

US and Russian Mars missions tap into Sandia, Lockheed Martin technologies and know-how

Fiber-optic sensor is a key science instrument on Russia's Mars '96 mission

By Bill Murphy

Lab News Staff

Beginning this month, Earthlings will turn the tables on H.G. Wells' Martians. In *The War of the Worlds*, it was the Martians who "regarded this earth with envious eyes, and slowly and surely drew their plans against us."

Now, US and Russian scientists are regarding the Red Planet with, not envious, but excited eyes — and have drawn new plans to unlock more of the planet's secrets.

With three major missions scheduled to launch in November and December, the Red Planet will be the target of an unprecedented scientific broadside. The US plans to launch the Mars Global Surveyor as early as this week and the Mars Pathfinder mission in December. Meanwhile, the Russians are poised to send forth their Mars '96 mission, also this month. All three missions carry an array of sophisticated instruments designed

to scan, map, measure, and analyze different aspects of the Martian geology and environment. And these missions are just the beginning. NASA has ambitious plans for a series of low-cost, high-science missions over the next several years, culminating possibly in a mission to return Martian

soil samples and rocks to earth.

As the earthly armada hurtles toward Mars, it will be taking Sandia and Lockheed Martin technology and know-how along. Sandians played a key role in designing and prototyping Pathfinder's airbag landing scheme and helped

design a key science instrument on the Russian Mars '96 craft. Meanwhile, Lockheed Martin Astronautics was prime contractor on the Mars Global Surveyor spacecraft.

The Russians, who in the old Cold War-Soviet era had a special affinity for the Red Planet, have put together a small but science-rich mission, Mars '96, which is scheduled for launch on Nov. 16 from the Baikonur Cosmodrome in Kazakhstan. It will arrive at Mars next September, when it will deploy two small landers and two surface penetrators. The mission has an international flavor — its suite of science instruments includes contributions from several countries.

The US instrument, (Continued on page 4)



MARS-BOUND — Mike Butler, left, and Rick Buss examine a sample holder used in preparing thin film coatings similar to organic coatings used in the Mars Oxidant Experiment, or MOx. Mike and colleague Tony Ricco conceived of the fiber-optic chemical sensor system used in the MOx experiment, which is the US contribution to the Russian Mars '96 mission. Rick, using this plasma deposition chamber in Bldg. 807, laid down two of the chemical coatings used in the MOx instrument, which was built by NASA's Jet Propulsion Laboratory in Pasadena. (Photo by Mark Poulsen)

Labs on track to reduce indirect expenditures

Less than two years ago, Sandia promised DOE — through the so-called Curtis Commitment, named for then-Under Energy Secretary (now Deputy Secretary) Charles Curtis — that the Labs would reduce indirect costs by a total of \$250 million over five years. At the time, that seemed to many Sandians to be a rash, not to say radical, promise; those not openly skeptical about the feasibility of such a prospect were downright scared at what it might mean for the future of the Labs.

However, as Sandia enters FY97, the Curtis Commitment is on track — and the Labs is a more business-like, efficient, customer-focused operation as a result, says Gary Riser, Chief Financial Officer and VP of Business Management and CFO Division 10000. During FY96, he says, the Labs, through reengineering processes and aggressive cost-control efforts Labs-wide, reduced indirect costs by some \$20 million. Under initiatives directed by Executive VP John Crawford — including a VP-level Indirect Strategic Management effort headed by Laboratory Services Division 7000 VP Lynn Jones — Sandia is on track to reduce costs by an additional \$30 million during FY97, Gary says.

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Sandia National Laboratories

Sandia LabNews

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1,500-mile trip is a show of thanks to Sandia for its work with GM

Aluminum engines on six cars have wear-resistant steel coatings

The drivers and passengers of six Saturn sedans that came rolling in a caravan into Area 3 last week were General Motors Powertrain engineers, and each piston stroke during their 1,500-mile journey had been made possible by a technology that Sandia helped develop.

For almost four years, researchers at GM Powertrain and Sandia have been working on a new technology to deposit wear-resistant steel coatings on the cylinder walls of aluminum engines. The work began as a cooperative research and development agreement (CRADA), with DOE and General Motors both providing money and in-kind research.

As the CRADA period drew to a close and DOE Technology Transfer Initiative money dwindled, GM managers decided the thermal spray work at Sandia was valuable enough for their company to allow the project to continue by providing additional funds to Sandia.

Like all Sandia/industry research partnerships, the work has mutual benefits to both parties, says Mark Smith of Direct Fabrication Dept. 1831. In this case, GM has developed technology that has shown in laboratory testing to withstand engine wear better than a cast-iron engine. Sandia is using the new jointly developed process-control technology in its

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Low-emission heating device latest intellectual property

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Museum exhibit honors heroic Navajo 'code-talkers' of WWII

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WIPP site gets safety endorsement from NRC scientific committee

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Technology Ventures Corporation forging new technology businesses

This & That

Spell-checker chuckles - Several issues ago, I asked readers to submit amusing alternate words and names suggested by their spell checkers. Thanks to everyone who sent them. I received so many that I can't print them all, but here are several favorites. I'm assuming everyone mentioned here with alternate names has a good sense of humor. If not, my "fan mail" will probably increase next week.

Vicki Walker (9323) says spell checkers show interesting alternates for three people in her group: Mitchell Ruebush (rubbish), Malcolm Buttram (bathroom), and Charles Crist (crust or Christ); she notes that Charles walks through water, not on it.

Karen Weber (5715) says she used to chuckle when sending e-mail to Rob Duncan (formerly 5725, now on a leave of absence). Rob's a bright fellow, she notes, but the spell checker suggests "dunce" for Duncan.

John Finger (6111) used the word borehole while writing a report about a geothermal drilling project. John says he considered allowing his spell checker to change the word to its suggested alternate (brothel) just to see if anyone read the report carefully.

Finally, Bruce Hansche (9742) submitted several amusing spell-checker alternates. We both may be in trouble with a certain VP for printing this - an alternate suggested for the name Gerry: greedy.

* * *

Good shows! - Speaking of VPs, I toss a few zingers their direction occasionally (the devil makes me do it, of course), but I also like to give them credit when it's due. I'm a bit late with this, but I think our upper management deserves substantial credit for getting us up to speed quickly about our eight new strategic objectives, particularly for holding the two related briefing sessions last month (*Lab News*, Oct. 11). Featuring talks by the eight VP "owners" and participation by our president and executive VP, the sessions were well attended, indicating that employees are truly "buying in." Because the objectives will guide us into the next century, I'd like to see similar updating sessions by these VPs at least annually. Nothing beats the personal touch.

By the way, a condensed version of our strategic plan and objectives is now on Sandia's External Web to help inform our customers and other constituents about what we do and how we do it. It's currently a featured item on our External Web home page: <http://www.sandia.gov>.

* * *

Southern sayin's - Southerners have a lot of colorful sayings, and while on a special assignment several weeks ago, I worked with a classic good ol' boy from Alabama who was full of 'em (and full of some other stuff, too). Ol' John said it was so dry down his way earlier this year that they had grown frogs that didn't know how to swim yet, and their catfish had ticks on 'em. Also, he was pretty sure he heard a small tree in his yard begging his dog to come over and ... uh, you know. (John may have been sucking a little too hard on a Southern Comfort bottle that day.) His most memorable comment came when talking about someone trying in vain to put a positive spin on a bad situation. John said, "You can put lotsa perfume on a pig, but smart folks still know it's a pig!"

Larry Perrine (845-8511, MS 0129, lgperri@sandia.gov)

John Crawford to host Employee Dialogue Sessions Nov. 19-21

This month, Sandia Executive VP and Labs Deputy Director John Crawford will conduct employee dialogue sessions for New Mexico and California employees. Here is the schedule:

- Nov. 19, 8:30-9:30 a.m., TTC, Sandia/New Mexico
- Nov. 19, 10-11 a.m., TTC, Sandia/New Mexico
- Nov. 20, 10:30-11:30 a.m., Sandia Vista (BDM) Auditorium, Sandia/New Mexico
- Nov. 21, 8:30-9:30 a.m., 904 Auditorium, Sandia/California
- Nov. 21, 10-11 a.m., 904 Auditorium, Sandia/California

Employee dialogue sessions do not follow a prescribed agenda, but generally begin with a brief, informal presentation about current issues and then offer attendees an opportunity to ask written and oral questions about their concerns.

Dave Palmer named Procurement Director

David Palmer has been named Director of Procurement Center 10200.

Dave joined Sandia's General Accounting Department in 1977. He transferred to Procurement in 1978 and entered MLS training in product buying. In 1980, he joined the Contract Auditing Department as an external auditor. He was a buyer in Procurement from 1981 to 1986. In February 1986, he joined the Job Evaluation and Classification Department, where he worked on the 14-level plan. Dave was promoted to supervisor of the Construction Purchasing Team in 1988, was promoted to manager of the Supplier Relations Department in 1989, and was most recently the program manager in the APS/JIT Procurement Department. Since joining the Procurement Center, he has been buyer for staff augmentation, computers, Sandia/California computer training, and research and development procurements.

Dave is a Certified Procurement Manager and is a member of the National Association of Purchasing Managers. He has a BBA from New Mexico State University and an MBA from New Mexico Highlands University. Before joining Sandia, he was a bank auditor at the First National Bank of Santa Fe.

Sandia Web Watch



Magazine honors Michael Hannah's Web site - Thousands of people around the world access dozens of Sandia External Web sites daily to get information about the Labs, but the site they visit

most isn't really about Sandia. It's Michael Hannah's online *HTML Reference Manual*. HTML (hypertext markup language) is a computer language used to build documents for viewing by World Wide Web browsers.

PC Magazine Online's editors find Michael's site so useful that they named it the "Internet User Site of the Week" on Oct. 28. Michael is a senior member of technical staff in Scientific Computing Systems Dept. 4918. He developed his site in the summer of 1995 primarily to give Sandia Web-page developers a comprehensive guide for designing their own pages. "Because Sandians were using different browsers and Web servers, we needed a 'non-vendor-specific' guide," Michael says. "It didn't exist, so I pulled together information from lots of publicly available sources - including the Internet - and put it all together."

Michael put his manual on the World Wide Web to give access to Sandians who can't access Sandia's Internal (restricted) Web site, but word soon spread around the cyberworld that it was an excellent reference, and many people started accessing it. In August 1996, more than 37,000 users accessed Michael's manual.

PC Magazine Online called the site "one of the best online references for HTML" and said it "will provide intermediate HTML users with a great explanation of the HTML specifics." For the full write-up, see the HTML Reference link on Sandia's External Web home page at <http://www.sandia.gov>. To view the actual HTML Reference Manual, see http://www.sandia.gov/sci_compute/html_ref.html.

("Sandia Web Watch" is a new *Lab News* series featuring news and developments about Sandia's Web sites.)

- Larry Perrine

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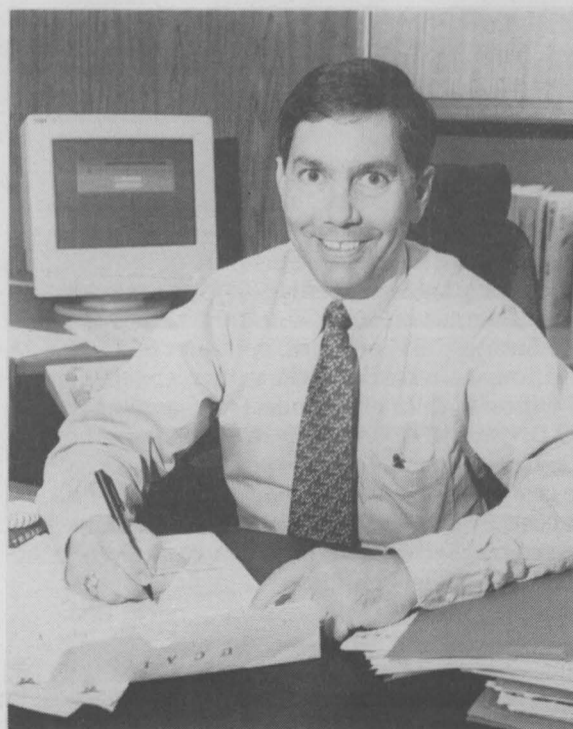
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LOCKHEED MARTIN



DAVE PALMER

Recent Patents

Barry Marder (9541) and Maynard Cowan, Jr. (ret.), Albuquerque: Segmented Rail Linear Induction Motor.

Mary Crawford (1113) and Richard Schneider, Jr., of Albuquerque: Visible-Wavelength Semiconductor Lasers and Arrays.

Nonpolluting heating device for home and industry becomes latest combustion patent

Intellectual property portfolio to be cultivated at California site

By Nancy Garcia

California Reporter

As plans move forward to foster intellectual property growth in California, an environmentally friendly way to operate heaters for home and industry is the latest technology to receive a patent at Sandia's Livermore site.

The approach creates only 5 ppm of NOx (oxides of nitrogen), a pollutant that contributes to smog. Air-quality limits are about 20 ppm, says Jay Keller of Combustion in Engines & Furnaces Dept. 8362. Jay is a co-inventor of the device with Taz Bramlette (8422) and Pamela Barr (8366). Besides low NOx, this clean combustion approach also emits very low amounts of carbon monoxide.

The invention arose from work at the Combustion Research Facility to understand and improve the performance of pulse combustion, an inherently efficient process that was first demonstrated in turbines shortly after the turn of the century. Pulse combustion is currently used in industrial systems, such as process heat boilers, and some residential furnaces and water heaters. Once it is sparked, pulse combustion is self-sustaining, drawing in gas in a pulsating pressure wave and automatically firing on the order of 100 times a minute.

Anyone who has heard an older automobile make a "ka-bump, ka-bump" noise after the ignition is turned off has encountered a similar phenomenon, known as "dieseling," in which the engine continues to draw in combustion products, says Jim Alvarez (8362), who provided technical support to the research team.

