, runs well, $1,400 OBO. Estill, 268-6730.

REAL ESTATE

4-BDR. HOME, Academy Acres, La Cueva High School, living room, dining & den w/fireplace, 1,800 sq. ft., $129,000. Lin, 821-6183.

HORSE PROPERTY, 9 stalls, very complete facility; 3-bdr. home, on two acres, Coors/Gun Club area, $179,500. Fernandez, 877-1565.

3-BDR. HOME, 1-3/4 baths, FP, DR, large kitchen, utility room, 1-car garage, 1,310 sq. ft., 8 minutes to base/UNM. Martin, 299-1748.

3-BDR. HOME, 1-3/4 baths, 1,800 sq. ft., double garage w/1 opener, 2 blocks from Dennis Chavez Elem. School, $139,900. Gallegos, 821-3611.

NEW CORRALES HOME, Southwest style, vigas, tile, radiant heat, great views, 2,600 sq. ft., paved road, natural gas, CTV. Karler, 298-3265.

WANTED

RUGBY PLAYERS, old or new, matches start March 11. Buchheit, 856-6283.

SMALL MUSHROOM ANCHORS, 5-10 lbs. Horton, 883-7504.

RIVER RUNNERS, for Sept. 2-9 Grand Canyon Colorado River trip, professionally guided raft, meals & service provided, 280 miles, $1,400. Barr, 856-1767.

USED OUTBOARD MOTOR, 10-15 hp, short shaft, reasonable priced. Miller, 869-6383.

BABY GRAND PIANO, good shape; '86 or later Mercedes 300E, excellent condition, w/low miles & maintenance records. Richards, 296-2272.

APARTMENT, unfurnished, prefer efficiency or 1 bdr., Air Force Reserve Officer at Kirtland, non-smoker, no pets. Barnaby, 255-5624.

35MM SLR CAMERA, Minolta, model SRT101. VanDenAvyle, 898-6474.

GASOLINE LAWN MOWER, must be strong enough to cut weeds, prefer large rear wheel model, will settle for less. Schaub, 865-8807.

3-BDR. TOWNHOUSE/CONDOMINIUM, June 1, NE Heights, 2-story, 2 baths, FP, 5 yrs. or younger. Sanchez-Conroy, 896-1716.

GOOD HOME for MacDonald turntable/record changer; '88 Ranger/Bronco nose bra. Armstrong, 266-2334.

TUTORS, Sandians willing & qualified to tutor high school chemistry, biology, Wed. eves. 7-9 p.m., at La Cueva High. Barron, 294-3216.

KODAK CAROUSEL SLIDE PROJECTOR, for non-profit rescue team instruction about outdoor safety to children & Scouts. Rivers-Stroup, 836-6304.

HELP w/housework/ironing, preferably on Friday afternoons; daybed w/trundle bed. Washburn, 275-3751.

SANDIA professional looking for extended housesitting position, beginning end of May or beginning of June, non-smoker, non pet owner. Smoles, 845-8964.

ATARI 2600 VIDEO GAMES, (selected titles), will buy or trade. Smiel, 865-9081.

INFORMATION on how to repair dbl. pane thermal windows w/moisture between panes. Crain, 265-7322.

LOST & FOUND

BLACK EARMUFFS, morning of 1/31, east water tower parking lot. Noel, 844-9134.

Sandia News Briefs

Black History Month activities scheduled Feb. 21-22

Sandians are invited to attend two events in honor of Black History Month, sponsored by Sandia's Black Heritage Club and Black Leadership and Outreach Committee. "Implementing Diversity" is the subject of a forum to be held Tuesday, Feb. 21, 1:30-4:30 p.m. at the Coronado Club's Zia Room. Donald Grady, Chief of the Santa Fe Police Dept., will be the featured speaker at a luncheon on Wednesday, Feb. 22, 11 a.m.-1 p.m. at the Kirtland AFB Enlisted Club. Other luncheon activities will include gospel singing, dancing, and poetry reading. Awards will also be presented. For more information on these activities, contact Mary Ann Mitchell-Carr (13414) on 844-6547 or Gwen Germany (3611) on 845-8715.

Energy and Environment Information Technology Symposium is March 6

New information technologies will be highlighted at an all-day Energy and Environment symposium on Monday, March 6, 8:30 a.m.-4:30 p.m. Sandians are invited to stop by the Technology Transfer Center (Bldg. 825) to hear about supercomputing, virtual reality, and new developments in information technologies for oil and gas production, computer-aided design, and environmental waste management and remediation. In addition to the 18 scheduled presentations, a late-afternoon panel will focus on the synergism among these technologies, potential new work, and important strengths of the technologies. The last half hour of the panel discussion will involve audience questions. A complete agenda is available from Reeta Garber (6907) on 844-3900.

DOE/AL Safeguards and Security inspection starts Tuesday

A comprehensive Safeguards and Security (S&S) Compliance and Performance inspection from DOE/AL will occur between Feb. 21 and March 3. Approximately 40 federal and contractor inspectors will be evaluating the effectiveness of Sandia's security program and compliance with more than 40 DOE Orders, laws, and other requirements. The inspectors will visit Sandia/New Mexico facilities, both on and off Kirtland Air Force Base, as well as the Tonopah Test Range. For additional information, call James Giachino (7402) on 844-9026 or Linda Hurley (7402) on 844-9063.

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

National Engineers Week activities scheduled

Thousands of New Mexico engineers, many of them Sandians, are gearing up to celebrate National Engineers Week next week. The theme of this year's event, "Turning Ideas into Reality," recognizes engineers as contributors to the quality of life.

Nationally, more than 45 engineering societies and several major corporations are participating in the week-long event, which was founded in 1951 by the National Society of Professional Engineers (NSPE). The New Mexico chapter of the NSPE sponsors local activities.

Activities begin Saturday and Sunday, Feb. 18-19, with the second annual "Engineering Day at the Mall," sponsored by the Institute of Electrical and Electronic Engineers and the Engineering Societies Presidents Council. New Mexico engineers, including several Sandians, will be at Albuquerque's Winrock Mall, along with exhibits describing the ways engineering contributes to modern society.

On Wednesday, Feb. 22, a group of New Mexico high school seniors will tour Sandia's vehicle robotics range and solar power tower. Les Hill (9311) will lead the tour.

At noon on Wednesday, engineers are invited to a luncheon at the Albuquerque Marriott Hotel. Luncheon speaker James Hawland of CH_2M Hill will discuss "How to enjoy life in engineering." Tickets are $16 at the door, $15 in advance. Call Earl Yingling on 881-1547 or Barney Thorpe on 884-4553 for more information.

Also as part of National Engineers Week, local engineers are visiting Albuquerque-area middle schools and high schools to discuss careers in science and engineering with students. In addition, on Feb. 11, the Albuquerque chapter of the NSPE sponsored "MATHCOUNTS 1994," a game-show-like mathematics competition for seventh- and eighth-grade Albuquerque-area "mathletes." Winners of the Feb. 11 match will advance to the statewide competition on March 11.

Feedback

Q: I just took my first business trip under the new travel policy and I'm glad I don't travel more often. The new policy is the worst of both worlds for the employee. You get burned by paying out of pocket when going over the per diem and you get no benefit for days when you go under the per diem. Also, it requires extensive record keeping. Surely we can do better.

A: We agree that we can do better and have several improvements under way.

Sandia's policy states that "Sandia reimburses its employees for reasonable and actual travel expenses incurred on Laboratories' business." We always reimburse employees for reasonable amounts over per diem and encourage employees to report all reasonable expenses on the Employee Expense Voucher. Many employees have been confused about the policy because the Martin Marietta/DOE contract states that DOE will only reimburse Sandia up to the per diem rate (in the instances described in the Sandia Travel Handbook, DOE will reimburse Sandia up to 150 percent of per diem).

Sandia management has made the decision that reasonable and actual travel expenditures over the per diem rate will be reimbursed and charged to Martin Marietta. We currently are in the process of updating SLP4600, which covers Business Travel Expenses. In this SLP, we are giving managers the responsibility, accountability, and authority to determine the reasonableness of business travel expenditures.

Until the revised SLP is approved, we will continue to review vouchers for compliance with Sandia policy and for reasonableness. After the SLP is approved, we will be providing extensive communication and training for staff, management, and travel arrangers concerning their responsibilities and accountabilities.

We looked closely at the option of straight per diem. Although on the surface it appears simple and straightforward, there are numerous exceptions that make the process very complex, including proration of partial travel days, adjustments for meals provided by sponsors, etc. In fact, there are 15 pages in the Federal Travel Regulations describing the per diem definitions, rules, and exceptions.

After considering the benefits and drawbacks of all the choices, Sandia's top management decided on the "reasonable and actual" policy described above.

Paul Rosenkoetter (10602)

Coronado Club

Feb. 17 (tonight) — Mom & Dad Night Out dinner/dance. (Free baby sitting provided at the Kirtland AFB nursery for children of members who make dinner reservations. (Nursery will accept a maximum of 10 children.) Dinner, 6-9 p.m. All-you-can-eat buffet (baked ham, baron of beef, roast turkey breast, poached fish, chef's choice), $6.95 (less $1 discount for member and spouse showing C-Club membership card). Music, 7-11 p.m., by Together band.

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

Feb. 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.

Feb. 28 — Fireside chat with UNM football coach Dennis Franchione. Jim Crouch, moderator, plus the UNM Chaparrals. 5-6:30 p.m. Free munchies. Open to all Sandia and DOE employees.

March 2, 9, 16, 23, 30 — Thursday bingo nights. Card sales and buffet start at 5:30 p.m., early birds' bingo at 6:45 p.m.

March 3 — Friday night dinner/dance. Dinner, 6-9 p.m. Filet mignon, $11.95; grilled halibut, $10.95; all-you-can-eat buffet, $7.95. Music by Isleta Poorboys, 7-11 p.m.

Take Note

Do you recognize these people: Dr. Charles Drew, blood plasma pioneer; Frederick McKinley Jones, inventor; Ernest Everett Just, epidemiologist; Jan Earnst Matzeliger, inventor; Dr. Daniel Hale Williams, physician, surgeon, hospital administrator; and Dr. Mae Jemison, astronaut? Few appear in history books, yet all are black inventors and scientists who made major contributions to society. They are the subject of a National Atomic Museum exhibit in celebration of Black History Month titled "Black Scientists and Inventors." The exhibit opened Feb. 6 and will run through Aug. 6. The museum is open 9 a.m.-5 p.m. every day except major holidays.

Fun & Games

Boating — The US Coast Guard Auxiliary, Flotilla 2-4, is again offering courses in power boating and sailing. Classes are now being held at the Armed Forces Reserve Center (400 Wyoming NE). Both courses meet at 7 p.m. one night a week for 13 weeks. There is a charge of $15 for text and workbook. Additional family members who wish to attend pay $5 for workbooks only. These courses will introduce boaters to basic legal requirements, seamanship, navigation rules, and other safety-related topics important to all boaters. To register, call 897-1695 or 299-2855.

* * *

Softball — The 1995 summer softball season is just a few months away. An initial coaches' meeting is set for Thursday, Feb. 23, at the Coronado Club, Zia Room, at 5 p.m. Last year the Sandia Softball Association had six coed teams. This year the association hopes to have enough coed teams to form an upper and lower division. Same as last year, everyone is allowed to play on both a coed team and a men's or women's team. At least 10 coed teams are needed, so form your teams now and send a representative to the meeting on the 23rd. Everyone is welcome to attend the meeting. If you have questions, please call league president Don Wrobel (6319) on 891-8409.

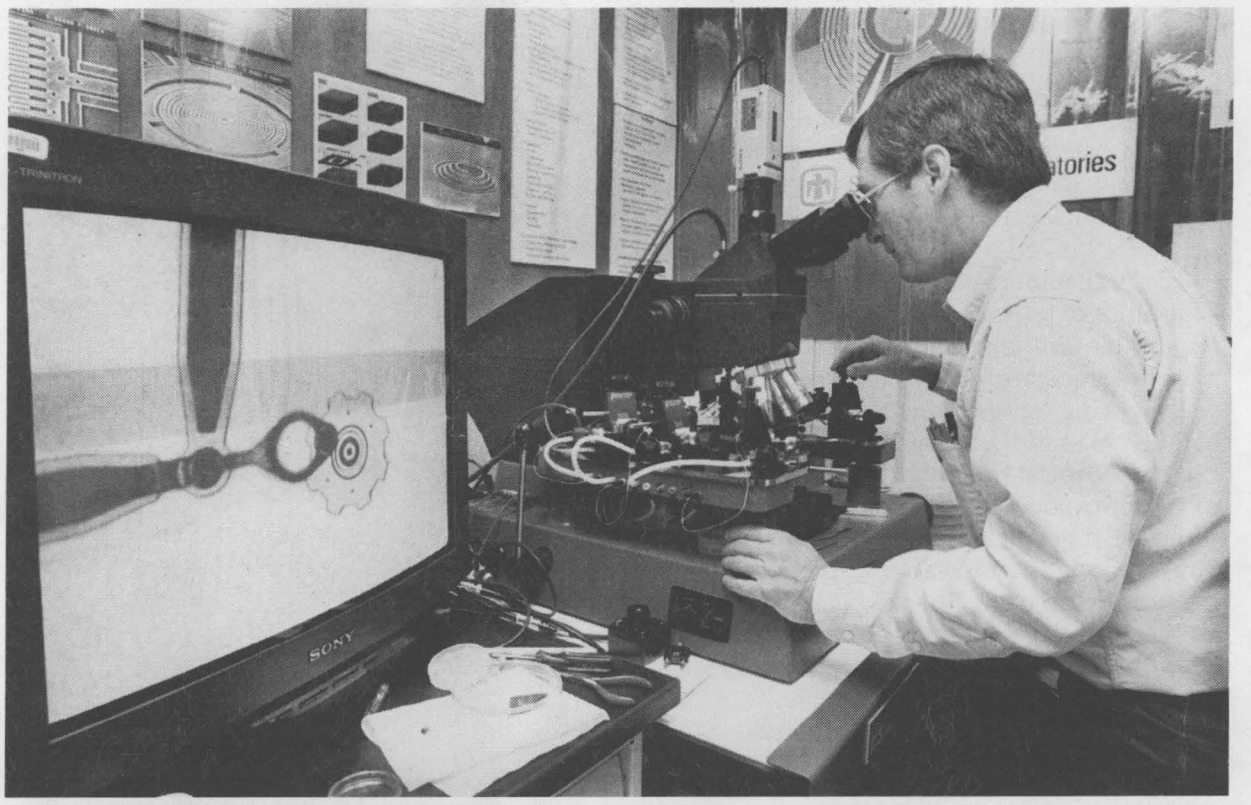
Labs Accomplishments FY94

Sandia National Laboratories • Albuquerque, New Mexico • Livermore, California

Toward the beginning of each calendar year — a practice we began with the Jan. 23, 1981 issue — the *Lab News* sums up Sandia National Laboratories' principal achievements during the previous fiscal year. This issue of *Labs Accomplishments FY94* continues that tradition.

All Sandia divisions were invited to submit achievements, and the ones selected are summarized on the following pages. The work was accomplished during the fiscal year that ended Sept. 30, 1994. These brief summaries are not ranked in any way, but as in the past, we have grouped items that are obviously related. Organizations contributing to each accomplishment are shown in parentheses at the end of each item.

Requests for further information should be sent to Media Relations Dept. 12621, MS 0167, Sandia National Laboratories, Albuquerque, N.M. 87185-5800.



SMALL AND FAST — Ernie Garcia (2643) looks through a microscope at the tiny machine displayed at left. He and fellow researcher Jeff Sniegowski (1325) developed the dynamo, whose toothed gear is 50 microns in diameter, about two-thirds the thickness of a human hair. The machines, fabricated at Sandia's Microelectronics Development Laboratory, are believed to attain speeds of up to 500,000 rpm (see final item on page 11).

To All Sandians:

As I reviewed Sandia's principal accomplishments for Fiscal Year 1994, I was impressed by the luster of Sandia's best work. We remained focused and continued to respond effectively to our customers' needs. The long-awaited report of the Galvin task force, which was released Feb. 1, 1995, mentioned Sandia positioning itself to adjust to global change and confirmed my own belief that Sandia is headed in the right direction.

Our technical core competencies and special capabilities continued to play important roles, and each of Sandia's three Sectors — DOE Defense Programs, DOE Energy and Environment, and Work for Others — once again made significant contributions. The Sectors' ability to change directions and redirect their efforts rapidly in response to changing national priorities has been and continues to be an important factor in Sandia's successes.

Our industrial R&D collaborations in areas such as agile manufacturing technologies, microelectronics, and information science and technology contributed to our nation's industrial strength while supporting DOE's core mission responsibilities in defense, energy, environment, and the basic sciences. We also enjoyed progress in developing teaming relationships with universities and other federal laboratories.

Sandia's commitment to Total Quality continues to grow, and our uncompromising focus on customers and on continuous improvement has served us well and remains key to our future.

