

Sandia groups make training, analysis a 'virtual reality'

Medicine, dangerous tasks, data comprehension could benefit from work

By Howard Kercheval

Lab News Staff

Virtual reality work going on at Sandia could lead to cost savings and greater safety in training people to do complex and dangerous work, controlling and communicating with satellites, and might even save lives on future battlefields.

"We are a multicenter program exploring a spectrum of issues in virtual reality from fundamental research through actual applications," says Sharon Stansfield of Intelligent System Principles Dept. 2121.

The five Sandia centers working on virtual reality (VR), she says, are Computational and Computer Sciences and Mathematics (1400), Intelligent Systems and Robotics (2100), Advanced Manufacturing Technology (2900), Exploratory Systems/Program Development (8100), and Information Systems Engineering (9400).

Sharon and her team — Nadine Miner, Ross Burchard, Dan Shawver, Dave Rogers, Ron Lump, Sofia Pastoriza-Nuñez, and Lydia Tapia, all of 2121 — are working to provide a science base of technologies to support general-purpose

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"This animation . . . greatly increases the flow of information to the participant."



THE MONITOR in the left background shows computer-generated "people" mimicking the movements of Sofia Pastoriza-Nuñez and Dave Rogers (both 2121), as they move around wearing virtual reality gear. They and others in their organization are working to develop situational training software and methods that can be used to train people to perform critical or dangerous tasks without exposing them to the risks inherent in the actual work.

Environmental team completes first Sandia site cleanup, in Area 2

By Will Keener

Media Relations Dept. 12630

It's a small step for Sandia's Environmental Restoration (ER) project, a great leap for the Labs' cleanup efforts. Workers at an environmental site inside Technical Area 2 last week completed the final touches on Sandia/New Mexico's first environmental site cleanup.

One way of thinking about it is that it's one site down, 180 to go. That being the case, why would Vice President for Laboratory Services Lynn Jones (7000) take time today to participate in a small ceremony at the site to mark the completion? Perhaps because of what the feat symbolizes.

In fact, several other sites also are being cleaned up in an innovative new program that got under way this summer. The cleanup marks a major step forward for Sandia environmental scientists, who took their first comprehensive cut at identifying sites for restoration in 1987. That effort has now grown to a point where a total of 181 environmental sites have been identified. In historic terms, the first site cleanup was a long time in coming. But some reasons for that were not within the control of Sandia's environmental staff. And the future is clearly

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Sandia LabNews

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Sandia National Laboratories

Sandians should get raises Oct. 1

DOE gives 'go-ahead' on Labs FY95 salary package

For the first time in two fiscal years, the numbers on most Sandians' pay stubs are expected to become a bit larger as the Labs' FY95 salary package takes effect in October.

For many Sandians, FY94 has been a year of uncertainty and perhaps frugality as a result of Energy Secretary Hazel O'Leary's announcement in May 1993 that DOE contractor salaries were frozen for FY94.

But all readings indicate that the freeze is over, at least for FY95. The DOE Albuquerque Operations Office has OK'd an average 4.3 percent increase to Sandians' base salaries, says Ed Cassidy, Manager of Compensation and Job Evaluation Dept. 3545. In addition, the amount of money available for non-base awards is comparable to last year's amount.

Non-base awards will show up on employees' paychecks of Sept. 29, and base increases

will show up on paychecks of Oct. 13, according to compensation analyst Kim Brown (3545).

She says salary increase notices will be sent to managers by Sept. 2, except for those employees whose FY95 salaries are expected to be more than \$80,000. Those employees will have to wait until mid September for final approval from DOE.

4.3 percent an average

Ed cautions that the 4.3 percent base pay increase is an overall average for all Sandians in all job classifications. That doesn't mean every employee will receive a 4.3 percent increase. Here's why:

- The approved package contains slightly different increase percentages for each category of employee (MTS, MLS, ASA, TA, etc.). That's

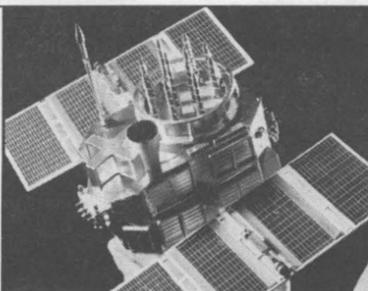
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Watchful GPS system reaches 100 satellite-years of operation

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Comet's week-long collision with Jupiter confirms predictions

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Proposed road would dissect KAFB, widen and extend Eubank

8

Sandian's science fiction inspired by latest Labs research

This & That

Headed for national tile museum? - You probably read in the last issue about the project that will get under way soon to spruce up Sandia/New Mexico's "front door" - the Bldg. 800 entryway and the lobbies and corridors that go into Bldgs. 801 and 802. It'll be real nice, I'm sure, but I'm gonna miss looking at those six different shades of lovely gray and brown plastic floor tiles in the 800/801 hallway. What classic pieces of circa 1940 jail flooring!

* * *

Family day by another name - If you didn't read the last issue carefully, you may have missed the announcement that another family day has been scheduled. Known this year as "Sandia Day 1994," the event is scheduled for Saturday, Oct. 22. There's a bit more information in this issue (page 12), and we'll publish major details in future issues.

* * *

Wrong profession - Here's part of the first sentence in a promotional mailer that I received lately: "Because of your stature in the public relations industry, I'm sending you a free three-month trial subscription to. . ." I'm not so sure that *stature* is precisely what I've achieved in this "industry." Maybe "statue" was what they meant. I frequently feel like a statue supporting a large flock of pigeons.

* * *

Pumped out and severely diluted - When Mom died several years ago, my two brothers, sister, and I each inherited one-quarter of her interest in some old Oklahoma oil leases. Coming from a family of 10 children, Mom inherited her part (one-tenth) of her parents' part of those leases some years ago, meaning that I wound up with a one-fortieth share of my grandparents' part, and even they were only partial owners. I got my yearly lease check last month - for exactly 53 cents. So much for those early retirement plans!

* * *

Where's the car, Granddad? - Speaking of my grandparents, I read an article the other day that reminded me of something my grandfather did during his declining years. An article in the July 18 "Business Outlook" section of the *Albuquerque Journal* talked about adjustments that various US companies are making to cater to an aging population, pointing out that people over 50 represent the fastest-growing age group in America. (I'm finally "in with the in-crowd.") I couldn't help laughing out loud when I read that one large retailer said one of the biggest "complaints" it gets is that older people forget where they park their cars. Dear Old Granddad lived in the country nearly all his life, and one day, fairly late in life, he took his car to town and later took a taxi home! See what you have to look forward to, Renae?

* * *

News from the Head Shed - This from a recent news summary I get periodically from Martin Marietta headquarters: Augustine Chiarenza, a 34-year employee of Martin Marietta's Vandenberg Air Force Base facility, won \$50.4 million in California's Super Lotto game. He's 72, and says he doesn't plan to quit his job! Let's check back in six months or so and see if the old boy's still around. Anyone willing to give me 50-50 odds?
- Larry Perrine

Lab News offices go outside area Monday Not moving, just moving out

If all goes as planned, the Employee Communications Department offices will be "outside the area" sometime Monday, Aug. 8. The department publishes the *Lab News* and *Weekly Bulletin* and administers the Feedback Program.

We're actually "going nowhere." Our offices remain in the lovely Mobile Offices (MO) 172-173 in the northwest corner of Tech Area 1 (just northeast of the visitor parking lot that's north of Bldg. 800). However, the fencing and gates surrounding MO 172-173 are being reconfigured to allow us to be outside the area and thereby accessible to all Sandians and visitors.

Although a fence remains around MO 172-173 and it may appear that we're still inside the area, a clearance will not be required to enter our offices. Beginning Monday, access will be via a single open gate at the northwest corner of MO 172. However, we hope to soon open another gate that is closer to Bldg. 800. Watch for an announcement of that.

'Take Your Sons to Work Day' activities planned Monday

Activities planned at the Technology Transfer Center (Bldg. 825) on "Take Your Sons to Work Day" Aug. 8, 8-9:30 a.m.:

- Welcoming address and introductions by Charles Emery, VP of Human Resources Div. 3000.
- Overview of the day's activities by Paul Robinson, VP of Laboratory Development Div. 4000.
- Demonstrations: "Fun with Science," "Liquid Nitrogen," and "3D Modeling."

A limited number of participants will be randomly selected to attend tours. For information about "Take Your Sons to Work Day," please call 845-8250.

Sandia LabNews

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MARTIN MARIETTA

Salary increases

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because Sandia now compares salary levels at the Labs with salaries paid to people in similar job types in US industry.

"We have to back up our salary recommendations with current market data, as well as consider DOE's perceptions of what's appropriate," he says.

This year's salary increase levels meet the DOE requirement that there be no salary "catch-up" as a result of the FY94 salary freeze.

• As always, managers will determine, based on merit, how the pool of available money will be distributed to individuals within an organization and job classification. So some employees within an organization will fall below the average for their job classification and some will fall above.

"What we distribute is a pool of money, not an entitlement," says Ed. "Each manager is responsible for deciding what an individual's value is to the organization and what an appropriate level of pay is considering the availability of funds."

He adds one final caution: "Anything's possible, but there are no indications whatso-

DOE deserves credit for compensation effort

Ed Cassidy (3545) says the people at DOE's Personnel Industrial Relations Department (PIRD), located at the Albuquerque Operations Office, deserve a lot of credit for this year's compensation process.

"They made a real effort to expedite the approval of Sandia's compensation package," he says. "They promised us 30 days turnaround and delivered on that promise. We received a great deal of cooperation the whole way through."

In addition, PIRD staff members began meeting in May 1993 with Dept. 3545 staffers in a PQMI (Process Quality Management Initiative) setting to plan the FY95 compensation process.

"They spent a lot of time up front to make the process go smoothly," says Mark James (3545). "Both parties now have a much better appreciation for each other's environment and requirements."

ever that the FY95 pay package will change between now and Sept. 29. I'll keep my fingers crossed."
- John German

Innovative device measures ultrashort laser pulses

'FROG' excites interest within the 'ultrafast' community

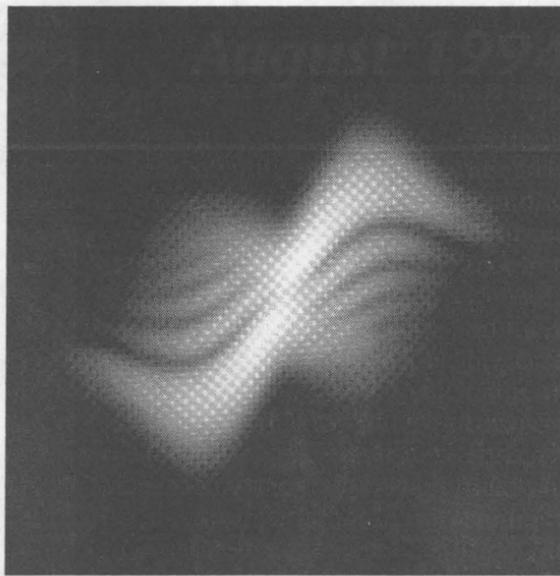
By Mike Sheehan

Lab News Correspondent

Ultrashort laser pulses are the shortest technological events ever created by researchers. They are less than one millionth of a millionth of a second long. By comparison, light travels about the thickness of a human hair in that time.

Because many fundamental events occur on these short time scales, ultrafast lasers are providing vital new tools for research in many fields including developing new electronic components, understanding how DNA works, and creating new chemicals. In most of these fields, however, the difficult problem of measuring the even shorter temporal substructure of an ultrashort pulse is a critical issue. Unfortunately, it would appear that such a measurement would require an even shorter pulse — but ultrashort laser pulses are already the shortest events ever created.

At Sandia's Combustion Research Facility, in projects funded by DOE's Office of Basic Energy Sciences Chemical Sciences Division, ultrashort pulses are being used in several projects. One involves the study of ultrafast vibrational relaxation in combustion-related molecules, and another involves developing new combustion diagnostics for species concentrations in flames. In these projects it is also crucial to measure the shape of the ultrashort pulse. For example, the pulse intensity substructure determines the experimental time



FROG TRACE — This is a type of spectrogram, a time-frequency diagram analogous to a musical score. Here we see the FROG (Frequency Resolved Optical Gating) trace of a pulse with self-phase modulation, a type of phase distortion commonly seen in high-power laser systems. The trace details the instantaneous frequency of the pulse as a function of time. The new FROG device is being hailed as an innovative way to measure the substructure of ultrashort laser pulses.

resolution. And laser pulses with phase substructure (for example, "chirp" or variable frequency vs. time), are well known to excite molecules quite differently from laser pulses with constant phase. Incomplete information con-

cerning either the intensity or phase can easily defeat a chemical dynamics experiment.

How to measure the shortest creations?

Challenged with finding a general method for measuring ultrashort laser pulses accurately, Sandia's Rick Trebino of Diagnostic and Reacting Flow Dept. 8351 and postdoctoral researcher Ken DeLong, in collaboration with Los Alamos National Lab's Dan Kane, have developed an innovative solution that they call Frequency Resolved Optical Gating, or FROG for short. According to Rick, the new FROG technology fully characterizes an ultrashort laser pulse, yielding the intensity evolution and phase (or color) evolution as well. It uses a simple apparatus and can measure ultrashort laser pulses in the visible, the infrared, and the ultraviolet. FROG can measure very complicated as well as simple pulses. It can even measure a single ultrashort pulse — it doesn't require averaging over many laser shots, as many laser techniques do. And it works for even the shortest pulses.

"Researchers are constantly attempting to create shorter and shorter pulses," Rick says.

(Continued on page 4)

Supervisory appointment

SHERYL BUCK to Team Supervisor of Mail Center 8533-1.

Sheryl began her Sandia career in 1980 upon arrival from Illinois. These past 14 years she has held a variety of jobs ranging from secretarial in combustion applications, solar programs, and the combustion and materials directorates to work in project management and engineering support as a network analyst. The last three years Sheryl has been the NEPA (National Environmental Policy Act) Compliance Officer for the California site, working toward development of the program and the sitewide Environmental Impact Statement.

Prior to her Sandia career, she held secretarial positions in Illinois, first in the president's office at Western Illinois University in Macomb and then as executive secretary to the chairman of the board of Servicemaster in Chicago.

She is a member of the National Association of Environmental Professionals and recently attended their conference and presented her paper on integrating pollution prevention into the NEPA process. Sheryl was one of the recipients of the first Corporate Employee Recognition Awards presented at ceremonies in June in Albuquerque for work done on the sitewide Environmental Impact Statement.



SHERYL BUCK

Sandia California News



CONGRESSIONAL VISITOR — US Representative Bill Baker (right), visited Sandia/California recently for discussions on health care and mammography, economic development and industry partnerships, agile manufacturing, and "virtual enterprise" with US industry, which is being discussed here. At left is UC Berkeley Professor Paul Wright, who is a Sandia consultant in manufacturing technology; in center, Lou Tallerico, Manager of Manufacturing Initiatives & Center Integration Dept. 8205. Virtual enterprise involves doing business over the information superhighway, developing the software, and collecting data. Accompanying Baker on his visit were his field representative Erlene DeMarcus and summer intern Chris Hall, son of Terry (8274) and Joan (8800) Bersie. (Photo by Lynda Hadley)

★ Congratulations

To Jennifer and Brad (5371) Mickelsen, a daughter, Sarah Jennifer, June 23, 1994.