Pulse combustion was also used in jet engines of the World War II German surface-to-surface V-1 buzz bomb. The pilotless bomb, also known as the doodlebug, was launched from the continent to England. It fell from the sky when its buzzing engine stopped after the valve wore out.

Nowadays, some top-of-the-line domestic water heaters and furnaces using pulse combustion exhibit thermal efficiency of 96 percent, compared to 70-85 percent thermal efficiencies characteristic of conventional systems.

One-way valve design

Working with an experimental, see-through burner, the Sandia team minimized emissions by mixing fuel and air prior to burning, and by keeping the fuel-air ratio lean. Their patented one-way valve design prevents the burning fuel from igniting this premixed fuel in a flame "flashback," Jay says.

"We wanted to make the burner as environmentally benign as we could make it," he says, "and we were able to do it safely."

Says Pam, "The invention operates safely because it keeps the fuel and air separate until the valve opens. Both gases mix after they pass through the valve. Allowing the fuel and air to mix during the journey to the combustion chamber minimizes the local regions of fuel-rich combustion, which is a major source of pollutants."



PATENT WINNERS pose with plaques. Don Nissen (11600) and Tom Hunter (8000) are to the left of Pamela Barr (8366), Rick Trebino (8366), and Rich Campiotti (8220). To the right is Subra Subramanian (8800).

The patented invention stems from a partnership that began at Sandia in 1982 between DOE and the Gas Research Institute, an industrial consortium. Experimental work and computer modeling efforts were completed at Sandia some three years ago. The US patent, No. 5540583, was issued July 30, 1996.

This is one of a half-dozen patents issued last year based on work performed at the California site, says Licensing Manager Subra Subramanian (8800). He noticed that the number of technical advances (patent disclosures and software copyrights) filed last year had dropped considerably from the year before, when nearly 70 were submitted.

Amassing intellectual property

To build up an intellectual property portfolio, Tom Hunter, VP for the California site, approved Subra's proposal for a technology maturation program. The program allows inventors to request funding so they may more fully demonstrate their partially developed concepts, perhaps by building a prototype or completing testing.

The funding would come from a portion of royalty income that's currently targeted for discretionary spending by the Div. 8000 VP. Subra says Sandia now divides royalty income this way: 50 percent goes to the sector VP office, 20 percent to the department where the invention is produced, 20 percent to the inventors, and 10 percent for miscellaneous purposes. The vice president's share is often used for discretionary R&D spending. Subra has proposed using this part to promote intellectual property development.

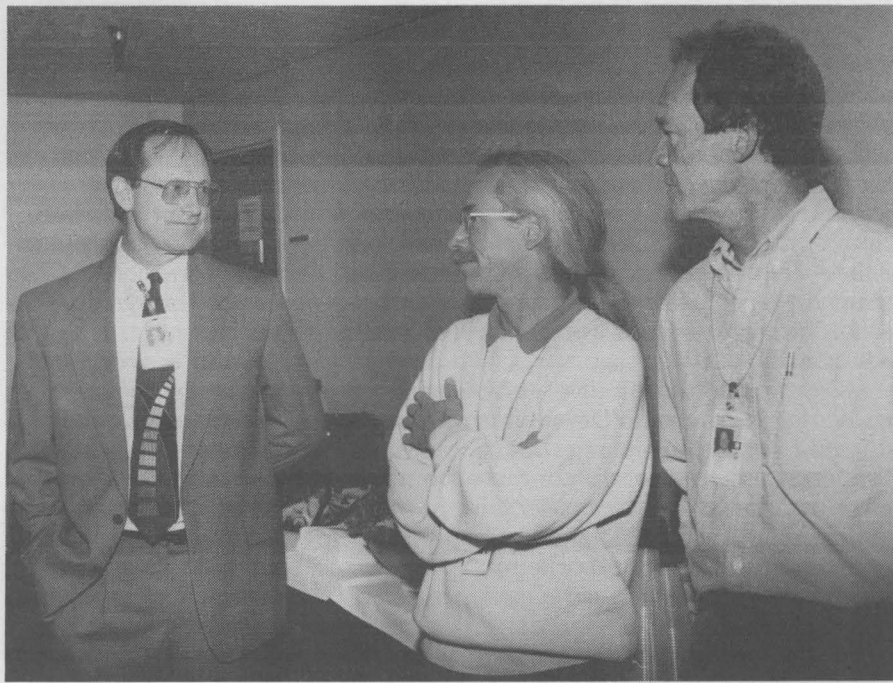
In December, he expects to issue a call for proposals, which will be reviewed by a panel. Commercial potential and readiness are among the factors to be considered by the panel in selecting proposals for funding.

Licensing royalties to accelerate

"I expect our licensing royalties to take off," Subra says. "By the year 2000, hopefully California Laboratory VP Tom Hunter will have a royalty share of about \$500,000, of which about \$250,000 will be available for technology maturation and the rest can be used by the California site line management to spend on discretionary R&D activities."

It's not unusual for large companies to devote royalty income for technology maturation. To be patentable, says Don Nissen, the California site patent agent in Legal Division 11600, inventions must not only be unique, they also have to be "reduced to practice," or demonstrated to work.

A more completely developed concept reduces risk for a company that might acquire the technology through licensing. Intellectual property protection, or the right to take a



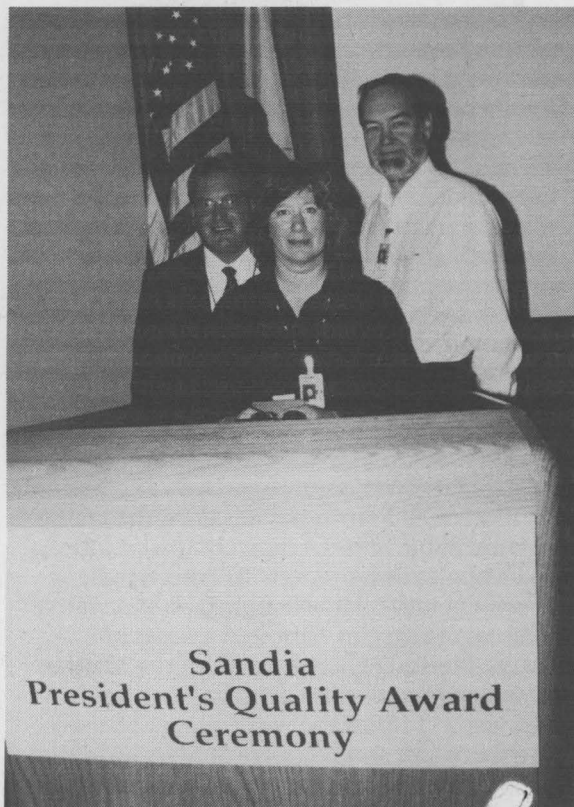
TOM HUNTER, California Laboratory 8000 VP (left), chats with Stewart Griffiths (center) and Bob Nilson of Mechanics & Simulation of Manufacturing Processes Dept. 8345 at a luncheon honoring employees who filed intellectual property or copyright disclosures.

patented or copyrighted concept to market, provides private industries a competitive edge and promotes their interest in partnering with Sandia, Don says.

A healthy intellectual property portfolio is essential for a successful licensing program at the California site, Subra says. In addition, by demonstrating Sandia's awareness of the importance of protecting intellectual property, Sandia makes itself a more attractive partner for industry customers. To build up the intellectual property portfolio available for patenting and licensing at the California site, Subra has arranged for Tom Hunter to hold honorary luncheons with the California site inventors who have filed technical disclosures on their inventions or copyright assertion of their

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Sandia California News



SILVER AWARD WINNERS — Present at the California site for the Sandia President's Quality Award ceremonies (see also page 6) were these three who were part of the Silver Award-winning FY97 Spend Plan Development Team. From left are Lyle Lining (8405), Karen Simkins (2211), and Jack Hairston (894).

Mars '96 mission

(Continued from page 1)

built at NASA's Jet Propulsion Laboratory with fundamental contributions from a Sandia team, is called the Mars Oxidant Experiment, or MOx.

When the Russians approached JPL in 1992 and offered it a chance to contribute a science package to the upcoming Mars flight, JPL scientists remembered a sensor technology they had discussed with Sandia researchers a few months earlier. The subject of that discussion was micromirror fiber-optic-based chemical sensor technology. The NASA scientists realized this was the ideal technology for a compact, sophisticated instrument capable of characterizing oxidation reactions first observed during the US Viking soft landing mission 20 years ago.

MOx, explains Mike Butler, a physicist in Microsensor Research and Development Dept. 1315 and a key designer along with colleague Tony Ricco (also 1315) of the concepts behind the US instrument, aims to answer some of the questions raised by the Viking mission. (See Tony's discussion of the MOx chemistry in "Of Martian meteorites, Mars '96, MOx, and life on Mars" on next page).

The MOx instrument works by measuring changes in reflectivity that occur as a result of chemical reactions between various thin film coatings in the MOx instrument and the Martian soil or atmosphere.

"Basically, what we're doing," says Mike, "is shining light on a thin film of material and then looking at the amount of light that's reflected back. We're doing this by shining light into an optical fiber. That fiber carries the light down to the sensor surface where the reaction occurs. The reflected light is carried back through a parallel optical fiber to the detector."

Upon landing and deployment, MOx will operate autonomously, following a sequence that is programmed into its internal memory. The instrument's three-inch sensor head is located on a petal of each of the two Russian landers and is comprised of eight sensor cell assemblies, four of

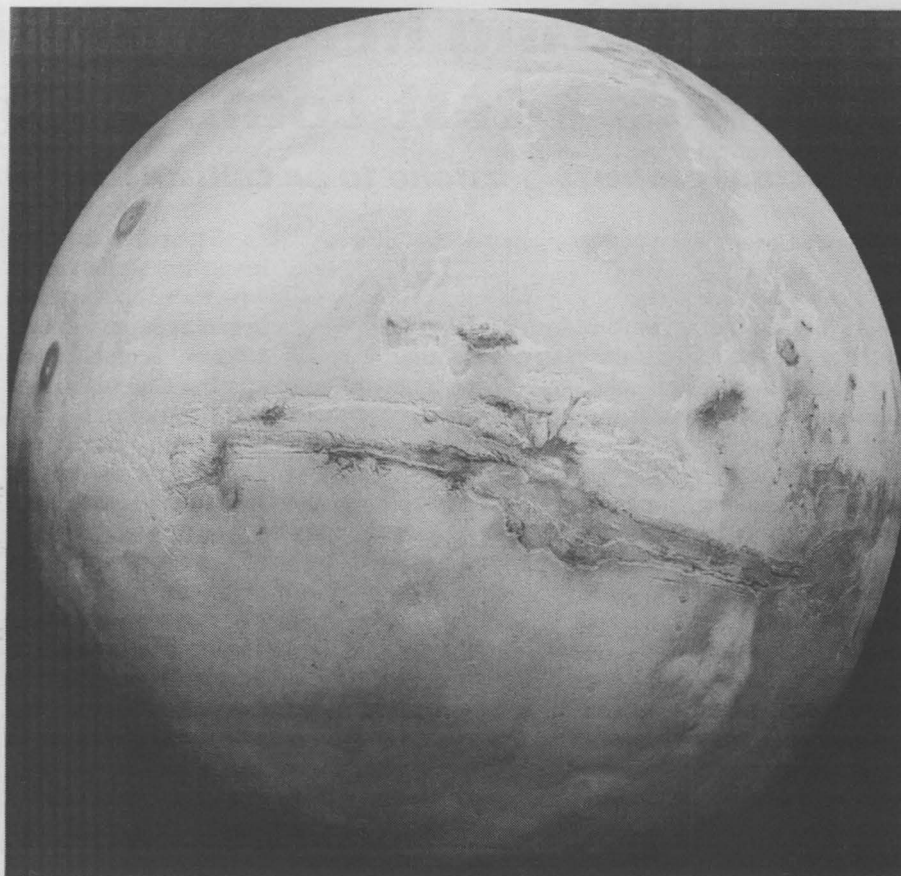
which are designed to contact the soil and four that will be exposed to the atmosphere. Within each cell assembly there are six active sensing sites and six reference sites, for a total of 96 sites.

The active sites are protected by thin membranes of silicon nitride, which protect the sensor films from premature oxidation. These membranes will be broken upon deployment, exposing the active film coatings. The reference sites will remain permanently sealed.

The specially tailored thin film coatings, including both metals and organics, react chemically with specific chemicals, for example ozone, hydrogen peroxide, or some solid oxidant that might be present. The resulting chemical reaction changes the reflectivity of the coating in a characteristic and measurable way. The sensor film coatings have been selected to provide a broad range of chemical reactions. Each film type is duplicated in the air and soil cells.

Viking missions raised questions

Each of the 96 sensor sites is illuminated by two light-emitting diodes. The reflected signal will be measured by a silicon photodiode detector



Composite Viking Orbiter photo image, NASA

The Planet Mars, I scarcely need remind the reader, revolves about the sun at a mean distance of 140,000,000 miles, and the light and heat it receives from the sun is barely half of that received by this world. It must be, if the nebular hypothesis has any truth, older than our world; and long before this earth ceased to be molten, life upon its surface must have begun its course. The fact that it is scarcely one-seventh the volume of the earth must have accelerated its cooling to the temperature at which life could begin. It has air and water and all that is necessary for the support of animated existence.

— H. G. Wells,
The War of the Worlds

array. The sensor sites are coupled to the LEDs and the detector array through fiber optics.

Viking, which carried three instruments designed to look for signs of life, measured some strong oxidation reactions in Martian soil, but found no signs of organic material. During several years following the Viking landings, scientists developed a number of alternative explanations, none of them without drawbacks, for the oxidation reactions and the lack of observed organics.