The Laboratories' accomplishments are products of all Sandians, and as a proud member of this institution, I offer my congratulations to everyone for their "exceptional service in the national interest."

Al Narath, President

Sandia National Laboratories

Sandia LabNews

Special Section February 17, 1995

Nuclear weapons

Rapid nuclear weapon dismantlement is necessitating **temporary storage of several thousand radioactive weapon components** (pits) at the Pantex plant. To gain sufficient storage capacity, Pantex must stack containers of pits in their existing magazines, but stacking containers results in increased radiation levels, thereby precluding routine entry by Pantex workers. Sandia and the Hyster Company delivered to Pantex an Automated Guided Vehicle (AGV) system that performs the material handling operations and can serve as a platform that transports inventory sensors inside the magazines. The AGV system consists of a computer-driven forklift and a mobile command center. A technician dispatches the AGV on missions from the command center, using a computer-based graphical user interface, then views mission progress on monitors that display video from AGV-mounted cameras. This system eliminates the need for employee entry into loaded magazines and could serve as a basis for future facilities (2100/9600).

When the sole supplier of current stacks **(neutron generator components)** unexpectedly halted production in May 1993, Martin Marietta Specialty Components (MMSC) found itself in need of 700 weapon stockpile current stacks beginning in August 1994. Faced with the threat of stopping a weapon limited life component exchange production line, MMSC asked Sandia for help. After receiving DOE mission assignment, a product realization team of Sandia, MMSC, and DOE employees was formed to plan and set up quality processes and supporting infrastructure. The production line doubled the product yield of the previous supplier, and parts exhibited less variability in performance. The Sandia team received commendations from DOE auditors and a Sandia President's Quality Award. (2400/2500/2700/5400/10200/12300)

The implementation phase of the non nuclear reconfiguration of the nuclear weapons complex began in FY94. The Martin Marietta Specialty Components plant in Pinellas, Fla., the Mound plant in Miamisburg, Ohio, and the Rocky Flats plant in Boulder, Colo., ceased all weapons production activity during FY94. Sandia hired 82 people from Pinellas to capture the critical skills necessary to transition the responsibilities to Sandia. Facilities design and construction activities in support of the neutron generator and thermal battery reconfiguration plans are under way. A major effort to relocate the critical equipment, inventory, and records from the donor sites to Sandia began in July and will continue to the end of 1995. A new production organization of the division level has been formed and will assume the **Sandia mission assignment production responsibilities**. (2400/2500/5400/14000)

The MC4438 single stronglink assembly (SSA) is one of two independent stronglinks used in the Pit Reuse for Enhanced Safety and Security, Cruise Missile application (PRESS/CM). The MC4438 SSA is a descendent of the MC4063 SSA, designed for the W89. A stronglink is a rugged, mechanical **device used to ensure the safety of nuclear weapons** in

both normal and abnormal environments. A stronglink has dozens of performance requirements and associated performance indicators. Three important indicators for the SSA are magnetic attenuation at reset, magnetic coupling at armed, and total part count. Compared to its predecessor, the MC4438 SSA has 30 percent fewer parts, couples energy with 74 percent greater efficiency, and improves the attenuation characteristic by a factor of 3.5. (2600)

Critical, undocumented knowledge and experience of retired and retiring engineers responsible for the **development and maintenance of nuclear weapons for the past 30-35 years** is being captured on video tape. Interviews of individuals in single and group settings explore technical issues that include development of weapon requirements, the complexity of component design and testing, system integration, economic considerations, and political interactions, to name just a few. This unique data set is being integrated with other data sets in an electronic multimedia information management system that will become the cornerstone of future stockpile stewardship efforts and engineer education and certification. (5000/13200)

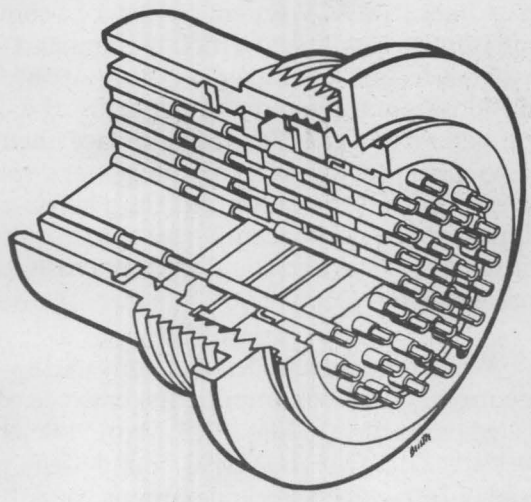
KNOWLEDGE BANK — Henry Street (retired, with beard) talks about his years as a nuclear weaponeer with Keith Johnstone (5006, left foreground) and David Weigand (2223). Jim Lloyd (12614) operates the video camera recording the conversation, which is part of Sandia's Knowledge Preservation Project to record weaponeers' memories of how they approached their work and the thinking processes that went into creating solutions.

Radiation hardening requirements for nuclear warheads were established during the Cold War era. Sandia has completed a mission-based reassessment of **future radiation hardening requirements for strategic warheads** and has concluded that lower radiation hardening levels might be acceptable in the new world environment. However, the reassessment also showed that a judicious minimum lower level of hardening must be retained to ensure that our strategic deterrent forces can accomplish the missions required by the National Command Authority. This requires that Sandia retain selected testing capabilities and radiation-tolerant design expertise. A major achievement this year will be sponsorship of a national forum on hardening where both the appropriate DoD and DOE agencies can debate and negotiate future hardening levels. (4100)

A study, documented in the white paper "The Sandia Reactor Facilities: Strategic Value to Defense Programs in the Post Cold War Era," was performed concurrently with a reexamination of **reentry vehicle radiation hardening requirements**. Our analysis showed that, under the new hardness numbers, reactor effects tests would not be needed. We projected that Defense Programs (DP) utilization would drop to near zero for the foreseeable future and, based on the overall national strategic value of the Tech Area 5 reactor facilities and staff, recommended that joint funding be sought from the Nuclear Energy (NE) and DP branches of DOE. Plans are now being developed for significant DOE/NE utilization of the Tech Area 5 Annular Core Research Reactor for medical radioisotope production. (4100)

Two new lightning arrestor connectors (LACs), the MC3612A and MC3729A, were designed with improved safety and reliability features and delivered on schedule. These LACs, which **protect against unintended nuclear detonation** if a weapon is struck by lightning, are part of the B61-3, -4, and -10 retrofit program for enhanced nuclear safety of the enduring stockpile. They were submitted to peak lightning currents up to 171 kiloamperes in tests at the lightning simulator, and performed successfully in all tests. A major accomplishment was the reduction in the development to production cycle from the typical 36 months to 15 months. These are the first LACs to be designated as "Nuclear Safety Critical" ("Pentagon S" designation), which required more rigorous controls for processing and inspections. This effort is more impressive in view of the reduction in force that took place at the production agency (Pinellas Plant) during this program and the impending plant closure. This "Pentagon S" implementation resulted in a notable improvement in the quality of the LAC, whose team was awarded the Sandia President's Quality Award. (2200/2700/12300)

The Strategic Studies Center provided analytical and program development support to Sandia's involvement in the **safe, secure dismantlement of Russian nuclear weapons**. The center evaluated modifications of Russian railcars, emergency response options, and long-term storage projects currently under way at Sandia and other DOE facilities. Study results helped fashion the thinking of stakeholders at Sandia and the Departments of Energy, State, and Defense. We also initiated collaborative studies in hazardous cargo transportation with Russian institutes in Moscow and Chelyabinsk-70, and we have produced two proposals for collaborative US-Russian development of advanced rail transportation safety systems for nuclear weapons under the US Cooperative Threat Reduction Program. (4100)



NEW CONNECTORS — This cutaway drawing shows the inside of one of the new lightning arrestor connectors that protect against unintended nuclear detonation if a weapon is struck by lightning.

The Industrial Partnering Program is developing 70 cooperative projects among scientific and engineering institutes in the New Independent States (NIS) of the former Soviet Union, Sandia, and US industry. Sandians are working with their NIS counterparts to identify **NIS technologies with good potential for commercialization** in the areas of energy and environment, laser technology, manufacturing, materials, sensors and instruments, and biotechnology. Examples of projects that have been selected to refine and demonstrate the capabilities of novel NIS technologies include specialty metals processing, improved oil and gas recovery, high temperature electronics, environmental monitors, and medical radioisotopes. The next phase of the program will bring this NIS technology and US companies together through the risk-shared cooperative research and development agreement process. With industry involved, specific applications can be developed that can benefit the US partner's technology base and provide economic benefits to the NIS institute. (5000)

The STRATCOM Secure Recode System (SSRS), a new **Permissive Action Link (PAL) code management system** for use within the United States Strategic Command (USSTRATCOM) and the Air Combat Command (ACC), was delivered and became operational in January 1994. The SSRS was developed at Sandia, with two of its components, the UC1583 PAL Controller and the UT1585 PAL Material Verifier, built at AlliedSignal in Kansas City. Initial training on the system took place during the fall of 1993 with representatives of the SSRS development team and Sandia's Military Liaison department providing on-site training for USSTRATCOM and ACC personnel. Initial reaction to the system within USSTRATCOM and

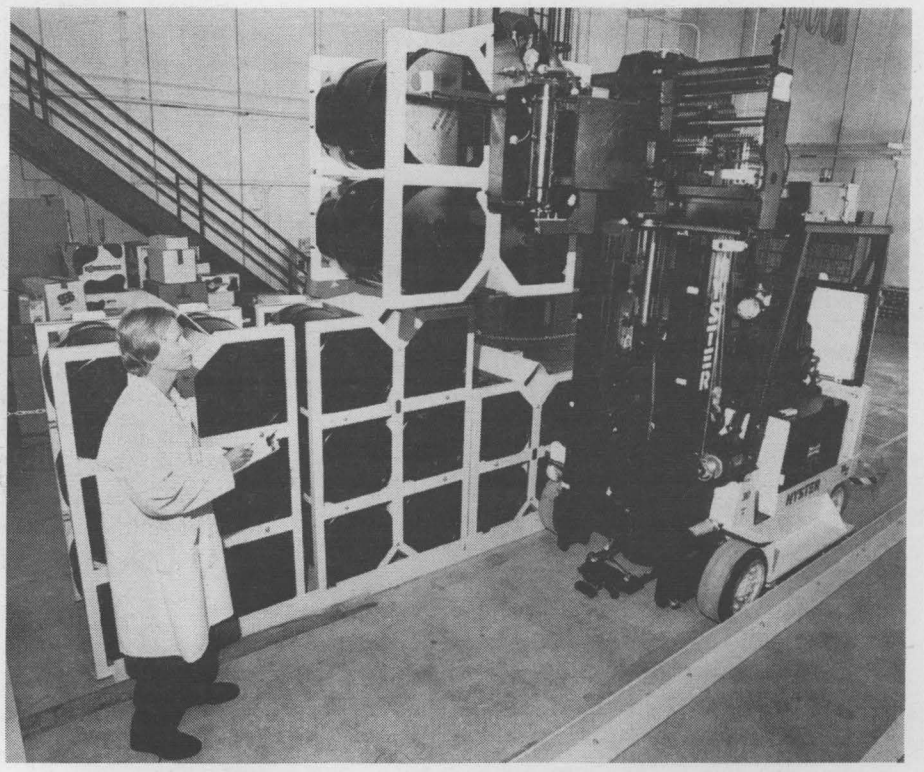
ACC has been positive. User comments include compliments about the speed and ease of use of the SSRS, as well as the simplicity of training required for the system. (2600/5100/ 5500)

A series of B61 and B83 **vibration flyaround tests on the B-2 stealth bomber** were successfully completed in May 1994. These tests measured the vibration environments imposed on bomb components carried by a B-2 test aircraft based at Edwards AFB, Calif. Data was obtained from B61 and B83 test units loaded on aircraft rotary launchers for load configurations of one, four, and eight bombs per launcher, and at low, medium, and high altitudes and maximum aircraft speed. Data is being evaluated to determine whether vibration levels are within the B83 and B61 design limits. (2600/2700/5100)

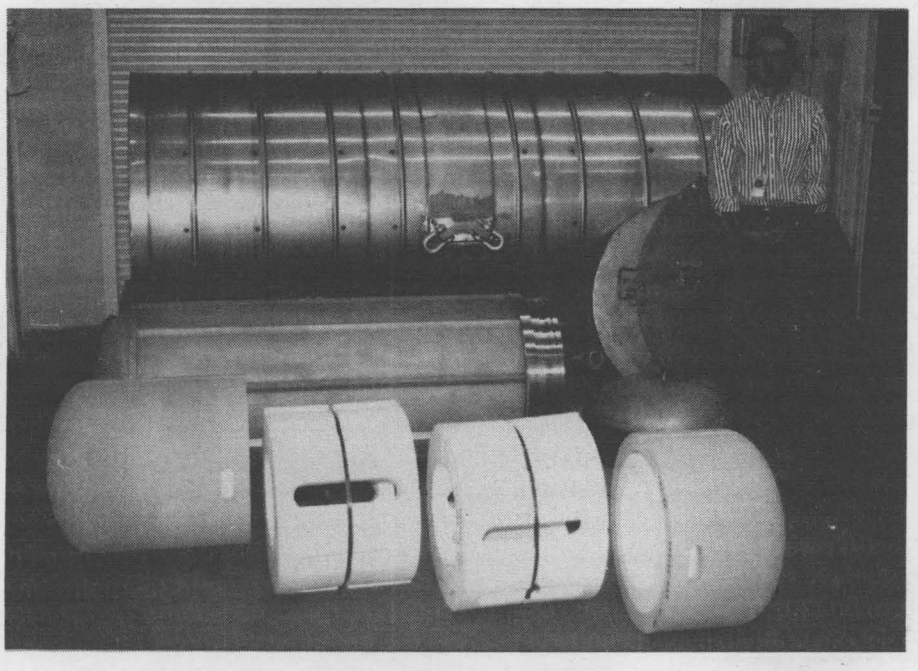
Sandia-modified **Russian railcars designed for carrying nuclear weapons** headed for dismantlement had a successful eight-day joint test that included DOE, the Defense Nuclear Agency, Sandians, and Russians. The round-trip train tests in Russia from Tver to Astrakhan demonstrated that the safe and secure modifications of three cars could survive the operational rail environment in Russia. This environment was continuously measured by Sandia instrumentation during the tests to verify that environments were within negotiated bounds. The Russians are modifying 100 of their cargo railcars. (5800)

The US Navy's **Trident II Submarine-Launched Ballistic Missile** system routinely conducts joint DOE/Department of Defense flight tests on instrumented Mk5 Reentry Bodies known as Joint Test Assemblies (JTAs). During a past flight, the JTA telemetry experienced a single-event upset occurrence as it flew through the Van Allen Belt and the South Atlantic Anomaly (an intense, low-altitude high-energy proton belt). A multidisciplinary effort by Labs scientists and engineers assembled to determine the causal elements and to assist in devising a solution. To correct for this event, the W88-0/JTA telemetry system was redesigned by incorporating into the signal processor design four high-energy-proton-resistant integrated circuits. (5100)

Department 5165 designed, procured, and tested a high-performance **container for the transportation of damaged weapons** that can accommodate payloads weighing up to 750 pounds. In addition, handling gear for the container was designed and procured. The container advanced the state of the art in impact and fire protection and is a major step toward container technology that will meet 1996 International Atomic Energy Agency standards for the shipment of large quantities of radioactive material. Four rocket pull-down tests onto an unyielding target demonstrated the ability of the container to retain its contents at impact velocities up to 200 mph. Two units were delivered to the United Kingdom and two are on hand for DOE's Accident Response Group. (1500/2400/2700 /5100)



HEAVY LIFTING — James Jones (2172) watches and takes notes as a specially designed lifting machine hefts and stacks pallets of storage containers. The pallets and containers simulate plutonium pit storage facilities like those used at Pantex. The containers and machine are part of Sandia's Project Stage Right.



SECURE CONTAINER — Allen York (5165) stands among the components of a container system designed to transport damaged weapons. The container can accommodate payloads weighing up to 750 pounds and has been shown in tests to retain its contents at impact velocities up to 200 mph.