To Kim (8642) and Tim (8713) Shepodd, twin sons, Devin Brook and Kyle Morgan, June 26, 1994.

Celebrating 100 satellite-years of flawless GPS operations

Sandia designs the 24 satellites' global burst detectors

By Ken Frazier

Lab News Managing Editor

A hundred or so Sandians gathered in a Bldg. 890 conference room July 22 to celebrate a timely milestone in Sandia's contributions to the Global Positioning Satellite (GPS) program: The system had just passed 100 satellite-years of flawless operation of the satellites' Global Burst Detectors.

The 24th GPS satellite was launched in March and declared operational in April, completing a full constellation of 24 satellites in six orbital planes watching over the earth 24 hours a day from an altitude of 10,900 nautical miles. Four more completed satellites await launch whenever a replacement may be needed.

The GPS satellites are probably best known to the general public for their navigation function — providing phenomenally precise information about position on the earth to anyone or anything carrying a small portable receiver. But each of the 24 also carries a nuclear detonation detection payload, the heart of which is a Global Burst Detector.

The detector consists of a Sandia-designed optical sensor, a Los Alamos National Lab-designed X-ray sensor, and a Sandia-designed data-handling processor that provides the detector's interface to the satellite.

Every one of the detectors has worked

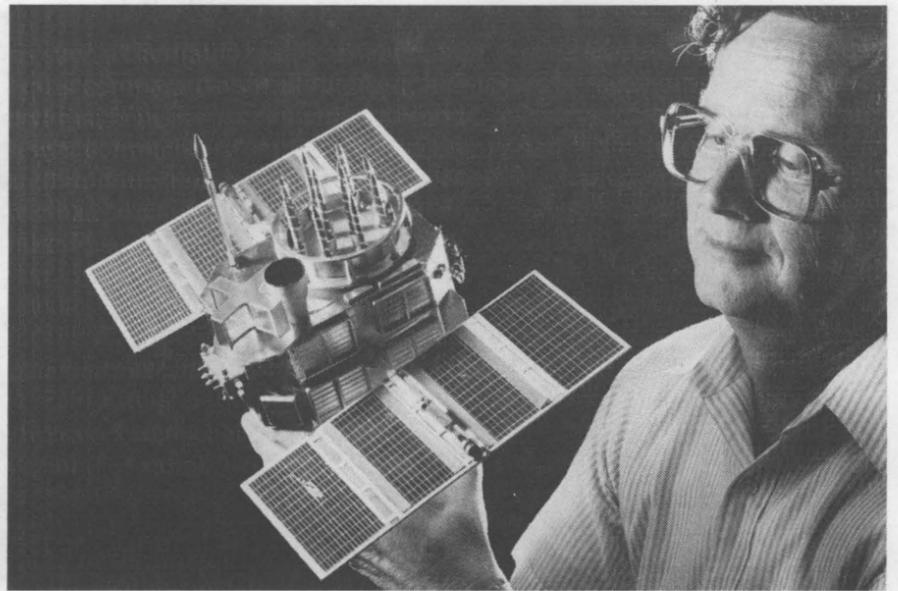
without a hitch, some even outlasting the satellites that carry them. "This is an extraordinary accomplishment," Tom Sellers, Director of Monitoring Systems and Technology Center 9200, told the assembled Sandians. "It deserves a large amount of praise."

"Sandia's role with the GPS is something to be proud of," says Tom. "It's nice to have the quality record we have.

Our detectors have always outlasted the satellite. The customer is happy. And we've never held up a launch."

He says the nuclear-detection capability is becoming even more important with a Comprehensive Test Ban Treaty being negotiated by the current administration that will ban all nuclear tests in all environments.

Only a few days earlier, Paul Phipps of Operational Satellite Payloads Dept. 9206 had



MODEL OF SUCCESS — Paul Phipps (9206) with a scale model of the Global Positioning Satellite. Twenty-four of them are now in orbit.

been tallying up the length of time each of the 24 GPS satellites now in orbit had been operating. Paul is a 33-year Sandia veteran and project manager for the GPS program.

The first GPS satellite with a Sandia payload was launched in July 1983, and had accumulated 110 months of service, nearly double its design lifetime. Three others dated back to 1984 and 1985. All the rest have been launched since February 1989 aboard Delta II rockets.

Paul discovered that on July 18 100-satellite years of successful operation would be passed. A small celebration was quickly arranged.

Paul says one of the great strengths Sandia brings to the GPS program is continuity and length of service of its satellite engineers. He and Lee Maschoff, Manager of 9206, who has been at Sandia 35 years, agree that it is rare for any laboratory anywhere to have a satellite group that has stayed intact for as long as Sandia's has.

Measuring experience in decades

"A number of our people have been with the GPS program since its very beginning, back in 1975, almost 20 years now," says Paul. "Steve Yearout [Advanced Digital & Power Subsystems Dept. 9212] and Greg Christiansen [Sensors and Electronics Dept. 9222] have turned on all 28 GPS satellites," he says. Those 28 include the 24 now in orbit and 4 earlier ones now decommissioned — their Global Burst Detectors still working until shutoff. "Keith McCoy [9212] has worked on satellite power supplies since 1963."

Tom says Sandia's depth of capabilities is also a strong factor. "We have power-supply designers, systems engineers, test system designers, electronics and sensor specialists, quality control and manufacturing engineers, and launch-operations people," he says. "It all contributes to an extraordinary record of success."

Sandia, in partnership with Los Alamos, has a proud history with satellites designed to detect and monitor nuclear tests, going back to the late 1950s and early 1960s when the Vela satellites, which served that function from 1963 to 1984, were envisioned and designed. "We've been able to improve the capabilities over the Vela by orders of magnitude while maintaining the reliability," says Paul.

Laser pulses

(Continued from page 3)

"The question always was, 'But how do you measure the pulse?' because nothing shorter existed than the pulse itself. For years scientists used the pulse to measure itself, but the results were only an ambiguous measure of the pulse evolution. Available methods yielded some — but not enough information about the pulse intensity evolution, and essentially no information about the pulse phase evolution."

Ideas from acoustics, astronomy

The Sandia/Los Alamos team continued to use the pulse to measure itself, but it also incorporated the concept of a "spectrogram" of the optical pulse, analogous to a musical score of a sound wave. The spectrogram displays the optical spectrum of the pulse vs. time, and contains all the necessary information to reconstruct the pulse. In addition to borrowing the concept of the spectrogram from acoustics, FROG also borrows an idea from image science: Rick has shown that the problem of extracting the pulse intensity and phase evolution from this trace is mathematically equivalent to "two-dimensional phase retrieval," a solved problem in image science. The problem was thus solved by modifying the appropriate phase-retrieval algorithms and applying them to the ultrafast spectrogram. "Researchers in ultrafast phenomena were very familiar with the one-dimensional phase retrieval problem, which, unlike its lesser known 2D relative, is well-known to be unsolvable. The fact that a general solution was obtained by converting to a two-dimensional problem is surprising to most people in the field."

Rick points out that one very interesting application of FROG technology is the measurement of shaped laser pulses used by chemists who are researching ways to control

chemical reactions. The control of branch reactions, for example, would allow higher efficiencies and fewer by-products in chemical processing. In addition, chemists desire to produce new reaction products that do not naturally occur. These researchers would like to influence these reactions by judiciously exciting the molecules involved with a precisely shaped ultrashort laser pulse. Now, these chemists have a useful tool to apply to this long-standing problem, and they have been some of the first to take advantage of FROG to measure their pulses.

"The ability to fully characterize an ultrashort laser pulse has tremendous potential impact on other work, as well," Rick says. "For example, knowledge of the intensity and phase of a pulse that has been reflected or transmitted by a medium will allow significantly better characterization of the medium." As a result, FROG will likely see customers at semiconductor companies, optical fiber companies, and chemical labs, as well as at universities and the national labs.

Device already a commercial product

Since patenting the FROG device, Rick, Ken, and Dan have been invited to speak at many conferences and universities, including the University of Michigan's Center for Ultrafast Optical Studies, the University of Rochester, Stanford University, and several international meetings.

"People throughout the 'ultrafast community' have needed something like FROG for a long time, and they're excited that it's now available," Rick says. Consequently, commercial interest has been generated in the technique. To meet this demand, Sandia's Technology Transfer Office negotiated an exclusive licensing agreement with Clark Instrumentation, Inc., a manufacturer of ultrashort-pulse lasers. In May, Clark announced the availability of a commercial FROG product and demonstrated it to many interested scientists at the Conference on Lasers and Electro-Optics. It sells for about \$25,000.



Comet week awe-inspiring for two Sandia scientists

Their computer predictions of visible fireballs right on the mark

By Pat Radin

Summer Science Writer

Glancing at their watches, Sandia physicists Mark Boslough and Dave Crawford of Experimental Impact Physics Dept. 1433 gazed out the airplane window at the blue sky over the Pacific.

It was July 16 and the two scientists, who had led a year-long project to calculate the impact of the fragments of Comet Shoemaker-Levy 9 on Jupiter, were flying to Hawaii to observe the real thing. Just at this moment, Fragment A was on its death dive into the massive, gaseous planet. The event could be observed on the far side of the globe, where it was nighttime; another impact, that night, would be seen from Hawaii.

Or would it? In a team effort with Timothy Trucano and Allen Robinson of Computational Physics R&D Dept. 1431 and others, Mark and Dave had simulated the plunge of comet fragments of several different sizes into Jupiter's atmosphere. They had predicted that the larger fragments would have enormous impact, creating fireballs that could be visible from Earth. Their predictions were based on three-dimensional computational simulations using Sandia's shock physics codes, combined with data on Jupiter's atmosphere and on the comet. The simulations had been performed on the world's fastest supercomputer (an 1840-cpu Intel Paragon). Now, the spectacular event the Sandia team had modeled was actually beginning to occur on Jupiter. What was really going on, more than 400 million miles away?

Once on the Big Island, Mark and Dave checked out a rental car and headed for Mauna Kea, where leading astronomers from around the world had set up their instruments. Flipping on a small portable TV they had brought along, they heard the sketchy news:



JOVIAN IMPACT — Fireball created by impact into Jupiter of fragment G of Comet Shoemaker-Levy. This infrared image was taken by Peter McGregor with the Australian National University 2.3-meter telescope at Siding Spring, Australia. Fireballs like this were predicted by Sandia scientists' computational simulations using Sandia codes.

Astronomers in Spain had seen a flash at the time of impact for fragment A. Dave and Mark realized that could only have come from a very large fireball.

"We just looked at each other," Dave says. "Even though we were in our car, we started jumping up and down."

Awe-inspiring, exhausting week

This was just the beginning of a week that was at once thrilling, awe-inspiring and exhausting for the two scientists. But the details were still to come. "It was very gratifying to see what we had predicted actually unfolding right in front of us," Dave says. Speaking with astronomers, checking the latest

data by e-mail and examining photographs in the newspaper, they saw how well their simulations fit. The fireball size and asymmetric shape, its visibility in infrared wavelengths, the fact that comet debris was carried upwards over the planet's rim into the sunlight, all had been predicted.

But the best evidence came in the middle of the week, when Hubble Space Telescope pictures arrived, showing the impact site of the crash of Fragment G the night of July 17-18. The detailed photos, taken at different wavelengths, revealed a dark spot rimmed by a growing circle that was an expanding wave. To the south of the site lay a crescent-shaped spray of dark material.

"That's the ejecta blanket," Dave explains. "The fireball, coming out of the clouds at the same angle that the comet went in, deposited this comet debris. We were surprised, and very happy to see it." He phoned his father, a quarter of a world away, to share the news. Later, he and Mark toasted with a beer.

Seeing a new impact site

The only comet collision they actually viewed live was the plunge of Fragment R. Looking through their own 8-inch-diameter telescopes from Haleakala on Maui, they didn't see a fireball, but they did see the darkened impact site immediately after it formed. "To someone whose career is in hypervelocity impact — not observational astronomy — that was really exciting," Mark says.

One day as they drove up Mauna Kea, the sun set and Jupiter appeared, a golden disc of light over the Pacific. Still many miles away from the observatory's powerful telescopes, the two stopped by the side of the road and Dave pointed his camera at the planet. Although spectacular photos of the comet collisions have poured in from all over the world — even from spacecraft — this simple shot is the only Jupiter photo they took themselves. It's their memento of those first days when they knew their project had been a stunning success.

Even though the comet collisions ended July 22, Mark and Dave's work is far from over. They have been fielding media interviews and requests for TV appearances. While en route home to Albuquerque, they gave their first public talk on the subject, giving two end-to-end lectures to accommodate the overflow crowd at the Tech Museum of Innovation in San Jose, Calif.

Now, they're getting ready to present their results at the 1994 Hypervelocity Impact Symposium, hosted by Sandia and Los Alamos in Santa Fe Oct. 16-19. U.S. Geological Survey geologist Eugene Shoemaker, co-discoverer of the comet, is scheduled to be the keynote speaker.

Mark and Dave plan to apply for funds to take their project a step further, to help astronomers interpret their data. The first phase had been partly supported by a National Science Foundation grant.

A major cosmic event such as the comet collision comes along very rarely and yields a wealth of valuable new data. "We're going to be moving as fast as we can" to explain the new findings, Dave promises. Already, he says, the observations have extended the range of valid energies for Sandia's shock physics codes "by a factor of a million."

Mark adds, "We were in exactly the right place at the right time to do this project. We are extremely lucky that nature provided this avalanche of data in our lifetimes. We can't wait to start working with the astronomers. They are already asking us for help."

Seven Sandians participate in National Corporate Cup Track Meet

Seven Sandians competed as members of the Martin Marietta National Track and Field team at the 1994 National Corporate Cup Track and Field Meet, at Colby College in Maine, July 16-17.

Martin Marietta fielded a team of 50 men and women. This was the second year the corporation has competed in the nationals.

All seven Sandians medaled in one or more events, including a first place in the 5-kilometer road race by Jim Reitz (8417). Jim also ran in the 10-kilometer race.

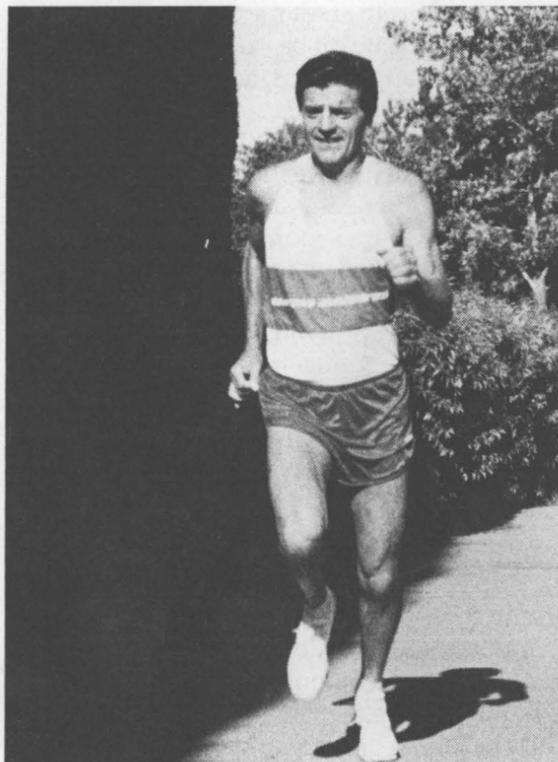
The other Sandia participants and their events:

Richard Cernosek (1315), high jump and long jump; Bob Nellums (9122), 800, 400, and 200 meter races; John Otts (4232), shot put and discus; Frances Stohl (6212), 400 and 200 meter races; Tamara Ulibarri (1811), 800, 400, and 200 meter races; and Larry Walker (9204), 1600, 800, and 400 meter races.