The lack of organic materials, Mike says, was particularly troublesome. Meteorites, for example, are well known to harbor organic materials, and Mars is known to have been subjected to countless meteorite strikes over its history, yet no organics were found. Why? Again: Solar ultraviolet radiation acting on atmospheric CO₂ (of which Mars has a relative abundance) should produce organic materials. Where are they? Is there, scientists wondered, a chemical process on Mars that essentially "eats" organics? Viking posed lots of good questions, but at least in this context, few answers. Clearly, more data on Martian reaction processes were needed.

"If we plan to search for the organic remnants of early life on Mars with future missions," says NASA scientist Christopher McKay, "then we have to understand the processes that are destroying these organics on the surface so that we know how deep we have to dig to reach unoxidized material. Viking, for instance, dug under a rock as deep as 11 centimeters but found only oxidized sand."

While MOx promises to provide excellent data to augment Viking's findings, Mike says, the challenge of building the instrument within the constraints laid down by the Russian mission planners was daunting. The entire instrument, Mike says, had to fit within the very small excess volume in the Russian lander, tucked in almost as an afterthought. The instrument was not to exceed 850 grams, nor consume more than 25 to 50 milliwatts of lander power, and that only for very short periods. Because the lander will not come down "soft," but will slam into Mars cushioned by a rubber ball-type arrangement, the MOx instrument had to be able to sustain landing shocks of 250 G's and function in an environment characterized by daily temperature variations of approximately 100 degrees Celsius. The instrument also had to be essentially autonomous: it had to provide its own central processor, command set, and memory.

(Continued on next page)

Pathfinder and Mars Global Surveyor missions

The Martian window has slid open and both the Russians, with Mars '96, and the US, with the Mars Global Surveyor and Mars Pathfinder missions, intend to slip through before it slams shut again. The "window" represents the period of time when the planets are aligned in such a way to make low-energy trajectory missions possible. All three pending missions have a solid Sandia or Lockheed Martin connection.

If current schedules hold, the Lockheed Martin Astronautics-built Mars Global Surveyor, with launch set for as early as this week (Nov. 6), will be first off the pad. The mission, which aims to carry out much of the science originally intended for the Mars Observer, which disappeared near Mars in 1993, will place a craft in Mars orbit for detailed, high-resolution study and mapping of the Red Planet. Of particular interest: the Global Surveyor's camera system, with a resolution of 6-10 feet, will return the best images yet of the entire planet; it may even be able to spot the Viking craft on the surface.

Lockheed Martin has designed the craft to be launchable on the relatively small McDonnell Douglas Delta rocket. To keep weight down, engineers have designed an innovative aerobraking system. Through a series of energy-bleeding encounters with the Martian atmosphere, the craft's orbit will be circularized just 234 miles above the planet's surface. The spacecraft should arrive at Mars in September 1997. Following close behind the Mars Global Surveyor and on essentially the same trajectory, Russia's Mars '96 mission will be launched Nov. 16 and arrive at Mars in late September.

Although the Mars Pathfinder is the last out of the blocks among the three current missions, it is on a faster-track trajectory and will reach Mars in July. Pathfinder, although it will do some key science — collecting surface and atmospheric data — is largely an engineering flight, designed to demonstrate an innovative, low-cost approach to bringing down a lander and diminutive (22-pound) rover to the Martian surface. Sandia played a key role in developing the landing technology.

Don Wayne of Unsteady and Reactive Fluid Mechanics Dept. 9112 headed a team of Sandians who worked on the Pathfinder landing project. He describes the basic landing scenario: When the Pathfinder mission reaches Mars, the lander will separate from the mother craft and enter the atmosphere. It will be slowed by a parachute, but because the Martian atmosphere is so thin, the parachute alone won't be able to slow the craft enough to ensure a safe landing. As such, after the craft separates from the parachutes, an airbag assembly will inflate and deploy. That airbag array provides the final margin of protection for the craft and its little robotic rover, named Sojourner.

The airbag system that will be used on the mission was conceptualized and designed at Sandia by Don and his team, and a one-third scale model prototype was built at Sandia. The prototype, Don says, went through extensive testing at Sandia's high-altitude test chamber and drop test facility in Area 3.

Sandia proved out the concept and the basic design, Don says. JPL then awarded the prime contract for the airbag assembly to ILC Dover, which built the operational model.

General Motors

(Continued from page 1)

neutron generator thermal spray facility.

General Motors is evaluating the technology, and the engineers came to Sandia from Michigan in Saturns equipped with the experimental aluminum engines with thermal spray-coated steel cylinder bores. The Sandia visitors had two missions, the first being several days of experiments as they continue their collaboration with Sandia researchers. The second mission was to bring a letter of appreciation for the Sandia work, which they presented to Bruce Twining, Manager of the DOE Albuquerque Operations Office.

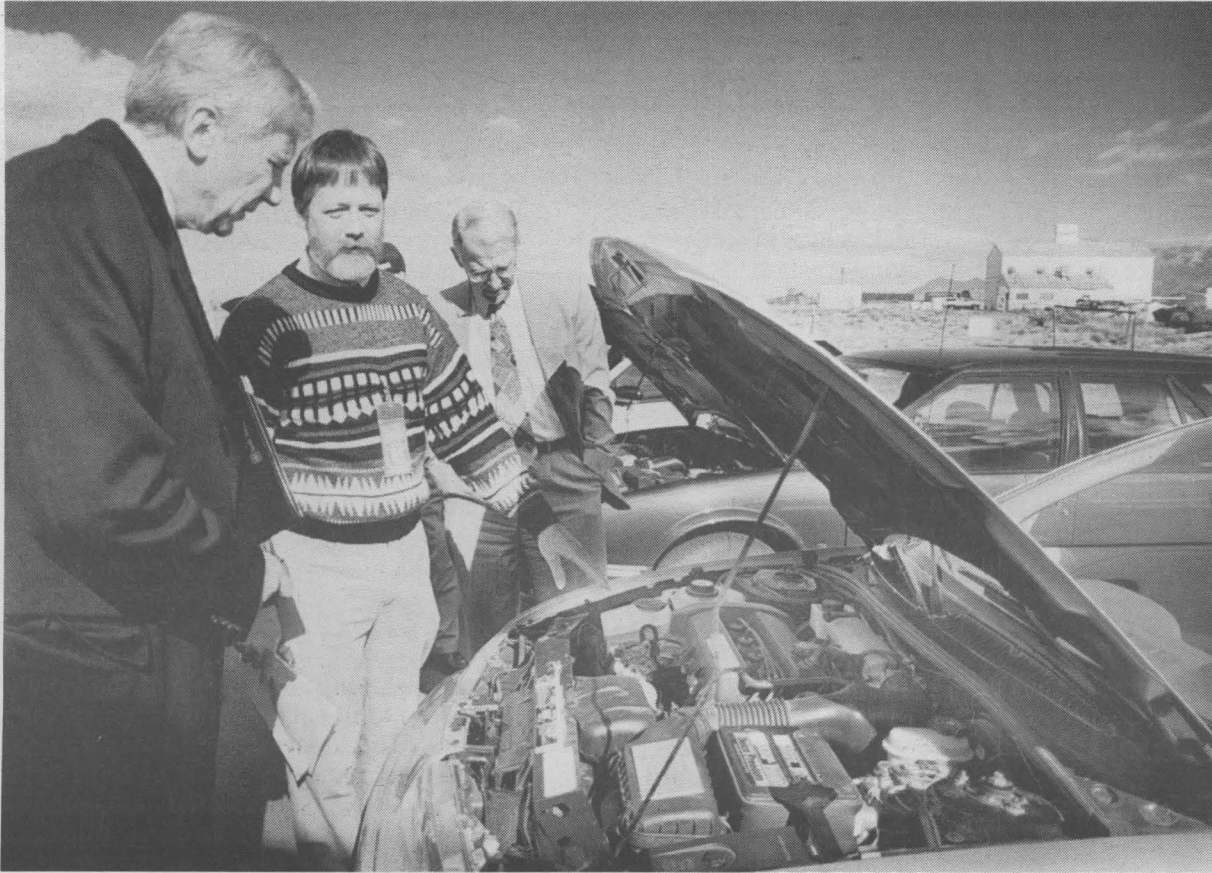
When presented the letter in an Oct. 29 ceremony at Sandia's Thermal Spray Laboratory, Twining said the letter really belonged to Sandi-

ans and promptly handed it to Sandia President C. Paul Robinson.

Mark, who along with Bill Oberkamp of Aerosciences and Compressible Fluid Mechanics Dept. 9115 and Rich Neiser (1831), is leading the Sandia part of the research, opened the short ceremony. He told the local journalists, GM visitors, Sandians, and DOE managers attending that the work with GM Powertrain has involved the efforts of staff members and technicians in eight departments — 1472, 1831, 8743, 9111, 9112, 9113, 9114, and 9115.

Larry Byrnes, a GM Powertrain technical manager, spoke for the visitors from Michigan. He told the audience gathered around the six cars with their hoods opened to a chilly late October wind that General Motors expects "to continue to take advantage of the resources here."

— Ace Etheridge



CHECKING OUT THE ENGINE — Larry Byrnes of General Motors Powertrain shows Sandia President Paul Robinson and Sandia Executive VP John Crawford the engine in one of the special Saturns that Byrnes and his colleagues drove from Michigan.

(Continued from preceding page)

"In my own opinion," says Mike, "with the size, weight, power, time, and dollar constraints that were imposed it would be very difficult to do this through any approach other than a micromirror, fiber-optic-based system."

Mike says the concept for the instrument has been refined considerably since it was first conceived.

"The original concept was Sandia's," Mike says, "but it has evolved considerably through the project at JPL. We've contributed to that evolu-

tionary process."

As members of the MOx science team for the mission, Mike and Tony not only initiated the instrument concept, but also were involved with JPL from the project's inception in refining the instrument design and developing specifications for the array of chemically sensitive coatings. In fact, three of the coatings to be flown to Mars (hydrogenated carbon films that emulate material expected to be deposited by meteorites on the Martian surface) were deposited at Sandia, two by

Feedback

Q: I was reading today's Daily News and noticed that the Lockheed Martin monthly video tapes (LM1) are now being broadcast throughout the day on the TV monitors located throughout the Labs. It seems like a duplicate effort for each center to show the tape to its employees when the tape is already being made available for viewing by all Sandians. It also seems like a major waste of money (especially if they send as many copies to all of their entities) to have Lockheed Martin produce the tapes and Sandia distribute them only then to have each center throw them away each month after they are obsolete. In this time of tight budgets, it seems like Lockheed Martin could set an example by only sending Sandia enough copies to allow the information to be disseminated by the Labs; those individuals interested in the information can watch the tapes on the TV monitors. From a recycling standpoint, throwing the tapes away instead of reusing them seems very wasteful.

A: Thanks for your interest in the LM1 video. The reason we show the video on the TV monitors is to reach a few employees as they come to and from work and during lunch. This is not intended to reach all employees. Many do not have access to a TV monitor or have time to stand and watch the entire video. The second reason we show the video on the TV monitors is because many managers do not show the video to their employees as requested. TV monitors provide a way for employees who want to see the video to do so, even if their managers do not show it.

I also asked about reusing the VHS cassettes when I was working at Lockheed Martin. In researching this, Lockheed Martin found it to be less expensive to use a video one time than to try to collect, sort, erase, rerecord, relabel, and redistribute the cassettes. The cassettes are very inexpensive. We receive only enough copies to send one to each director. They are asked to share the video with their managers or show it at their center all-hands meetings. I hope this explains why we handle LM1 as we do. We think it is an excellent product. We think it helps Sandians know what is going on in Lockheed Martin and also helps us to keep up with developments in some of the technologies we work with.

Donald Carson (12600)

Rick Buss of Electronic and Optical Materials Dept. 1812, and one (based on Buckminsterfullerene or "Buckyballs") by Tony.

Ultimately, Mike says, MOx, like the Viking experiments, may pose as many new questions as answer old ones. Still, he adds, the experiment will advance the state of knowledge.

"What we're doing," he says, "is flying a different experiment [from Viking] with the expectation that it will give us different information and allow us to see things a little better."

Of Martian meteorites, Mars '96, MOx, and life on Mars

In a general sense, says Tony Ricco, a chemist in Microsensor Research and Development Dept. 1315 and a key contributor to the conception and design of the Mars Oxidant Experiment (MOx), the Mars '96 experiment "may shed some light on just how hostile the present surface conditions would be to life of the sort that we are familiar with on Earth."

Specifically, Tony says, if MOx confirms one of the hypotheses from the Viking results, namely that the surface is highly oxidizing, one might conclude that it would be extremely difficult for Earth-like microbial life, for example, to exist under such conditions. The question would then become: "How long has Mars been this way, and to what depth under the Martian surface might the organic traces of previous life be wiped out by such conditions?"

"Of course, planetary scientists have ideas

about how long Mars has been similar to its current state," Tony says. "As for the depth dependence of the chemical nature of the Martian surface, NASA is in fact planning future missions right now to address that question."

MOx does include a number of carbon-based films, and if some or all of them degrade rapidly enough to be measured over the course of the experiment, this will provide some ideas about how quickly various forms of carbon might be expected to be oxidized, Tony says.

As for the current flurry of interest related to possible signs of ancient Martian microbial life detected in meteorites recovered in Antarctica, "the claim is that the stuff found in the meteorite is, or might be, fossils," Tony says. (A NASA-led team of scientists, including a team member from Lockheed Martin, announced

those findings last August. Last week, a British team reported they had found additional meteoritic evidence of Martian life, reinforcing the initial NASA findings.)

"Since a fossil has had its carbon-based structures replaced by minerals, it would not be readily oxidized by the surface material of Mars," says Tony. "So even if MOx tells us that the surface is oxidizing today, it probably won't directly tell us, one way or the other, if a fossil might have formed long ago when conditions may have been different than they are today. The key question, again, is how long the surface of Mars has been in its present state (assuming that MOx confirms that it is a strongly oxidizing surface today), and also how old the alleged fossils are, and perhaps from what depth on the surface of Mars it is thought that the material found in the meteorite might have been ejected."