Sandia's Project Stage Right provides an **interim plutonium storage system** at the Pantex Plant that accomplishes several goals. It increases existing facility storage capacity, reduces radiation exposure to workers, guarantees safe handling and storage of plutonium-pit containers, and provides management tools to increase coordination and control planning effectiveness. In achieving these goals, Sandia provided four major subsystem products: the Inventory Control Computer, which assists in administrative responsibilities and safety compliance monitoring; the Physical Inventory Pallet, which provides automated physical inventory capabilities; the Radiation Shielded Lift Truck, which enables the placement and retrieval of pit container pallets in radiation areas; and man-portable Plutonium Measurement Equipment, which enables enhanced plutonium pit authentication and classifications. The Stage Right system went fully operational at the Pantex Plant in August 1994. (9600)

Unsatisfactory Reports (URs) are the customer-service mechanism by which the Air Force and Navy inform DOE, through Sandia, of **maintenance and logistics problems with DOE-provided nuclear weapons**, equipment, and/or technical manuals. The Military Liaison departments received 877 URs last year and answered 64 percent of the routine URs within 45 days. After we electronically connected our departments with Field Command, Defense Nuclear Agency (FCDNA), and the three military UR service centers, we reduced the transmission times from the maintenance person in the field or fleet to FCDNA and then to Sandia, as well as the return response to the field. The DOE/Albuquerque Operations Office (AL) commended us for providing "exceptional support to AL in this area. Sandia's overall performance for FY94: excellent." The military users have also been complimentary about the system. (5500)

The START 2 arms control agreements require the US to modify all **land-based intercontinental ballistic missile reentry systems** to a Single Reentry Vehicle (SRV) configuration. A series of tests consisting of centrifuge, laboratory shock and vibration, and flight tests were completed and demonstrated the compatibility of the W78 for use in the SRV configuration in the Mk12A Minuteman III weapon system. DOE's Albuquerque Operations Office will issue a statement during FY95 notifying the Department of Defense that the W78 is certified for release in the SRV configuration. (2300/2600/2700/5100/12300)

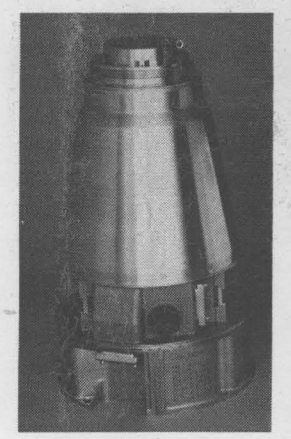
On Oct. 1, 1993, Sandia received mission assignment for the production of ceramic components, low-power pyrotechnic devices, high-energy-density capacitors, frequency devices, magnetic devices, thermal and ambient batteries, microelectronics, double-layer capacitors, and explosive-to-electric transducers. In addition, Sandia received mission assignment for switch tubes in June 1993 and for the AT400A container in June 1994. These mission assignments are being implemented by the Manufacturing Development and Engineering (MDE) program, using the skills and resources of **Sandia design and procurement organizations**. To date, the MDE program has delivered more than 3,000 war reserve components in the course of satisfying requirements under this challenging set of mission assignments. (5400)

Historically, the Pantex Plant developed processes and procedures for **assembly/disassembly of weapons** with advice and review from the design agencies. At DOE's request, the three weapons labs teamed with Pantex to develop the total process for dismantlement of the B-61 center case with emphasis on designed-in safety rather than achieving safety through review processes. Sandia participants made particularly significant contributions in ergonomics, risk assessment, design specifications for hazard identification, weapons status

Nuclear weapons

determination, and in the development of an engineering procedure for application to future systems. The new processes and procedures have been reviewed and received favorable comment by the Defense Nuclear Facility Safety Board. (5400)

The MC3810 arming, fuzing, and firing assembly ended a six-year production run at AlliedSignal. The MC3810 is the AF&F assembly for the W88/Mk5 Reentry Body deployed on the US Navy's Trident II Submarine-Launched Ballistic Missile system. Sandia developed the arming and fuzing components for the Navy and integrated them into a single compact assembly with the firing system components. The MC3810 represents a **significant advance in reentry body fuzing technology** with the introduction of proximity radar and radar updated path length fuzing, hardened complementary metal oxide semiconductor electronics, solid-state non-volatile memory, and many other features. It met or exceeded all customer performance requirements and goals. Production started in July 1988 and was completed in September 1994. (5100)



ADVANCED ASSEMBLY — MC3810 arming, fuzing, and firing assembly production has been completed.

Flight qualification of an **alteration (Alt 750) for the B83 Modern Strategic Bomb** has been successfully completed. Alt 750, the third phase of the B83 Quality Improvement Program (QIP), will retrofit B83-1 bombs with the new MC 4033 common radar. Five B83-1 radar flight test units (RFTUs) were tested at Tonopah Test Range (TTR) from Air Force B52H and B1B bombers to demonstrate the new radar performance at the extreme airburst delivery conditions for the B83. Each RFTU was configured with a telemetry system to monitor performance of the radar and bomb. The telemetry and TTR tracking data were used to determine that the common-radar-equipped B83-1 bomb performed as expected. Following completion of pre-production activities at AlliedSignal and Pantex, Alt 750 retrofits will begin this year. (2700/5300/8400)

Sandia recently completed a **major transportation risk assessment** for DOE known as DPTRA (Defense Programs Transportation Risk Assessment). The study focused on the probability and consequences of radiological dispersal resulting from a severe accident during transportation of material such as nuclear weapons and components. Databases and models were generated that enable a more detailed characterization of the packaging system and shipment routes than that available in previous studies. The ADROIT (Analysis of Dispersal Risk Occurring In Transportation) code, which was developed for DPTRA, incorporates these advancements. The transportation risk from radiological dispersal was demonstrated to be small relative to the transportation risk associated with fatalities caused by trauma from collision and/or fire. (9600)

The Pit Reuse for Enhanced Safety and Security (PRESS) project is demonstrating that advanced surety technologies can **enhance weapon systems in the enduring stockpile** with no compromise in military effectiveness. PRESS uses a novel system architecture to substantially reduce the volume devoted to warhead electronics, making this volume available for surety enhancements. The PRESS team is also pioneering technologies and processes to create a "virtual" design team consisting of systems engineers from both the California and New Mexico sites. This virtual design team approach demonstrates that individuals from physically remote sites can use modem communications to effectively collaborate on highly integrated systems designs. (5300)

Organization 12300's Stockpile Surveillance Program evaluated 114 nuclear weapons in FY94. All weapons were denuclearized and instrumented in test configurations at Pantex. Eighty were tested, at various environmental conditions, in Sandia's Weapons Evaluation Test Laboratory at Pantex. Thirty-four test warheads were flight tested with operational delivery systems. Reliability assessments for five weapon systems and more than 300 major failure events were updated to incorporate these test results. In addition, 18 significant finding investigations were opened to determine the reliability and safety impacts and appropriate corrective actions for anomalies detected during these tests. All results were reported to DOE's Weapons Quality Division, which requires that this activity be accomplished yearly to continuously demonstrate the **reliability and safety of the nation's nuclear stockpile**. (8100/12300)

Other defense-related work

Fire is a significant threat to the safety of advanced engineered systems, including nuclear weapons, alternately fueled vehicles, aircraft, and hazardous waste shipping containers. In response to the needs of industry, DOE, and other government agencies (e.g., the Federal Aviation Administration and the Defense Nuclear Agency), Sandia researchers have developed unique analytical and numerical tools to enhance the design and performance of these systems. Research has focused on understanding a broad range of complex physical phenomena and technologies, including crash dynamics, fuel dispersion, fire characterization, and system physical response. Development and validation has relied on a vigorous large-scale testing and experimental program. The use of these tools can help increase the escape time for passengers from an aircraft, mitigate the hazard from alternately fueled vehicle accidents, decrease the potential of releasing hazardous material from advanced transportation systems, and enhance the safety of weapon systems. (1500/2700/6600/8700)

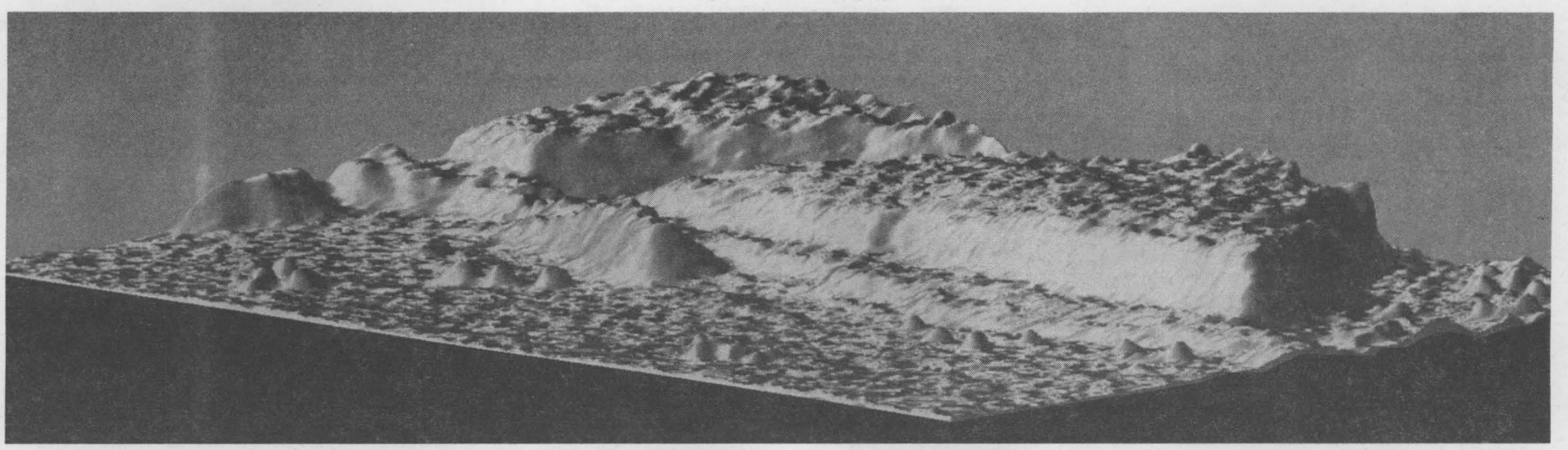
RANGE IMAGING — John Sackos (foreground) and Bart Bradley (both 9127) check components of a scannerless range imaging system developed by Sandia for Department of Defense non-nuclear weapon system applications. The system also has potential for many non-military applications.

A **scannerless range imaging system** has been developed for Department of Defense (DoD) non-nuclear weapon system applications. This project resulted in the realization of a compact, low-cost, high-resolution, high-frame-rate range imaging sensor system that is intended to enable future smart weapon systems to make more accurate real-time target, guidance, and fuze decisions. This ongoing project is jointly funded by DOE Defense Programs and DoD's Office of Munitions. Range imaging technology derived from this work is currently being evaluated for many other potential non-military applications — areas such as robotics, transportation, manufacturing, and assistive devices for the visually impaired. Other Sandia departments are working on similar technology for other applications. (2200/9100)

A joint Sandia, Phillips Lab, and Communications Satellite Corporation (COMSAT) team recently completed a series of laser power beaming experiments. The experiments demonstrate key aspects of the technology required to **beam power from ground based lasers to space assets** for future applications such as satellite life extension, space debris removal, or orbital transfer missions. The team performed demonstration experiments using the Air Force Starfire telescope and adaptive optics capability with a highly modified Air Force/Sandia ruby laser to illuminate commercial and scientific satellites. More than 300 illumination and detection experiments were successfully performed on satellites in orbit at a range of 12,000 miles. The results of these experiments identified key sensitivity limits for high-orbit satellite tracking and beaming, resulting in COMSAT and INTELSAT (the international consortium for communications satellites) proposing to configure future satellites to facilitate tracking of high-altitude satellites. (6500)

DOE has selected Sandia as technical integrator for its **Surplus Fissile Materials Control and Disposition Program**. The technical program is a multilaboratory research and design

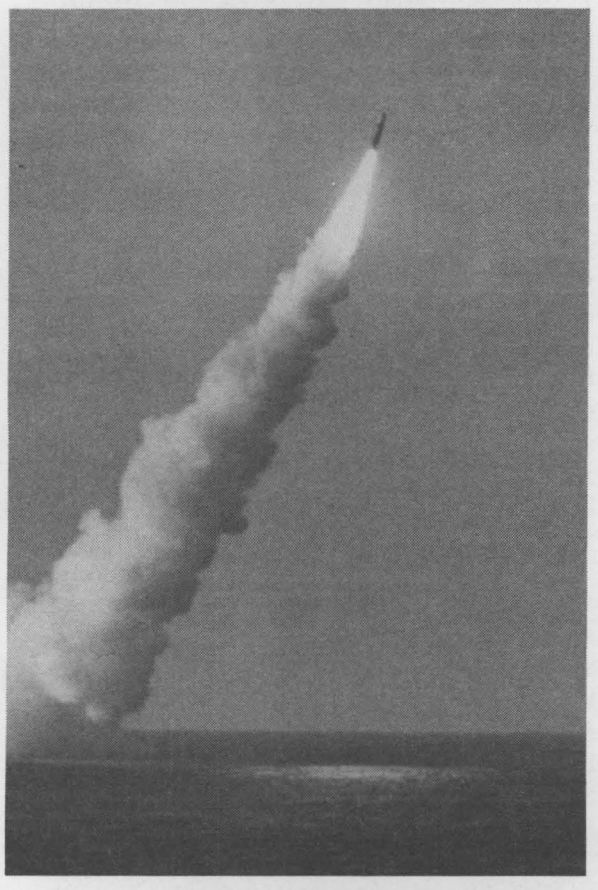
Other defense-related work



HIGH QUALITY IMAGING — This view from the east-northeast of the Interstate 25 cut along the east side of Black Mesa southwest of Albuquerque shows the imaging detail available through synthetic aperture radar technology. It offers day/night, nearly all-weather imaging capability to defense, counter- and nonproliferation, and environmental monitoring communities.

development effort aimed at evaluating various technologies for disposing of surplus plutonium, highly enriched uranium, and other minor actinides. Sandia is using its systems engineering expertise to integrate various technologies into viable alternatives. Data supporting preparation of a Programmatic Environmental Impact Statement for these alternatives will be developed. A record of decision in the spring of 1996 will state which disposition alternatives will be implemented. (5300)

Synthetic aperture radar (SAR) technology offers the defense, counterproliferation and nonproliferation, and environmental monitoring communities a **day/night, nearly all-weather imaging capability**. When SAR images are processed using automatic target recognition (ATR) technology, an even more powerful capability results. Sandia is developing a state-of-the-art, real-time, airborne SAR/ATR testbed to enable testing of the many possible uses for SAR/ATR technology. In addition to the SAR/ATR subsystems, the testbed includes a high-quality navigation/motion measurement subsystem, an encrypted, broad bandwidth data link, a mobile ground station, and highly accurate full-scale target mockups. The testbed, which has been partially funded by the Army, serves as a prototype for a future SAR/ATR targeting system that will give the Army the capability to identify and precisely locate targets such as a Scud missile launcher. The SAR/ATR testbed has recently been modified to include a three-dimensional terrain mapping capability called interferometric SAR (IFSAR). An operational IFSAR system would enable the real-time production of highly accurate topographic maps. (2300/2600/5900/9100)



INSTRUMENT TESTS — A D5 missile launched by a Trident II submarine bursts from the sea and rockets upward carrying Sandia-designed instrumentation packages to evaluate Global Positioning System hardware. The Sandia-designed antenna will be used in future Navy tests and is being transferred to industry.

