

Comet update: New predictions envision a giant fireball

Colossal cosmic collision

By Ace Etheridge

Media Relations Dept.

Comet Shoemaker-Levy 9 is heading ever closer to its impending crash into the planet Jupiter in July, and Sandia researchers have presented their latest predictions of what will happen when the colossal cosmic smashup occurs.

A giant, upward-growing fireball is one of the new outcomes predicted.

The researchers are using the world's fastest supercomputer, Sandia's 1,840-processor Intel

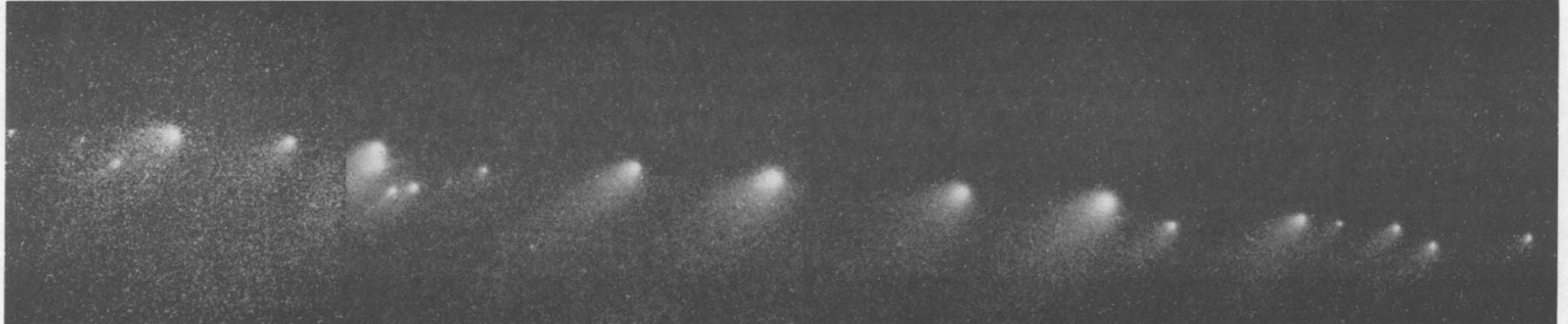
Paragon XP/S, to refine their estimates of what will happen when comet fragments the size of mountains collide with Jupiter's atmosphere. The Sandians are from various departments of Computational Science, Computer Sciences, and Mathematics Center 1400 and are working in cooperation with the Atmospheric Sciences Division of the National Science Foundation (NSF).

Sandia is interested in these calculations because the comet collision offers its researchers an unprecedented opportunity to validate their computer codes for highly ener-

getic impacts. The codes are widely used in weapons work and for a variety of other DOE applications. The masses and impact velocities involved with this event are far beyond what can be duplicated in the laboratory.

"This astronomical event is unprecedented," says David Crawford, one of the researchers, of Experimental Impact Physics Dept. 1433. "Never before has an object been discovered, its orbit calculated, and an impact prediction made. This allows astronomers a unique observational opportunity and provides

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HUBBLE'S VIEW — Mosaic image of Comet Shoemaker-Levy 9 fragments made by NASA's newly serviced Hubble Space Telescope in late January. Twenty comet fragments are visible. The largest may be an estimated 2 to 4 km in diameter. (NASA Space Telescope Science Institute photo)

Sandia Sandia National Laboratories

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Sandia, Intel enter into five-part R&D agreement

Two of the Albuquerque area's largest firms — Sandia and the Intel Corp. — have joined forces to help improve US global competitiveness in the microelectronics industry and to help the industry develop more environmentally friendly manufacturing processes.

The two groups signed a cooperative research and development agreement (CRADA) this Monday, April 11, comprising five major projects:

(1) Volatile organic compound (VOC) monitoring — Sandia and Intel will work together to monitor and measure VOCs in the workplace at Intel's New Mexico plant in Rio Rancho. VOCs are emitted in microelectronic plants' exhaust streams after use in the photolithography process.

(2) Quick response teaming — The two groups will jointly identify highly focused, in-depth teams to examine issues in environmentally conscious manufacturing, safety and health, failure analysis, and reliability.

(3) Particle reduction in acid pumps — Pumps used to recirculate filtered acids have caused loss of product at the plant when they have failed and introduced contamination into the chip-manufacturing process. Sandia researchers will study the dynamics of the pumps. This is expected to lead to a smart system that can predict pump failure so they can be replaced before causing problems.

(4) Contamination reduction in diffusion furnaces — Using high-speed computers and numerical simulation techniques, Sandia researchers will work with Intel engineers to better understand how various gas flows inside

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'Less-than-lethal' weapons: an extra step between talking and shooting

Fighting felons with foam

By John German

Lab News Staff

The new weapon seems unusual at first.

In less than four seconds, a liter of taffy-brown gooey glop squirts from the nozzle of a shoulder-slung canister, expands to 50 times its original volume, and hopelessly entangles a mannequin in tenacious foam.

But the new "sticky foam gun," as it's called, could help the nation's corrections officers resolve some very serious situations without bloodshed.

The gun is among a relatively new class of law enforcement weapons, called "less-than-lethal" weapons, that don't kill their human targets. Instead they temporarily disable a person, rendering a belligerent prisoner or suspect unable to fight or resist.