National Atomic Museum exhibit honors WWII Navajo 'code talkers'

US military radio transmissions intercepted by Japanese intelligence during World War II were spoken in such an unusual lexicon that Japan regarded the secret code unbreakable.

Ironically, the Americans' "secret code" was based on Navajo — the tribal tongue of then about 50,000 (now about 200,000) American Indians in New Mexico and Arizona but little

known beyond the southwestern United States. From May 1942 until the war's end, some 420 Navajo "code talkers" served as signalmen with US Marine combat units from the Marshall Islands to Okinawa, using a system of fewer than 500 Navajo "code words" representing common military terms. The linguistic complexity of the Navajo language frustrated Japanese intelligence efforts, and many believe the code played a significant role in the American victory at Iwo Jima.

A new photo exhibit at the National Atomic Museum, titled "Warriors: Navajo Code Talkers," provides a glimpse into the contemporary lives of the 150 to 200 surviving code talkers. The exhibit, on display through Dec. 31, includes forty 16x20-inch black-and-white photographs taken by Japanese-American photographer Kenji Kawano from 1982-1988.

Kawano began photographing Navajos in 1974 and later served as the tribe's official photographer and as a staff photographer for the daily *Navajo Times Today*. He now lives in Fort Defiance, Ariz., on the Navajo reservation.

Kawano says his photographs and book (*Warriors: Navajo Code Talkers*, Northland Press, Flagstaff, Ariz., 1990) honor the patriotism of the code talkers. "These men did something really marvelous," he says. "The only way I could tell their story and help change attitudes about Native Americans was to publish a book. I hope it will make people rethink American Indians." Kawano's story was the subject of a December



NATIONAL ATOMIC MUSEUM librarian Arlene Lucero hangs one of Kenji Kawano's photographs of World War II 'code talkers.'

1991 *National Geographic* article.

Financial support for the traveling exhibit is provided by the Arizona Commission on the Arts and the National Endowment for the Arts.

Sandians are invited to the exhibit's opening reception at 5:30 p.m. Wednesday, Nov. 13, at the museum. In addition, a group of students from Isleta Headstart Middle School will perform traditional American Indian dances beginning at 10:30 Wednesday morning. The two events are among Native American Month activities sponsored by Sandia's American Indian Outreach Committee. (See schedule at left.) —John German

Native American Month activities on KAFB

November is Native American Month. Sandians are invited to the following activities on Kirtland Air Force Base (KAFB) sponsored by Sandia's American Indian Outreach Committee:

- Nov. 13, 11 a.m.-1 p.m. — Native American Arts & Crafts Fair, KAFB Enlisted Club (across from KAFB bowling alley)

- Nov. 13, 10:30 a.m. — Students from Isleta Headstart Middle School perform traditional American Indian dances, National Atomic Museum

- Nov. 13, 5:30 p.m. — Navajo code talkers exhibit opening and reception, National Atomic Museum

- Nov. 21, 11 a.m.-1:30 p.m. — Native American Month celebration luncheon, keynote address by KOB-TV investigative reporter Conroy Chino, KAFB Officer's Club (tickets can be purchased from Sandra Begay-Campbell, 844-5418)

For more information, contact Sandra.

Savings Plans participants will have six new options starting Nov. 20

Beginning Nov. 20, Sandians who participate in the Sandia Corporation Savings Plans will have six new investment options, bringing to 13 the total number of investment options available.

Up to now, investment options included six funds managed by Fidelity and a Company Common Stock Fund administered by Fidelity. The new options include four non-Fidelity funds,

made available to Sandians through Fidelity's FundsNet™ Funds program and accessible through the normal Fidelity recordkeeping and administration system.

According to Rebecca Spires, Pension Fund and Savings Plans Dept. 10510, the new options to the Savings Plans were implemented in response to a survey included in a recent quar-

terly statement mailing and an internal analysis of the need for additional fund options. The survey responses, Rebecca says, indicated the kinds of investment options Sandians said they would like to see added to the Savings Plans.

Based on an analysis of investment options that would complement the current options, Rebecca says, Sandia has received approval to add the following funds effective Nov. 20:

- Neuberger Berman Guardian Trust
- Fidelity Growth Company Fund
- Warburg Pincus Emerging Growth Fund
- Templeton Foreign Fund I
- Janus Worldwide Fund
- Fidelity Intermediate Bond Fund

A 20-page brochure will be mailed to participants in the Savings Plans Nov. 18 that spells out the new options in detail. The brochure also features an "Investor Profile Questionnaire" designed to help Plans participants determine the right mix of investment options for their particular needs.



PRESIDENT'S QUALITY AWARD WINNERS — Sandia Public Involvement Program team members (from left) Will Keener (7500), Dana Pulliam (former Sandian in 12650), Maureen Baca (4022), and Richard Bild (6801) talk to Labs President C. Paul Robinson following this year's PQA awards presentation Oct. 22. The team, which also includes Stephen Baca, Arturo Sandoval (both 12650), and Al Stotts (DOE), were presented a Turquoise Award in this year's annual PQA process. (A complete list of winners appeared in the Sept. 13 *Lab News*.) In all, four teams earned Silver Awards, 10 won Turquoise Awards, and three gained Special Recognition Awards. The PQA program is based on the Malcolm Baldrige National Quality Awards criteria and is intended to help Sandia teams and organizations gain awareness of quality as a critical element of the Labs' success.

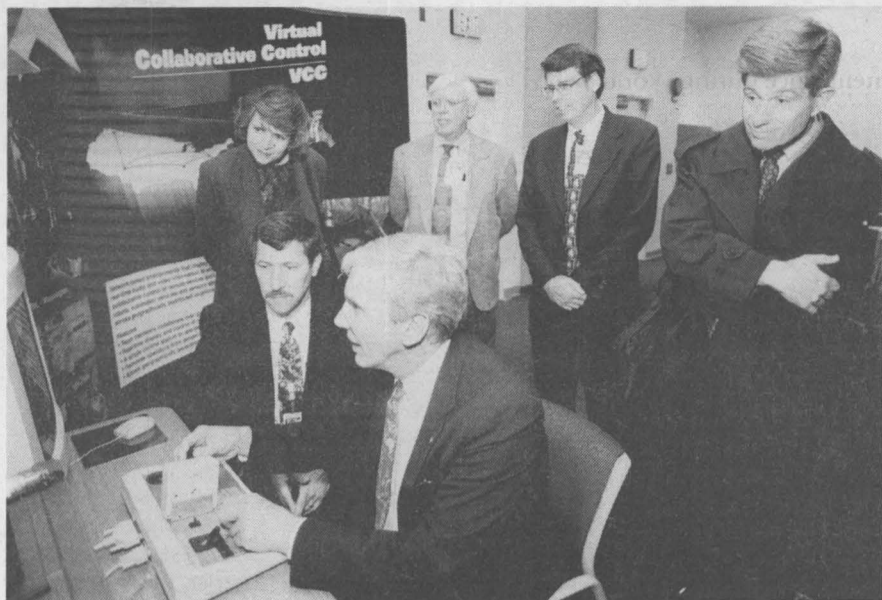
Patents

(Continued from page 3)

software. Patent winners also receive a \$500 cash bonus in addition to a wall plaque. "This provides more recognition and encouragement to our scientists to file technical advances and copyright disclosures on their valuable technical work and inventions," Subra says.

"I'm really pleased we're able to do this and have the latitude to do this at this site," Tom says. Encouraging staff awareness of intellectual property protection should enhance the lab's ability to create partnerships that are important for the future, he says.

Initially, funding for recognition lunches will come from FY96's approximately \$90,000 royalty income plus \$17,000 carried over from FY95, Subra says. He eventually expects to spend about \$5,000 to \$10,000 a year promoting growth of an intellectual property portfolio. The remainder of the California site vice president's share of royalties will be dedicated to technology maturation.



RMSEL DEDICATION — About 100 visitors from government, industry, and universities turned out Monday, Oct. 28, to take part in the dedication of Sandia's new Robotic Manufacturing Science and Engineering Laboratory (RMSEL). Wet weather caused the ceremony to be moved from RMSEL's parking lot to inside the Technology Transfer Center (left photo), where Labs President C. Paul Robinson (right) talked with Sen. Pete Domenici, R-N.M. Following the ceremony, some of the attending VIPs were given a tour of RMSEL. Paul (right photo), with the help of Oak Ridge National Laboratory robotics researcher Dave Thompson, controls the motions of a 16,000-pound robotic waste remediation vehicle (similar to a backhoe) located at Oak Ridge using Sandia's Virtual Collaborative Control (VCC)

remote teleoperation software. Behind them are (left to right) Ruth David, Deputy Director for Science and Technology, Central Intelligence Agency (she is a former Sandia director); Bob Eagan, Sandia VP for Electronics, Materials, and Components Engineering Div. 1000; Stan Dains, a Sandian on loan to the Defense Nuclear Agency as a technical advisor reporting to DNA's director for tests; and Everett Beckner, VP of Technical Operations for Lockheed Martin's Energy and Environment Sector. Other VIPs who attended included Bruce Twining, Manager of DOE's Kirtland Area Office; Phil Monnin, president and chief executive officer of robot manufacturer Motoman Inc. and president of the Robotic Industries Association; and Albuquerque Mayor Martin Chavez.

WIPP transuranic waste not likely to harm humans, scientific report says

Humans are not likely to be exposed to radiation as a result of storing transuranic waste at the Waste Isolation Pilot Plant (WIPP), according to a report released Oct. 23 by the National Academy of Sciences.

"Scientific analyses indicate that the WIPP repository has the ability to isolate transuranic waste for more than 10,000 years, provided it remains undisturbed by human activity," says Charles Fairhurst, chairman of the National Research Council's Committee on WIPP, which conducted the independent study of the site for DOE. Fairhurst is a professor of mining engineering and rock mechanics at the University of Minnesota. The NRC is the Academy's operating arm.

Unless the site is breached by humans, the report says, "there is no credible, probable mechanism for release of radioactive material into the surrounding environment."

WIPP is an underground network of chambers and tunnels excavated in a layer of geologically stable salt near Carlsbad, N.M. Since 1975, Sandia scientists and engineers have served a scientific advisory role in helping construct the facility and determine whether it could safely store transuranic waste without release of radioactivity to the biosphere, either as the result of human intrusion or through migration of contaminated materials into groundwater. (Transuranic waste comprises a variety of materials, such as protec-

tive clothing, laboratory equipment, and machine parts, contaminated with radioactivity during the handling or manufacture of nuclear weapons.)

Conjecture not scientifically valid

The NRC further concludes that speculation about whether the facility might be breached by humans centuries into the future should not be used as a basis for judging the site's acceptability. "The consequences of future drilling or activities at the site should be examined in order to assess ways to reduce its vulnerability, but predictions of what human activities and technologies will be thousands of years from now are highly conjectural and lack scientific foundation," the report says. Current regulations require that a disposal site for radioactive materials be protected from human intrusion for 10,000 years or more.

The NRC report also provides a list of issues that warrant further study, including recommended actions to ensure that the facility is not breached and that migration of contaminated materials does not occur.

"In essence, the report says we've done a good job as scientific advisors," says Wendell Weart (6000), senior scientist for Sandia's nuclear waste management programs. "We've picked the right site and we've addressed the right technical issues. Although the NRC recommends that we look at a

few more issues, it is convinced WIPP is safe."

Last week DOE submitted results of the NRC study, along with reams of technical information and compliance documentation gathered by DOE over a 20-year period, to the Environmental Protection Agency. Based on the information, which is intended to demonstrate compliance with environmental and safety regulations, the EPA will

determine whether to certify WIPP as a permanent repository. If the site is accepted, it would be the nation's first permanent disposal site for transuranic waste.

Wendell says the NRC findings came at a critical time and are "being viewed very favorably" by



WENDELL WEART

Sandia investigators who provided the scientific basis for the long-term performance assessment contained in the certification application. But he adds that a positive NRC report doesn't ensure the EPA's stamp of approval.

"The EPA is more concerned about whether the site meets certain quantitative criteria," he says. "Compliance is different from safety. We think we've demonstrated compliance, and we certainly believe WIPP is safe." — John German

Indirect costs

(Continued from page 1)

Sandia's Curtis Commitment came about in the wake of the so-called Galvin Commission report, which asserted, among other things, that DOE's national laboratories were top-heavy with indirect costs compared to similar operations in the private sector. To demonstrate that DOE took seriously Galvin's findings, Undersecretary Curtis asked the national labs to make firm dollar-figure cost-reduction commitments. Sandia committed \$250 million toward the DOE laboratories' overall \$1.7 billion five-year commitment.

Gary emphasizes that the Curtis Commitment, although motivated originally by money concerns, is about much more than dollars and cents. As Labs President C. Paul Robinson has stated on many occasions, and as the Labs' Strategic Objectives explicitly spell out, a primary goal for Sandia is to create an agile infrastructure that is

a competitive advantage for its strategic missions.

Last year, Gary says, "we began the 'leaning-out' process in some indirect costs. This year, we plan to continue the process. Our intent is to make Sandia more competitive compared to others, to put a greater percentage of our revenue dollars directly into our technical mission."

As Gary explains, that means reengineering processes to reflect best business practices, investing in new technologies that enable more efficient operations, working smarter, and providing better customer-focused, customer-friendly service with fewer resources.

"A lot of converging elements have brought us to where we are," Gary says. "The Galvin Commission report; our own Curtis Commitment; Paul's personal vision of an agile Laboratory; Lockheed Martin leadership — they're all moving us toward a more business-like operation."

Clearly, given those "converging elements," the time was ripe for a tough-love approach to indirect costs. As M.J. Myers, Manager of Indirect Business Office Dept. 10405, explains it, line orga-

nizations have seen a significant increase in indirect costs in recent years. Many of those costs, she notes, stemmed from a significant ramp-up of DOE controls that occurred over the late 1980s and early '90s in the wake of Tiger Team reviews.