A Sandia program to develop a **small, practical robotic ground vehicle for Department of Defense** (DoD) applications represents a shift in policy by the Office of the Secretary of Defense (OSD) and the US Army/Marine Corps Joint Program Office for Unmanned Ground Vehicles/Systems (JPO/UGVS). The Surveillance And Reconnaissance Ground Equipment (SARGE) is intended to provide a robust and versatile platform to be incorporated into platoon-level operations by field soldiers. The SARGE system will provide prototype hardware to actual field units so that tactics, doctrine, and requirements can be better developed. A simple yet robust design, SARGE incorporates many successful technologies in telerobotics developed over the past 10 years at Sandia's Robotic Vehicle Range. We demonstrated the first of two prototypes for OSD and JPO/UGVS customers in 1994, and are currently constructing the second prototype. Once the second unit has been delivered and production documentation is complete, a commercial contractor will construct for delivery a fleet of eight production units to the JPO/UGVS for training and use by military field units. SARGE represents what may become the baseline configuration for DoD's battlefield ground robots in years to come. (9600)

Reliability assessments of the Navy's existing strategic missile stockpile and as yet undefined applications of prompt, precise conventional weapons will rely increasingly on technologies such as the **space-based Global Positioning System** (GPS) to provide real-time navigation data. In support of these needs, Sandia was jointly funded by the Navy and DOE to design, fabricate, and test two reentry body (RB) instrumentation packages to evaluate GPS hardware. The successful experiments, flown on a D5 missile launched from a Trident II submarine, demonstrated the first-ever acquisition of data by a GPS receiver on an RB, the first on-board GPS navigation solution on an RB, and the ability to receive GPS signals in the high dynamic portion of the reentry environment. The GPS antenna design, developed by Sandia specifically for this application, has been selected for use in future Navy tests and is being transferred to industry. (1500/2300/2600/2700/5100/9100/9800)

The third flight of the **Strategic Target System (STARS) missile** was launched from Sandia's Kauai Test Facility in July 1994. It was the culmination of a five-year, $60 million effort to develop and test the Operational Deployment Experiment Simulator (ODES), a post-boost vehicle designed to maneuver in space while accurately deploying test objects and experiments. This mission provided the US Army Space and Strategic Defense Command and the Ballistic Missile Defense Organization, sponsors of the program, with valuable characterization data for all three elements (the STARS booster, the ODES vehicle, and the payloads deployed for observation by ground-based sensors) for use in future development tests of missile defense systems. Program participants from a number of Sandia organizations shared in a special quality award presented by Labs President Al Narath. (9800)

The Commander-in-Chief Mobile Alternate Headquarters (CMAH) for the US Space Command/North American Air Defense (USSPACECOM/NORAD) commander was delivered, accredited, and declared ready for initial operational capability in FY94. In addition, an expanded battle staff remote operating equipment (ROE) area and upgraded mission equipment was added at the US Strategic Command CMAH this past year. The US Pacific Command CMAH was upgraded with a **mission-enhancing communications bridge** to replace a print-and-retype communications interface. Sandia staff provided project definition/management, system integration, and extensive hardware and software support to all of these accomplishments. (9400)

Testing

Stable, large-radius, and high-velocity krypton z-pinch implosions have been observed using uniform-fill gas puffs as the initial condition. The development of stable z-pinch configurations allows high-velocity implosions leading to intense 10-thousand-electron-volt **plasma radiation sources**. The Stockpile Stewardship Program will be able to use X-ray sources based on this development. The same concept can potentially create higher-powered soft X-ray sources needed for Defense Programs research and development weapons-physics efforts. The techniques will also improve plasma source for X-ray lithography for the electronics industry. (1200)

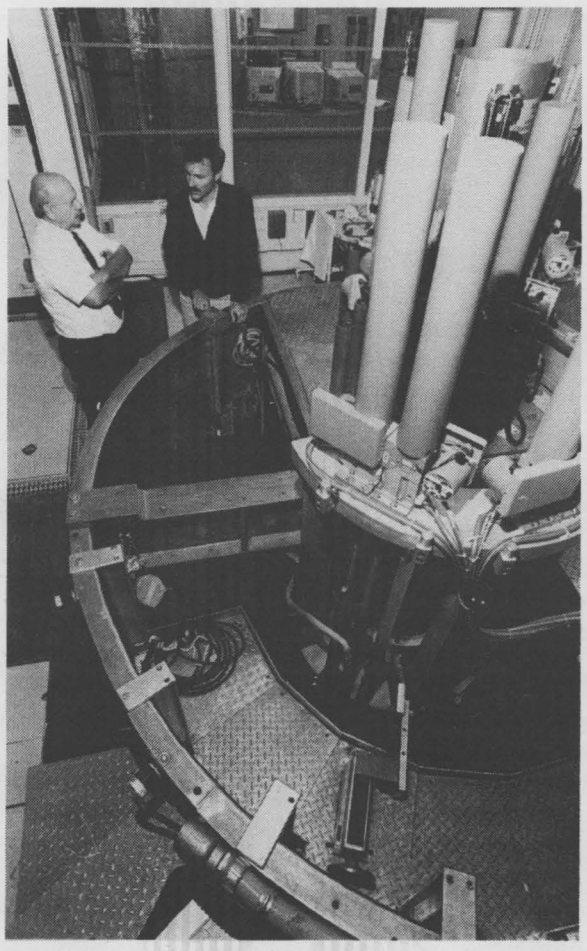
Energy and environment

Sandia contributed significantly to the expansion of the **Natural Gas and Oil Technology Partnership** — a new paradigm for national laboratory collaboration with the nation's petroleum industry. Keys to its success are industry-driven solutions, flexibility, joint participation, and simple procedures. In FY94, the partnership expanded from two national labs to nine, broadened its scope to include natural gas, and added a major DOE advanced computational technology initiative. At the end of FY94, there were eight Sandia projects under the partnership. (1400/1500/1900/6100/8900)

Sandia continues to support Solar Thermal's flagship demonstration project, Solar Two, on a number of fronts. Under the guidance of the technical advisory committee, which includes industry partners such as Bechtel and Southern California Edison, the design has been completed and construction has begun on Solar Two, a 10-megawatt (electrical) solar central receiver power plant. Solar Two is a modification of the Solar One pilot plant located in the Mojave Desert near Barstow, Calif. Solar Two will generate **electricity from the heat of concentrated solar energy**. Instead of the water/steam system Solar One used, Solar Two will use molten salt to transfer and store thermal energy. The plant's three-year operation phase is scheduled to begin in January 1996. Through a 50/50 cost-shared partnership, DOE and a consortium of industries, research organizations, and regulatory agencies share the $48.5 million cost of Solar Two. The project is designed to be the final step leading to commercialization of solar central receiver technology. (6200)

Within the next few years, the Waste Isolation Pilot Plant (WIPP) project will apply for certification that it meets the regulations governing the **disposal of radioactive waste**. During FY94 Sandia developed a formal decision-analysis tool, the System Prioritization Method (SPM), for helping DOE decide which of the proposed activities the project should undertake as it pursues certification. To identify low-risk, cost-effective activities, the tool analyzes cost, duration, and probability of demonstrating compliance. Other steps in the SPM identify the models and data necessary for estimating this probability. In a successful prototyping operation, the Sandia team demonstrated that the SPM is computationally feasible and can generate the needed information. (6300)

The **safety of foreign nuclear facilities** is an important topic. A geographic information system, the Energy Intelligence Information System (EIIS), is being built to help DOE analysts formulate responses to nuclear accidents. Their major concern is rapid information retrieval within 24 hours of the report of an incident at a facility. EIIS was built to access any point on the globe or to move directly to a site, facility, or city, and currently includes more than 1,000 nuclear fuel cycle sites. The EIIS database contains more than 70 entities and thousands of attributes. The architecture can be easily modified to deal with other global databases. (6900)



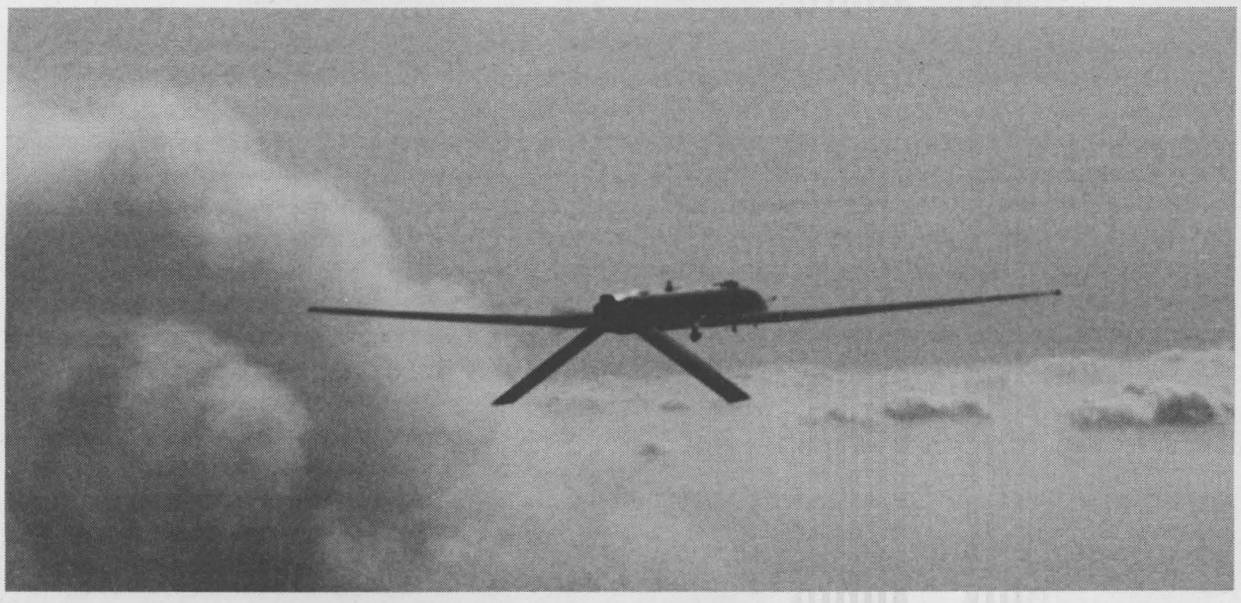
MAKING MEDICINE — Dick Coats (left, 6500) and Dennis Nelson (6521) discuss Sandia's plans to begin making enough Molybdenum-99 to meet US nuclear medicine needs. Currently, the only source of Moly-99 is a single, aging Canadian facility.

Sandia has developed the MELCOR computer code for the US Nuclear Regulatory Commission and the international reactor safety community as a tool for radiological source term and risk assessment analyses for **severe accidents in nuclear power plants.** A new version containing several major improvements was released in August 1994, following several months of testing to demonstrate its robustness and reliability on a variety of computer systems for several accident scenarios. A six-day instructional workshop was also held for several international organizations to assist them in learning to use the code. Because of its flexibility and degree of integration of diverse phenomena, MELCOR is being used to estimate severe accident source terms and their sensitivities and uncertainties in a variety of applications involving US, western and eastern European, and Asian reactor designs. (6400)

Molybdenum-99 (Moly-99), the parent nuclide of ^{99m}Tc, is the dominant radioisotope used in nuclear medicine. It is currently available only from a single, aging foreign (Canada) source. DOE has been chartered by Congress to provide a domestic source to ensure that, in the event of an interruption in the Canadian supply, US medical needs can be met. The feasibility of Sandia producing Moly-99 in sufficient quantity to serve the **US nuclear medicine needs** has been established, and DOE has selected Sandia to provide the domestic source of Moly-99 using the Annular Core Research Reactor and its associated hot cell facilities. Sandia has been funded and instructed to prepare the ACRR and hot cell facilities for production of Moly-99 following satisfactory completion of the National Environmental Policy Act process and project management plans. (6500)

The **Strategic Petroleum Reserve** storage site at Weeks Island, La., experienced a collapse sinkhole directly over the edge of the former underground salt mine used for storing 73 million barrels of crude oil. Diagnostic efforts by Sandia established a likely leakpath between the overlying groundwater and the underground mine, which if not stopped or slowed, could eventually dissolve major holes in the salt roof and jeopardize the facility. Sandia specialists in rock mechanics, seismology, hydrology, geology, exploratory drilling, and fluid dynamics pooled their talents to advise DOE on future options and eventual withdrawal from this site. Of special concern will be the manner in which the oil is removed, now being determined in follow-on studies. (6100)

Two teams from Sandia/California participated in a three-week remote cloud sensing intensive observational period at the DOE Cloud and Radiation Testbed site near Lamont, Okla. The project is part of the Atmospheric Radiation Measurement Program, the primary DOE element in the **US Global Change Research Program.** The remote sensing team provided Raman lidar (light detection and ranging) measurements of atmospheric water vapor. This system was accompanied by three other high-power laser-based lidar systems and many other instruments. The measurements focused on upper tropospheric moisture and successfully demonstrated Sandia's state-of-the-art ultraviolet lidar capability. The second activity was a Sandia/California-led multilaboratory team's atmospheric radiation measurement unmanned aerospace vehicle project. This team fielded a radiometric payload flown aboard an unmanned aerospace vehicle that obtained clear-sky radiant flux profiling, representing the first climate-relevant measurements made from remotely piloted aircraft. These major advances in atmospheric research capabilities were funded by DOE and the Strategic Environmental Research and Development Program. (8100/8300)



REMOTE SENSING — An instrumented, remotely piloted ARM-UAV (Atmospheric Radiation Measurement-Unmanned Aerospace Vehicle) collects data over Oklahoma in research aimed at improving understanding of the role of clouds in determining climate.

Sandia's photovoltaics program received a 1994 R&D 100 award for the commercialization of a **high-performance silicon photovoltaic cell** that is more efficient than conventional photovoltaic cells, and is amenable to high-volume manufacture by standard integrated circuit processing tech-

nology. This award is shared with the Electric Power Research Institute (EPRI) of Palo Alto, Calif.; DOE; Amonix, Inc., of Torrance, Calif.; and SunPower Corp., of Sunnyvale, Calif. Amonix and SunPower are photovoltaic cell manufacturers that commercialized the new technology, while EPRI, DOE, and Sandia provided technical and financial assistance to the project. (6200)

SEAMIST™, a technology demonstrated as part of **Sandia's Mixed Waste Landfill Integrated Demonstration** (MWLID) was chosen to receive an R&D 100 award. The R&D 100 program recognizes innovators and organizations for outstanding practical technical developments. SEAMIST, a membrane liner developed by Science Engineering Associates (SEA), demonstrated by the MWLID, and commercialized by Eastman Cherrington, saves not only time, but also money in drilling costs, tool rehabilitation (not replacement), upgrades, and waste stream disposal. It also minimizes or eliminates problems that conventional systems experience, such as retrieval and repair of buried instrumentation, cross-contamination of samples, single-point sampling with screened wells, and borehole stability. SEAMIST was submitted jointly by Sandia and its industrial partners, SEA and Eastman Cherrington. (6600)

TIME, MONEY SAVER — Cecelia Williams (background, 6621) and Bill Lowry of Science and Engineering Associates demonstrate SEAMIST™ technology as it would be used at a mixed waste landfill. SEAMIST, which won an R&D 100 award, saves time and money in drilling costs, and minimizes or eliminates other problems in characterizing waste.

Production of plutonium at Hanford and other DOE facilities has created large volumes of radioactive cesium-contaminated waste that must be treated and safely stored. Sandia and Texas A&M researchers invented and developed a new class of **inorganic ion exchanger called crystalline silicotitanates** (CSTs) that are highly selective for cesium and strontium removal. CSTs are stable in the corrosive, highly radioactive solutions, and their use will simplify radioactive waste processing compared to existing organic ion exchangers. During 1994, the technology for preparing CST powder was successfully transferred to a major chemical company, UOP (formerly Universal Oil Products), through a cooperative research and development agreement, and it produced an 1,800-pound commercial batch with excellent ion exchange properties. UOP is developing a granular CST for treatment of radioactive wastes in an ion exchange column. (6200/6600)

Remediation of a hazardous waste site was conducted at Sandia's gas cylinder disposal pit, a facility that operated since 1963. The cleanup prevented possible spontaneous releases of hazardous gases from corroded cylinders. Special safety and quality plans were developed for this project, and archaeological excavation techniques were used. Excavation was a tightly controlled activity using experienced gas cylinder and reactive chemical specialists. The project resulted in removal of several dozen thermal batteries; five pounds of lithium metal; 6.6 pounds of rubidium metal; several pounds of unknown chemicals; 140 cubic yards of thorium-contaminated soil; 270 cubic yards of chromium-contaminated soil; and 450 gas cylinders, including 97 intact cylinders containing inert, flammable, toxic, corrosive, or oxidizing gases. This remediation effectively and safely eliminated immediate and long-term hazards associated with the pit. (7500)

Sandia's Combustion Research Facility has joined in a cooperative program with the Cummins Engine Co. to investigate the dynamics of diesel engine combustion and the associated production of **particulate and nitrogen-oxide emissions**. Understanding these processes is crucial to developing new diesel engines that meet stringent emission standards while maintaining high performance. Using a newly designed optically accessible diesel engine (developed as part of this project), researchers are applying advanced optical imaging diagnostics to the in-cylinder processes. Several studies already conducted covered fuel-jet penetration, fuel vaporization, quantitative fuel/air mixture measurements, and relative soot-concentration and particle-size distributions. The overall goal is to provide a complete physical picture of the processes occurring in the cylinder of a firing diesel engine. These data provide guidance to industrial designers and are being used to support the development of predictive computer models. (8300)

Rechargeable lithium batteries are pervasive in the world and find widespread use in many applications, such as consumer electronics, computers, etc. This technology has been identified by the US Advanced Battery Consortium (USABC) as one of the long-term power sources for electric vehicles (EV). Sandia is

Education outreach

The three Hands-On/Minds-On programs — Hands-On/Minds-On Technology (HOMOT), African-American; MANOS, Hispanic; and Dream Catcher, American Indian — all **increased student participation** during FY94, doubling the previous year's participation. For FY94, HOMOT had 125 participants, MANOS had 238, and Dream Catchers had more than 80 students and 50 parents. HOMOT, the only program with seniors, had 23 graduates, up from 16 the previous year, the first year the program had seniors. All 23 graduates are enrolled in college, with 15 intending to major in science or engineering and nine enrolled in historically black colleges and universities. (3600)

In collaboration with the University of New Mexico Colleges of Education and Arts and Sciences, Sandia's Education Outreach organization initiated the University Pre-Service Initiative to dramatically change the **science and mathematics curriculum for elementary education majors**. The new curriculum will include hands-on science instruction that will cover the basic physical and life sciences and mathematics instruction through probability and statistics. The final course in this curriculum will be a capstone course integrating mathematics and science. The first phase of the project established the curriculum content and assured compliance with the national standards for science and mathematics instruction. In FY95, the project will develop the laboratories, hands-on lectures, and integrate the pedagogy with the content for the courses. The first courses of this new curriculum, which represents a major systemic change in elementary teacher education, will be offered at UNM in the fall 1995 semester. (3600)

Sandia's new Carlsbad Operations Center 6700 has been a catalyst for the formation of the Southeast New Mexico Educational Resource Center (SNMERC). This consortium of 11 school districts in Chavez, Eddy, and Lea counties, DOE's Carlsbad Area Office (CAO), and Sandia focuses on **improving science and math education**. SNMERC's goal is to seek common curriculum and approaches to optimize utilization of resources. Initial organizing meetings were hosted by Sandia, which also houses SNMERC's activities and director. SNMERC was used to distribute excess Waste Isolation Pilot Plant equipment from DOE/CAO. Resource kits for hands-on math and science education were to be distributed in January 1995, and the first annual environmental competition for member high school students were to be held during the spring semester. (6700)

Energy and environment

funded by the USABC to develop solid electrolyte rechargeable lithium batteries for the EV application. During FY94, we succeeded in synthesizing carbon materials for anodes with high capacity and fast discharge rate, and manganese oxide materials for cathodes. These technologies should be transferred to the USABC contractors and industry soon for commercialization of the materials. (2200/8700)

In September 1994, Sandia researchers conducted a comprehensive series of shock and vibration tests on one of the six **Russian Topaz 2 space reactor systems** at the US Air Force's Phillips Laboratory. These intense tests simulated the stressful forces experienced during launch into space. The tests simulated the launch environment of US medium class launch vehicles and the Russian Proton launch vehicle. These were the first tests of this type to be conducted in the US with a space reactor since the 1960s. Information yielded by these tests will be used to develop standard space qualification and acceptance procedures for future space reactor systems. Research on the Ballistic Missile Defense Organization-funded Topaz International Program is conducted by Phillips Laboratory, Los Alamos National Laboratory, Sandia National Laboratories, and the University of New Mexico. (2700/6400)

Two major surface surveys were conducted to assure Labs-wide safety and begin the characterization of **potential hazardous waste sites** on Kirtland Air Force Base. First, 2,200 acres encompassing 89 sites were scanned for unexploded ordnance, resulting in the detection of more than 40 pieces of live ordnance, most of which have subsequently been removed for disposal. A radiation survey of 61 sites (820 acres) detected nearly 3,550 point sources of elevated gamma radiation, mainly due to fragments of depleted uranium, and 196 area sources associated with soils. All sources were flagged, hazard areas were posted, and cleanup completion was scheduled for April 1995. (7500)

GROUND SWEEP — Workers sweep across the ground during one of two major surface surveys conducted to begin the characterization of potential hazardous waste sites on Kirtland Air Force Base. Cleanup completion of these sites was scheduled for spring 1995.