Martin Marietta finished first in Division 1A, compared with a fourth-place finish in 1993. It finished fourth overall in Division 1, compared with 12th in 1993.

Sandia's participants competed in 21 events overall during the qualifying and finals.

Martin Marietta plans to compete each year and is looking for men and women track and field athletes. Sandia plans to be



Jim Reitz (8417) shows the form that brought him a first-place medal in the 5-kilometer race at the National Corporate Cup Track and Field Meet.

an integral part of the future teams. Anyone interested in participating should contact Peter Green (1845) or Jim Garsow (9212).

Virtual reality

(Continued from page 1)

situational training applications. Situational training is designed to prepare employees to function in scenarios unique or specific to their individual jobs, such as a fireman entering a smoke-filled house to rescue a child, or a security guard neutralizing and disarming a terrorist.

"In addition to funding to support basic research in VR," she says, "we are also funded to research application of the technology to nonproliferation inspector/escort training, and to training of robot operators." The team is also doing integrating research in VR and multimedia and, in collaboration with the University of Pennsylvania, in creating "virtual" humans to represent human participants and populate the virtual environment.

Meanwhile, a team from Bruce Malm's Decision Support Systems Dept. 9432, made up of Jerry Van Slambrook, Dan Holloway, Vic Holmes, Ken Piorkowski, Debbie Campbell, and Ron Olsberg, is looking into VR's potential in information and satellite sciences. Jerry, project leader for his organization's work in satellite command and control and data visualization, believes VR is a wonderful medium for displaying and interacting with complex information sets from nearly any source.

Real-time imaging is a plus

"We have demonstrated the benefits of VR in dynamic displays of multiple terrain data sets, time variant seismic data, and satellite system simulations," he says. "A key element of the VR technology is the ability of the system to render images in real time. This animation, whether it is abstract data or a simulation of a real-world environment, greatly increases the flow of information to the participant."

His organization has current funding from the GPS (Global Positioning System) Follow-on project, whose goal is to generate a simulation of the GPS satellite constellation so the system's dynamics can be studied. Dan has implemented a realistic simulation of the satellites showing orbital dynamics, uplink and downlink communications, and crosslink communications between the satellites. Dynamic sensor coverage maps on an Earth model may also be generated for various configurations of satellites and sensors. (For more about GPS, see page 4.)

One particularly interesting use of this simulation was the reconstruction of a large meteor event that occurred in February, says Jerry. Data from on-board Sandia sensors was used to recreate the track of the meteor as it burned up and exploded in the atmosphere. Within the virtual environment, the event could be viewed from Earth positions for comparison to ground-observation reports. This illustrates the power of the technology to create multiple scenarios in a virtual environment that would not be possible in the real world, he adds.

Sharon's organization has a cooperative research and development agreement (CRADA) with BE Software Co., to co-develop a software platform for creating VR-based, intelligent simulations. "This software will allow anyone with a VR application to sit down and program intelligent simulations applied to their specific interest," she says, "anything from industrial maintenance to medical procedures."

Her group has also worked with Deneb Robotics and SILMA, Inc., to enhance their robot simulation products with VR capabilities, and with Fakespace Labs, a leading VR hardware vendor, to integrate Fakespace hardware into an enhanced telepresence system. The group is also exploring other avenues of collaboration, such as the Technology Reinvestment Program and Small Business Innovation

Research program, with Computing Devices International, United Technologies, and Orbitech, among others.

Collaboration, funding sought

Jerry says his group worked with the company Sense8 to help test, evaluate, and provide inputs for the development of a VR software package called WorldToolKit. This is a VR application development package supporting numerous computer platforms and basically all VR hardware devices commercially produced today.

Sharon says her group is seeking collaboration and the research and development funding needed to work with companies in bringing technologies

developed at Sandia to the commercial market.

"Our customer base is the people who want to get this technology developed by sharing Sandia's broad expertise in the area and to then take a finished product to market," she says. "These products, fully developed and supported, may then be used by other Sandia groups addressing critical needs of DOE and the nation."

"Because Sandia does not compete with industry, my approach has been to look for a niche, an area where little work is being done either because the outlook is longer-term or because the breadth of expertise does not exist in a single place," she adds. "One of the strengths of my group is our ability to bring government, industry, and academia together to work toward a larger common goal."

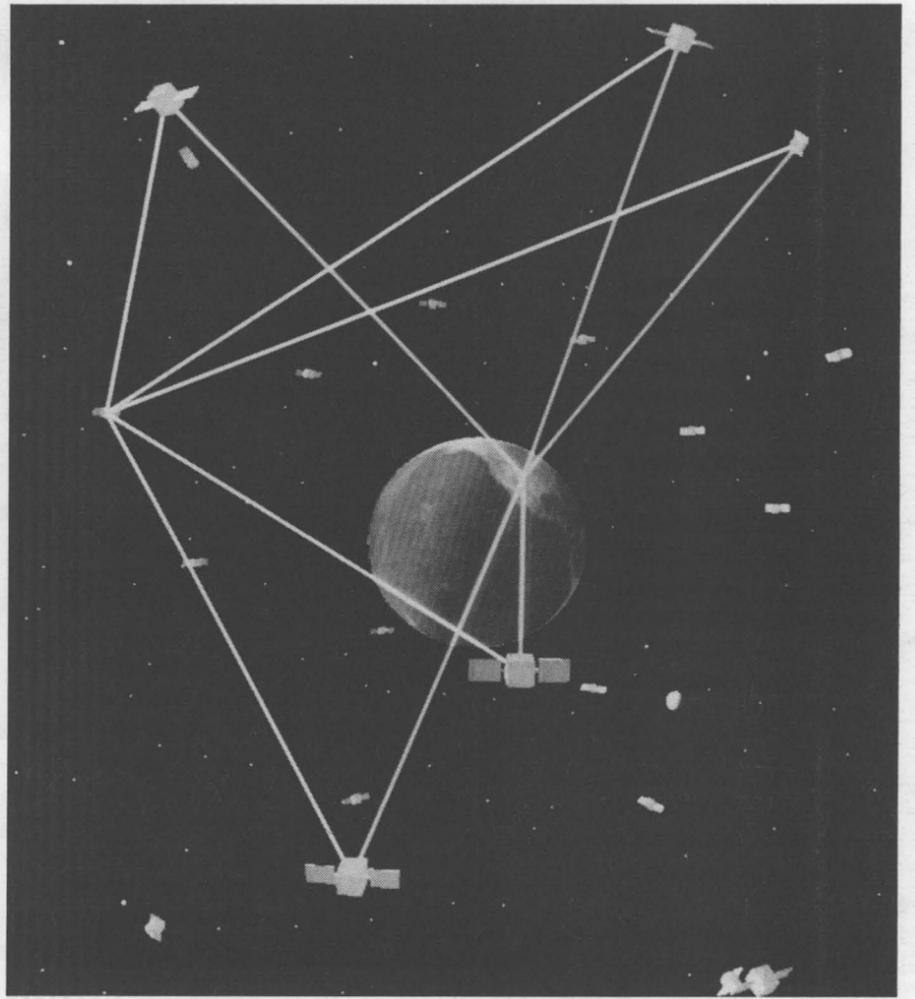
Sharon feels the best niche is situational training because it will be valuable across a wide range of applications, and because little work is being done in this area elsewhere. "It really does require the broad range of capabilities and the systems integration expertise that Sandia has to offer," she says.

Sharon's group demonstrated its work during a recent visit to Sandia by US Senator Jeff Bingaman and US Representatives Pat Schroeder and Steve Schiff, who were interested in applying Sandia technologies to National Institute of Justice (NIJ) needs.

Better human-machine interaction

"I view virtual reality not so much as a complete and total paradigm shift as a logical progression in information display and interaction with computers," says Jerry. "VR is a very exciting concept that, after 20 years, is coming to fruition through major performance advancements in computers and graphics hardware and software."

He believes a primary value of VR is in its multidimensional capability, which is essentially an infinite display capability that matches effectively with the human multi-sensory system — 3D color displays, spatialized sound, tactile feedback, and methods for participants to interact easily with an environment that's created within the computer. "The one overriding



PATHS OF COMMUNICATIONS among satellites in the GPS constellation orbiting Earth — showing uplinks, downlinks, and crosslinks — are illustrated in this image generated from the VR work being done by Dept. 9432.

thing virtual reality is doing is it's improving our ability to comprehend and learn from computer-based information," he says.

Sharon agrees: "Having a more natural and intuitive interface with the computer through immersion, voice, sound, and touch — Jerry is right; it really is a next step in the progression of human-machine interaction."

Situational training is piquing interest in a lot of different groups, she says, and has recently resulted in funding from the Advanced Research Projects Agency for research into how it might be used to train battlefield medics. She also expects to write proposals to NIJ and a number of other agencies.

Examples range from training people in law enforcement, emergency rescue, and medicine, to training for aircraft maintenance and weapons dismantlement.

"VR allows a trainee to make mistakes without serious consequences," Sharon says. "We're not trying to replace the hands-on training they do, but to augment it. For example, there may be situations that come up only once every 10 years, but when they do come up, they are critical. We can create those situations in the virtual world and teach people how to deal with them."

One potential use of VR that Sharon says her team is particularly excited about is improving the quality of life for people who are recovering from accidents and illnesses, or who have permanent disabilities.

"VR can be used to retrain people who have had strokes or accident injuries how to gain use of their limbs or to use prosthetics," she says. "It can even be brought into the hospital to be used as a motivator for children and others who have endured illness and long hospital stays." Some of these programs might be funded through Sandia's biomedical initiative, she says.

"[VR] really is a next step in the progression of human-machine interaction."

Group narrows Kirtland road route proposals to one

Plan would link I-25 with I-40 via Eubank

By Howard Kercheval

Lab News Staff

Long-discussed proposals to build a highway through Kirtland Air Force Base (KAFB) linking I-25 south of Albuquerque International Airport with I-40 in the eastern part of the city are moving from discussion rooms to drawing boards and, in one case, the ballot.

Charlie Thomas, Manager of Planning and External Interfaces Dept. 7255, says negotiators recently agreed to set aside all proposed routes but one, and give that one serious consideration. That route would begin with a widened Eubank Boulevard east of Sandia and extended south across Tijeras Arroyo. It would then turn west and trend to the west-southwest roughly along the arroyo, terminating with a major I-25 interchange at Los Picaros Road, which now crosses the interstate a mile and a half south of Rio Bravo Boulevard.

"Proposals for roads through Kirtland have been on the books for 10 or 15 years," says Charlie, "a primary reason being a desire to develop Mesa del Sol, which is a 12,500-acre piece of property west of the base. The state land office holds the property in trust for the University of New Mexico, which would benefit from commercial development."

Mesa del Sol is adjacent to Sandia's sled track buffer zone, south of the airport, south of Tijeras Arroyo, and extends westward toward I-25.

A primary concern has always been that additional routes through the base could interfere with or limit existing or future missions required by the Air Force, DOE, or other tenants. Routes being removed from consideration, for example, ran close to Sandia's Tech Area 3 and Kirtland's helicopter training area. The new proposed route appears to minimize these concerns.

Extensive, expensive cleanup

"Things like leftover explosive ordnance and environmental restoration become prime concerns," says Charlie. "It would be an extensive and expensive cleanup, so you have to look at the cost of this route versus the benefit

you would get from it."

Bernalillo County, meanwhile, has become the first government entity to take action on the proposal, scheduling a bond issue referendum to be included on this fall's election ballot.

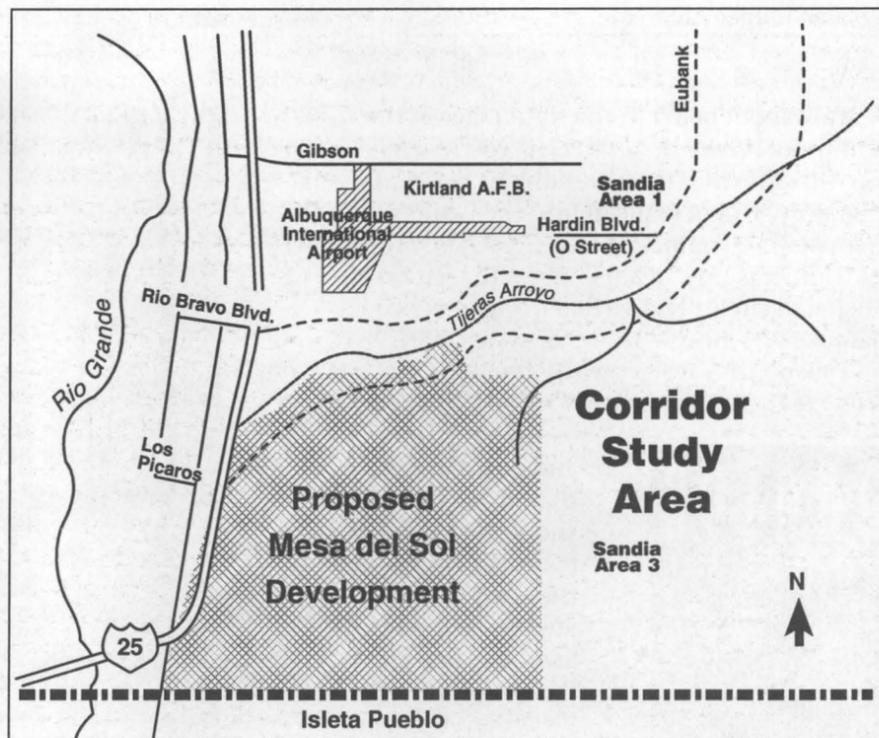
The county's interested, Charlie says, because the route would complete a southeast loop and enhance the possibility of development on the southwest mesa, which county officials see as a major area for low- and middle-income housing of the future. That might include people with jobs in the various federal agencies on the base.

Not 'turning dirt' tomorrow

Study of the proposed route grew out of a July 14 meeting of representatives from KAFB and the various agencies and government entities involved in discussions. He says they agreed that it would be productive to eliminate from consideration routes with potential problems and focus on the arroyo route as the one with the least impact on all of the agencies that would be affected. Charlie says planners probably will designate a wide study area that runs from Eubank southwestward along the arroyo.

"The planners are telling us that they want to go to Los Picaros and build a new I-25 interchange," he says. "The old Rio Bravo route doesn't work because it would interfere with extension of the runway, which is part of the airport master plan."

Charlie emphasizes that at this point, it's



still a study route, "not something we're going to start turning dirt on tomorrow." However, it would be a natural fit with plans now under discussion to create a visitor center and entry directly into Sandia from Eubank.

Also being discussed with city and Air Force officials is the so-called Gibson corridor, a new limited access road looping around the north edge of the base to connect with Eubank. Under that plan the Air Force would lose some property now used for housing, but the road would become a major innerloop for Albuquerque, including major interchanges at Wyoming and at Eubank.

Charlie says there is no specific time frame for any of the route changes or additions, but generally it is thought of as something that will happen by the turn of the century. The county bond issue probably will seek sufficient money to study the route and fund the county's share of construction. But he says the cost of any eventual route probably would involve a combination of federal, state, and local money, although total project cost has not been addressed yet.