Sandia's Curtis Commitment obligations, M.J. says, led to the first major activity to partner with DOE to reduce those requirements.

Gary says the "compliance focus" during the DOE administration of Adm. James Watkins — epitomized by the Tiger Teams — fostered "zero-risk ways of doing business." That approach, he says, was very expensive and outside of what industry normally practices.

Sandia's comprehensive reengineering efforts, driven by the Curtis Commitment and accomplished in partnership with DOE, is enabling the Labs to save money and deliver better service, Gary says. "This is important — I don't want to limit people to just thinking about the budget aspect of this. We're ultimately talking about making the Labs work better."

— Bill Murphy

In its third year, Technology Ventures Corporation exceeding expectations of DOE, Lockheed Martin

Nonprofit group established by Lockheed Martin has helped start 18 businesses, create 550 jobs

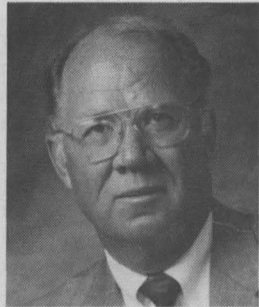
By Bill Murphy

Lab News Staff

By any standard, Technology Ventures Corporation (TVC) is exceeding the expectations laid out for it when it was created by Lockheed Martin (heritage Martin Marietta) three years ago, says its president, Sherman McCorkle. Whether the yardstick is businesses formed, jobs created, technologies commercialized, or funding commitments secured, TVC has outperformed its own demanding self-expectations, as well as the expectation of its Lockheed Martin parent and DOE, he says.

"That's a delightful and happy condition to be in," says McCorkle.

The nonprofit TVC was established by Lockheed Martin to foster the commercialization of technology from the national laboratories, primarily Sandia, and the research universities in the region. The creation of TVC was part of Lockheed Martin's commitment to DOE to make technology commercialization a priority during its tenure as manager of Sandia. TVC's charter is carefully crafted to ensure that its efforts pose no conflict of interest concerns



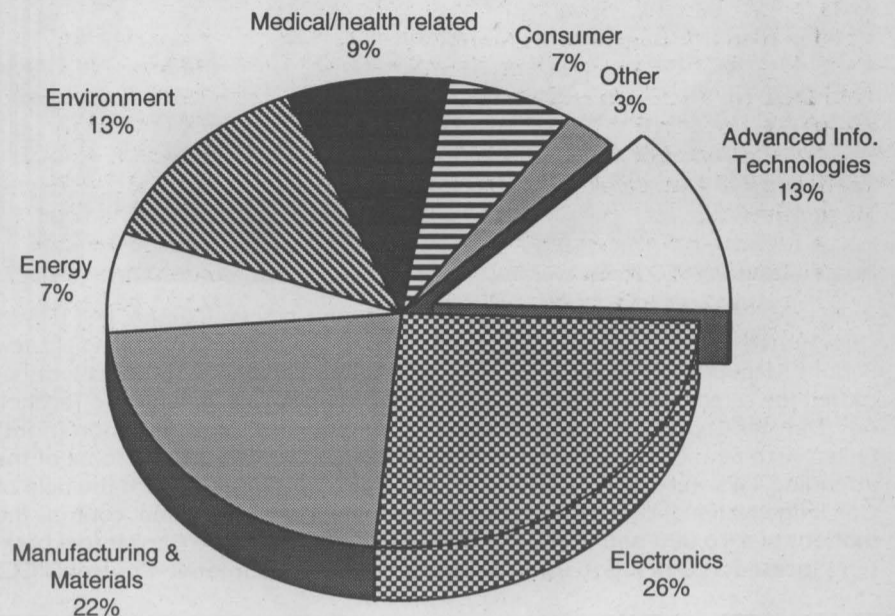
SHERMAN McCORKLE

among Sandia, DOE, and Lockheed Martin. TVC functions as an impartial broker between technology and investment sources.

Since October 1993, TVC, with its six-person staff, has played a central role in creating 18 new businesses in New Mexico, most of them with a strong Sandia connection: either they are based on technology developed at Sandia or involve Sandians taking the plunge into entrepreneurial waters.

"The creation of TVC was perhaps the most ingenious of all the ideas in the [Lockheed] Martin proposal to manage Sandia," says Labs President and Director C. Paul Robinson. "At virtually all of the DOE sites, as inevitable reductions have occurred [after the Cold War], a universal desire has been to try to create private sector jobs to make up for the decrease in

Technologies reviewed by TVC



TVC ready to help Sandians who harbor entrepreneurial ambitions

Of the 18 business formations TVC has facilitated since October 1993, 15 have a distinct Sandia connection. They are either based on technology or know-how developed at Sandia or are headed by Sandians or former Sandians with entrepreneurial ambitions, or both.

TVC President Sherman McCorkle says his team is ready and willing to talk to any Sandians who think they have a technology or a technology-based idea that would form the basis of a viable commercial enterprise.

"We can provide a confidential assessment of the idea, an assessment of its marketplace potential, and, if it looks like an idea that might fly, we can offer extensive assistance in helping to get a company up and running," Sherman says.

Here's a list of Sandia-related companies TVC has helped to establish:

Advanced Device Corporation — ADC was referred to TVC by Sandia. The company has worked with Sandia for technical assistance to develop its patented automotive theft and speed control device technology.

ATIIN, Inc. — Sandian Laurence Brown and associate Evans Craig, a Sandia contractor, formed ATIIN to help develop a solid Native American commercial and cultural presence on the World Wide Web.

Boissiere Engineering — The principal, Peter Boissiere, worked at Sandia, where he developed a telerobotic system for cleaning up hazardous and radioactive environments.

Conductors Analysis Technologies, Inc. — Conductors Analysis Technologies, Inc., provides services and equipment to the printed wiring industry. The company was started by Sandian Tim Estes.

Hydrotechnics — Hydrotechnics was started by Sandians Sandy Ballard and Glenn Barker. The company makes in situ permeable flow sensors to measure groundwater flow velocity in geologic formations.

Infinitely Variable Transmissions — Sandian Jim Purvis and Don Wilkes, a former Sandian recently deceased, started this company, which specializes in the engineering and design of variable transmissions.

Triconics, formerly Infoscapes — The principals, John Mareda and Ed Marek, were Sandia employees who left to start this company. The company develops Internet software.

MicroOptical Devices (MOD) — MOD, whose president, Tom Brennan, is a former Sandian, licensed technology developed at Sandia to manufacture vertical cavity surface-emitting lasers, or VCSELS.

MuSE Technologies — MuSE's technology was licensed from Sandia by Sandians Arlan Andrews and Creve Maples. MuSE develops and markets new virtual reality software and hardware products, processes, and services.

Prosperity Institute — Prosperity Institute's product originated in a management development project at Sandia aimed at enhancing the formation of strategic alliances and partnerships. Prosperity Institute is headed by Sandian Pace VanDevender.

Quantum Manufacturing, Inc. (QMI) — QMI manufactures rapid-fire, high-power pulsing electrical beam equipment to harden the surfaces of metals, ceramics, plastics, and other materials. QMI founder is Regan Stinnett, a former Sandian.

Sandia Technologies — Two Sandians, Don Pierce and Eric Snyder, formed Sandia Technologies in 1996. Sandia Technologies provides silicon wafer reliability measuring software and program consulting services.

SiCASA — Silicon Consultants and Software Associates, or SiCASA, was formed by John Medernach using technology licensed from Sandia. SiCASA offers consulting services and silicon characterization software to address production and quality control needs in the semiconductor manufacturing industry.

Silicon MicroDevices — Founder Ned Godshall was one of the first Sandians to take a Tech Transfer Leave of Absence in 1995. Silicon MicroDevices was a presenter at TVC's 1994 Equity Capital Symposium with its transdermal drug delivery system using micromachine skin patch.

Sky+ — The principal of Sky+, Nina Bergan French, was the first Sandia/California employee to take a Tech Transfer Leave of Absence. Sky+ has developed a continuous metal emissions monitor using laser spark technology from Sandia.

Wavefront Sensors — Wavefront Sensors, using licensed Sandia technology, manufactures multi-use instruments for real-time quantitative beam analysis in laboratory, quality control, and process monitoring applications. The principal is former Sandian Dan Neal.

government jobs. I believe none have been more successful than TVC in capitalizing on new technology to create new companies and jobs.

"The first Sandians to take us up on an Entrepreneurial Leave of Absence were indeed pioneers. But they found great assistance from Sherman McCorkle and his TVC cohorts, whose assistance made that transition much more friendly than it otherwise would have been.

"It is said that the 'three legs of a stool' on which to build a stable business are: 1) technology that works; 2) business management experience; and, 3) capital (funds). TVC has been invaluable in helping Sandia entrepreneurs with the latter two."

During the three years since its founding, McCorkle says, TVC has contributed to the creation of 550 new jobs, facilitated seven business expansions and two business relocations to New Mexico from other parts of the country, provided management assistance to 31 budding technology companies, and extended various other forms of technical business assistance to 20 companies. TVC has also secured \$22 million in equity funding commitments for New Mexico entrepreneurs. That money is the seed corn for new technology-related jobs in the area.

"We're doing much better than I anticipated, than anyone really anticipated, three years ago," McCorkle says. "I'm more excited than ever about the opportunities for business development in New Mexico. I thought I understood a little bit about business formation and seed investment when we started this enterprise, but in fact my learning curve has been vertical."

McCorkle is being modest; in fact, he brings impressive credentials to the table as TVC president. A former chairman of the Greater Albuquerque Chamber of Commerce, he is the current chairman of the New Mexico Governor's Business Advisory Council. He has been active for a quarter-century in a wide range of business development activities in his native state. Like-

"The creation of TVC was perhaps the most ingenious of all the ideas in the Lockheed Martin proposal to manage Sandia."

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wise, with his staff at TVC, McCorkle has assembled a team with a varied, though impressive, mix of business development skills.

A commitment to DOE

Although much of the initial local media coverage about TVC focused on its equity capital-raising function, the company actually has a much broader mandate. Helping start-up businesses secure equity capital is, to be sure, a significant mission objective, but, as McCorkle puts it: "My baseline is the commitment Lockheed Martin [heritage Martin Marietta] made to DOE. That's where I come from. That's what we told DOE we would do and that's how we should be measured."

So what was Lockheed Martin's commitment to DOE concerning TVC? It said it would be involved in:

- Technology assessments
- Market assessments
- Technology selections
- Investment assessments
- Entrepreneur identification, training, and mentoring
- Economic development interactions
- Government relations

These so called "pre-seed" activities, which TVC has pursued aggressively, are intended to identify, evaluate, and package investment opportunities to be considered by equity investors. The securing of investment dollars, though, is not an end in itself. Ultimately, as Lockheed Martin's commitment to DOE explicitly states, TVC's purpose is to create new businesses and generate new jobs for the state of New Mexico and the nation.

Bruce Twining, Manager of the DOE Albuquerque Operations Office, says DOE is more than pleased with TVC's contribution to technology commercialization. "Technology Ventures Corporation," Twining says, "has succeeded in transferring a broad variety of technologies from the

Department of Energy's Sandia National Laboratories to the commercial marketplace. Their record is admirable and I feel they will continue to create new business opportunities for the state of New Mexico."

TVC's efforts have not gone unnoticed within its parent corporation, either. TVC is the 1996 recipient of a Lockheed Martin "NOVA" teamwork award. The award citation reads: "For charting new ground in successfully demonstrating a technology commercialization model that can be replicated throughout the Department of Energy's nationwide network of laboratories."

Al Narath, President and Chief Operating Officer of Lockheed Martin's Energy and Environment Sector, of which TVC is a part, says "TVC's early success record has exceeded expectations. I am confident that Sherman's team, with the active support of DOE, Sandia, and the local community, will continue to be successful. I believe the TVC story will serve as a model in other communities." Narath was President of Sandia until taking the Lockheed Martin position in 1995.

Setting the stage for success

Indeed, Lockheed Martin has adopted TVC's organizational and operational structure as a model for use in the creation of Nevada Ventures, Inc., headed by former Sandia Dennis Hayes (at the Nevada Test Site) and Columbia Valley Ventures, Inc. (at the Hanford site).

"We consider that quite a testimonial and vote of confidence for what we're

"Their record is admirable and I feel they will continue to create new business opportunities for the state of New Mexico."

TVC issues call for technologies

TVC is seeking business investment opportunities to be presented at an Equity Capital Symposium to be held in May 1997. The opportunities should involve the formation or expansion of a technology-based business in New Mexico. Preference will be given to those opportunities that are based on technology developed by, or with, one of the national laboratories or research universities in New Mexico. For consideration, each opportunity must be described in a complete business plan. Business plans must be submitted to TVC on or before Dec. 20, 1996.

The Equity Capital Symposium held in May 1996 featured 10 business opportunities presented to an audience of about 200 entrepreneurs, business professionals, and equity capital investors. More than 25 percent of the audience was from the investment community.

For further information contact Randy Wilson at TVC, 505-246-2882.

doing," McCorkle says.

McCorkle says a series of official memoranda among DOE, Sandia, and TVC helped set the stage for TVC's success by spelling out expectations and responsibilities. These agreements — one about management, one about implementation — "got us off dead center," McCorkle says. The documents were vital, he says, because, "The [TVC] concept, if you go back to 1993, was not really understood inside the Sandia Labs culture. It was perceived as a proposal to DOE, and Sandia was waiting for us to perform, to do something. The management agreement and the assignment of roles and responsibilities in the implementation agreement made everything else [i.e. TVC's success] possible."

Also, McCorkle says, TVC's effectiveness is ultimately attributable to the quality of the staff. "They bring a wealth of experience and dedication that is unique in this kind of activity," he says. "They have achieved results where there was no road map to follow and have created an effective mechanism for commercializing laboratory technologies. It is they who rightfully deserve a large portion of the credit for the success we have enjoyed."