URANIUM PIT CLEANUP — Workers examine soil beneath a tank being removed from an environmental restoration project site in Sandia's Tech Area 2. Remediation of the site involved removing material from four uranium calibration pits DOE had used between 1978 and 1984 to test and calibrate uranium exploration tools.

The first remediation of an **environmental restoration (ER) project** site at Sandia was successfully conducted in May and June 1994 at Tech Area 2. The removal action involved four uranium calibration pits (UCPs), some filled with radioactive or hazardous materials. The pits were used by DOE between 1978 and 1984 to test and calibrate borehole radiometric logging tools for uranium exploration. The UCPs were remediated as part of a voluntary corrective measure (VCM) to reduce investigation costs and accelerate regulatory cleanup schedules. The cost of the VCM to the ER project was approximately $100,000. A cost saving of at least $180,000 was achieved by conducting the VCM instead of following the standard regulatory process. (7500)

Sandia has completed a successful field demonstration of a prototype **continuous emissions monitor for metals**. The monitor relies on a measurement technique known as laser spark spectroscopy, an established laboratory tool that we have adapted for field measurements of emissions from thermal processing facilities for the treatment of hazardous waste. In the demonstration, cadmium, lead, and manganese were measured in the effluent from a pilot-scale vitrification facility that was processing a surrogate waste water treatment sludge. The measurements provide the first real-time insight into how emissions change as operating parameters such as waste feed rate are changed. Tests were conducted at Clemson University in cooperation with the joule-melter vitrification project at Clemson and the Savannah River Plant. (8100/8300/8700)

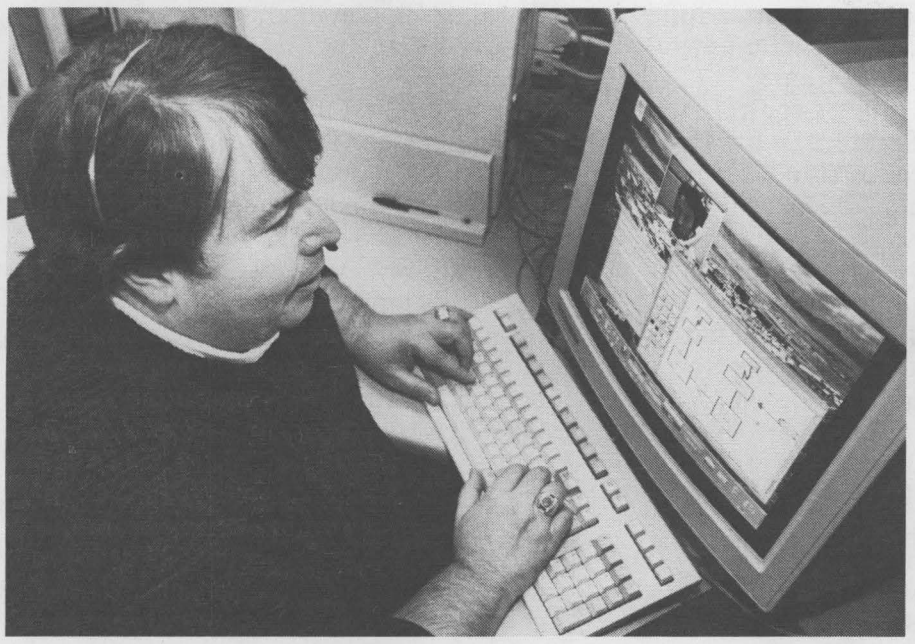
Safeguards and security

Sandia's Safeguards and Security Center successfully completed **security awareness training** for 160 subcontractor facility security officers (FSOs) who represented 1,600 employees. The objective was to train FSOs so they would design training programs for their cleared employees and thereby fulfill DOE requirements for security awareness. DOE requires a strong security awareness program for everyone granted a clearance. The program mandates initial, comprehensive, annual, foreign travel, and termination security briefings. The 160 FSOs represented a potential population of 230 Sandia contractor firms that have one or more cleared employees within their companies. FSOs worked with Sandia Personnel Security staff and established team working relationships and contacts for clarifying and resolving various DOE and Sandia requirements. DOE was complimentary of the Sandia effort and will use it as a model within the complex. (7400)

Safeguards and Security began the **Q-Clearance Reduction Program**, under DOE's direction, during FY94. The objectives were to transfer existing Q clearances to L clearances, and to issue L clearances for many new Sandia/New Mexico employees and subcontractors. The principal features of the process were to evaluate Sandia employees and subcontractors with Q clearances for possible transfer to L clearances, consider new Sandia employees and subcontractors for L clearances, and have focus group meetings for education and awareness of the DOE L-clearance requirement. During the 12-month period, 2,500 subcontractor Q clearances were reviewed and more than 60 percent were converted to L clearances. One thousand employee Q clearances were also reviewed, and 15 percent of those were converted to L clearances. L clearances were requested for 300 new employees and subcontractors. It is estimated that the utilization of L clearances at Sandia resulted in a saving for DOE of $2 million in background investigations during FY94. (7400)

Members of Facilities Planning and Engineering Dept. 8611, Operations Security Dept. 8631, and Security Systems Dept. 8632 combined as a team to facilitate the implementation of a new after-hours, **automated site-access gate**, a cost-effective site access control method. The new gate allows people arriving on-site after "normal" working hours to enter the parking lot with a badge swipe that activates an electric sliding gate for vehicle passage. Closed circuit TV is incorporated to provide for remote security monitoring. With the use of this new gate in conjunction with other automated access controls, authorized individuals may now enter the site after normal working hours and gain access to most areas without requiring key service or a personal badge check by a security police officer. The cost of the new gate will be recovered in less than two years through the savings generated from the elimination of the former security force staffing requirement at the parking lot entrance. (8600)

Information and computation



TELECOMMUTING — Hewlett Packard engineer Bill Cadier uses an informal Sandia-developed system called Work at Remote Office to communicate from his office in Albuquerque with colleagues at his work group in Cupertino, Calif. The project demonstrated the positive impact of such an information environment on employee efficiency and productivity.

In collaboration with Hewlett Packard (HP), Sandia has established a pilot project to evaluate and optimize the work productivity and quality of life of an HP employee living in Albuquerque, N.M., and **telecommuting to his work group in Cupertino, Calif.** He "telecollaborates" with his clients through a diverse workstation-based information environment providing digital desktop video conferencing, shared X-Windows applications, and a shared whiteboard. The project quickly demonstrated the positive impact of such an information environment on the employee's efficiency and productivity. (8900)

The Sandia/California technical library installed 12 CD-ROM **databases that are accessible** to most network-connected IBM PC and Macintosh users. Access by Telnet will be available soon. Available on CD-ROM are database versions of *Books in Print, Thomas' Register of Manufacturers, US Business Telephone Pages, Patent Abstracts, Computer Select, Ulrich's International Periodicals Directory*, and *Infotrac Medical. Ei Compendex, National Technical Information Service*, DOE's *Energy, Science & Technology*, and *Metadex* databases provide information on science, engineering, energy, and metallurgy, research and application. Instructions for obtaining service are available from the Technical Library bulletin board on the Livermore cc:Mail system. Macintosh and IBM PC terminals are available for CD-ROM access in the library. (8500)

Sandia has worked jointly with Lawrence Livermore, Los Alamos, and Oak Ridge national laboratories, the Society for Exploration Geophysicists, and many private companies to produce a **three-dimensional synthetic seismic data set.** The data set is being generated using massively parallel processors at all four DOE facilities and will be made available to the gas and oil industry using collaborative tools and networking technologies developed as part of the project. The work was funded under the Gas and Oil National Information Infrastructure program funded by the Office of Economic Competitiveness. The resulting data set and the access tools will be used by private industry to evaluate information infrastructure alternatives and provide a "ground truth" for three-dimensional seismic inverse calculations. (1400/1500/8900)

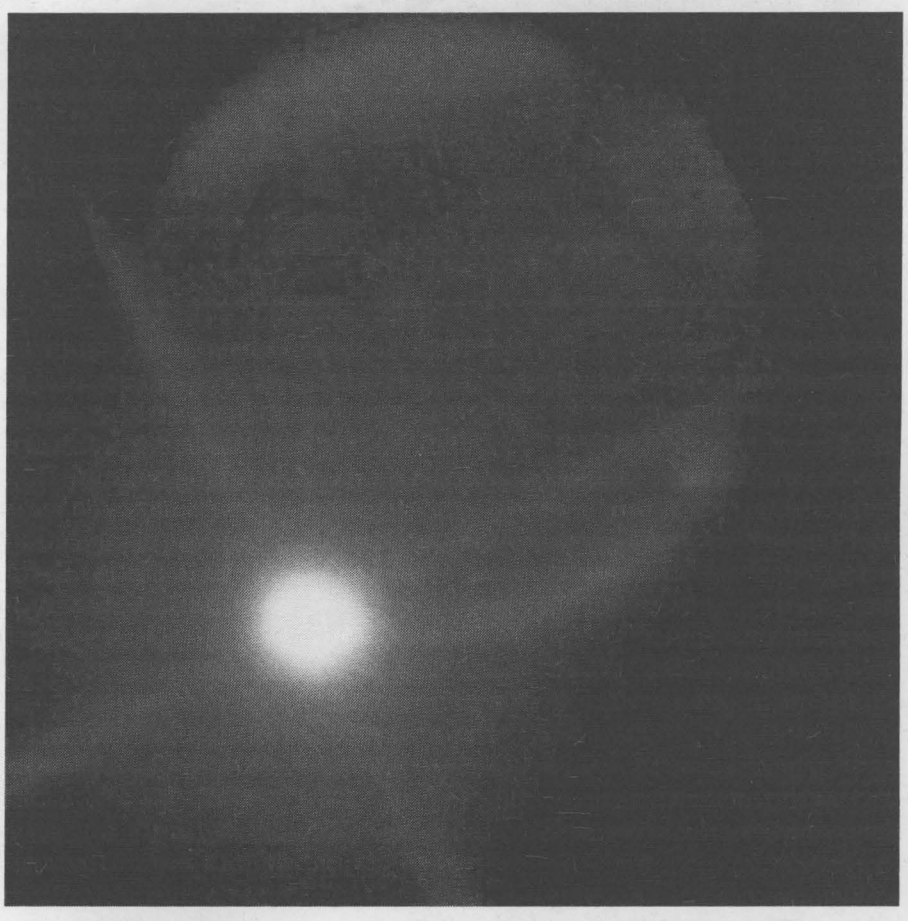
IMPRESARIO (Integrated Multiple Platform for Remote-sensing Simulation and Real-time Interactive Operation) is a newly developed software system that creates a framework to support **simulation of remote sensing applications.** This technology enables model designers to integrate independently created models into the same system. By enhancing the user interface and the model output, and by enabling the models to interact with one another, IMPRESARIO provides a much more powerful environment in which to work. All interaction is achieved in real time; and when appropriate, models may be visualized in three-dimensional graphics, as well as hypermedia. IMPRESARIO fosters a synergistic effect, heretofore not available, allowing models to perform in ways beyond the original intent of the designer. (9200/9400)

With the addition of 5,000 new customers, the Sandia Voice Information System (SVIS) accomplished the goal of becoming Sandia's first **pervasive information system.** Applications were integrated into the SVIS to accomplish such tasks as benefits open enrollment, job vacancy postings and bidding, material and purchase requisition status reporting, and purchase requisition number assignment. In addition, the SVIS deployed new quick-dial codes for the Sandia Line information service and implemented telephone-based quizzes to demonstrate system capabilities. Customers use the SVIS applications at a rate of 3,300 hours yearly (100 simultaneous calls for 12 hours daily), thus relieving Sandia staff from answering routine queries. (3500/10200/13300/13400/13900)

Before the July collision of **Comet Shoemaker-Levy 9** with Jupiter, many scientists and astronomers expected the event to be unobservable because it would occur on the far side of the planet. A team of Sandia scientists thought otherwise and simulated the collision using the Sandia three-dimensional hydrocode CTH on the Intel Paragon supercomputer. The results of their study, published prior to the event, predicted fireballs that would be directly visible from Earth-based telescopes and won the Hypervelocity Impact Society best paper award. The study forms the basis for a Laboratory Directed Research and Development proposal on antipodal shock focusing from impact events that have occurred on Earth. (1400)

Sandia's New Mexico and California sites are working toward common, cost-effective solutions for the **generation, management, distribution and retention of engineering information.** The Configuration Management System used to manage administrative data relating to engineering information is now operational at Sandia/New Mexico, and has resulted in significant cost reductions. Both sites, along with AlliedSignal/Kansas City (AS/KC), are now using the same computer aided drafting/computer aided engineering software for creating design information in their design service centers. This has greatly improved the ability to rapidly exchange design information over communication networks. Both Sandia sites, along with AS/KC and DOE's Albuquerque Operations Office, are also using a common optical disc storage system, Image Management System — which contains more than three million design images — for direct access to historical design information. (2600/2700/8200/13200)

Top industry analysts have predicted that the Asynchronous Transfer Mode (ATM) technology will be the enabling **networking technology for the future National Information Infrastructure.** Through Laboratory Directed Research and Development (LDRD) efforts and other initiatives, Sandia has been on the leading edge of research, standardization, and deployment of ATM equipment. Sandia demonstrated the state-of-the-art of ATM at the Supercomputing '93 conference in November 1993. By using several different vendors to build an all-ATM network from Albuquerque to the conference floor in Portland, Ore., using a 155-megabits-per-second link, Sandia presented the most heterogeneous high-speed ATM network ever demonstrated up to that time. Along with standard network applications, the following multimedia applications were also demonstrated: desktop video conferencing, remote visualization, distance learning, and video-on-demand. Sandia is now using the lessons learned in this demonstration to implement early customer trials of ATM to the desktop. (13200)



JUPITER IMPACT — This infrared image of the fireball created by the impact into Jupiter of fragment G of Comet Shoemaker-Levy was made by Peter McGregor with the Australian National University 2.3-meter telescope at Siding Spring, Australia. This and other fireballs like it were predicted by Sandia scientists on the basis of computational simulations they produced using Sandia codes.