"We're eager to hear from any Sandians with questions about the project, but I'm particularly interested in hearing from anyone who knows about possible impacts on missions if the road is built," says Charlie. Sandians can call him on 845-3506.

"We're looking at our maps, charts, and facility locations, and we think we can make this work," he says, "but we'd sure like to know if someone has a show stopper out there."

Sandia News Briefs

Sandian receives Secretary of Defense Medal for Outstanding Public Service

Mark Dickinson of Defense Programs Sector Weapon Development Center 5200 has been awarded the Secretary of Defense Medal for Outstanding Public Service, the second highest award a non-DoD civilian can receive from the Defense Secretary. The award cites Mark for "exceptionally outstanding service as Scientific Advisor; Nuclear Command and Control System Support Staff; and Office of the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence, from July 1993 through July 1994."

The citation goes on to say that "Mr. Dickinson superbly applied his nuclear weapons technical and programmatic expertise to make significant improvements in the Nuclear Command and Control System interagency process. His insightful information to senior executives was instrumental in assuring that nuclear weapons safety, security, and control were enhanced during an unparalleled period of change."

Sandia/California will host Microelectronics Network Day 1994

In order to showcase Sandia technologies, Sandia/California will host Microelectronics Network Day 1994 on Aug. 17 at the Santa Clara Convention Center. Sponsored by Sandia in cooperation with the Semiconductor Industry Association, SEMI/SEMATECH, and Joint Venture Silicon Valley, the conference will feature Sandia's microelectronics and photonics expertise and is designed to promote technology transfer with industry and universities. Coordinated by Jay Jakubczak, Manager of San Jose Microelectronics Program Office 8006, the conference includes 10 technical presentations and an all-day poster session where Sandians will be available to discuss areas of possible joint work.

Send potential Sandia News Briefs to Lab News, Dept. 12660, MS 0413, fax 844-0645.

Retiree deaths

John H. Sackey (95)	4511	May 1
Moses Loretto (74)	3417	May 3
Richard T. Baff (64)	9323	May 9
William F. Carstens (79)	3511	May 10
James A. Heider (54)	9419	May 10
Frances M. Sheaffer (89)	2234	May 10
J. Frank Suazo (87)	4515	May 15
Earnest Yaeger (81)	3242	May 18
H. Gerald Laursen (73)	1123	May 29
Elias Gabaldon (79)	9714	May 30

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

Sandia manager by day, science fiction writer by night

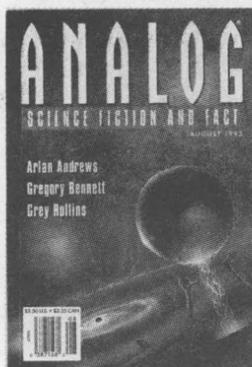
Arlan Andrews draws on his Sandia experience for futuristic fiction

By Janet Carpenter

Lab News Staff

Talk about being in the right place at the right time. Where better to be if you're a science fiction writer than working in a national laboratory, where you can find the world's top scientists and engineers working on such futuristic things as tiny steam engines that sit on an integrated circuit and virtual reality systems that take you around the solar system?

Pick up the latest copy of *Analog Science Fiction & Fact*, *Science Fiction Age*, or *Amazing Stories* magazines and you're more than likely to find a short story or science fact article with these things in them and the name of one Sandia manager at the top of the page.



Arlan Andrews, Manager of Advanced Manufacturing Initiatives

Dept. 2902, dreamed of rockets and space as a boy growing up in Little Rock, Ark. He grew up to be an engineer who worked on actual rockets at White Sands Missile Range and then in the evenings went home and wrote about rockets as a science fiction writer.

"I've always lived in the future," Arlan says. "I discovered science fiction when I was nine years old and became an engineer so I could work with rockets."

Arlan has written dozens of science fiction short stories, novellas, articles, poetry, and limericks since he was 14 years old and has gotten them published.

Humor, hard science, theology, politics, and sociology are the primary ingredients of his science fiction.

The shortest story he's written was just the two words "Nuclear Spring" in white letters at the top of a dark half page in *Analog's* January 1990 issue.

"If I hadn't become an engineer, I probably would have been a preacher," he says. In the theological vein is Arlan's "Epiphany," a short story written in 1987 about a pragmatic alien carpenter who talks to an earth preacher about God.

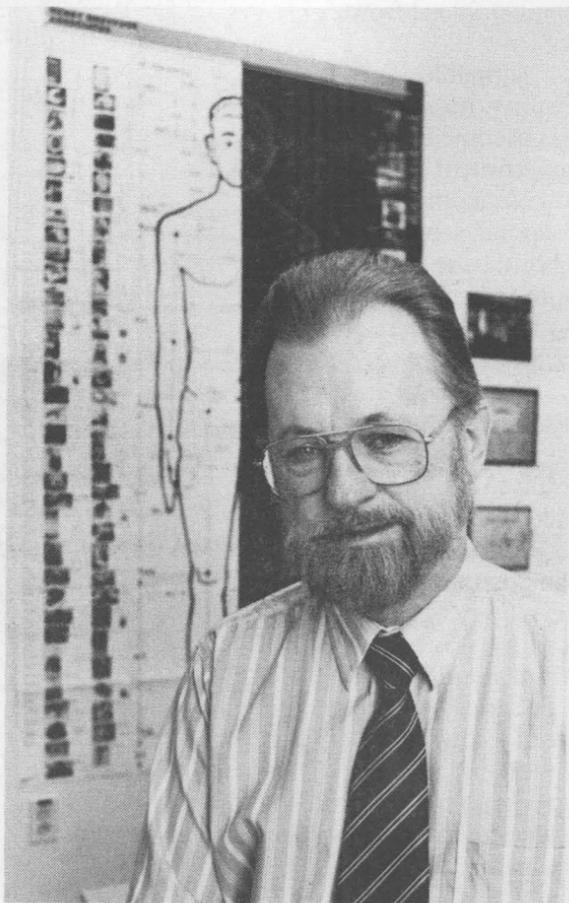
New technology not surprising

Arlan's inspiration comes from everyday life at Sandia and at Bell Labs. Having a sci-fi type of mind means that new technology doesn't surprise him. "I like to think about technology affecting life," he says. "We have all the elements to create the future here at Sandia," says Arlan. "We have hard-nose, gear-head engineers, the fastest computers, micro-machines, modeling and simulation, robotics lab, metallurgists, virtual reality. Alan Kay said that the best way to predict the future is to invent it. Somebody will put all these elements together eventually. We have to be wise enough to think about the future and consequences of what we are doing."

A futuristic technology showing up often in his stories is what he calls nanotechnology, mechanisms working at the atomic or sub-atomic level.

One of his yet unpublished novels is a grim story about the world laid waste by a form of nanotechnology — drugs actually grown in the human body and then harvested for profit.

In "A Visit to the Nanodentist," dentists spray molecular-sized machines (nanodemons)



ARLAN ANDREWS

onto a patient's teeth to clean and repair them.

"Hail, Columbia" includes nanomills, nanomachinists, nanofiles, nanoelectronics, and nanodevices that sample DNA molecules, evaluate how the configuration would evolve into a human body, and then correct any deficiencies they find; becoming in effect, a "vaccine for the soul" that changes society for the better. No more drug addicts, no more homeless, no more murders because everyone becomes healthy.

A novella that appeared in *Amazing Stories*, called "Other Heads," included semimorphous materials evolved from liquid crystal technologies; room-temperature superconductivity in plastics, liquid crystals, glass, and living biotech materials; googolbyte storage; nanotronics; neural interfacing; and semimorph conduits, expanding nervous systems that would eventually encompass the entire planet.

Predicting possible futures

Science fiction often predicts a range of possible future technologies. Arlan says the first "true spaceship" will take off from earth "the way God and Robert Heinlein intended — spewing a long column of flame, thrusting its entire body into the heavens without dropping off any parts along the way. And it will land in a similar fashion: descending nose first, meteorically, from space; maneuvering into a tail-down attitude; then lowering itself on roaring rockets until the fiery exhaust splashes the landing pad."

In several science fact articles and in his science fiction, Arlan makes a case for spacecraft that can be used over and over again without having to be rebuilt each time, spacecraft that Robert Heinlein and others wrote about for decades — single-stage-to-orbit (SSTO) rocket technology. He takes his sci-fi colleagues along in "A Little Waltz Music" as the first "tourists" in space. The pilot uses virtual reality (VR) technology to fly the Delta Clipper, which is based on a real single-stage rocket — a DC-X demonstration craft successfully tested at White Sands Space Harbor near Alamogordo last year.

VR, what Arlan sometimes calls "vertch," is

included in most of his recent stories. With Creve Maples (1412) and fellow science fiction writer Geoffrey Landis, Arlan discussed VR in a science forum, "Virtual reality will let you visit the alien worlds inside your computer," in the November 1993 *Science Fiction Age* magazine.

Arlan is in a good position to predict the future. He works to apply virtual reality to the problems of product design, analysis, manufacturing, and testing. "I get paid to look at Sandia technologies to see what can be applied to manufacturing, primarily government agencies," he says. "We have imaginative people. Sandia is fertile ground. Nanotechnology should originate here."

True machine intelligence may also be a possibility in the future. Arlan explores this in "Silicon Bouquets," a story in which all machines (including automobiles, kitchen appliances, vacuum cleaners, televisions, pacemakers, etc.) become sentient (a take-off on the "Flowers for Algernon" theme) when a computer virus is deliberately dispensed from a plane. The results are horrendous.

At Sandia, Arlan also contributes to predictions of future technology and political trends for program planning and other technical and political studies. He says, "As much fun as it is to write science fiction, it is a great honor and very satisfying to be in the *business* of making science fiction become reality."

A certain turn of mind

Arlan's mind doesn't turn off when he goes home at the end of the day. He's always thinking about the world around him.

In "Capitol Punishment," he theorizes how government can disappear into a black hole. Black hole theory says that when enough matter collects in a small enough space, self-generated gravity pulls that mass into an even smaller space until most of the void between the subatomic particles is squeezed out. Socks in a dryer, sheets on the bottom of a linen closet, papers on the bottom of a stack — they disappear into a micro black hole and if enough micro black holes accumulate, they coalesce into a larger one. World capitols vanish under a paper weight. One way to get rid of politicians.

Reading about so-called spontaneous human combustion produced the story "An Hour to Kill." It's about the manifestation of the universe's desire to improve and correct itself. Hours are people and the protagonist kills people with an hourblaster to kill time; adjusting time to unravel the "ultrathreads" so the "Chronoverse" breathes.

He also considers ethical concepts when writing. He feels humans have made little or no progress socially over the Stone Age.

"A lot of science fiction today doesn't consider social consequences of future technology," he says. "Most people in the 23rd century will be no different. But, because of nanotechnology, parts of the human race will be immortal and scarcely recognizable." He likes to address these concepts, as he does in "Other Heads."

"When I write about a depressing future, it's a warning — look what could happen," he says. Arlan explores how new technologies might affect society as a whole.

Perspective works both ways

Arlan went to Washington, D.C., in 1991 as the first American Society of Mechanical Engineers (ASME) Technology Administration Fellow, working with the U.S. Department of

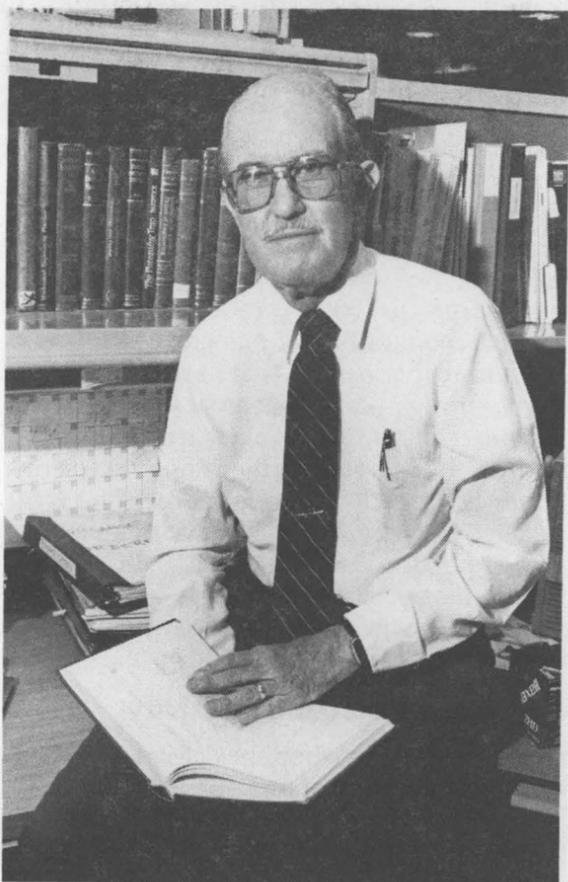
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Three Sandia engineers named ASME Fellows

Three Sandians were recently named Fellows of the American Society of Mechanical Engineers (ASME). Only a small fraction of ASME's membership of more than 100,000 become Fellows.

Tom Mancini of Solar Thermal Technology Dept. 6216 was recognized for 20 years service and more than 60 papers in solar energy research and development, specifically his "significant contributions to the solar technical field through development and research of dish concentration at Sandia."

Robert Luna, Manager of Site Restoration Technology Program Office 6603, "developed and applied codes for nuclear weapon accident evaluations, assembled supporting probabilistic definitions of atmospheric dif-

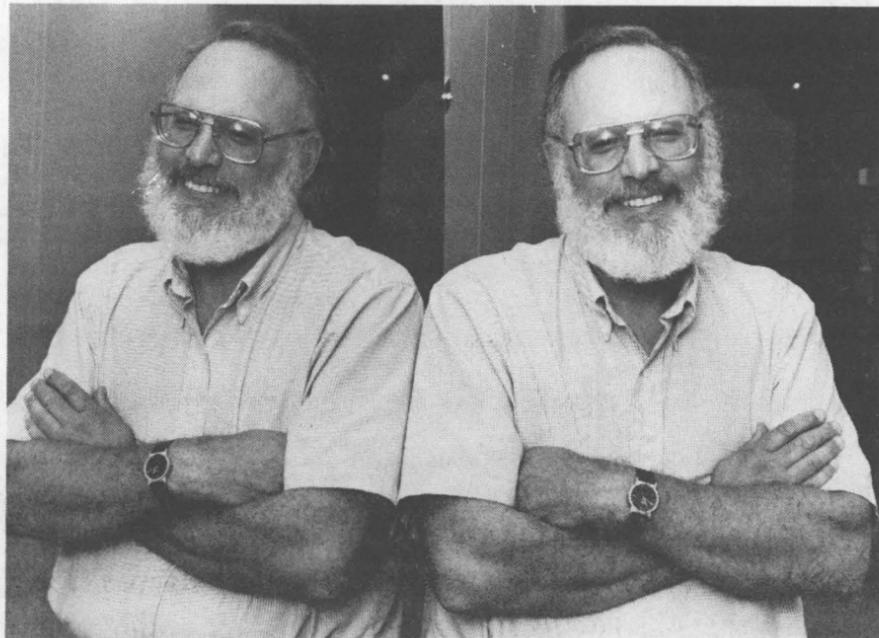


ROBERT WOODS

fusivities, and developed definitions of key aerosol source terms from his and other experiments and theory. He headed the team that wrote the first evaluation of the US-wide radioactive material transportation risks and developed the RADTRAN transportation risk assessment code used as a standard today by DOE and other government agencies."