Beyond the agreements and the efforts of the TVC staff, McCorkle attributes much of TVC's effectiveness to the relationship his enterprise has established with Sandia.

"Overall, our relationship with Sandia is very good," Sherman says. "Occasionally, it's exceptionally good. And occasionally, it's like running your tires over an old cattle guard, but that's reality. All in all I can say that if Sandia is as pleased with this relationship as we are, then they're very, very pleased."

International conference on nuclear microprobe advances opens Monday

A week-long international conference to report on exciting new developments and applications in nuclear microprobe analysis opens Monday in Santa Fe. Barney Doyle, a leading microprobe researcher and Manager of Ion Solid Interactions & Defect Physics Dept. 1111, is chairing the conference.

The 5th International Conference on Nuclear Microprobe Technology and Applications runs from Nov. 10-15. The conference has been held previously in Oxford, Melbourne, Uppsala, and Shanghai, so this is its first time in the US.

Nuclear microprobe analysis is founded on the numerous microscopy capabilities offered when high-energy ions or other forms of nuclear radiation are focused to micron or even 100-nanometer dimensions. This beam is then scanned across a target sample, much like the case for an electron microscope.

Barney's group has pioneered numerous applications of the nuclear microprobe, including elemental profiling in three dimensions, eXternal Micro Ion Beam Analysis (an R&D 100 award winner in 1987), and single-event-upset imaging of Sandia's radiation-hardened integrated circuits.

Sandia/California also has a nuclear microprobe developed jointly with Lawrence Livermore National Laboratory and located at the LLNL Multi-user Tandem Laboratory. The Sandia/LLNL team, led by Arlyn Antolak and Dan Morse (both 8715), has also invented and perfected microbeam techniques including Ion Micro-Tomography and isotope-specific micro-particulate analyses. Sandia's New Mexico and California sites each currently have new, more powerful, microbeams under development, and Sandia/California is developing an X-Ray Tomographic Microscope that will be described at the conference.

One of the newest topics at the conference,

says Barney, will be single ions and effects. Presentations in this area will range from exposing single ions to individual components in integrated circuits and biological cells to the production of single-ion "Coulomb explosions" in insulating materials.

The conference will also report on applications of nuclear microprobe analysis in materials science, microelectronics and photonics, biology, medicine, geophysics/geology, arts/archaeology, and environmental science.

Most conference sessions are at the Eldorado Hotel in Santa Fe (where VP 1000 Bob Eagan will welcome the group on Nov. 11), but a one-hour closing session will be held at Sandia at 1 p.m. Friday, Nov. 15 (in the TTC auditorium). Sandia President and Laboratory Director C. Paul Robinson will speak at that. A summary of the conference's key results will be given at 1:30 by David Jamieson, a leading Australian microprobe scientist and Director of the Melbourne Analytical Research Center. Sandians interested in this field are of course welcome to attend this session.

It will be followed by a tour of Sandia's nuclear microprobe facility in the Ion Beam Materials Research Laboratory in Bldg. 884 and visits to the Microelectronics Development Lab and the National Atomic Museum

Congratulations

To Melinda Mouer and Rich Hunt (5715), married in Albuquerque, Aug. 3.

To Nicole and Mark (6612) Ivey, a son, Jack Augustus, Oct. 11.

To Jolene and Bob (2523) Hawley, a daughter, Lauren Elizabeth, Oct. 17.

To Cindy and Gary (1567) Laughlin, a daughter, Macey Kathleen, Oct. 19.

Fun & Games

Fun walk/run — Bells beckon walkers and runners to race for local arthritis research, community programs, and services in the annual Jingle Bell Walk/Run 5K on Sunday, Dec. 1 (rain or shine). Event includes food, Santa's elves, costume contests, aerobics, massage therapists at end point, and prizes (based on pledges raised). The walk/race starts at the Macaroni Grill at Winrock Center (2100 Louisiana NE). Registration and team photos are at 7 a.m., warm-up aerobic exercises are at 7:30, a runners' costume contest is at 7:45, the 5K run start line forms at 8, the walkers' costume contest is at 8:15, and the 5K walk start line forms at 8:30. Brochure/registration forms are available from the Arthritis Foundation at 265-1545 (1-800-999-8022) or from Albuquerque Norwest Banks.



Mileposts

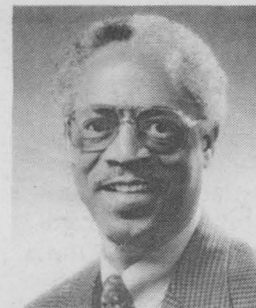
November 1996



Ken Gentry
40 9781



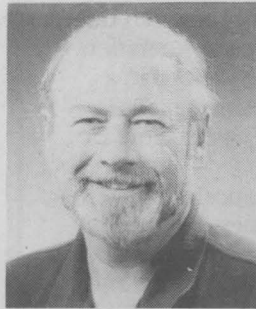
Julia Norwood
20 7435



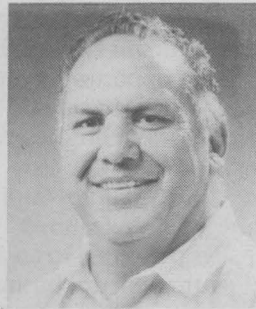
Hugh Jones
25 10221



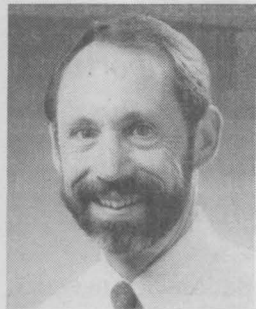
Robert Mattison
15 1481



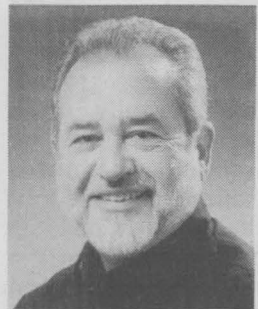
Bill Moore
20 9573



Denny (DP) Gallegos
30 7613



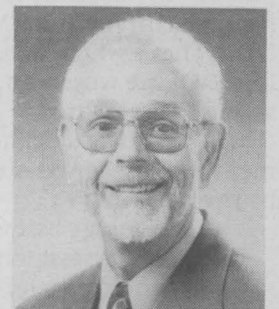
Paul Shoemaker
15 12100



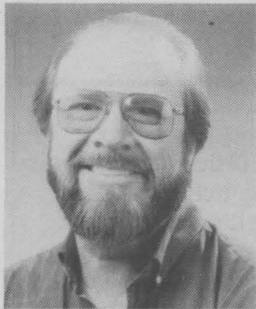
Gregory Silva
35 7822



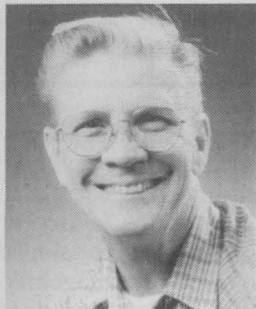
Kenneth Boldt
20 9364



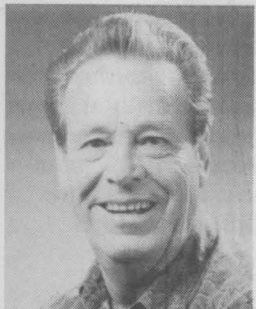
Bill Trebilcock
15 14702



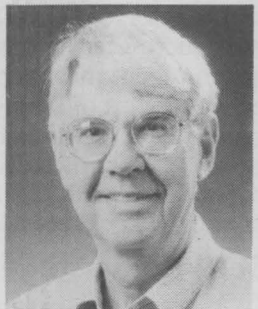
Jose Padilla
20 1486



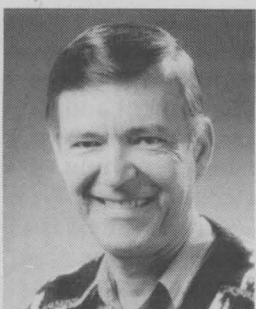
Dennis Smith
35 14303



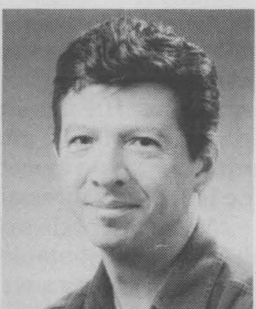
Arthur Maestas
20 7618



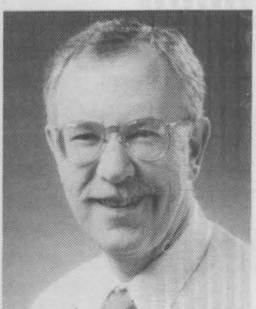
Keith Brower
30 6524



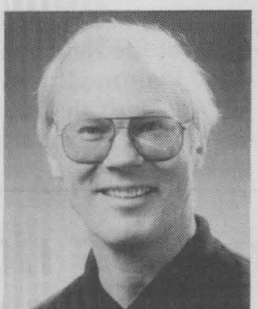
Joe Kubas
20 4417



John M. Garcia
15 7844



Richard Pettit
25 1542



Jerry Bollig
20 4918



John Souza
45 2151

Feedback

Q: Why did we not renew our arrangement with TWA? The seats on American were obviously intended for very small people. TWA has extra room.

A: Our Domestic Agreement with TWA expired on March 31. At that time, we chose not to renew it because we had entered into an agreement with American Airlines. There were many reasons that we selected American Airlines as our primary carrier, mostly because of traveler comfort issues. American has the highest customer satisfaction scores of the major airlines serving Albuquerque, according to a recent J.D. Powers survey; offers the greatest number of arrivals/departures (14 per day versus 11 a day for Delta, four a day for TWA, and four a day for USAir); they reach the greatest number of cities with no-stop and one-stop routing; their fleet is relatively new (average age 7.56 years versus Delta 11 years, TWA 18.6 years, USAir 10.9 years); and they were able to support Sandia's travel program at a reasonable cost.

We appreciate your concerns regarding the seat configuration and the necessity for more leg room. We have talked with our local representative and he recommends that you request the exit row for more leg room. We have also asked American Express to flag your profile with this information.

Ralph Bonner (10500)

Q: What does management intend to do about the inequity of MLS and MTS doing the same work for vastly different pay? This happens at the management and staff level, and it seems to indicate that Sandia does not believe in equal pay for equal work. Will there be a real commitment under the new job structure system to resolve this? How will that be done?

A: We recognize that there are cases in which employees in different classifications are doing very similar work. One of the reasons we are implementing a new job structure at Sandia is to address this very problem. In the new system, managers will assign employees to the occupation that best describes what they do, regardless of their current classification. Each occupation is designated "Administrative," "Technical," or "Technologist." This means that some employees will be changing classification.

Another important feature of the new structure is the Level Chart for each classification. Level Charts will indicate differences in responsibility, skill, knowledge, and contribution within a given occupation. Using the charts, managers will be responsible for placing their employees at the appropriate level.

We also recognize that salary differences may exist for people doing the same work at the same level — that people who have been placed on the same occupation at the same level may not be paid comparable amounts. (Differences in employee salaries are a function of many legitimate factors, including work history, performance, and experience.) While we do not anticipate any wholesale salary corrections at the time of placing employees in the new structure, managers are able to correct perceived salary misalignments over time with available review funds.

Don Blanton (3500)

Q: It would be great if there was a bulletin board somewhere on the Net where people could post notices of excess equipment, chemicals, software, etc., or to solicit technical advice and assistance in select areas.

It would save wasting a lot of paper by publishing this information in the Weekly Bulletin and would be more timely. The postings could be purged regularly to keep the bulletin from being cluttered. Similarly, will we be able in the future to use the Net to survey equipment that is at Reclamation? We could use this tool for personal want ads now being posted in the Lab News.

A: Reapplication Services Dept. 7617 is planning to conduct a Web-based survey to see if there is enough interest in creating a material exchange system on the Internal Web. Our current thinking is to implement the material exchange system via a newsgroup. A newsgroup allows you to post items of interest and see the responses. Newsgroups can be set up for a variety of topics. For example, a newsgroup for technical specialties could be set up. At this time, there is a drawback in that in order to participate in a newsgroup you must have your computer registered in a special way. We are investigating ways to make this process easy for the end-user. There is a way to survey reapplied property on the Web. The URL to survey Sandia reapplied property is http://www-irn.sandia.gov/cgi-bin/templates/template_reap.sh. The URL to survey DOE reapplied property is <http://apollo.osti.gov/cgi-bin/reaps.sh>.

Paul Merillat (4800)

Recent Patents

Michael Ross (5318): Non-Invasive Hyperthermia Apparatus including Coaxial Applicator having a Non-Invasive Radiometric Receiving Antenna Incorporated therein and Method of Use Thereof.

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

MISCELLANEOUS

COMPUTER 486/DX66, 8MB, VESA 1MB video, 340MB HD, \$500. Jones, 843-3500, leave message.

KING-SIZE WATERBED, 6-drawer pedestal, bookshelf headboard, padded rails, \$75. Barnes, 265-2836.

MICROWAVE, very basic, white, works fine, \$25; exercise bike, same specs, same price. Caskey, 298-6428.

WOODEN HIGH CHAIR, excellent condition, \$38; RCI timeshare in Tahiti, superb location & exchange value, \$2,950 OBO. Ludwig, 856-5111.

MARCY EXERCISE MACHINE, \$300; dresser, \$85; Sears 5-hp rototiller, \$450; 2 Motobecane 10-spd. bikes, \$100 ea. Brosseau, 896-3801.

INVISIBLE FENCE for pets, \$85; Fujitsu 50-watt car amplifier (new in box) \$50. Goering, 897-9505.

GE REFRIGERATOR, 18 cu. ft., frost-free, almond, no ice maker but has connection, almost new condition, \$300. Dwyer, 271-1328.

WASHER & ELECTRIC DRYER, Whirlpool super capacity, automatic, 9 yrs old, excellent condition, \$300/both. Andrews, 281-5574.

FINCH CAGE, 21" x 18" x 13", 2 orange-cheek finches, supplies, \$50. Jacobs, 281-9483.