Supporting technologies

Free-standing metal microdevices with aspect ratios of more than 300-1 have been fabricated by a Sandia, Lawrence Berkeley Laboratory, and Jet Propulsion Laboratory team. The fabrication technique, termed LIGA (an acronym from the German words for lithography, electroplating, and molding), uses synchrotron radiation to produce a **pattern in a resist with high resolution and deep parallel walls**. The resist pattern is then electroplated with metal to produce the free-standing part. Due to the material selection flexibility, thickness, and high resolution, the LIGA technique is being explored to miniaturize components such as valves, motors, optical devices, and sensors. (8700)

A major step in flexible, advanced manufacturing of photonic and microelectronic devices has been realized with the development of an in situ growth rate monitor and its implementation on our production metal organic chemical vapor deposition (MOCVD) reactors. The process-control sensor, based on optical reflectance, is the **first practical in situ monitor of thin film growth** to be implemented on a CVD tool. This monitor, which is sensitive to quantum well layers as thin as 30 angstroms, enables real time corrections during process operation. It has become a critical new tool in the accelerated development of new processes under cooperative research and development agreements with industry partners such as Hewlett-Packard, Motorola, TriQuint and EMCORE. (1100/1300)

Two high-performance antennas supporting advanced **synthetic-aperture-radar (SAR) flight tests** were designed and manufactured with advanced techniques that reduced development and fabrication costs. A dual reflector antenna for Ku-band interferometric SAR was built using virtual prototyping techniques that coupled a custom electromagnetics (EM) computer model with computer aided drafting software (ProEngineer). The EM model defined the antenna parameters based on performance requirements, while CAD software produced a stereo-lithography definition, a casting definition, and numerically controlled machine-tool paths that allowed fast turnaround of precision antenna components. Low-frequency SAR development was supported by the design and fabrication of an extremely wide-bandwidth, dual-polarization antenna. This unusual, compact antenna operates from 130 MHz to 4 GHz, and is based on a conical zigzag spiral. (2300)

CHECKING RESULTS — David Womble (left, 1422), Art Hale (center, 1424), and David Greenberg (1423) check notes beside the massively parallel Sandia computer that set a record in May 1994 by performing 143.4 billion double precision floating point operations per second (Gflops/sec). The accomplishment won the Labs an R&D 100 award. They nearly doubled that speed in December 1994, with 281 Gflops/sec.

On May 19, 1994, Sandia and Intel announced a **record-breaking 143.4 billion double precision floating point operations per second** (GFlops/sec) on a massively parallel LINPACK Benchmark, which measures the speed at which a computer solves a dense linear system of equations. This record was nearly doubled by Sandia and Intel on Dec. 17, 1994, with a speed of 281 Gflops/sec. A Japanese machine, Fujitsu's Numerical Wind Tunnel, held the record from July to December. The Sandia solver was developed to support the use of parallel computing facilities by scientists and engineers. The software won a 1994 R&D 100 Award, and has been incorporated into a suite of three real-world applications (structural mechanics, acoustics, and electromagnetics) that won the national 1994 Gordon Bell competition. (1400)

The **transition of the Tritium Research Laboratory** from a nuclear facility to a controlled access laboratory continued in FY94. The projected $20 million savings — by making the change, rather than going through a decontamination and decommissioning process — is achievable. A $1 million budget under-run was realized during the fiscal year and returned to Sandia Defense Programs. The project was four months ahead of schedule at the end of FY94. More than 60 percent of the building floor area had been emptied of equipment, and equipment valued in excess of $10 million has been released for reuse at other DOE facilities. In spite of the hazardous nature of the cleanup, radioactive releases were the lowest since tritium was introduced into the facility. More important, worker dose levels continue to be low. The team won a Sandia President's Quality Award for the second year. (8200)

Sandia has developed a new instrument, the X-ray tomographic microscope load frame (XTM-LF), to allow 3-D, high-resolution (2 micrometer), in situ **characterization of metal, ceramic, and biological materials** while they are undergoing deformation. The purpose of this experimental apparatus is to aid in developing a technique for determining the initiation and evolution of deformation damage in materials with complex microstructures, such as the composite materials found in aircraft engines, reentry vehicles, and bone. It is expected that the information provided by this system will play an important role in the development of physically based models for such materials. (8700)

Biomedical engineering

Sandia has engineered and delivered an optical instrument that **noninvasively analyzes cervical tissue** for a precancerous condition called CIN (cervical intraepithelial neoplasia). This technique was first conceived by researchers at the University of Texas at Austin (UTA), and was tested in more than 200 women at the M.D. Anderson (MDA) Cancer Center in Houston. Patient Technologies Inc. (PTI, Albuquerque, N.M.) licensed the technology from UTA, but the original prototype was not marketable because it was too large (the size of a washing machine) and too expensive (in excess of $50,000). Under a Small Business Technical Assistance Award, Sandia engineers worked closely with PTI and UTA to develop a commercially viable prototype that is smaller (the size of a computer monitor) and more cost effective (less than one-half the cost of the original device). After completing engineering tests at UTA, this device will undergo clinical trials at MDA. (2600/4200)

A biological microcavity laser that uses high-resolution spectroscopy to **rapidly probe living or fixed cells** has been developed at Sandia. Resolution of light emitted from this "biocavity laser" allows researchers to assess the internal structure of targeted cells. The technology has demonstrated, for example, the ability to detect differences between normal and sickled human red blood cells arising from microscopic changes in the cell hemoglobin. Further, developers have demonstrated the ability to distinguish surface and volume lasing modes of human lymphocytes, where the surface modes depend on properties of the cell membrane and the volume mode corresponds to the fundamental mode of the nucleus. This new technique is based on Sandia's advanced semiconductor laser technology and may have significant implications for low-cost instrumentation for sorting cells. (1100)

Environment, safety, and health

Sandia's **Electrical Safety Program** — selected as a model program in 1993 — was recognized by DOE in 1994 for participating in the Occupational Safety and Health Worker Protection Pilot (OSHWPP) process that resulted from being selected as a model program. In the process, Sandia transferred the Electrical Safety Program to the AlliedSignal Kansas City Plant. AlliedSignal officials felt that our collaboration saved them one and one-half to two years of development time on their electrical program. DOE funded the transfer. (7700)

Sandia participated in October 1993 in development of a comprehensive "Ozone-Depleting Substances Management Plan for Real Property." This management plan provides a definition of terms, a policy for real property, a plan showing actions, and resources that will be required for the planned actions. The basic policy for building air conditioning equipment and Halon fire suppression agents is to economically select, efficiently use, recover, recycle, and reclaim the **refrigerants and Halons**; to plant or replace when appropriate; and to actively manage and plan for the eventual replacement of all ozone-depleting substances in the workplace in a cost-effective manner. All refrigeration mechanics have been trained and have received EPA certification. Sandia has procured both the high- and low-pressure recovery systems and has certified these recycle and recovery systems with EPA. Facilities Center 7800 had converted four major chillers to non ozone-depleting refrigerants by the end of FY94. (7700/7800 /7900/8600)

A challenge facing Sandia and DOE is determining the **disposition of radioactive and mixed waste** stored at Sandia. Mixed waste contains both radioactive material and specific hazardous constituents. Storage and transportation is regulated under Resource Conservation and Recovery Act (RCRA) regulations, the Atomic Energy Act, New Mexico Environment Department (NMED), Hazardous Materials Transportation Act (HMTA), and DOE orders. A team composed of Sandia ES&H specialists; contractors from Scientific Ecology Group, Inc., Environmental Dimensions, Inc., and CDM Federal Programs Corp.; DOE consultants; and Oak Ridge National Laboratory employees worked together to obtain a DOE contract for disposal of the mixed waste at a permitted commercial disposal facility. This team completed the first Sandia mixed waste shipment, and team members are now seeking approval to dispose of radioactive waste at a DOE site. This process will enable Sandia to actively manage radioactive and mixed waste in compliance with regulations. (7500)

The Generic Building Program was developed by Facilities in response to increasing construction costs at Sandia and the need to stay within DOE budget restrictions for General Plant Projects. The program consisted of **designing and building a generic 10,000-square-foot office building** that could be repeated multiple times at a minimal cost. The pre-designed building represents a $60,000, six-month saving in design cost and time, which translates to more building square feet and quicker occupancy for customers. There are four generic buildings in various stages of construction now: Buildings 877, 886, 879, and 811, and more are expected to follow. (7900)

After the DOE Tiger Team visit to Sandia/California in 1990, ES&H committed to reworking the **chemical inventory and data management practices** with a corporate prototype project at Sandia/California. Over the past several years, the project team, partnering with AT&T Bell Laboratories, successfully implemented the AT&T Chemical Information System with 33,000 bar-coded chemical containers and a 40,000-MSDS document library. The first major fruits of the multiyear effort came in FY94 through the development of inventory-based information reports for 12 ES&H compliance and line programs. This advanced data management reduces the burden to the line in annual and ad hoc ES&H-driven data calls, and represents a major improvement in the quality and availability of inventory-based information. (8600)

The Clean Air Network (CAN) commenced operations Jan. 4, 1994. The network's two main functions are to **monitor air quality and gather site-specific meteorological data.** The program was developed through the cooperative efforts of Departments 6612 and 7575. The network includes nine meteorological monitoring towers, a criteria pollutant monitoring station (CPMS), eight particulate matter monitors, and four volatile organic compound monitoring stations. Data from the air quality stations will be used to establish background levels for measured pollutants, to show compliance with national ambient air quality standards, and to evaluate changes in air quality. Data from the meteorological stations will be used to evaluate air transport and dispersion patterns, and to support environmental monitoring programs and emergency operations. (7500)

WEATHER WATCHER — Danielle Nieto (7575) downloads data from one of nine meteorological/ambient air monitoring stations that comprise Sandia's Clean Air Network. Among other things, the network will help establish background levels to show compliance with national ambient air quality standards.

Electronics

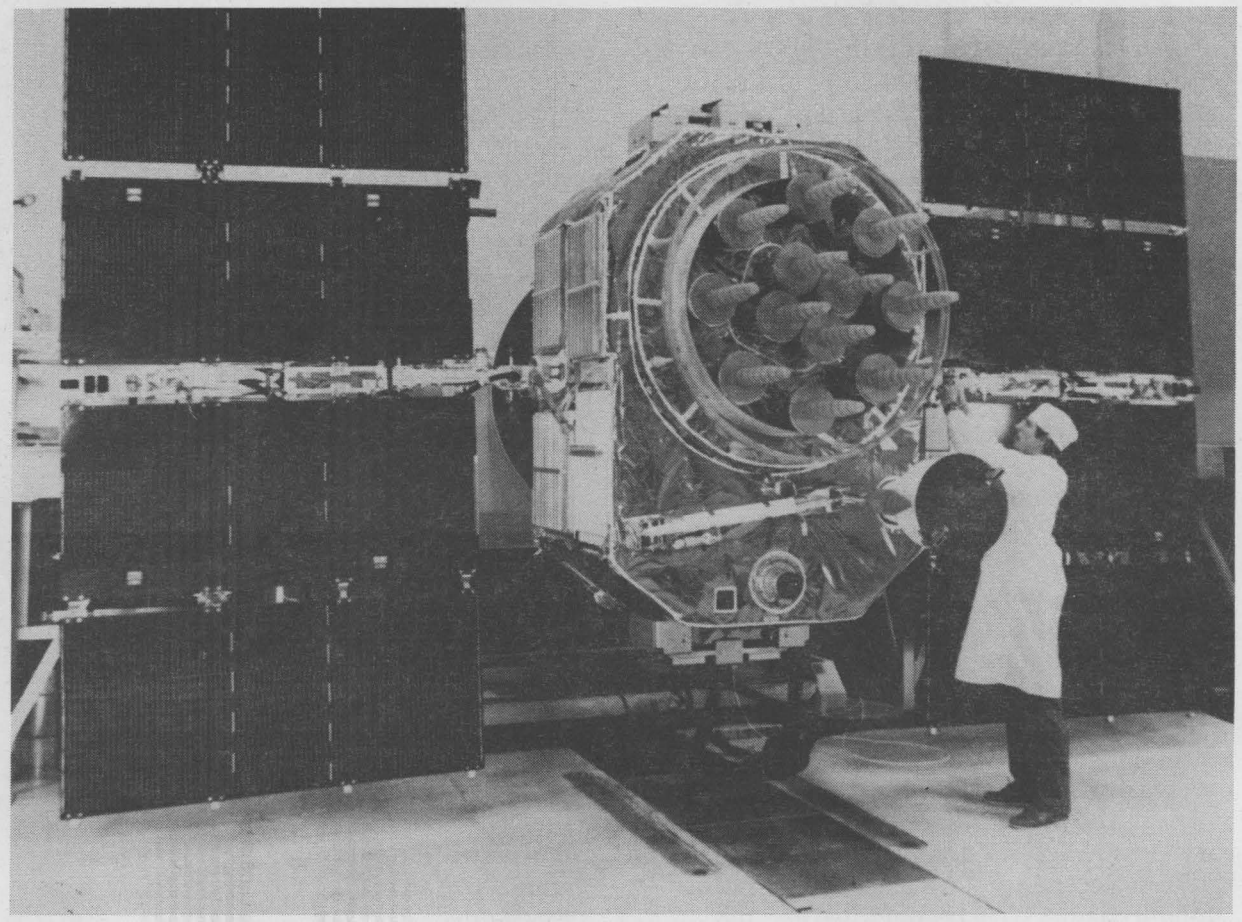
Sandia established a Microelectronics Industrial Partnering Office in San Jose, Calif., in January 1994 to provide local access for Bay Area semiconductor industries to Sandia's **microelectronics resources and capabilities**. The San Jose office hosted an all-day workshop in August, showcasing Sandia's capabilities in semiconductor research and development. The workshop was attended by representatives from 70 semiconductor manufacturing and equipment and materials suppliers, resulting in seven new partnerships between Sandia and the semiconductor industry. In addition, Sandia and SEMI/SEMATECH — which represents a US industry base of semiconductor equipment and materials suppliers — signed a memorandum of agreement to collaborate on aligning the microelectronics capabilities of Sandia with the needs of SEMI/SEMATECH's member companies. (8000)

What is probably the **world's fastest engine** is not much larger than the thickness of a few human hairs, and it is capable of powering other devices, like microsurgical tools. The Sandia mechanism has an innovative linkage that, for the first time, can convert linear motion to rotary motion for delivering continuous mechanical power to other micromachines. Because of its tiny size, the engine can attain record speeds, perhaps up to 500,000 rpm, without flying apart. Few other manufactured devices can exceed even 100,000 rpm. Potential defense and commercial applications of the power source include medical uses such as unclogging arteries, destroying abnormal cells, or operating procedures inside eyes, ears, or perhaps even the brain. Sandia researchers also believe the technology could be applied to miniaturization of safety components in nuclear weapons. The micromachine is fabricated at Sandia's Microelectronics Development Laboratory on the same kind of silicon wafer used to make integrated circuits. (1300/2600)

Arms control verification

Sandia provided the **nuclear detonation detection system** payload for the two Global Positioning System (GPS) satellites that were launched during 1994. Our Department of Defense and DOE customers now have a full constellation of 24 GPS satellites in 10,900-nautical-mile orbits that are capable of detecting and locating nuclear detonations worldwide, 24 hours a day. Our GPS payloads passed 100 satellite years of continuous operation during the past year, a milestone that was a contributing factor in the Sandia GPS team's receiving a Sandia President's Quality Award. (9200)

The Advanced Radiation Detection Capability Data Unit (ARDU) was delivered to the Air Force during FY94 and the Integrated Correlation and Display System (ICADS) began operations for the **tactical warning and attack assessment** community. The ARDU processes nuclear detonation (NUDET) detection data from sensors on the Defense Support Program satellites and creates a NUDET report. ICADS correlates the ARDU report with analogous data from sensors on the Global Positioning System satellites and creates overall assessment displays for Air Force operators. These reports are forwarded to national command authorities over a wide area network. Sandia has cradle-to-grave responsibility for the ARDU and ICADS. These systems use a multiprocessor local area network architecture built around open standards. The effort involves 75 people in three centers. The synergism of this ground data fusion work with Sandia's satellite sensor work and our nuclear burst phenomenology expertise provides a high-quality product for both the Air Force and DOE. (2600/9200/9400)