Robert Woods of Manufacturing Systems Dept. 2172 has had a Sandia career that has involved managing energy programs and developing laboratory instrumentation and aerospace mechanisms for rockets and satellites. He had some years of practical engineering in industry before being admitted to Princeton University's engineering school with advanced standing (the second person in Princeton's history to be so admitted). After passing through the undergraduate curriculum in two years, he went on to receive his doctorate at Princeton and has been at Sandia ever since. From 1991-1992 he was an ASME Congressional Science Fellow, working with the Senate Committee on Governmental Affairs, chaired by Sen. John Glenn of Ohio.

Robert Luna and Robert Woods attended Princeton at the same time, sharing an office at one point.



TOM MANCINI



BOB LUNA

(Continued from preceding page)
Commerce's Technology Administration. The ASME fellow program allows scientists and engineers to provide technical expertise to the nation's policymakers.

He then was selected as the 1992 ASME White House Fellow and spent 14 months on the staff of the President's Office of Science and Technology Policy (OSTP). OSTP staff members serve as advisors to the President on science and technology policy, review the R&D budgets of the National Science Foundation and the departments of Energy, Commerce, and Interior, and work with Congress to set research priorities consistent with the President's science and technology goals.

The science fiction perspective — welcoming change and embracing the future — works both ways. For example, Arlan was quick to recognize the practical applications of Sandia's multi-dimensional, user-oriented synthetic environment VR system (*Lab News*, May 13) and worked to have it installed in a manufacturing environment. He also brings his futuristic visions to pragmatic programs when forecasting the direction of technology development.

In his White House assignment, he was asked to describe the factory of the future and the evolution of manufacturing, and his visionary article, "Manufacturing — the New Competition," appeared in the "President's Report To

Congress on Science and Technology" in April 1993. The chapter describes molecular nanotechnology — "the first White House endorsement of this revolutionary technology" — as well as stating that today's rapid prototyping will become advanced rapid manufacturing in the near future.

While in Washington, Arlan put together a "think tank" of leading science fiction writers who are also established scientists and engineers to provide technical opinions to government agencies and other groups. "Future technology as seen by those in Washington is not very exciting," he says. "Various industries and academics don't seem to be very imaginative."

Before joining Sandia in 1989, Arlan was with AT&T Consumer Products Laboratories in Indianapolis for 12 years. He received a BS and an MS in mechanical engineering and an ScD in engineering from New Mexico State University, and went to work for Bell Labs at White Sands and then Greensboro, N.C., after graduation.

Labor of love

Arlan says his short stories are a labor of love, as evidenced by tributes to his science fiction idols and colleagues Robert Heinlein, John Campbell, Isaac Asimov, Arthur C. Clarke, Ray Bradbury, Charles Sheffield, Jerry Pournelle, and Larry Niven, among others. He often includes their names on spaceports and rock-

ets, and the science fiction they wrote about becomes reality in his stories.

To produce a story, Arlan visualizes it in his mind and then sits down and describes what he sees. It takes about three or four hours to write a 1,000-word story, usually not more than a couple of weekends for longer ones. He says he doesn't rewrite stories except at an editor's request. He also writes musical comedies based on works of the guests of honor at the many science fiction conventions he attends and is often toastmaster for these events held all over the country. He's been a panelist discussing such topics as politics, weapons, new technologies, and strange and unusual events. He says he likes to look into the dark, dusty corners of science.

In collaboration with his son Kris and Joe Giarratano, Arlan has also produced five computer/comic/game books. He is a member of the Science Fiction Writers of America and received a 1994 *Analog* AnLab award for his fact article "Single Stage to Infinity," published in the June 1993 *Analog Science Fiction and Fact* magazine. He is also a member of ASME, Mensa, Sigma Xi, and Pi Tau Sigma.

"I consider the very best science fiction writers to be humanity's envoys into the future," says Arlan. "We take a few voyages and prepare ourselves. It's a great job, but somebody has to do it."

Technology may help mediate centuries-old disputes

New Cooperative Monitoring Center gets its first foreign visitors

Sandia's nonproliferation program entered a new era recently when representatives of five Middle Eastern countries visited the Labs to learn how modern-day technologies made in America can help reduce political tensions in

warring regions of the world.

The five-day workshop July 17-21 was the first visit by foreign delegates to Sandia's new Cooperative Monitoring Center (CMC). The center's purpose is to acquaint arms control spe-

cialists, politicians, and military leaders from adversarial nations with verification and arms control technologies developed by US government labs and industry (*Lab News*, May 27).

The hope is that familiarity with available monitoring technologies will allow opposing nations to construct peace agreements based on technology and the information it provides.

Uncertainty, fear, and mistrust

"The basic idea," says Program Manager Arian Pregoner of Verification and Analysis Dept. 9241, "is to use technology to help attain regional security, thereby reducing tensions that could motivate countries to acquire weapons of mass destruction."

If two adversaries allow one another to monitor each other's tank and troop movements near borders, for instance, neither side has to prepare for a surprise aggression. That can reduce regional political tensions significantly, she says.

"It begins to change the psychology from a level of uncertainty, mistrust, and fear to one of certainty, trust, and confidence based on technology," says Gerry Yonas, VP for Systems Applications Div. 9000.

Such monitoring technologies can also help ensure that nations that have entered arms control or peace agreements are complying with terms of such an agreement. "If they can trust the technology, they don't necessarily have to completely trust one another," he says.

That, he adds, may allow adversaries to settle their political differences and begin to see the benefits of collaboration and trade. "What could be a disputed border one day might be a port of entry for trade the next day," he says.

Visitors assured confidentiality

During the workshop the delegates were shown various types of surveillance and monitoring hardware and software developed either at Sandia or by private industry. Such equipment might include ground-based cameras; acoustic, magnetic, and seismic sensors; unclassified satellite imagery; and data from airborne sensors such as the Open Skies synthetic aperture radar. It also includes data processing and integration capabilities.

Although countries participating in the workshop were assured confidentiality as a condition of their visit, the five Middle Eastern nations represented are involved in ongoing multilateral peace negotiations in the region.

"They are working together to promote various confidence-building measures that eventually will lead to some type of regional security," said Michael Yaffe of the US Arms Control and Disarmament Agency, who attended the workshop. (The CMC is sponsored primarily by the DOE Office of Nonproliferation Policy with additional support from the Arms Control and Disarmament Agency.)

Arian says the inaugural CMC visit was successful and expects more countries to visit the Labs as word gets out. In the future, she says, Sandia's role will be to help delegates identify technologies that might be useful for monitoring and confidence-building measures in their particular regions. Resident experts will help delegates who arrive with questions about available technologies.

"Technology can't solve everything," said Massachusetts Institute of Technology Professor Marvin Miller, who also attended the workshop. "There are some deep-seated hatreds among various parties in the world. But it can change some people's perspectives."

— John German



DELEGATES of five Middle Eastern nations inspect ground sensors available from US government labs and industry recently during the first foreign visit to the new Cooperative Monitoring Center located at Sandia.

Area 2 cleanup

(Continued from page 1)

brighter, or at least cleaner for the ER group.

"This is important because it demonstrates our capability to move forward rapidly on environmental restoration projects," says Tom Blejwas, Director of Sandia's Environmental Operations Center 7500. "It comes at a time when we've been challenged in terms of our ability to complete these projects in a cost-effective and aggressive fashion."

A rigorous review of Sandia's efforts earlier this year by a private company and DOE experts examined the prickly question of whether the cleanup job should be placed in the hands of the private sector or continue at the direction of the Labs. Shortly after the completion of that evaluation, ER staff, contractors, and managers developed alternate strategies, including accepting higher programmatic risk so that sites could be restored more quickly and efficiently. As a part of that strategy, Sandia environmental scientists asked the Environmental Protection Agency (EPA) for permission to move ahead at several selected waste sites. These efforts, referred to as "voluntary corrective measures," or VCMs, were designed to put Sandia years ahead of schedule on some sites.

Costs for cleanup of the first site came to approximately \$100,000, says Rarilee Conway (7582), task leader for the effort. Costs include removal and storage of concrete and uranium-bearing soil from the site, previously used to calibrate geophysical logging tools. The expenditures will help save DOE an estimated \$180,000, based on cost estimates for simply monitoring and carrying the site through the standard regulatory process during the next few years.

Each of the four uranium calibration pits

included a four-foot-diameter concrete culvert, buried on end. The eight-foot-deep pits were emplaced between 1978 and 1984 to test various instruments. One pit contained uranium oxide buried below six feet of sand. Another had eight feet of sand saturated with 750 gallons of uranium nitrate. A third was filled with a chromium sulfate solution. The fourth was empty because it was used to measure natural background radioactivity.

The actual cleanup involved removing the contents of the pits and soil around them and then filling in with clean soil. Sampling and analysis of both soils and concrete assured researchers that the extent of any waste migration had been confined within the excavations. The effort resulted in about 60 drums of radioactive waste, eight drums of hazardous waste, and three culverts, two of which will be disposed of as radioactive waste. The third culvert is classified as hazardous waste.

The prompt cleanup of the uranium pits and several other sites now under way does not mean that the EPA has been ignored or pushed out of the way, explains Warren Cox (7581), Sandia project manager. EPA officials will have an opportunity to review the work and require more extended efforts, if they deem them appropriate, he says. Albuquerque citizens interested in the cleanup project also have been involved, he notes. Plans to initiate the corrective measures were discussed with the public at a meeting in May, and results will be reviewed at the next Sandia quarterly public meeting.

Other sites now being cleaned up include:

- A storm-drain outfall on the north side of Tijeras Arroyo.
- A gas cylinder pit used from 1963 to 1984, in Technical Area 3.
- Forty sites identified as containing fragments of metal, including depleted uranium, at various Sandia locations on the base.

Supervisory appointments

KAREN SHANE to Manager of Community Relations Dept. 12640.

Karen joined Sandia in 1966. She was Sandia's Corporate Historian assigned to the Records Information and Management Department at the time of her promotion. She previously worked in the Community Relations Department from 1974 to 1989. Karen developed Sandia's Volunteers in Action



KAREN SHANE

program and the Community Focus Lecture series during that time. She has also worked for the Nuclear Security Systems Center.

She has a BA in journalism, history, and anthropology and an MA in history, both from UNM. She has served on many community boards. She is past chair of the Board of Trustees of the New Mexico Chapter of the Nature Conservancy and is a founding member and past president of the Greater Albuquerque Volunteer Association.

MARTY NOLAND to Manager of Work for Others Strategic Programs Dept. 9914.

Marty joined the Labs in 1985 as a member of the Staff Employment and Personnel Policy Department. Other organizations she's worked for include Technical Communications Department and the Work for Others Program Development and Support Center.

She has a BS in applied arts from Texas Tech University, an MA in counseling psychology from the



MARTY NOLAND

University of Texas at San Antonio, and a JD from Texas Tech University School of Law.

Marty is a member of the New Mexico State Bar Association and the Texas State Bar Association and the National Association of Professional Organizers. She is a certified professional aerobics instructor and is a member of the Aerobics and Fitness Association of America.

Before coming to Sandia, Marty was employed by the United States Bankruptcy Court for the Northern District of Texas.

JUDY JEWELL to Supervisor of Warehouse Procurement Team 7815-1.

Judy joined Sandia in 1979 as a member of the Quality Assurance Division, where she provided secretarial support. Other organizations she's worked for include the Safeguards Evaluation Department, Systems Research Department, Components Directorate, and the Internal Programs Division, which is



JUDY JEWELL

now the Laboratory Services Division.

Judy has served as a member of several Sandia teams, including the Laboratory Document Accountability Study Team, the USS Iowa Review, and the Office Automation Subcommittee.

Before coming to the Labs, Judy worked for an Albuquerque law firm and served with the US Army and the Michigan Civil Service.

ELIZABETH "BETSY" FORBES to Manager of Industrial Hygiene Operations Dept. 7712.

Betsy joined Sandia in 1989 as a health physicist and industrial hygienist in the Health and Safety Department. Other organizations she's worked for include the ES&H Assessments Department, the Facilities Development Center, and the Maintenance Management Pro-

gram Office.

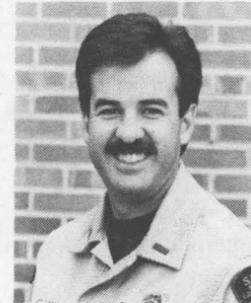
She has a BS in radiation/nuclear technology from Oklahoma State University and an MS in radiology and radiation biology from Colorado State University, and is a Certified Health Physicist and a Certified Industrial Hygienist.

Betsy is a member of the American Industrial Hygiene Association, the Health Physics Society, the American Nuclear Society, the American Academy of Industrial Hygiene, the American Academy of Health Physics, Phi Kappa Phi, and the New Mexico Network of Women in Science and Engineering.

Before coming to Sandia, Betsy worked for the Lovelace Inhalation Toxicology Research Institute, Colorado State University's Radiology and Radiation Biology Department, DOE's Safety and Environmental Branch at Rocky Flats Plant, Pantex Plant, and Oklahoma State University.

PAUL JUSTICE to Lieutenant in Security Dept. 7435.

Paul has been a member of Sandia's Security Department since he joined the Labs in



PAUL JUSTICE

1983. He has been a member of Sandia's Special Response Team since 1985 and has attended specialized SWAT (special weapons and tactics) training at the Central Training Academy. Paul has been a member of the Albuquerque Police Department Reserve Unit since 1992.



ANYTIME NOW — Students participating in the DOE-sponsored High School Students Honor Program sit at the starting blocks of a miniature solar car race willing their vehicles to go (left photo); unfortunately, neither car budged. The vehicles were among several miniature solar cars designed, developed, and then raced at Sandia's Solar Tower recently as part of the DOE-sponsored program that emphasizes the importance of chemistry, math, and physics in engineering research. In the photo above, students discuss the design of their winning solar car with Terry Cornwell-Rumsey (left), Director of DOE's Office of Science Education and Technical Information. Built by students (right to left) Jason Crockett, Tim Henson, Mary Fenstermaker, Raymond Li, and Scott Cole (not seen), the car was the only vehicle to finish the race. The secret of their success, says Crockett, was a high gear ratio and small tires.

Narath answers questions submitted during employee dialogue sessions

At his employee dialogue sessions in June, Sandia President Al Narath said he would prepare detailed answers to several questions and get the answers to all Sandians. Here they are:

Q: Will the reengineering effort address the best utilization of resources taking into consideration the DOE FTE [full-time equivalent employee] cap for the Labs [for example, contractors vs. FTEs]?

A: Yes. One of the major efforts in reengineering is in our Human Resources (HR) area, including the redeployment of current staff, an alignment of our FTEs, and a strategic and operational plan. Incidentally, there is no imposed DOE FTE cap; the FTE cap is self-imposed as a good business practice.

The reengineering effort will address the issue of resource utilization within the FTE operational constraints. Charles Emery, VP of Human Resources Div. 3000, as owner of the HR Management process, is leading the effort for our strategic staffing initiative. Donna Martin, Director of Procurement Center 10200, is leading the effort to provide a process for determination of "make vs. buy" (will Sandia provide the service with an FTE, or will we buy it elsewhere [contractor]?).