SOLOFLEX, w/all attachments, \$500 OBO; Tunturi exercise bike, \$100 OBO; dbx component stereo equipment. Laros, 890-0657.

AQUARIUMS: 50-gal. reptile tank, w/screen, \$50; 10-gal. w/screen & lights, \$85; 10-gal. tropical setup, \$10; wrought iron stand, \$10. Suderman, 265-1786.

TRADITIONAL WOOD ROCKING HORSE, tail & mane of soft yarn, leather saddle, glass eyes. Hassig, 293-5423.

REMINGTON COPY, new Army 1851 .44 pistol, 7-1/2-in. barrel, cap & ball, spare cylinder, holsters, \$160. Lyons, 281-9283.

PFALTZGRAFF DISHES, sky pattern, 12 complete place settings plus many extras, \$295; hardwood rocking chair, \$50. Fitzgerald, 275-0521.

VICTORIAN LOVESEAT (mahogany), w/lots of carving & cut velvet upholstery, \$575. Anderson, 296-3352.

STAIR STEPPER, \$50. Doran, 255-9321.

ACOUSTIC GUITAR, solid cedar top w/rosewood sides & back, like new, w/case, \$220. Carson, 858-1460.

CHIHUAHUA PUPPIES, purebred, no papers, ready 1st week of Dec., females \$150, and male \$100. Sargent, 865-3227.

TRUCK TOPPER, fits Mazda B200 or similar size, \$40. Dalton, 296-4947.

ANGELS GALORE CRAFT FAIR, Faith Lutheran Church, 10000 Spain NE, Nov. 8, noon-6 p.m., Nov. 9, 9 a.m.-4 p.m., 40+ crafters. Stichman, 856-6242.

ELECTRIC HEATERS, 220V w/temperature controls, various sizes, enough to heat 1,400 sq. ft. home, \$50/all. Fischer, 292-3427.

TI-92 CALCULATOR, bought new in February, original packaging, symbolic calculus/trigonometry, 3-D graphics, \$150. Miranda, 293-8644.

WURLITZER CONSOLE PIANO, w/bench, beautiful oak patterning, like new, hold for Christmas if desired. \$1,500. Robbins, 823-2492.

PIANO, Wurlitzer upright, matching bench, \$600. Tenorio, 821-8967.

PUPPY, free to good home, approx. 5 months old, black lab cross (?), adorable. Harrison, 865-0123.

DINING ROOM TABLE, w/4 chairs, wood & wicker, chairs have arms, leather seats & casters, \$125. Konkel, 866-0304.

GOOSENECK FLATBED TRAILER, 18-ft., 3-axle, \$1,800. Haley, 281-2898.

WINDMILLS: Model X702, 6-ft. Aero-motor & 30-ft. galvanized steel tower, \$1,650; Dempster, Model 12A, 8-ft. diameter, new, \$1,650. Konklin, 847-2280 or 298-8217.

MOTORCYCLE JACKET, large Harley-Davidson, new, \$285 value, asking \$175 firm. Perryman, 281-3020.

BEDROOM DRESSER & CHEST OF DRAWERS, good condition; Bissel carpet cleaner, works great. Royer, 293-2350.

SUNBEAM PROPANE GRILL, dual burner, has side tray & 5 gal. propane, used once, \$75. Hayes, 299-1200.

WOOD-BURNING STOVE, long-burn capacity; girl's mountain bike, 18-spd., \$75; dispatch phone. Garcia, 343-8207.

DOGHOUSE, for small dog up to 30 lbs., new, never used, \$35. Walling, 298-1604.

SCHWINN XR-8 EXERCISE BIKE, \$75; child's wooden rocking horse, \$55; 120 Elan skis, Marker bindings, \$100. Anderson, 293-5387.

SIBERIAN HUSKY PUPPY, red/white male foundling, approx. 5 mos., 40 lbs., smart, willful, needs good home & training. Johnson, 899-9387, leave message.

WHEELS, steel, 7-spoke, set of four, 15x7, fit Toyota 4WD truck/4Runner models, '89 to '95. Castillo, 899-4154.

COUCH/HIDE-A-BED, green Naugahyde, \$25; weightlifting bench & weights, \$75; gerbil equipment, \$15. McGee, 857-0661.

GLOCK 17, 9mm, 3 high cap. mags., one 30-round mag., like new, box & papers, \$650. Yost, 255-2911.

SPORT RIDER, by Health Rider, like new, \$145. Lahusen, 299-1672.

TRUCK TIRES, 16-in. radials, 235/85, very good tread, 2 only, \$50. Wilde, 281-7027.

PAPERBACKS, rare science fiction & fantasy, many from '50s & '60s, cinefexs, cinefantastiques, & artwork. Barbera, 275-2562.

SHOP MANUALS, Volvo maintenance manuals for models 242, 244 & 245, \$35. Plummer, 828-3028.

COCA-COLA METAL SIGN, from '70s, 44"x 44", excellent condition, great decoration, \$95 OBO. Dybwad, 296-9047.

COMBINATION SKI/ROWING EXERCISE MACHINE, Westlo, easier than NordicTrak, good workout, new \$240, asking \$80 OBO. Rieker, 294-8216.

BEN FRANKLIN WOOD STOVE, 30-in. box, \$250 OBO. Serafin, 864-3524, after 5 p.m.

COMPAQ NOTEBOOK COMPUTER, 486DX33, 4MB RAM, 250MB HD, pen-based input or mouse, \$675. Smith, 856-1567.

PLAYPEN, \$20; infant wind-up swing, \$30; plastic bathtub, \$2; all very good condition. Pfeiffer, 275-2931.

EXERCISE BIKE, Tunturi Ergometer, \$80; Super 8 movie camera, \$25; projector, \$50; screen, \$12; juicer, \$100. Ashcraft, 884-4934.

SKIS, Volkl P-9 G.S., 207cm, w/Marker M-46 bindings, excellent, \$130; Salomon SX-91 Equipe boots, size 9-1/2-10, \$40. Healer, 298-6967.

COLLECTIBLES: Dionne quintuplet memorabilia, \$200 OBO; Macintosh computer (needs hard disk), & ImageWriter II, \$150. Coalson, 298-0061.

PRECIOUS MOMENTS COLLECTION, \$35-\$100. Wenzelburger, 256-9370, after 4 p.m.

MICHELIN TIRES & RIMS, 205/70R14, \$100 for all 4 tires; 2 scuba pro BCs, regulators, like new, \$250 ea. Avila, 275-9572.

BETTY BOOP WRISTWATCH, w/brand, brand new, \$10. Wagner, 823-9323.

WOOD HEATER, brick-lined, \$50; treadle sewing machine, works well, \$35. Carter, 821-6383.

MOVING BOXES, 1/2 price, good condition, all sizes, w/wardrobe. Hill, 299-9416, after 5 p.m.

HIGH-GAIN TV ANTENNA, \$10; weight training bench & weights. Moss, 298-2643.

PIANO, Kawai studio, beautiful sound, well cared for, tuned & played regularly. Bonzon, 828-1066.

RADIAL-ARM SAW, Craftsman, 10-in., 2.5-hp, w/carbide-tip blade, leg set & cover, very good condition, \$350. Rodriguez, 332-7822.

BINOCULARS, spotting, unparallelled for astronomy & big game hunting, Fujinon 16X70, brand new, \$650. Jimenez, 891-2593, after 7 p.m.

7TH ANNUAL CRAFT SHOW, Chelwood Elementary, Nov. 9, 9 a.m.-3 p.m., Constitution & Chelwood. Bailey, 271-9715.

TEAK DINING ROOM SET: 5 pieces, \$3,000; wicker living room, 6 pieces, \$500; new furniture coming, old must go. Beckmann, 296-1829.

TIRES, 4 ea., P235/75/R15, good tread left, \$15/ea. or \$40/all; Miller Beer neon sign, \$75 OBO. Hole, 255-1444.

DRYER, '93 Maytag-LD7500, electric, large capacity, mint condition, \$250 OBO. Eager, 299-6874.

BAILLO'S WOODEN TRAIN SET, worth \$250, asking \$95 OBO. Patterson, 822-1196.

DEADLINE: Friday noon before week of publication unless changed by holiday. MAIL to Dept. 12640, MS 0165, FAX to 844-0645, or bring to Bldg. 811 lobby. You may also send ads by e-mail to Nancy Campanozzi (nr campas@sandia.gov). Questions? Call Nancy at 844-7522. Because of space constraints, ads will be printed on a first-come basis.

Ad Rules

1. Limit 18 words, including last name and home phone (We will edit longer ads).
2. Include organization and full name with the ad submission.
3. No phone-ins.
4. Use 8 1/2" by 11-inch paper.
5. Type or print ad; use accepted abbreviations.
6. One ad per issue.
7. We will not run the same ad more than twice.
8. No "for rent" ads except for employees on temporary assignment.
9. No commercial ads.
10. For active and retired Sandians and DOE employees.
11. Housing listed for sale is available without regard to race, creed, color, or national origin.
12. "Work Wanted" ads limited to student-aged children of employees.

EAST INDIAN ROSEWOOD PEDESTAL DESK, 3' x 5' rosewood veneer desktop, incomplete (needs drawers), great woodworking project, best offer. Owyong, 797-4137.

CUSTOM QUEEN SOFA BED, inner-spring mattress, double stuffed pillows & seat, pale green striped upholstery, \$495. Madsen, 856-1530.

TRANSPORTATION

'93 MAZDA MX-3 GS, sunroof, Yakima racks, cruise, 5-spd., 6-cyl., 68K miles, \$9,200. Moore, 250-9455 or 281-0534.

'96 TOYOTA CAMRY LE, V6, 11K miles, mint condition, dual airbags, PS, PW, white, 4-dr., \$17,400. Harding, 898-1981.

'89 FORD AEROSTAR MINIVAN, 3.0 V6, AT, AC, PS, PB, must sell, \$4,500 OBO. Stephens, 292-9867.

'96 GRAND CARAVAN ES, 15K miles, 7yr./100K extended warranty, loaded, \$25,500 OBO. McCrory, 292-7516.

'66 FORD MUSTANG, poppy red, 289-cu.-in. V-8, excellent condition. Vigil, 897-3821.

'85 HONDA ACCORD, 4-dr., AC, AM/FM cassette, power everything, 138K miles, good condition, \$2,700 OBO. Dubbert, 281-7942.

'95 JEEP CHEROKEE SPORT, 4-dr., 4WD, white, AT/OD, extras, ext. warranty, \$17,850. Oglesby, 296-5361.

'94 SATURN SL1, 33K miles, excellent condition. AT, AC, PB, PS, Power System, AM/FM cassette, \$10,600 OBO. Giere, 296-1347.

'89 AUDI 100, loaded, PS, AM/FM cassette, new tires, very good condition, maintenance records, \$6,995. Harrison, 897-0658.

'74 CADILLAC COUPE DEVILLE, saddle tan over yellow, 70K miles, incredibly good condition, \$3,669. Dye, 299-6525.

'89 GMC SLE 2500, 4x4, ext. cab SWB, w/matching shell, 5.7L AT, AC, AM/FM cassette, rcvr. hitch, extras. Millington, 821-3959.

'85 FORD F-250 SUPERCAB, 4x4, 6.9L diesel, XLT pkg., needs some mechanical work, \$3,500. Haley, 281-2989.

'93 TOYOTA DX, X-cab, red, AT, AC, AM/FM, bedliner, anti-theft, low mileage, excellent condition, must sell. Sanchez, 873-2058.

'95 DODGE NEON, white, 37K miles, loaded, tinted windows, must sell. Garcia, 861-2477.

'89 FORD BRONCO, Eddie Bauer, 302 V8, 4WD, 5-spd., AC, nonsmoking owner. Jordan, 299-4004.

'80 BUICK REGAL, 2-dr., 3.8L V6, 52K miles, garaged, looks/runs great, brown, AT, AC, PS, PB, \$1,995. Vook, 884-4754.

'92 CHEV. CAPRICE CLASSIC, V8, fuel-injection, AT, AC, PS, anti-lock brakes, very clean, \$6,400. Dayton, 343-9719.

'82 TOYOTA FJ-40 LANDCRUISER, hard-top, \$5,500. Galloway, 281-5671.

'90 CHEV. S10 TRUCK, white, good condition, \$3,500 OBO. Schiess, 883-7107.

'90 CHRYSLER LEBARON, convertible, navy blue, all power, alarm, 54K miles, excellent condition, must sell, \$6,300. Tenorio, 898-7404.

'81 CHEV. CITATION, AT, 4-dr., repairable (needs freeze plug) or good parts car, \$400 OBO. Krause, 299-0931.

'77 CHEV. C10 LONG-BED PICKUP, w/camper shell, 6-cyl., original owner, 94K actual miles, \$2,200. Young, 265-1192.

'90 OLDS CUTLASS SUPREME SL, 2-dr., 56K miles, power everything, great condition, below NADA at \$7,600. Johnsen, 298-1086.

'91 ESCORT, 4-dr. hatchback, 72K miles, clean/good condition, 1 owner, well cared for, \$3,700. Brown, 271-8916.

'86 CHEV. ASTRO VAN, AT, AC, PW, AM/FM cassette, great condition, 101,400 miles, \$3,500. Aragon, 243-4521.

'91 FORD MUSTANG, 5.0L, AT, AC, cruise, AM/FM cassette, original owner, 22K miles, \$10,000. Harris, 299-4559.

'72 CHEV. CORVETTE LT-1, 350/255-hp, 4-spd., 4:11, PS, PB, 59K miles, NCRS car, must sell, \$14,000. Cerutti, 269-9038.

'84 INTERNATIONAL SCHOOL BUS, 40 passenger, w/handicap lift, good tires, excellent motor, \$2,500 OBO. Padilla, 869-6395.

'88 NISSAN STANZA WAGON, 5-spd., low miles, good condition, excellent gas mileage, good family car, \$6,200. Schkade, 292-5126.