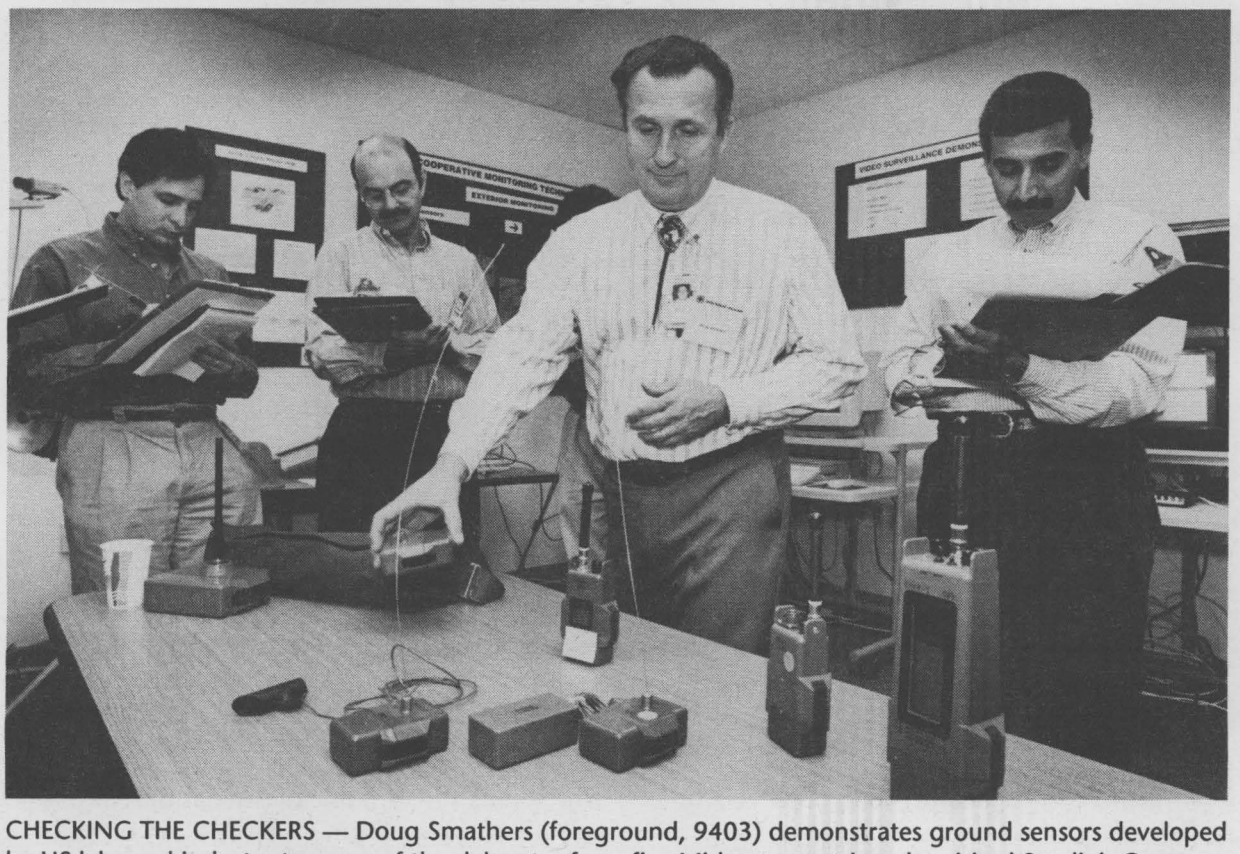


BIG EYES, EARS — A Rockwell technician works on one of two Global Positioning System (GPS) satellites that went into orbit in 1994 carrying Sandia-built nuclear detonation detection system payloads. The 24-satellite constellation is capable of detecting and locating nuclear detonations worldwide, 24 hours a day.

Developing and demonstrating the capability to **remotely detect and characterize chemical effluents** is the objective of Sandia's ultraviolet (UV) lidar (light detection and ranging) research activity. This effort is a broadly matrixed project that has tapped unique resources in Divisions 1000, 8000, and 9000. As part of a DOE five-laboratory program, we are focusing on the detection and characterization of gaseous effluents, as well as signatures from solids and liquids. We are also working on analysis algorithms that will permit near real-time identification of complex chemical mixtures. This year we have developed and deployed both multispectral UV fluorescence and differential absorption lidar systems for field testing at the Nevada Test Site. The extension of this technology to environmental monitoring, waste site remediation, and other applications is encouraged by DOE. (1100/1200/8100/8300/9200/9300/9400)

At the Cooperative Monitoring Center (CMC), **nonproliferation objectives** are achieved by promoting regional security. Regional security is of concern to the US because of the global consequences of the escalation of regional conflict, particularly if the countries involved possess weapons of mass destruction. Sponsored by DOE, the Arms Control and Disarmament Agency, and the Department of State, this project provides a forum in which regional participants can access the extensive US monitoring and verification experience base and explore ways that technology can reduce tensions in a region by facilitating regional confidence building. The CMC facility became operational this year, with Middle East and South Korea workshops. Workshop participants received hands-on experience with hardware, simulation software, and data processing for arms control, resource management, and environmental restoration applications. (4100/5800/6600/8100/9200/9400)

The Global Telemetered Seismic Network (GTSN), developed by Sandia for the US Geological Survey (USGS) and the Air Force Technical Applications Center (AFTAC), attained operational status in 1994. The system acquires seismic data to facilitate the rapid **location and analysis of seismic events** in support of USGS's mission to provide global earthquake monitoring and AFTAC's mission to monitor compliance with treaties limiting tests of nuclear weapons. (6100/9200/9400)



CHECKING THE CHECKERS — Doug Smathers (foreground, 9403) demonstrates ground sensors developed by US labs and industry to some of the delegates from five Mideast countries who visited Sandia's Cooperative Monitoring Center in 1994.

Pulsed power

Electron beam joining of refractory ceramics was demonstrated in a Laboratory Directed Research and Development (LDRD) project. In the conventional ceramic brazing process, the entire piece to be bonded must be raised to high temperature by surface heat transfer. Temperature gradients and temperature rise rate must be controlled carefully to avoid thermal stress cracking. Since the power of a 10-million-electron-volt beam is sufficient to penetrate 1 cm of ceramic, this process offers the possibility of directly heating and joining a buried interface for complex shape joining. This process could be particularly attractive for **high temperature joining of ceramic components** for gas turbines, heat exchangers, and high temperature combustion engines. Silicon nitride samples were brazed, using both platinum and molybdenum foils. Shear strengths up to 28 million pascals have been measured. This technique has potential application for DOE Defense Programs for ceramic and glass joining, as well as fossil energy programs for high temperature heat exchangers and high efficiency engines. (1200)

Advanced manufacturing

Testing represents one-half the manufacturing cost in the $83 billion dollar integrated circuit (IC) business. SHIELD™, a "Reliability Test-Lab-on-a-Chip," is a new paradigm in **reliability characterization** from Sandia's Electronics Quality/Reliability Center. It significantly reduces the qualification cost and time-to-market of advanced IC processes. Using less-expensive direct current stimulus, SHIELD™ has been used to perform the world's highest-frequency (530 MHz) and -temperature (430° C) complementary metal-oxide semi-conductor IC reliability tests. This product, winner of a 1994 R&D 100 Award, is now used by three US companies for advanced manufacturing. (2200)

America's flat-panel display (FPD) industry is critical to the nation's **economic competitiveness and military preparedness**. Through the National Center for Advanced Information Components Manufacturing (NCAICM), Sandia is developing software that allows industry planners to compute the cost of equipment and factories. We developed the FPD Cost of Ownership (CoO) model, which computes the "total" life cycle cost of operating a piece of equipment. More than 250 copies are now being used by industry. The Factory Cost Model, under development, will compute factory operating cost. The *Los Angeles Times* said, "The US flat-panel display industry doesn't have much in the way of factories, but thanks to Sandia National Laboratories, it will have a good software model of what operating such a factory might cost." (4112)

In a cooperative research and development agreement partnership with the Saginaw Division of General Motors, Sandia researchers have developed and demonstrated a closed-loop, real-time **process controller for induction hardening**. To accomplish this, computational modeling, experimental process characterization, and material analysis were combined to characterize critical variables and develop a unique set of process signatures. The signatures were then used with a circuit model and neural net control techniques to form the basis for a first generation closed-loop controller. This controller, relating process conditions to case thickness in real time for simple geometry parts, was demonstrated in Saginaw's facility. It offers the potential of millions of dollars in savings per year by reducing scrap, eliminating a large testing infrastructure, and improving process development and optimization. Efforts have begun to extend this technology to the broad heat treatment industry. (1200/1500 /1800/2300)

MOTOR CITY CONNECTION — Bruce Kelley (1833) and Suzanne Stanton (2338) watch Sandia equipment during a demonstration of induction hardening. Sandia has a cooperative research and development agreement with the Saginaw Division of General Motors to develop the process for GM's use in manufacturing.

The National Center for Advanced Information Components Manufacturing (NCAICM) has 25 projects under way in support of the **US flat panel display and advanced information components industry**. NCAICM is a multilab effort — Sandia, Los Alamos, and Lawrence Livermore national labs — with eight university and 39 industrial partners in 16 states and the District of Columbia. NCAICM researchers are concentrating on improving manufacturing technologies associated with emissive flat panel displays, advanced lithography, microelectronics, and optoelectronics. Two example projects are: factory cost modeling, in which a cost-of-ownership model has been distributed to more than 230 flat panel manufacturers and equipment vendors; and field emission characterization, in which field emitter arrays and low-voltage phosphors are being analyzed in two new facilities, one at Sandia/New Mexico and one at Sandia/California. The Advanced Research Projects Agency is the program sponsor. (1100/1300/1500 /1800/2200/2300 /2400/2900/4000 /8300/8700/9100)

A CLOSE LOOK — Walter Worobey (2411) adjusts a microscope to get a closer look at a flat panel display. Sandia is among a consortium of three national labs, eight universities, and 39 industrial concerns working to improve manufacturing technologies associated with emissive flat panel displays, advanced lithography, microelectronics, and optoelectronics.

Technology transfer

An update of a technique for **locating integrated circuit (IC) failures** that was originally developed to meet the needs of Defense Programs (DP) is now benefiting both DP and industry. Charge induced voltage alteration (CIVA) can locate in minutes a common type of IC failure that could take more than a week to find using other techniques. Motivated by millions of dollars in productivity improvement resulting from the successful transfer of CIVA, Intel presented a plaque ("In recognition of the outstanding contribution of Sandia's Failure Analysis Department to the semiconductor industry"). For Defense Programs, CIVA is the key to more rapidly analyzing any stockpile IC problems that might develop. (2200)

New uniform **large-area transverse magnetic fields** can have many applications. A method has been discovered to locate conductors along a cylinder to produce highly uniform magnetic fields over a large fraction of the cross-section of the cylinder. Additionally, a method was devised to locate conductors carrying the proper currents that confine the field virtually entirely inside the magnet. A simple transformation converts the wire systems to constant gradient (quadrupole) or higher-order multipole magnets. The magnet can be the basis for a medical magnetic resonance imaging (MRI) system with lower total cost because of lower site and shielding costs, which also has greatly reduced claustrophobic effects on patients. Other applications include imaging for industry, atomic clock compaction, improved beam focusing coils for accelerators, and chemical resonance spectroscopy. The higher-order multipole versions of this technology can be improved beam focusing and guiding magnets for accelerators, replacing iron-core and present coils with simpler, less-expensive, and more accurate magnets. (1200)

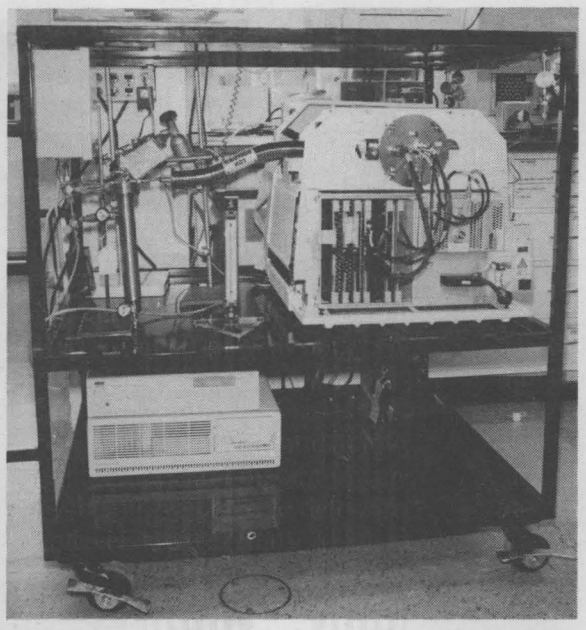
Computational fluid dynamics studies were completed in support of the Sandia Contamination Free Manufacturing Initiative to evaluate the use of ultra-pure water (UPW) in wafer rinsing and **cleaning operations associated with semiconductor manufacturing**. This work was performed with Santa Clara Plastics (SCP), the largest US manufacturer of rinsing systems, under the Sandia/SEMATECH cooperative research and

Technology transfer

development agreement. Our objective was to reduce water usage, since as much as a billion gallons of UPW can be used annually for wafer rinsing at a single facility. UPW is expensive to produce; moreover, water used to produce UPW is in limited supply in some regions of the country, such as at Intel Corp. in Rio Rancho, N.M. Initially, the studies indicated that in the idealized rinsing tanks considered, much of the water bypassed the wafers, thereby providing little or no rinsing. Four new design guidelines (patent pending) recommended for rinse tanks are expected to reduce UPW usage by at least 50 percent. Follow-on activities with SEMATECH and SCP are expected to develop a new, water-efficient wafer-rinsing system, and to recommend modifications for existing rinse tanks. (1500)

A method has been developed for **identifying and quantitating organic vapors** in the exhaust streams from process tools at integrated circuit fabrication facilities. A quadrupole mass spectrometer was modified to sample atmospheric pressure gases and to use chemical ionization for sample analysis. The instrument and method were prototyped and demonstrated at the Intel fabrication plant in Rio Rancho, N.M., by monitoring actual wafer processing runs for four different lithography systems. The technology was developed under a cooperative research and development agreement funded by Intel. Intel will use this method to adjust process parameters to minimize volatile organic compounds at the point they are generated. (1800)

From October 1993 through September 1994, Sandia executed 83 **cooperative research and development agreements** (CRADAs) with private companies, totaling $145 million. Through the Small Business Program, 267 tech-



HIGH TECH SNIFFER — This specially modified mass spectrometer developed and built at Sandia now identifies and quantitates organic vapors in the exhaust streams from process tools at Intel's Rio Rancho, N.M., integrated circuit fabrication facility.

nical assistance projects were completed. Private sector access to unique Sandia capabilities was broadly expanded through the designation of eight additional Labs facilities as user facilities. Two new technology transfer mechanisms were established: The 100 percent funds-in CRADA and the abbreviated small business CRADA. Processing time required for a standard CRADA has been reduced by 67 percent. (4200)

A multilaboratory team led by Sandia established Prosperity Games and Roadmap-making as tools for developing industry-led, government-partnered, and laboratory-university-supported enterprises. Prosperity Games requires executive-level strategy interactions of discretion and judgment as players **formulate and implement robust strategies** to deal with complex, rapidly changing alternate realities. Technology Roadmap making is enabled by the relationships and the issue clarification resulting from Prosperity Games. The tools made the Electronic Manufacturing Initiative the vanguard for the National Science and Technology Council's thrust in industrial competitiveness while furthering Sandia's thrusts in manufacturing, electronics, and electronics technology. Sandia has been named the executive secretariat for the implementation. (4700)

The Semiconductor Industry Association has identified Extreme Ultraviolet Lithography (EUVL) as one of the candidate technologies to be pursued for future production of **integrated circuits with minimum feature sizes** below 0.15 microns. Along with AT&T, Sandia has led the field in demonstrating subsystem components and integrated laboratory tools based on a compact laser plasma source of EUV radiation. Working with industry, Sandia has assembled a third-generation EUVL system with overlay capability that will enable us to complete experiments to demonstrate the feasibility of fabricating prototype devices and circuits with features as small as 0.1 micron. This will be the first EUVL laboratory tool in the world with mask-to-wafer overlay capability and incorporates innovative approaches to high precision alignment with the use of a magnetically levitated wafer stage. This program is supported by DOE and the Advanced Research Projects Agency, and achievements to-date have been the result of a diverse, motivated team of scientists and engineers. (1200/1400/1800/2200/2300/2600/6500/8300/8400/8700/9200)

Components/materials and processes

Future requirements for advanced electronic packages, such as multichip modules, include not only smaller package volumes but significant improvements in efficiency and speed. Much of this is now possible because recent **Sandia advances in materials processing** have enabled the development of ceramic thin film decoupling capacitors for advanced packaging applications. These thin films (less than one micrometer) of lead lanthanum zirconate titanate possess very high dielectric constants (permittivity greater than 1,000) and exhibit excellent insulation resistance. As a result of this technological advance, developed as part of Sandia's Advanced Electronic Packaging Program, important agreements between Sandia and private companies are under way. (1800)

A **prototype robotic work cell for spray cleaning of electronic components** at AlliedSignal in Kansas City — part of the Automated Component Cleaning project — was completed and shipped. The prototype system uses an aqueous spray cleaning solution and precision motions to clean beneath surface mount devices on circuit boards. The robotic system provides precise, repeatable, controlled, and reliable motions during spray cleaning, thus improving the application of slow-acting environmentally benign solvents in precision cleaning applications. An important feature of the prototype system is its ability to automatically generate the robot paths and motions from the computer aided drafting models of the part to be cleaned. Automated path planning and robot programming speeds and simplifies the automation process, and adds great flexibility by rapidly accommodating changes in part design or cleaning process specification. At AlliedSignal, the automated work cell will be used for precision cleaning process development and for demonstration of advanced manufacturing technology. (2100)