Q: Why is Sandia's top management so arrogant that it doesn't perceive or recognize that most Sandians are dissatisfied with the current retirement plan? This question is reinforced by the questions at the dialogue. The oversubscription/underutilization problem is that Sandia does not have the right mix of skills for present and future projects. To obtain the right mix, Sandia needs to offer an incentive/sweetener for retirement that will get approximately 1,800 takers. The 1,800 could be replaced by 3,600 new hires with the right skills at the same cost. Long-term employees' salaries are usually twice that of new hires'. To do this would not cost the current budget a dime, since the sweetener would come from our well-endowed retirement fund. Let's drop our arrogance and make some worthwhile decisions at the top level. Just telling us how great we are doesn't solve root concerns with the worker.

A: Sandia management is aware of the discontent among employees concerning the pension and retirement plan. This discontent is mainly from those employees who contributed to the plan prior to 1976 and believe they receive no benefits from these contributions. We have not seriously contemplated introducing a sweetener to encourage people to retire because losing 1,800 key individuals at one time would severely limit Sandia's capabilities. We have budget and work for our current staff. The problem is training and redeploying our employees to meet our shifting work demands. Some of the steps we have taken to retrain employees include:

- Sandia's *Opportunities Bulletin* advertises availability of employees and their skills/expertise,
- New business directions are being balanced with skills of surplus employees,
- HR coordinates with line organizations to match openings with surplus employees,
- There is a special fund to pay for up to three months of training for surplus employees to learn a new job, and
- Redeployment efforts are coordinated through the Employee Development Center and through Labor Relations for represented employees.

Incidentally, we are getting a better mix of skills through our new hires.

For more information about either of these topics, please contact Charles Emery, VP for Human Resources, on 845-7692.



INSTANT FAMILY — Lovella and Mike Chadwick (5913) show off their newborn family: Timothy Michael (left), Brienne Michelle (middle), and Ashley Lyn. The triplets were born one minute apart on June 21 at St. Joseph's Hospital.

Sandia Day: guest lists and special events

For those of you who had to make special arrangements to bring nonfamily guests to the last Family Day, things will be different for this year's Sandia Day, Saturday, Oct. 22. Anyone with an authorized Sandia badge (Q and L-cleared, contractor, and DOE/Sandia badges) at Sandia/New Mexico will be allowed to bring eight guests — family, friends, or students. An equal number of guests will be allowed at Sandia/California's celebration, but only Sandia employee badges will be authorized for entrance. You must wear your badge in order to escort your guests. If you forget it, you won't be allowed in.

Guest forms will be available in the badge office and are due Oct. 1. Special restrictions apply for foreign national guests, so if you are thinking of bringing one, you'll need to call Melanie Florez (7437-1) on 844-3668 immediately.

Former Sandia employees including retirees and summer hires will need to have cleared escorts for Sandia Day. Redd Eakin of Community Relations Dept. 12640 will be coordinating

escorts and special activities for retirees. Summer hires interested in attending Sandia Day should ask their supervisors or co-workers to add them to their guest list.

Special events update

A car show and the popular "Kid's View" drawing contest are two of Sandia Day's latest special events. The car show, open to all Sandia/DOE employees, will feature restored and custom vehicles. Entry forms will be available in September issues of the *Weekly Bulletin*.

The Kid's View drawing contest is scheduled for early September. Children of Sandia/DOE employees are invited to enter their drawings with descriptions of what their parents do at work. Winners will be featured in the *Lab News*, and all entries will be on display during Sandia Day. Look for entry forms in the Sept. 2 *Lab News*. In the meantime, kids can break out the colors and get in some pre-contest practice.

Feedback

VP parking in tech area

Q: Can someone please explain how VP parking privileges inside the tech area are consistent with the corporate value of respect for the individual?

Please do not use the explanation that off-site meetings demand this. CEOs of Compaq, Chrysler, and many other well-run companies are capable of doing their jobs well, even while parking with the common workers. Also, many other employees have a large amount of off-site work.

What other interpretation should I make than that executives are better than the rest of us?

A: Parking inside the tech area is authorized for VPs and above as part of the Executive Protection Program. Admittedly, the convenience that comes with the inside parking may be the reason some VPs choose to accept the option of parking inside.

When a bomb was detonated in the parking lot at Sandia's California site a few years ago, Security recommended that VPs, executive VPs,

and the president be required to park inside the secured area. After viewing the recommendation, the executive VPs decided that parking inside would be optional rather than mandatory. Inside parking remains optional today, with most of the eligible individuals choosing to park outside the security areas.

Doug Robertson (12110)

Welcome

Albuquerque — Kenneth Keahbone (13422),
Douglas Otts (10240)
Other New Mexico — Terry Jaramillo (10504)
Texas — Michael Wilson (9127)



More answers to questions about pensions, benefits

Fourth installment stemming from employee forum

This is the fourth and final installment of questions and answers stemming from the May 25 forum on the Labs' retirement plans and other benefits. Because many questions address the same, or closely related, issues, Sandia benefits specialists have combined them and provided a single answer to each basic question.

Videotapes of the forum are available at the Technical Library at Sandia/New Mexico and from the Benefits Organization (Bldg. 911) at Sandia/California. Mark Biggs of Pension Fund/Benefit Program Management Dept. 3542 says any further questions should be addressed to him.

Inspector General report

Please provide an update on the status of the DOE Inspector General (IG) report.

The IG report — based on a 1993 audit of the status of Sandia's two pension plans at the end of 1990 when the plans' assets totaled \$1.29 billion — calculated that the plans contained \$588.9 million in excess assets on a current-value basis. It recommended that DOE initiate action to return those assets to the government (*Lab News*, April 29).

DOE was initially required to respond to the IG report and develop a position by June 15, 1994, but that deadline has been extended to August 15. To prepare the Departmental position, DOE's general counsel is researching legal issues associated with the IG's recommendations and DOE, and Sandia pension actuaries are updating the estimates of the plans' funded status.

Is it legally possible for DOE to pull funds from a pension plan in which a large fraction of the reserves has been funded by employee contributions?

Yes, a pension plan can be terminated and excess assets returned to the plan sponsor even if the plan required mandatory employee contributions. However, employees who previously contributed to the plan are eligible to share in any excess under a formula established by ERISA (Employee Retirement Income Security Act) before reversion to the plan sponsor.

What is the purpose of maintaining a surplus in a retirement plan whose benefits are guaranteed under federal programs?

Sandia funded its defined benefit plans in compliance with applicable legal and accounting standards, and the surplus is largely a result of greater than expected investment returns. The fact that DOE or the Pension Benefit Guaranty Corporation (PBGC) guarantee part or all of the benefits provided by the plans does not impact the funding of those plans. The guarantee is in the context of any asset over liability shortfall if the plan were terminated. Unlike a defined contribution plan, the benefits provided by these defined benefit pension plans are not dependent on the level of assets in the plans, but rather by the underlying plan design and competitiveness of the formula.

Why doesn't Sandia increase pension benefits for active and retired employees rather than have the surplus returned to the government?

Both Sandia and DOE view the current benefits provided by the pension plans as very competitive. Sandia cannot unilaterally increase pension benefits without DOE approval.

Is there any precedent for DOE, or any other

Federal agency, to terminate the pension plan of an ongoing contractor to recover excess pension funds?

No, we are not aware of any precedent for DOE or any other Federal government agency recovering surplus pension funds under those circumstances.

On what does Ralph Bonner base his contention that the plan is not overfunded?

Sandia believes that the IG report focused on an inappropriate measure of funded status in its report. Many of the IG's conclusions were based on viewing the plans on a termination basis, which compares the market value of assets at a point in time to a current liability established with IRS-dictated rates. Since Sandia intends to continue its pension plans indefinitely, we believe that a more appropriate measure of funded status is to compare actuarial value of assets to actuarial accrued liability, which is determined with the assumptions used to fund the plans. By that measure, Sandia's pension plans are well funded, but not excessively overfunded as the IG claims.

Comparisons with other companies

Please explain the survey data that were used to compare Sandia's benefits against those in private industry?

The survey data presented at the May 25 forum and summarized in the June 10 *Lab News* was performed by Hewitt Associates, a benefits consulting firm. The survey compared Sandia's benefit plan with those of 15 other R&D firms for salaried employees and 20 other industrial companies for hourly employees. The surveys ran each company's benefit plans against a common employee database to derive a value for the benefits. The Hewitt surveys are available for review by employees in Departments 3542 and 8522.

How does Sandia compare against other Martin Marietta sites?

Data presented at the May 25 employee forum demonstrated that Sandia's pension plan compared very favorably against other Martin Marietta plans. For example, an employee with 30 years of service retiring at age 61 with final earnings of \$50,000 and 3 percent annual increases could expect the Retirement Income Plan (RIP) benefit to replace approximately 42.5 percent of his final earnings, while we estimate that pension plans at Martin Marietta Corporation or Energy Systems would replace approximately 35.4 percent of those same final earnings.

Why are our benefit plans constrained by industry standards? Sandia is a unique organization and should have a unique retirement plan.

Comparison to a peer group of companies in private industry (e.g. the Hewitt survey) is one of the metrics that Sandia uses to evaluate the competitiveness and adequacy of its benefit plans. The pension plans are also measured against other metrics, such as the study on income replacement ratios frequently updated by Alexander & Alexander and Georgia State University. DOE uses these same comparisons and analysis, in addition to other standards of its own, when reviewing plan changes.

Why isn't the "industry standard" argument used to improve the Sandia dental plan?

The Hewitt survey data indicates that the employer-paid portion of Sandia's total benefit program ranks between 1st and 2nd in both the salaried and hourly employee surveys.

While some individual plans such as dental and disability benefits may rank comparatively low, in general Sandia's individual benefit plans ranked highly. The Hewitt commentary on the survey results indicated that most of the companies in the comparison had some significant pluses and minuses in their benefit programs.

Miscellaneous

How many employees are covered by the Pension Security Plan?

Approximately 1,650 employees were eligible for the Pension Security Plan (PSP) as of December 31, 1993.

Why do the pensions provided by the two pension plans (RIP and PSP) vary so much?

In general, Social Security provides a larger replacement of final earnings for employees covered by PSP than for employees covered by RIP because of the different average earnings for the job classifications covered by each plan. Consequently, to provide approximately the same total replacement of final earnings from the sum of the pension benefit and Social Security income, the PSP pension benefit is typically slightly below the pension benefit generated by the Retirement Income Plan.

What has been the annual financial experience for the Retirement Income Plan since its inception?

Itemized annual financial experiences for the RIP and PSP are available for review in Departments 3542 and 8522.

Why don't we get annual Employee Benefit statements anymore?

Full employee benefit statements were discontinued after 1989 due to manpower limitations and feedback received from employees questioning the usefulness of the information on the statement. In subsequent years, with the exception of 1993, pension statements were prepared and sent to eligible employees. Pension, Life Insurance, and Employee Services Administration Dept. 3544 will distribute pension statements to retirement-eligible employees before Sept. 1, and to all other employees later. Any employee may request a statement of accrued pension benefits once every year.

Sandia finally implemented the 401(k) provision into the savings plan Jan. 1, 1986, after it had been available and used by other companies for a long time. Why didn't Sandia implement the 401(k) provision earlier?

Until June 1993, Sandia employees were allowed to participate in the AT&T savings plans. However, AT&T and its Board of Directors made decisions concerning plan design, such as allowing pre-tax contributions. Sandia employees were permitted to begin making pre-tax contributions to the savings plan at the same time as all other AT&T employees who participated in those plans.

Congratulations

To Joanne Fredrich (6117) and Richard Fagioli, a son, Marcus Aurelius, May 25.

To Laura Gilliom (5603) and Alan Sylwester (6203), a daughter, Lauren Michelle, July 12.

To Rafael and Tom (1322) Plut, a daughter, Analise Marie, July 23.

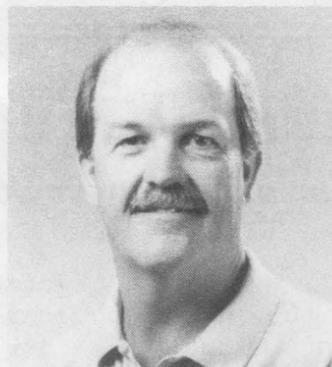
To Donna and Randy (6118) Cygan, a daughter, Nora Anne, July 27.

Mileposts

August 1994



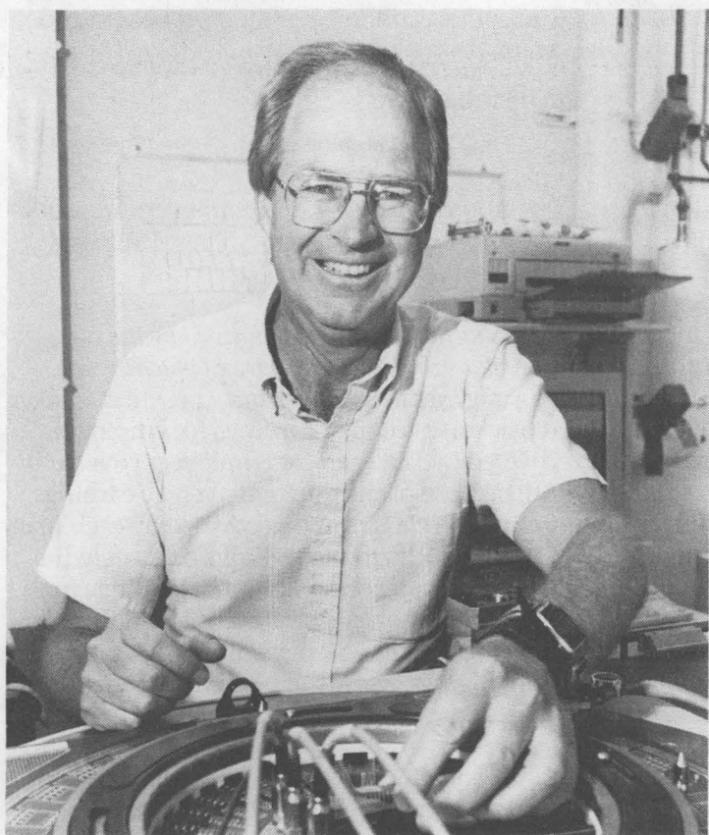
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Mark McAllaster 25
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Florian Lucero 15
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Richard Beegle 30
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David Nichols 20
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Alice Starcher 15
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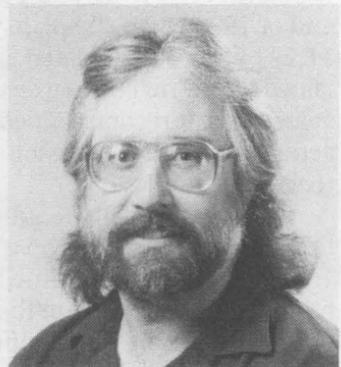
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Daniel Salmen 15
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Galen Puls 25
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Joseph Fernandez 15
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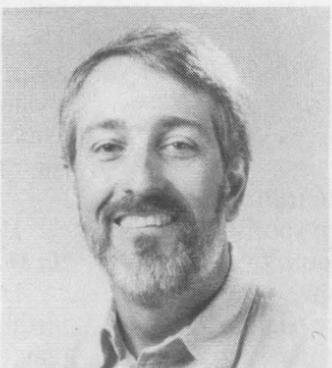
Howard Seltzer 30
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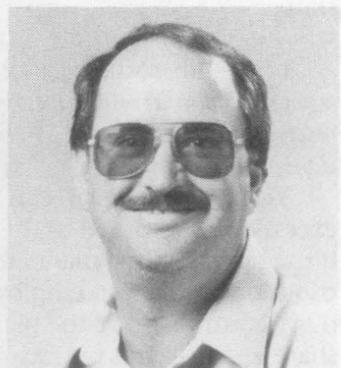
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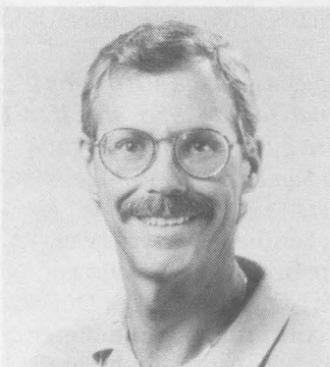
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7711