'62 CLASSIC CHEV. IMPALA, 4-dr., brown, body good condition, no motor or transmission, \$1,100. Ferrell, 883-8595.

'90 CHEV. 1500 SILVERADO, ext. cab, garaged, 46K miles, V8, 5-spd., excellent, \$1,500 under NADA, asking \$10,700. Baker, 856-6228.

'95 FORD F-250, Supercab PowerStroke diesel, XLT pkg., 4x4, 5th wheel hitch, \$25,500. Haley, 281-2898.

'89 HONDA ACORD LXI, 5-spd., loaded, champagne, 62K miles, excellent condition, \$6,950 OBO. Sanchez, 265-8398.

'83 BUICK REGAL LIMITED, 4-dr., fully loaded, 110K miles, \$1,700. Martin, 822-9940.

'55 WILLYS JEEP, new upholstery, cloth top, paint, 90-percent rebuilt, great for hunting, \$3,500 OBO. Wright, 293-9599.

'88 NISSAN KING-CAB PICKUP SE, V6, AT, loaded, Brahma shell, carpet kit, bedliner, 68K miles, great shape, \$6,150. Horton, 281-2402.

'92 SUZUKI SIDEKICK, 4WD, soft top, CD player, 33K miles, below book, \$7,495. Werner, 292-5520.

'76 RED DALE PICKUP CAMPER, 9-1/2 ft., refrigerator, heater, hot water, bathroom, very good condition, \$750. Detry, 856-2999.

'82 HONDA XR500R DIRT BIKE, original owner, well maintained, garage kept, excellent condition, \$950. Lemon, 896-0388.

VACATION, Bahama cruise/Ft. Lauderdale/Orlando, 11 days, 2 adults/2 children, video available, by 5/30/97, \$498. Field, 268-4914.

REAL ESTATE

NORTH VALLEY ADOBE HACIENDA, beautiful, 1 acre, 3,700 sq. ft., w/pool, priced to sell, \$290,000. Ward, 892-1956.

3-BDR. HOME, w/study or 4th bdr., Willowood, brick, 2-car garage, 2 baths, X-large lot, appliances, big/open kitchen, beautifully landscaped, extras. \$170,000. Willey, 237-2257.

2-BDR. HOME FOR RENT, Ridgecrest area, hardwood floors, 1-car garage, alarm, washer/dryer, automatic sprinklers, \$800/mo. Harding, 254-9515.

2-BDR. TOWNHOUSE, 1 bath, 2-car garage, front courtyard, backyard, open floor plan, fireplace, Lomas/Tramway area, \$99,900. Draper, 281-2663.

3-BDR. HOME, Rio Rancho, 1/2-acre, 1,925 sq. ft., 1-1/2 baths, oversized garage w/workshop, landscaped, secluded, buyer's warranty, \$122,000. Heerdt, 323-5706.

2-BDR. HOME, charming, University area, hardwood floor, fireplace, beautiful sunroom, landscaped backyard, dog run, \$114,500. LeTourneau, 265-0987.

4-BDR. MOSSMAN HOME, 2-1/2 baths, 2,102 sq. ft., living room, formal dining, family room, Sandia High district, \$169,000. Reed, 897-7489.

4-BDR. HOME, w/den, 1,900 sq. ft., walk to elementary & mid-schools, consumer protected, \$119,500. Rebarchik, 299-1385.

1-BDR. CONDO, 1 mile south of Pur-gatory ski resort, Durango, Colorado. Painter, (510) 443-3015.

3-BDR. CUSTOM-BUILT ADOBE HOME, 3 baths, 3,100 sq. ft., 2-story, 2-1/2 acres, Los Chavez area, \$269,000. Chavez, 866-0533.

WANTED

FENCING, 48-in. wove-wire stable fence, need 30 ft. Kennicott, 286-9288.

USED TREADMILL, good condition. Brigham, 293-6914.

HOUSEMATE, female to share passive solar adobe on west side, \$275 + 1/3 electric & gas. Rivers, 864-2335.

SPINLET PIANO, working order, tuned. Kercheval, 864-6549.

EXHIBITORS, "Cherished Creations" arts/crafts show, Thanksgiving weekend, Nov. 28-Dec. 1, State fairgrounds, Flower School Arts Bldg. Self, 296-4137.

EXHIBITORS, Arts & Crafts Fair, Holy Ghost School, 900 block of San Pedro SE, Nov. 23, 10 a.m.-4 p.m., Nov. 24, 8 a.m.-2 p.m. Rivera, 892-3236.

JOGGER, used, motorized. Brigham, 293-6914.

HOUSEMATE, non-smoker, 4-bdr. home, 5 minutes from Eubank gate, quiet & safe, \$400/month, utilities included. Werner, 296-8008.

HARD DRIVES, 100+ MB, VGA monitors, for St. Martin's homeless (computer education); also need tutors. Eakin, 844-4124.

RIDING LAWN MOWER, 3 blades, good condition. Gallegos, 864-1111.

LOST & FOUND

LOST: Pear-shaped amethyst stone, lost on Oct. 23, either Coronado Club or Sandia Credit Union, great sentimental value. Murray, 856-3347.

FOUND: Homemade Valentine card to "bytful mom," front of Bldg. 802 in the 800 parking lot, last week on 10/23, sentimental value for sure. Hunter, 844-2444 or 865-5745.

RECREATIONAL

McGREGOR SAILBOAT, 26-ft. water ballast, 4 sails, VHF, 8-hp outboard, many extras, great shape, \$7,500. Savage, 837-2692.

CAMPING TRAILER, 23-ft., '87 Starcraft, excellent condition, \$6,000. Chavez, 865-4556.

CAMPER, full-size, fits Ford/Chev./Dodge long wheel base, great condition, refrigerator, heater & bathroom, \$800 OBO. Gonzales, 344-5582.

BICYCLE, Fuji 12-spd., Mixte frame, 53-1/2cm (21 in.), centerpull brakes, recent rebuild, \$100. Joseph, 822-0536.

'73 DODGE EXPLORER CAMPER VAN, completely self-contained, use for travel, camping, transportation, excellent condition, \$5,400. Ronquillo, 842-8833.

VACATION in luxury villa, 1 mile from Disney World Orlando, sleeps 8, resort has tons of amenities. Devonshire, 821-7863.

'88 CARRI-LITE FIFTH WHEEL, 32-ft., loaded, great condition, AC, heater, refrigerator, awning, \$10,000 OBO. Cobb, 844-3705.

BOY'S BICYCLE, 16-in. Huffly, good condition, \$35 OBO. Mayer, 299-8524.

LAGUNA SAILBOAT, outboard, 26 ft., roller furler, loaded w/extras, A-1 condition, \$14,500. Lewis, 291-8181.

Sandia News Briefs

Kathleen Schulz named to chair ACS Public Relations Committee

Kathleen Schulz, Manager of Environmental Programs Development Dept. 6652, has been appointed chair of the American Chemical Society's Committee on Public Relations for 1997. This national committee, which includes representatives from industry, government, and academia, oversees and advises the ACS on its public outreach program. Public outreach activities under the committee's purview include a 16,000-member Volunteers in Public Outreach program; ACS media relations activities; Kids & Chemistry; National Chemistry Week; Inside Science, which provides science spots for national TV distribution; public relations training programs for ACS local sections and technical divisions; and the National Historic Chemical Landmarks Program. The ACS, founded in 1876, is the largest scientific organization in the world, with nearly 150,000 members.

Darrel Frear earns US Army tech transfer award

Darrel Frear, Materials Aging and Reliability Dept. 1811, has been recognized by the Army for helping to create masters degree programs in manufacturing. The recognition was given to Darrel as one of four people to share in the 1996 Army Research Laboratory Technology Transfer Award. The award cites "initiatives to insert Department of Defense critical technologies into the academic curricula of major universities" and recognizes Darrel in particular "for organizing more than 100 nationally renowned scientists and engineers in national science conferences for the purpose of authoring and publishing three graduate-level college textbooks on the mechanics, mechanisms, and design of electronic assembly solder interconnects." The textbooks, which were edited by Darrel, are being used in a new master of science program in electronics manufacturing at the University of Maryland.

Labs and Lockheed Martin recognized for efforts on behalf of 'Character Counts'

Sandia and Lockheed Martin were among honorees at a ceremony acknowledging businesses that have supported the Character Counts youth development initiative. The ceremony was hosted by Sen. Pete Domenici, R-N.M., and New Mexico First Lady Dee Johnson. Character Counts, of which Domenici has been a vocal and visible champion, is a national campaign to instill good character traits in young people through encouragement and example. Don Carson, Director of Public Relations and Communications Center 12600, accepted a certificate of appreciation on behalf of Sandians who have volunteered in the program, and on behalf of Lockheed Martin, which has made grants available to many Albuquerque public schools to augment their Character Counts programs at the grass roots level. Sandia's volunteer involvement in the program is coordinated by Redd Eakin of Community Involvement and Issues Management Dept. 12650.

Send potential Sandia News Briefs to Lab News, Dept. 12640, MS 0165, fax 844-0645.

Favorite Old Photo



WINDSOR WIZARDS — In 1924, the tiny northern Colorado farm town of Windsor achieved something that still lives on in local legend. Its high school basketball team became the US national champion, defeating the best teams from around the nation, large and small, and winning the US Basketball Championships in Chicago. This was a remarkable achievement for a town with fewer than 1,200 people and a high school with fewer than 40 boys. The ball-handling wizardry of the Windsor players so impressed the Chicago media that they dubbed the team the "wizards." The name stuck, and ever since, the school's teams have been the Windsor Wizards. I was born and grew up in Windsor, and you can imagine the basketball tradition was a proud one. This photo was taken shortly after the 1924 national tournament in Frazier's Drug Store, owned then by my great-uncle, L.E. Frazier, and operated by him and my grandfather, Carl Frazier, and later owned and run by my father, F.E. (Jim) Frazier. Two of the key players on that national championship team who also worked part time at the drug store are behind the soda counter. On the mirror, written in my grandfather Carl's precise print, are the scores of the national tournament games. This summer, the player on the right, Larry McGlynn, now 91 and the only surviving member of the 1924 team, was honored in Windsor at ceremonies marking the 72nd anniversary of the event. My father had a chance to renew his friendship with him. Dad was only 10 years old in 1924 but remembers going to most of the league basketball games that year with his family — he says almost everyone in town did. Frazier's Drug Store was the town social center, and it remained so all the years I was growing up in Windsor in the 1950s (I worked there too). Dad sold it in 1965 and later retired, and he and Mom live in nearby Greeley, Colo. Newspapers and TV stations in Colorado frequently remember Windsor's 1924 champion team in features. This June my brother James, a filmmaker and also a Windsor native, completed a movie script about the Windsor Wizards of 1924, so perhaps some day you'll be able to see the story dramatized in your local theater. — Ken Frazier (12640)

Coronado Club

Nov. 7, 14, 21 — Thursday bingo night. Card sales and buffet start at 5 p.m., early birds' bingo at 6:45 p.m.

Nov. 17 — Sunday brunch buffet, 10 a.m.-2 p.m. \$6.95 all-you-can-eat buffet. Kids 3-12, \$1, under 3 free. Music by Bob Weiler, 1-4 p.m.

Nov. 22 — "Western Night" dinner/dance. \$8.95 steak or shrimp dinner, 6-9 p.m. Music by Bobby Buttram, 7-11 p.m.

Nov. 26 — Traditional Thanksgiving lunch, \$4.95; also serving normal lunch line.

Nov. 28 — Thanksgiving Day dinner, seating 11 a.m. and 1:30 p.m.; \$8.95 adults, \$4.95 children 4-12, under 3 free.

Sandia holiday drives

As the holidays approach, Sandians are encouraged to think about others who may be in need. If you are interested in collecting items from your group for a community agency, here are guidelines established by the Sandia Volunteers in Action program:

1. Notify Redd Eakin (12650) at 844-4124 to indicate your interest and to be connected with suitable agencies based upon your desired focus.
2. A volunteer from your organization will be responsible for delivering the collected items. There is no case number for time spent.
3. Collect in small file-size cardboard boxes for easy transport.
4. Do not accept monetary donations.
5. Keep an estimated record of total collected.

Feedback

Q: Why is it required to give our Social Security number on all Just-In-Time orders when our E-number should be sufficient? I have always felt uncomfortable giving out that information, and in today's (8-22-96) Albuquerque Journal Business Outlook (page 22), there is an article about thieves now using people's names and Social Security numbers to create financial headaches for them. I think it's about time that we stop using Social Security numbers as freely as we have been. I do not like being forced to give this information out.

A: In 1989 a study was undertaken to determine if there should be one primary identifier for both employees and nonemployees. Approximately 200 managers and administrative assistants were surveyed about this matter. The study discovered that a number of Sandia organizations already used SSNs as the primary identifier. In addition, most companies or agencies (such as the Internal Revenue Service, DOE Security, etc.) with which Sandia communicates use SSNs as identifiers. At that time, Sandia's legal organization determined that it is legal for a private corporation to use SSNs for record-keeping purposes. Consequently, in 1990, management decided that SSNs would be the primary identifiers for all Sandia employees and nonemployees.

In response to a few isolated cases wherein employees expressed concern over providing SSNs for JIT orders, the JIT Department sought documentation from the Sandia Legal organization on the matter again in 1995. Legal confirmed that it is a management decision that SSNs will be used and disseminated for Sandia's business purposes.

There is a significant investment in administrative computer applications, including the JIT system, for which the SSN is the unique identifier. The JIT system is linked to other corporate databases that use SSNs as unique identifiers. It is not possible to place a JIT order without the use of an SSN to identify the requester.

You are not forced to give out your SSN. However, until such time that a management decision is made to redesign all corporate databases and eliminate the use of SSNs as a unique identifier, you must provide your SSN in order for you to be the documented requester on a JIT order or a purchase requisition. Dave Palmer (10200)