Lithium thionyl chloride batteries, the new **power source for nuclear surety devices**, have been qualified for production using the new DOE Quality Process of EP401100. To meet these criteria, a high-performing product realization team devised and implemented a new way to apply quality functional deployment (QFD) to the component development process. They were the first process realization team at Sandia to complete all four stages of component qualification using the new requirements, successfully demonstrating a tool-made sample for the low-production-rate lithium/thionyl chloride battery in August 1994. (2200)

Sandia/California researchers have discovered a simple mechanical method to create **hard, wear-resistant surfaces.** This mechanical process creates a new material on metal surfaces with a nanometer-scale microstructure, increased strength values 30 times normal, and significant ductility and toughness. That combination of properties provides these new materials with a promising potential for use in micromachines as well as in hard surfaces. A manufacturing and environmental benefit is gained by this method, since no chemical or heat treatments are required. Our discovery is an outgrowth of a Laboratory Directed Research and Development program on modeling friction at sliding interfaces. A patent application is in process. (8700)

The Burner Engineering Research Laboratory (BERL) at the Combustion Research Facility (CRF) became fully operational during FY94 and has already served a variety of customers. The BERL is jointly sponsored by DOE and the Gas Research Institute, and provides a means of technology transfer of Sandia's **combustion expertise and diagnostics utilization** to manufacturers of industrial gas-fired burners. (Diagnostics include Mie scattering [the scattering of light by a sphere of dielectric material], laser-induced fluorescence, chemiluminescence, and laser Doppler velocimetry.) At BERL, the physics of the burner fluid mechanics, the chemistry of combustion, and the formation of air toxics and pollutants are tracked to enable improved combustion efficiency and reduced emissions. First to bring a burner to BERL was the International Flame Research Foundation (IFRF), followed by Arthur D. Little and Accurex companies. In cooperation with the Petroleum Environmental Research Forum, BERL researchers are currently studying refinery burners to help oil companies meet air quality goals from the Clean Air Act Amendments. (8300)

Simulating the **interaction of electron/photon radiation with matter** is a difficult task that is important for applications as diverse as radiation shielding, commercial materials processing, and the treatment of brain tumors. A recent application of our Integrated TIGER Series (ITS) radiation transport code was to model electron-beam processing of plastic films, adhesives, and magnetic media. We consulted with the 3M Company on the use of ITS to optimize material processing with electron beams. We have also created a multigroup version of ITS that should be useful in a variety of areas, including the simulation of organ doses due to therapeutic or diagnostic radiation and in the study of the effects of space radiation on satellite electronics. (9300)

Laboratories support

The Sandia Business School (SBS) is a **Labs-wide training effort** demonstrating successful cross-organization teamwork between Corporate Training and Development and the various owners of business and financial systems. The pilot effort of the SBS is the Financial Management School, led by the Labs' chief financial officer. The first class, "How to Obtain Standard Reports," using the Financial Information System, has been offered monthly since March, and continues to be in high demand. Three other classes and a variety of job aids and written training material have also been developed. During FY94, 32 sessions were offered to approximately 600 attendees. Additional SBS training being developed includes the areas of procurement and business information systems. (3500/10400/10500)

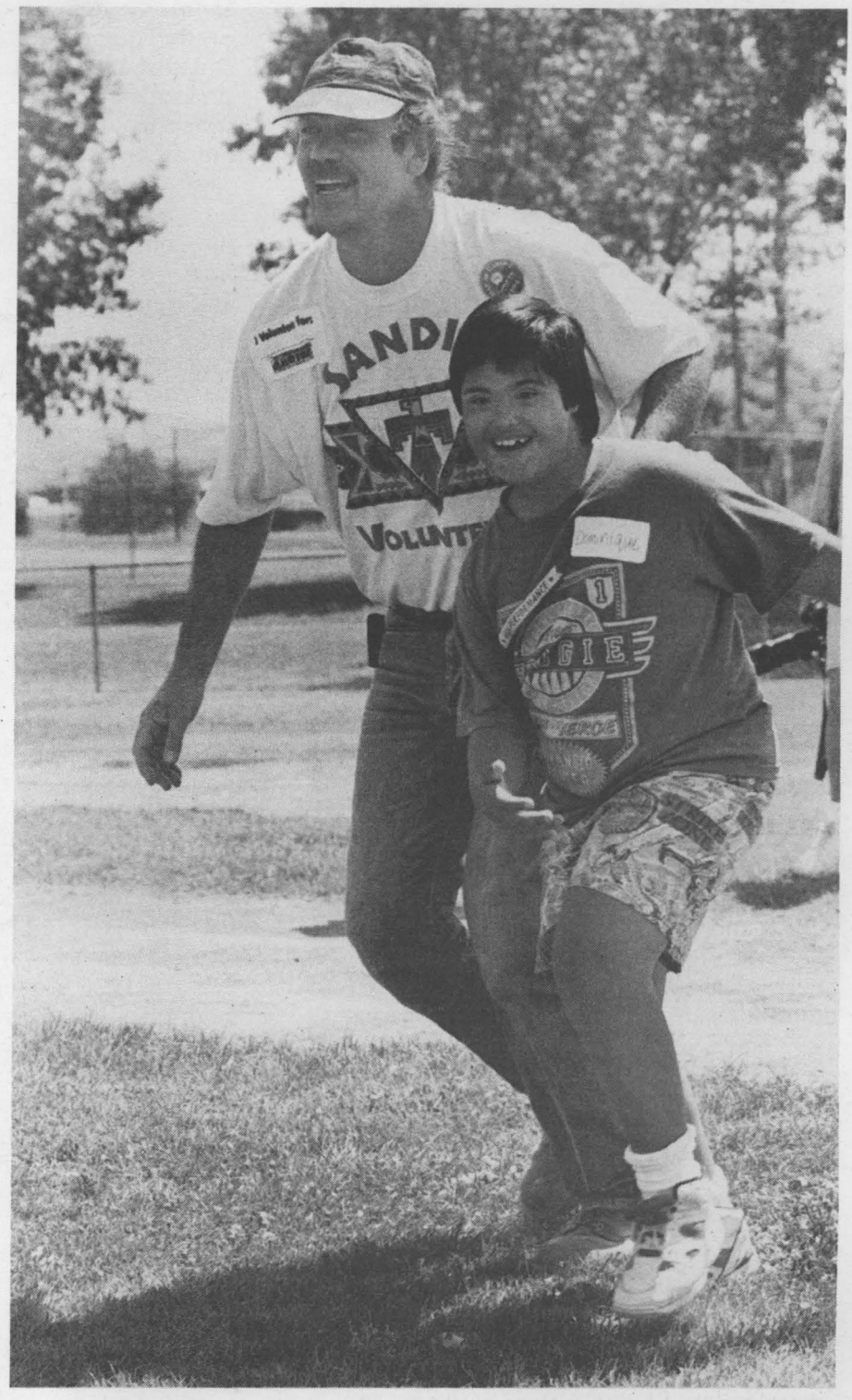
Sandia's first human resources conference, Towards The Agile Enterprise — Leading Sandia's People Into the Future, was held in Albuquerque Jan. 26-27, 1994. The two and one-half day conference attended by Sandia's top 100 executives focused on agility. The conference concept was formulated by the planning committee for the 1993 Fall Leadership Forum. The focus was on people; critical competencies for the future, including skill gaps; our large retirement-eligible population; and leadership. Conference speaker Bob Eichinger, former human resource executive at Pepsico and Pillsbury, emphasized development actions required to attain those skills, among both the present leadership team and those who will succeed them. To continue the focus on people, the 1995 Human Resources Conference is set for late March, with the theme of "Creating a High-Performing Inclusive Workforce." (3000)

Five Diversity Action Teams, under the direction of Sandia's Corporate Diversity Team, completed six-month projects to help **improve the work environment through valuing diversity**. The teams, comprising a cross-section of employees and first-line managers, researched and produced results that included a study showing costs/benefits of diversity; data to support a business case; a communications strategy to enhance awareness; publication of a report identifying principles and guidelines for diversity in teamwork; and the inclusion of diversity training into existing classes. This work becomes the foundation for improvements in corporate policies and processes, and for future corporate training. (3600)

A partnership of **financial operations and information systems** employees implemented a new Financial Information System (FIS) at the beginning of FY94. In its first year, the new FIS has consistently met the contractual requirement to transmit results to DOE on schedule and without error, and for the first time in recent history, year-end closing activities were accomplished ahead of schedule. Enhancements to financial reporting functions included weekly reporting of results, support of a larger case number, and availability of detail reporting of labor charges. FIS has the flexibility to support Sandia's management reporting and project management and control requirements as those become consistently defined on a corporate-wide basis. (10400/10500/13900)

Sandia's first Employee Recognition Awards Night was held June 11, 1994. Sponsored by Martin Marietta, the event honored 74 individuals and 23 teams, 16 of which were also Sandia President's Quality Awards winners. The event recognizes **outstanding accomplishments of employees** in the management, engineering, invention, publication, and operations and support categories. Honorees were selected by division selection committees from across Sandia. Each winner received a special pin and a plaque. Five of these Sandians were selected as nominees for a Jefferson Cup at the Martin Marietta Corporate Awards Night in Bethesda, Md., held June 24. Jeffrey Tsao (1311) was a recipient of this award in the publication category. (3000)

The Sandia Quality Leadership Council charged the Chief Financial Officer (CFO) organization with developing an FY94 **Spend Plan (budget) based on customer requirements**. A Labs-wide process management team including representatives of the divisions, each primary management area, and the CFO organization developed and implemented the FY94 Spend Plan process. The team used quality principles and tools, including project management techniques, in developing the Spend Plan, which was approved and in place by Sept. 15, 1994. The plan was consistent with Sandia's strategic and operating plans, and provided a foundation for strategic staffing decisions. (10000)



DAY OF CARING — Isidro Molina (1231) shares young Dominique's enthusiasm as they head for a base during a kickball game at a Special Olympics gathering in Albuquerque's Los Altos Park. Isidro was among dozens of Sandians who participated in Day of Caring activities in September.

Six hundred Sandia employees, contractors, retirees, and members of their families have formally responded to the recharged **Sandia Volunteers in Action program**. They have identified more than 335 skills and interests for a database designed to facilitate the process whereby they are placed in community volunteer work. Last year, 421 people contributed 7,679 hours as part of the corporate release program. On Sept. 1, 100 Sandians participated in United Way's Day of Caring, working for eight agencies and projects. More than 350 individuals have been placed in community service. (12600)

Sandia's first Operating Plan was developed and our Strategic Plan underwent a major update in FY94. Preparation of the plan implements a Martin Marietta planning process in creating a market-driven business plan for the Labs. Major elements of the plan are FY94 accomplishments, marketplace and strategy, technical foundations, internal programs, resource management, financial summary, issues, and planned FY95 accomplishments. The Operating Plan is a **five-year look at what Sandia will do** to move in the directions spelled out in the Strategic Plan, which sets broad objectives for the Labs. A Labs-wide process improvement team defined the content and process requirements for developing the Operating Plan, which was presented to Martin Marietta President and Chief Operating Officer Tom Young. (4500)

Tighter resources and increased requirements by customers and regulators have prompted development and implementation of a number of Laboratories Services Division 7000 **formal management processes** — Integrated Services Management System (ISMS) — to help directors and managers understand their work and apply scarce resources to the most important activities. ISMS is also designed to assist the 7000 management team in negotiating expectations with customers and regulators, and in consistently managing all work performed by the division. The major ISMS processes are issues management, task/activity planning, work decision, commitment management, program/process management, and performance assessment. Benefits of implementing the ISMS include work elements defined and prioritized, providing a defensible basis to support Sandia senior management in negotiations leading to commitments; work elements tracked against commitments and requirements; allocation of limited resources based on management's evalu-

ation of averted risk; and a consistent basis for comparison of diverse activities. (7200)

Additional sites and more remote locations for mail deliveries, and increasing numbers of organizations and organizational reassignments strained the mail sorting system (Department 7613) as it existed in October 1993. The root cause of the sorting delays was found to be address changes resulting from reorganizations. This process affects everyone and is critical for information transfer. We needed a system that would relate to a physical location, i.e., an address. The **mail stop process change was designed to improve service** by shortening the time it took to sort mail. The new system based on physical locations meant we would experience fewer changes of address since they would be generated by physical moves, not reorganizations or restructure. Since implementation of the mail stop system, delivery times have been cut in half. Delivery times now meet the quality criteria set with the division office — internal mail with good addresses get same day or next morning delivery; external mail with good addresses, one-day maximum delivery; improperly addressed mail, three days' maximum delivery. (7600)

The Sandia Central Steam Plant, built in 1949, provides steam to heat buildings in Technical Area 1, DOE's Albuquerque Operations Office, and the eastern part of Kirtland Air Force Base. The original boiler controls were electromechanical and by the early 1980s required significant repairs and replacements. Replacement parts had become increasingly scarce, and most were no longer available. Construction to upgrade the controls began in April 1992 and was completed in January 1994. This new computer-based digital control **system allows the boilers to operate more efficiently**, enables us to meet current and future environmental regulations, and provides for automated data collection and reporting. (7800/7900)

Reengineering Sandia has contributed to successful installation of the Intra-Building Recabling Communication System. Facilities Development Center 7900 has teamed closely with Computing and Communications Systems Center 13900 to implement the latter's vision of **high speed communication networks to meet Sandia's future needs.** This project is replacing antiquated phone/data lines in several major buildings at Sandia. Successful teaming of several Sandia organizations with design firms, contractors, and building occupants has allowed for development of design concepts and installation practices with minimal impact to building occupants. Well-structured team meetings successfully coordinated communication installations for 2,400 communication drops during FY94, and that number is expected to reach 7,500 by June 1995. The entire Intra-Building Recabling Program has an excellent safety record, and has met cost and schedule commitments. (7900)

WIRED FOR THE FUTURE — Contractor Bill Hill gives a final check to newly installed circuits that provide voice and data communications links for Bldg. 836. The Intra-Building Recabling Communication System is replacing antiquated voice and data lines to provide Sandia with communication networks to meet its future needs.

The Primary Standards Laboratory, formerly called the Weapons Primary Production Standards Laboratory, was officially dedicated on Nov. 18, 1994, making **unique capabilities for high-precision measurements** available to industry, universities, and other government agencies. New construction and equipment in this 55,000-sq-ft facility were funded by DOE's Facilities Capability Assurance Program at $17.7 million. Design features include: electromagnetic shielding; vibration isolation achieved by a post-tension concrete foundation slab (continuously poured for nine consecutive hours); and independent laboratory temperature and humidity control, featuring 27 computer-controlled air-handling units to help maintain temperatures as precise as 0.01 degrees C. (1140/7900)

The Martin Marietta/Sandia National Laboratories Thunderbird Award Program was launched on May 5, 1994. This initiative recognizes the success of "at risk" high school students who have overcome obstacles and excelled. In addition to encouraging decisions and efforts that result in the students more closely reaching their potential, **this award highlights inspirational role models for other teenagers** who are currently "at risk," and who may be involved in negative activities. Students selected "mentors" or supporters who helped them turn their lives around. A cash award of $1,000 was presented to seniors from 11 Albuquerque Public Schools high schools and five alternative schools. A full-page ad in Albuquerque's *The Sunday Journal* displayed the students' photos and summarized their accomplishments, and they were honored along with parents and principals at a luncheon. (12600)

REFLECTIONS — Christine Hans and her mother, Florence Baca, get a closeup look at a stretched-membrane mirror at Sandia's National Solar Thermal Test Facility. Christine, a senior at Albuquerque's West Mesa High School at the time, was one of 16 winners of the first Thunderbird Award scholarships from Sandia and Martin Marietta.

A new era of openness has begun in DOE, and Sandia is attempting to establish genuine and lasting relationships with customers and stakeholders based on mutual trust and respect. A team comprising Sandians and representatives from DOE's Albuquerque Operations and Kirtland Area Operations offices has worked with a variety of grass-roots community organizations; local, state, and tribal government representatives; environmental advocacy groups; and business associations to create a **first-ever Sandia Citizens Advisory Board.** The board, composed of a widely representative group of local citizens, will provide Sandia and DOE with a sense of the community's values and concerns related to our environmental cleanup and waste management activities. (12600)

Transportation

The Management Systems Server-Net Prototype Pooled Fund Study that began in November 1993 is a multiyear, multiphase project that is developing a comprehensive information framework for state and metropolitan planning organizations to use in transportation planning consistent with the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). The framework will provide a high-level view of the activities, data, and business systems involved in planning. Eleven experts representing eight state departments of transportation and one metropolitan planning organization met during the period of January-May 1994 to develop an information engineering (IE) framework for **comprehensive transportation planning.** The results of the first phase were presented to the Study Steering Committee in June 1994 and received with great enthusiasm. A study workshop was held in July 1994 to present the Phase-A results to private sector companies. Phase B of the study began in August 1994 and a team of six IE experts from Sandia and two transportation consultants are assembling object-oriented models of transportation planning consistent with the IE framework from Phase A. This study is sponsored by the Federal Highway Administration, the Federal Transit Administration, 40 state departments of transportation, the District of Columbia, nine private-sector companies, and Sandia. (6600/6900/9400/9600)