Paul Hatch 25
7312



Patrick Manke 15
9414



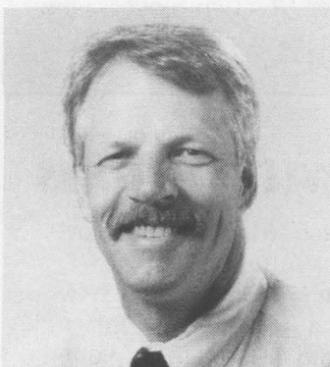
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Mark Bishop 15
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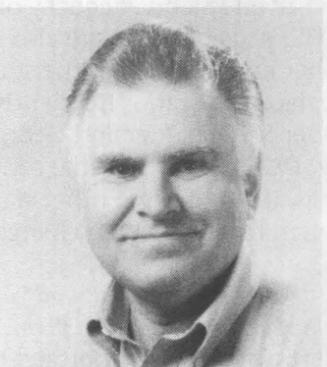
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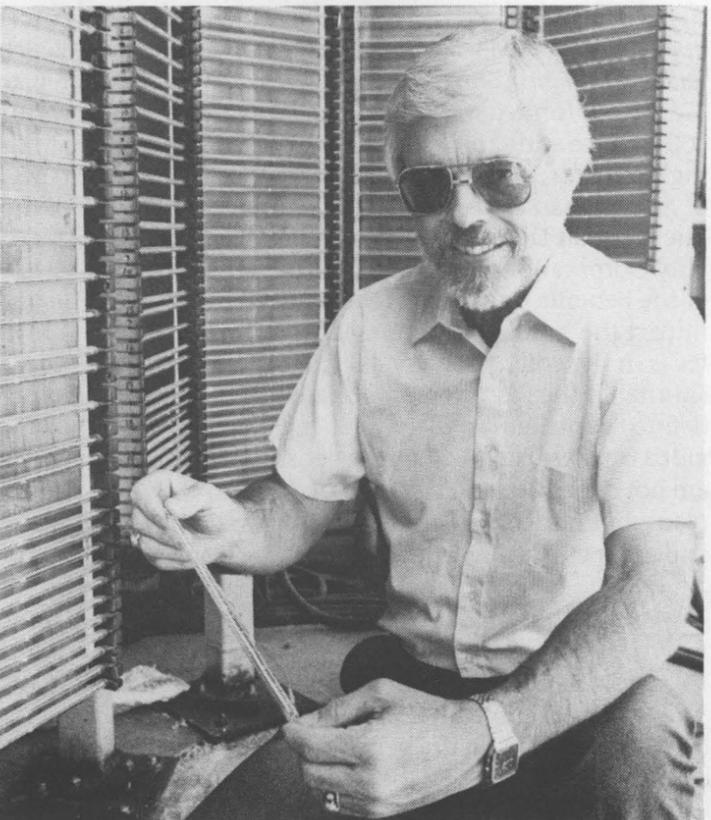
Alan Spencer 25
7312



Tom Stueber 15
9216



Robert Jaramillo 25
2313



Ned Keltner 30
2761

Sandia Classified Ads Sandia Classified Ads Sandia Classified Ads Sandia Classified

MISCELLANEOUS

SOFA & CHAIR, hand-carved, Spanish colonial style, woven Chimayo cushion covers, \$150 for both. Church, 281-5215.

COUCH, two blue chairs, w/ottoman, Drexel Heritage, earth tones, down & foam filled, used 1-1/2 years, must see, \$750. Hernandez, 299-5749.

TUNTURI ROWING MACHINE, \$45; small color TV, sits on a turntable, works well, \$60; electric typewriter, \$20; Indian saris, various types. May, 265-6175.

TYPEWRITER RIBBON CARTRIDGES, correctable carbon film, Unicopy brand, for IBM Selectric III, \$1.50/ea. or 11 for \$13. Schkade, 292-5126.

PROFESSIONAL TAPE RECORDERS: Technics RS-1500U (1/2T), RS-1506U (1/4T), like new, orig. \$1,500/ea., sell \$500/ea. OBO. Reels, tape, accessories available. Rathbun, 888-3344.

MARSHALL ANGLED CABINET, 4x12, excellent condition, w/cover, \$325 firm. O'Toole, 866-5327.

SHOP MANUAL, back rest, cruiser shield, aftermarket shocks. All for '86 VT700C Honda Shadow motorcycle. Reinhardt, 881-7883.

THOMASVILLE BEDROOM SET, full-size bed, w/mattress, dresser, mirror, headboard, excellent condition, \$500. Padilla, 822-9622.

LAWN MOWER, Sunbeam, 3.0-hp, 19-in. cut, electric, works, grass catcher bag needs repair, \$35. Simons, 821-9343.

THE SPLENDOR OF BAROQUE LP, set of six, by Phillips, w/book, new; halogen lamps for projector, brand new. Wagner, 823-9323.

WATERBED, wood, twin-size, w/sheets, and all extras, excellent condition, \$125 OBO. Moore, 898-9590.

REFRIGERATOR, Sears, w/auto ice maker, 19.1 cu. ft., \$100. Puccini, 255-0568.

KICKERBOX, two 15-in. "Power" woofers, 300 watts max, 4 ohm, 100-watt Pyramid Crossovers included in box, charcoal gray color, \$150. Aguilar, 873-1952.

WATERBED, queen-size, bookcase headboard, recently replaced heater/controller, \$20. Hansen, 296-0610.

PERSIAN RUG, semi-antique, collectible, handmade, broken-border Kerman, 12'x17', excellent condition, recently cleaned, \$15/sq. ft. without pad. Larsen, 292-7896.

CONCRETE CYLINDERS, 6" diameter x 18" length, approximately 75, great for borders and edging, free. Hatch, 265-4642, leave message.

CHOP BLOCK TABLE, Boos Bloc, walnut, originally \$500, now \$199; electric range, w/oven and microwave, \$350. Banks, 291-1794.

FROSTLESS FREEZER, Sears Kenmore, late '90, Model #39205, 66" H, 19.6 cu. ft., estate offer, \$400. Jeblick, 298-9513.

WINDSURFING EQUIPMENT: sails, masts, booms, bases, harnesses; car-top carrier, \$10; reel mower, \$30; answering machine, \$15; baby carriage, \$10. Horton, 883-7504.

CAMCORDER, RCA "Pro Edit," VHS, 8x Power Zoom, AC adapter/charger, carrying case, like new, paid \$900, asking \$550. Prins, 867-9440.

COMPUTER, 286/20-MB PC, Multi-sync monitor and VGA card, 3.5" floppy, IDE controller, no hard drive, \$300. Kaye, 292-4242.

WATERBED, king-size, firm support, waveless, bookshelf headboard, decorative mirror, w/shelves and door on each side of mirror, \$225. Duke, 298-4427.

TAMARRON RESORT, Durango, golf rounds, w/cart, two days for two couples, through Oct. 15 season, \$275; chandelier, cut glass & brass, semi-ornate, \$95. Nordeen, 296-7898.

REFRIGERATOR/FREEZER, Whirlpool, 21 cu. ft., frost free, almond, \$150. Aubert, 296-4173.

CLOTHESLINE, two heavy-duty poles, in concrete, already dug up, free. Lee, 256-0239.

DOG, white Maltese, 8 yrs. old, loves older women, should be an "only" dog, 9 lbs., very cute, \$25. Gregory, 275-3855.

EXERCYCLE, AirGometer, "DP - Fit for Life," new condition, cost \$400, asking \$150. Hanks, 867-1745.

GOLF CLUBS, Titleist DCI 3-PW, \$375; Zenith TV, 27-in., \$100 OBO; Precor stair stepper, \$50. Edwards, 899-8634.

BEDROOM SET, solid cherry wood, full-size, includes chest of drawers, night stand, headboard, footboard, mattress, & boxspring, \$800. Gurule, 298-5226.

BOY'S CATHOLIC SCHOOL UNIFORMS, many sizes. Quintana, 898-6718.

COUNTRY COTTAGE PLAYHOUSE, Little Tykes, \$90; basketball backboard, \$20; stair stepper exerciser, \$15. Smith, 281-9360.

GUN, 9mm, Smith & Wesson, two magazines, holster, \$350 firm. Anderson, 298-1635.

RATTAN/GLASS TABLE, 46-in., \$75; Ultrasonic humidifiers, \$12/ea.; electric ice cream maker, \$12; large Samsonite suitcase, \$30. All like new. Pitts, 293-5481.

MICROWAVE, Kenmore, 900-watts, \$60; clothes iron, \$6; small ironing board, \$6; hot pot, \$3; drafting lamp, \$5. Claassen, 271-8274.

'92 TERRY RESORT FIFTH WHEEL, 21-ft., AC, heater, microwave, awning, stereo, immaculate, \$12,000. Marquez, 294-9014.

DINING TABLE, 6 chairs, china cabinet, mint, \$528; bird cage, \$88; Encyclopedia Britannica, \$218; skis, boots, \$98; Ludwig drums, \$98. Chernoff, 821-0693.

MATTRESS & BOX SPRINGS, full-size, Simmons Ultra Pedic, good condition, \$100. Sutherland, 345-1183.

DRYER, Kenmore electric, 15 yrs. old, white, works fine, rarely used, \$75. Hasti, 294-4631.

RABBITS, free to good homes. Fischer, 296-6122, leave message.

STUDIO COUCH, full-size, like new, perfect condition, \$150. Newman, 299-2729.

ELECTRIC MOWER, Snapper, 19-in., Hi-Vac series, rear bag, used two years, good condition, \$125. Magnuson, 268-5955.

SALE, August 6, 8 a.m.-noon, 7737 Hermanson Pl. NE, electronic typewriter, sewing machine, twin bed w/headboard, bedding, miscellaneous. Holt, 294-6928.

PRINTER, Epson LQ-510, includes stand, cable, new ribbon, small box of continuous feed paper, excellent condition, \$75. Hoyt, 271-0688.

CHAIN LINK FENCING, 5'x40", \$25; Fisher Price table and chairs, \$25; tile grout, brown, 8 lbs., \$8. Skinner, 299-5063.

MALTESE PUPPIES, AKC registered, born June 7, great with small children, one female, \$450, one male, \$400. Danneels, 292-1548.

WATERBED, king-size, cream, mirrored bookcase headboard w/gold trim, semi-waveless mattress, heater, very good condition, \$125. Saiz, 842-6936.

STEREO, Fischer 400 receiver, Garrard turntable, pair Fischer XP-6 speakers, some repair needed, \$75. Lieberman, 299-7739.

KENMORE REFRIGERATOR, almond, ice maker, w/20 cu. ft. freezer on top, may need service, \$50. Wright, 892-7652.

SLIDE TRAYS, for Kodak projector, \$5/ea.; single CD disk player, Technics SL-P230, \$50; end table, solid pine, \$75. Whitehead, 292-1604.

FREEZER, 16 cu. ft., \$150; cabinet grand piano, \$850; '85 Edition World Book Encyclopedia, w/year-books, \$150. Kulawinski, 275-9185.

REFRIGERATOR/FREEZER, 21.8 cu. ft., Wards Signature, double door, almond, \$300 OBO. Sinerros, 294-7899.

ARABIAN MARE, registered purebred, 4 yrs. old, excellent bloodlines, great show horse, needs training and a good home, \$1,300. Striker, 281-7945.

EL VADO LAKE RESORT RV MEMBERSHIP, affiliated with Coast-to-Coast, \$200. Gregory, 344-1436.

FLUORESCENT TUBE LIGHTS, four, 48-in., two tubes in each set, ready to hang, chains/plug, \$25 for all; trampoline, \$8. Moonka, 856-1110.

WINDSURFER: complete outfit, 12' Sprint beginner/intermediate sailboard, 5-meter Mistral sail, Thule cartop combo sailboard/ski rack, \$320. Green, 281-4533.

GE REFRIGERATOR, 18 cu. ft., \$400; Weslow 2005 stair stepper, \$75; queen-size waterbed, w/pads, \$75; Elan skis & Technica boots, \$125. Montavon, 343-1961.

BRASS TRUMPET, Bundy, w/case and music stand, perfect for school band, \$100. Langwell, 293-2728.

OCCASIONAL TABLES, solid oak w/glass inset tops; coffee table,

Deadline: Friday noon before week of publication unless changed by holiday. Mail to Dept. 12660, 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 8 1/2" by 11-inch paper.
5. Use separate sheet for each ad category.
6. Type or print ads legibly; use only accepted abbreviations.
7. One ad per category per issue.
8. No more than two insertions of same "for sale" or "wanted" item.
9. No "for rent" ads except for employees on temporary assignment.
10. No commercial ads.
11. For active and retired Sandians and DOE employees.
12. Housing listed for sale is available for occupancy without regard to race, creed, color, or national origin.
13. "Work wanted" ads limited to student-aged children of employees.

\$120; end table, \$100; library table, \$120. By Bassett, excellent condition. Seyfer, 292-0179.

TWO-HORSE TRAILER, \$1,400; Roper saddle & accessories, \$450; '76 Cherokee, body only, \$200. Romero, 281-9423.

NIKON CAMERA, w/50 mm 1.4 lens, Vivitar 2X teleconverter, close-up tubes, flash, case, \$400; software Corel Draw 3.0, never opened, \$99. Luther, 822-1187.

THREE-RAIL MOTORCYCLE TRAILER, full-size, \$450; miscellaneous riding gear. Martin, 271-4992.

WATER-JEL BURN KIT, an amazing revolutionary burn care product, assorted size dressings, paid \$379, asking \$200. Jensen, 821-2373.

OVEN/RANGE/MICROWAVE UNIT, almond, good condition, \$350; king-size Beautyrest mattress, excellent, \$150; couch, 8-ft., brown, \$100. Brost, 298-6969.

MAYTAG WASHER/DRYER, avocado, old but in excellent condition, \$250. Renken, 296-9713.

VIDEO GAME, *Street Fighter II Turbo*, for Super Nintendo SNES, new \$75, sell \$50. Strascina, 294-0305.

BABY ITEMS: walker, Graco Tot Wheels II, \$15; Cosco infant carrier, \$10; Johnny Jumpup, \$12; Graco umbrella stroller, \$10; diaper pail, \$7. Wiseley, 298-3195.

STROLLER, Spectrum, full-size, \$45; Century 5000 STE car seat, \$25. Irwin, 883-2558.

PING PONG TABLE, w/accessories, \$40; modem and cables, \$30; camo daypacks, \$9; armored binoculars, Bausch & Lomb, 8x21, \$50. Klett, 884-8354.

LOVESEAT, good condition, \$35. Alexander, 291-8028.

PRINTER, Star Model NP-10, excellent condition, \$38. Minnear, 281-0946.

GARAGE DOORS, two, 8' x 7', 2" thick, insulated, brand new, raised panel, brown, 26-gauge steel front and back, \$450, \$550 installed. Carroll, 299-9486.

KENMORE WATER SOFTENER, Southwestern pool table light, oak bedroom set, couch, coffee and end tables. Pena, 898-2388.

TRANSPORTATION

BIKES: woman's 10-spd., \$50; girl's 10-spd., \$40; boy's 18-spd., \$35; man's 10-spd., \$35. Lovato, 836-3517.

'87 CHEV. BLAZER, full-size, 4WD, Silverado, loaded, tow package, 350 EFI, 89K miles, new tires, excellent condition, \$8,200 OBO. Mendez, 293-8649.

'85 RENAULT ALLIANCE, 4-dr. sedan, loaded, 5-spd., good condition, runs but engine needs work, \$500. Servis, 865-7629.

'76 OLDS. CUTLASS SUPREME, body in good shape, runs excellent, maintenance records available, extra tires,

wheels, and car cover included, \$1,300 OBO. Schreiner, 266-6020.

'78 FORD VAN, 6-cyl. Econoline, paneled, newly carpeted, side doors, tinted windows, excellent condition, \$2,150. Lambert, 299-4303.

'88 FORD MUSTANG, 5.0L, dark blue, in storage for last 8 months, \$5,900 OBO. Romero, 268-2947.

'93 HONDA CBR-900RR, 3K miles, black, immaculate, \$7,500. Saxton, 262-9325.

12-SPD. BICYCLE, Centurion Sport DLX, includes rack, pump, and front bag, bought new 4/93, \$125. DeReu, 275-2336.

'87 OLDS. CUSTOM CRUISER, 9-passenger station wagon, PS, PB, PW, PD, 59K miles, excellent condition. Bragg, 275-3172.

'90 TOYOTA CAMRY, V6, loaded, \$9,900; '86 Toyota Camry, \$4,400. Both low mileage, excellent condition, below blue book. Carnes, 344-4128.

BOAT, 16-ft., '90 Lund, carpeted deck, '88 25-hp electric-start Johnson, less than 250 hours, w/trailer, \$2,750. Holmes, 292-0898.

'91 PLYMOUTH SUNDANCE, blue, 5-spd., AC, AM/FM cassette, airbag, only 20K miles, like new. Hunkins, 299-4964.

WOMAN'S MOUNTAIN BIKE, Diamond Back, 20-in. frame, 21-spd., green, ridden three times, more than \$300 new, asking \$200, will hold until Xmas. Pettit, 292-0789.

SAILBOAT, "Force 5," 2-person, easy-to-sail fiberglass racer, w/trailer, \$750. Lorenz, 281-9321.

'91 HONDA CIVIC CRX, 37K miles, all records, tinted windows, CD, new tires, \$6,200. Eldredge, 881-4528.

'92 SAAB 900S, 3-dr., fully loaded, leather, sunroof, alarm, ABS brakes, cruise, AC, AT, 35K miles, \$18,500. Turner, 265-8235.

'86 CHEV. CAMARO, one owner, V8, AT, AC, PB, PS, good body but needs paint, \$2,900 OBO. Oberkamp, 888-1981.

'91 CORVETTE, red w/gray leather, Delco Bose Gold CD/cassette, 6-way power seats, AT, 24K miles, still under warranty, \$23,995 OBO. Walker, 275-2861.

'88 CHEV. 5-10 BLAZER, Tahoe Package, 4.3L V6, AT, PS, PB, PW, PL, 78K miles, good condition, \$8,500. Heise, 275-0099.

'80 MONACO, 24-ft., Dodge 440 engine, roof air, tub, shower, new awnings, like new interior, AM/FM radio. Allen, 298-9833.

'90-1/2 NISSAN HARDBODY PICKUP, 48K miles, new tires, Pioneer stereo, custom wheels, alarm, cover and bra included, \$6,800. Coucke, 294-8059.

'92 CADILLAC SEVILLE, taupe, 4-dr., sunroof, fully loaded, leather interior, 40K miles, excellent condition, \$27,000. Badillo, 296-4668 after 5 p.m.

'80 DATSUN 210, 4-dr. wagon, new tires, 125K miles, second owner, excellent condition, perfectly dependable, great engine, great car, \$1,074. Chernoff, 821-0693.

'83 CIVIC WAGON, 107K miles, AC, cassette stereo, new tires, 35 mpg, excellent condition, \$1,850. Clark, 281-1243.

'37 CHEV., 2-dr., for restoration, \$2,500. Kulawinski, 275-9185.

MOUNTAIN BIKE, Man's Huff, 18-spd., Shimano gear shifting, 16-in. frame, \$60 OBO. Zutavern, 298-6523.

'74 FORD PICKUP, 1/2-ton longbed, V8, PS, AT, good work truck, \$1,500. Romo, 275-1192.

FREESTYLE BIKE, boy's 20-in., \$40 OBO. Moonka, 856-1110.

'92 JEEP CHEROKEE, 30K miles, Laredo, CD player, hitch, 5-spd., tinted windows, excellent condition, \$15,500. DePoy, 281-4536.

'92 HONDA PRELUDE Si, silver, AC, cruise, sunroof, AM/FM cassette, CD, anti-theft, 22K miles, \$15,900. Snyder, 281-3822.

'84 HONDA GOLDWING, Hondaline stereo/cassette, CB, radar, intercom wired helmet, other extras, 44K miles, garaged, \$4,200. Palmer, 821-8563.

'89 FORD PROBE GL, AC, PS, AM/FM cassette, 5-spd., silver, 74K miles, \$4,800; '81 Honda CB-650, 17K miles, \$1,000. Jones, 275-6791.

'79 YAMAHA TT500, dirt motorcycle, \$700 OBO. Ford, 275-6657.

'80 CHEV. MONZA, hatchback, V6, AT, AC, \$500. Hospelhorn, 865-6724.

'87 NISSAN PULSAR NX/SE, 51K miles,

silver, T-top, garaged, full records, excellent condition, includes cover and alarm, \$4,900. Sjaardema, 299-8042.

'94 CHEV. 3/4-TON PICKUP, 4x4, extended cab, Silverado package, 6K miles, loaded, matching Glasstite camper shell. Marquez, 294-9014.

'85 KAWASAKI KDX200, \$1,000; '86 Yamaha IT200, \$1,200. Off-road bikes, excellent condition. Martin, 271-4992.

ALUMINUM BOAT, '50s classic, very sturdy, \$75. Alexander, 291-8028.

'66 FORD MUSTANG, 2-dr. sedan, AT, 302 engine, straight body, very good condition, \$6,000 OBO. Chavez, 877-2094.

'87 SUZUKI SAMURAI, teal, 4x4, two soft tops, 89K miles, looks and runs great, \$3,200 OBO. Garcia, 877-8063.

REAL ESTATE

40 ACRES, 33 miles east of Colorado Springs, good grass land, OK for horses & mobiles, utilities available, trade for motorhome. Sparks, 884-5644 or 880-0324.

2-BDR. CONDO, SilverPick at Purgatory, 2 baths, 1,500 sq. ft., at lowest possible price, \$69,000 by owner. Ask for Jerry or BJ. Hanks, 867-1745.

3-BDR. TOWNHOME, 1-3/4 baths, 1-car garage, fenced yard, wood burning stove, 10 minutes from E-bank gate, great starter/rental home, \$71,000. Romo, 275-1192.

3-BDR. MOUNTAIN HOME, 3 baths, 2,845 sq. ft., sun porch, garage, 1-1/2 acres, option of additional acre, quiet, peaceful, \$137,000. Keller, 281-3490.

WANTED

MUSICIANS, interested in getting together on a regular basis and working on tunes out of the Real (Fake) books. I play guitar. O'Toole, 866-5327.

EQUIPMENT TRAILER, 20-ft., tandem axle; lambs or goats, ceramic, stuffed, any kind. Lambert, 292-8417.

MOTORIZED TREADMILL, w/arms. Morales, 296-0928.

CAMPING VAN for two, w/toilet and shower. Moss, 298-2643.

DONATIONS, clothing, household items, toiletries for women & children, for Domestic Violence Shelter, collected by Women's Program Committee. Lovato, 844-0268 or Edmonds, 844-1474.

USED OUTBOARD MOTOR; someone to work on my old Evinrude. Roeschke, 266-8988.

'82 PLYMOUTH CHAMP, 4-dr., custom 1.6L twin stick, for parts or perfect. Jones, 281-3450.

COMPUTER PARTS: floppy, 5-1/2", 1.2 MB; 1MB RAM, 80ns or 4 MB RAM, 80 ns; IDE controller, 2 hard, 2 floppy; math coprocessor. Hemsing, 823-2086.

USED DRUM SET, 5-piece, name brand. Douglas, 281-9843.

RIFLE, Winchester or Marlin, lever action, .22 caliber. Poulsen, 265-0566.

HANDGUNS, Ruger SP 101 Spurkss 38 sp only, 2" barrel; Seecamp 32 ACP, 10.5 oz, new or used. Gonzales, 292-2969.

HOUSE-SITTING POSITION, female teacher, currently house-sitting for a Sandian on TDY, would like to find similar arrangement for fall. Clark, 271-9589.

EMPLOYEES helped by a United Way agency, for *Lab News* story about their experience, ECP campaign feature. Carpenter, 844-7841.

ROOMMATE, needed to share home or apartment, mother of three looking for non-smoking female. Padilla, 252-8835.

JEEP, CJ5 or CJ7, '77-89 model, hard-top, V6, standard, good condition. Ask for Ross. Yinust, 294-8864.

HOUSEMATE, for large, 4-bdr. home in NE, large yard w/hot tub, non-smoker, no pets, \$450/share utilities. Wells, 293-0468.

LOST & FOUND

FOUND: Money, on street east of Bldg. 807. Foster, 844-8992.



Sandians sign up for \$3.8 million worth of US Savings Bonds

Four divisions surpass 90 percent participation goal

Sandians signed up to buy \$3.8 million worth of US Savings Bonds during this year's campaign, with four divisions reaching Honor Roll status by surpassing the goal of 90 percent participation — the executive office (president and executive VP and their staff, and VPs and their staffs) and Divisions 3000, 6000, and 8000.

The executive office reached 100 percent participation, Div. 3000 reached 91.4 percent, Div. 8000 had 91.1 percent, and Div. 6000 had 90.2 percent.

Overall Labs participation was 87.8 percent, just short of the 90 percent goal. Campaign Chairman Jennie Negin says that although she would like to have reached the goal, she is proud of the still-high level of participation by Sandians.

Also, she says, 29 percent of Sandians — about 2,500 — signed up to buy a bond a month.

"We shouldn't forget something we talked about at the beginning of the campaign — that of the 124 on the Savings Bond Honor Roll of companies with more than 5,000 employees and at least 50 percent participation, there are only eight with a higher percent of participation than Sandia," she says.

Realizing during the campaign that a significant number of Sandians thought they were signing up to buy a bond a month, but because of wording on the form actually were terminating their participation, Jennie designed a questionnaire to use in surveying all nonparticipants: those who thought they were participating as well as those who chose consciously not to buy bonds.

She wrote in her request for information that she considered her campaign chairman role as important in "bringing your message to

management" as in communicating in the opposite direction.

Of those who chose not to participate, 69 percent cited as their reason the savings bond program itself — lengthy period to maturity, belief that it helps fund federal deficit spending, etc.; 49 percent blamed last year's pay freeze; and 42 percent cited a number of other reasons, mostly political issues. (Respondents could give multiple answers.)

"Some employees have obviously given a lot of thought to why they don't participate, but the politicizing of the program surprised me," says Jennie. "The indications are that there will be pay raises this year [see "Sandians should get raises Oct. 1," page 1], and I hope that will influence many who left the program to reenter it next year, and others who have not participated in the past to consider it."

Results of the April 11-22 campaign were celebrated recently at the Coronado Club, with a luncheon and awards.

Among individuals recognized for outstanding efforts were Polli Gerstle (3500), who led the Div. 3000 team; Jerry Wackerly (8500), who led Div. 8000; and Diana Suina (6400), the Div. 6000 team leader.

The award for the most improved division went to Rae Iman (11500), who led Div. 11000 to 82 percent participation, an improvement of 6 percent over 1993.

Centers that reached 100 percent participation, and the Sandians who led those efforts were: 2010, Denise Jaramillo; 2900, Marie Iverson; 3600, Linda Lovato; 4200, Donna Lambert; 5400 and 5600, Paul Page; 6700, Sherrie Jones; 10100, Valerie Contreras; and 12400, Drayton Boozer. — Howard Kercheval

Sympathy

To Karen Shanklin (9401) on the death of her father, James Heider (ret.), in Albuquerque, May 10.

Volunteers needed for Day of Caring

The third annual United Way of Central New Mexico Day of Caring will be held Thursday, Sept. 1. Sandians and retirees can join other area citizens in performing community service tasks for that one day for nonprofit agencies in Bernalillo, Sandoval, Tarrant, and Valencia counties. Day of Caring kicks off the 1994 United Way fund-raising campaign.

Teams of employees from organizations throughout Albuquerque and nearby communities are being recruited to participate in volunteer efforts such as children's activities, painting walls and murals, delivering meals to senior citizens, yardwork and gardening, and arts and crafts.

Choose your work

Volunteers may designate particular organizations or types of groups they prefer to work with and the kinds of work they prefer. Day of Caring gives participants a first-hand look at many of the services nonprofit agencies provide.

If you are interested in volunteering for the Day of Caring, please contact Redd Torres Eakin (12640) on 844-4124.

Coronado Club

Aug. 7 — Sunday brunch buffet, 10 a.m.-2 p.m. Tea dance, 1-4 p.m., music by Best Shot. Adult members \$6.95, non-member guests \$7.95, children 4-12 \$1, children 3 and under free.

Aug. 11, Aug. 18, and Aug. 25 — Bingo Nights. Card sales and buffet 5:30 p.m., early birds' bingo begins at 6:45 p.m.

Aug. 12 — Friday night dinner/dance. Dinner served 6-9 p.m., filet mignon for \$11.95, grilled halibut for \$10.95, or the all-you-can-eat buffet with baked ham, baron of beef, roast turkey breast, poached fish, and chef's surprise for \$6.95. Music by the Isleta Poorboys, 7-11 p.m.

Aug. 14 — Sunday brunch buffet 10 a.m.-2 p.m. Tea dance, Joe Sais & Showcase, 1-4 p.m.

Aug. 19 — Friday night kids' bingo. Buffet at 5 p.m., with cartoons and movies. Bingo starts at 7 p.m.

Fun & Games

Tennis — Here are the results of the SERP Memorial Day Tennis Tournament held at the Coronado Club May 28-30: Men's Singles — Alex Pimentel (1824) defeated Wendel Archer (2251) 2-6, 7-5, and 6-3; Men's Doubles — Alan Villongja and Daryl Greenstreet defeated John Perry and Jason Partch 6-3 and 6-2; Women's Doubles — Karen Nesbit and Pauline Goolsby defeated Kate Brennan and Carrie Henrick 7-6 and 6-2; Mixed Doubles — Daryl Greenstreet and Margaret Gabaldon defeated Roy Palmer (13918) and Pauline Goolsby 6-3 and 6-3. For information about upcoming tennis tournaments and other events, contact the SERP Office on 844-8486.



OH, WHAT a beautiful site! Members of the Sandia/DOE Singles relaxed recently at Williams Reservoir near Pagosa Springs, Colo. Camping, fishing, sailing, and canoeing are just some of the many activities of the group. For more information, call Libby Greene on 271-0487.