Sandia is among several national R&D institutions studying less-than-lethal technologies for law enforcement. (See "Labs investigates criminal justice technologies" on Page 6.)

"In the past, officers have had basically

three options for apprehending a criminal," says Dennis Miyoshi, Director of Nuclear Security Systems Center 5800. "They can talk a subject into cooperating, they can force him into submission, or they can shoot him. We need more alternatives," he says.

So far the National Institute of Justice (NIJ), the research arm of the Department of Justice, has provided funding to Sandia to develop the sticky foam gun. It also approved funding recently for Sandia to explore a variety of "smart gun" technologies designed to prevent an unauthorized user from pulling the trigger of an officer's firearm. Funding is expected soon for exploratory work on an aqueous foam dispensing system for isolating participants in a riot, as well.

Two foams and a smart gun

Most less-than-lethal technologies under investigation at Sandia were originally developed as part of the Labs' nuclear weapons security program to protect the nation's

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Martin Marietta breaks ground on Technology Ventures Corp. 5

Labs' diversity plan gets 'thumbs up' from DOE Headquarters 5



7 Improved e-mail services may connect all Sandians

9 Four Topaz space nuclear reactors arrive from Russia

This & That

Are we better looking? - It's been a long time since the *Lab News* had a facelift - maybe too long. We unveil our new look in this issue. It may take you a while to get used to the different look; in fact, it still looks a little strange to us, and we've been tinkering and rethinking with it for several months. We'll be making a few more adjustments in coming weeks, but we're basically set, and we hope you like the new look. Thanks to several Sandians who contributed to the redesign effort: Ileana Mendez of Art Dept. 7155; Lori Parrott, Janet Jenkins, and Kay Rivers-Stroup of Laboratory Communications Dept. 12610; and our own Mark Poulsen of Employee Communications Dept. 12660.

Beating back buzzwords - Sometimes I think folks around Sandia are reducing their use of buzzwords, then I pick up some Sandia document that's full of them or hear someone use them over and over in a talk. The one that seems to pop up the most is "world-class." Some people obviously think they can give instant credibility to their projects and departments by sticking a "world-class" in front of them.

If you don't think it's overused, consider this statement spotted for a product by former *Lab News* employee Charles Shirley (12610): "Sophisticated manufacturing technology combined with world-class designs make the _____ an investment. . ." What goes in the blank? An advanced computer? A fine new automobile? An artificial heart, maybe? No, no, no. A \$6 rechargeable flashlight made in China.

Of course I love talking to you, but. . . - We introduced new Managing Editor Ken Frazier to you last month, and now I encourage you to call him when you have a *Lab News* story idea. Part of Ken's job is to plan what stories we do, when we will do them, and who will write them. His phone number is 844-6210. However, we all pinch hit for one another, so call me or someone else here if Ken isn't available (see box at lower left for our names and numbers).

Maybe I'll have a vision - I get some very strange mail. Last week I received a four-page mailer from a small company wanting me to subscribe to its great graphics service, plus a separate piece listing the outfit's selected clients. Strangely, there wasn't a single graphic example in the entire package. One of the firm's clients: the American Institute of Psychics. If I concentrate hard enough, maybe I can conjure up what those graphics look like.

Engineered at Sandia? - Have you heard about the new machine that's due out soon - a combination food processor and word processor? It's for those times when you have to eat your words.

Too many millirems? - I give Sandia directors guff every now and then, but I do learn a few things from them. For example, my sometimes golfing partner Jim Rice (6500) taught me that any golf score of 85-89 is considered to be in the mid 80s. That's welcome news, but sometimes I wonder if his office may be a little too close to the Sandia reactor.

- Larry Perrine

Quarterly dialogue sessions are May 5-6

Sandia President Al Narath will address all employees during quarterly dialogue sessions May 5 and 6. Particular topics will be the status of strategic planning and the new information architecture effort. All employees are encouraged to attend.

New Mexico: Sessions will be held Thursday, May 5, in the Technology Transfer Center (Bldg. 825) at 8:30 and 10 a.m. and at 1 p.m. Employees with last names beginning A-H should attend the 8:30 a.m. session, I-Q the session at 10, and R-Z the session at 1.

California: Sessions will be Friday, May 6, at 8:30 and 10 a.m. in the Sandia/California auditorium (Bldg. 904). Employees with last names beginning A-M should attend the 8:30 session; N-Z should attend the session at 10.

US Coalition seeking nonmilitary work for former Soviet scientists

Sandia has joined other DOE labs, US industry, and universities in a new \$35 million program to develop peaceful nonmilitary projects with Russian and Ukrainian scientists and engineers formerly involved in nuclear weapons and other defense work.

The United States Industry Coalition (USIC) grew out of US Senator Pete Domenici's Ukraine/Russia Stabilization Partnerships amendment to the 1994 Foreign Operations Appropriations Bill. Its charter was signed March 29 at the University of New Mexico.

Domenici cited the Specialty Metals Processing Consortium run by US industry in cooperation with Sandia as a successful demonstration of how such arrangements can promote US competitiveness while helping stabilize key science and engineering institutes in the former Soviet Union.

"The program develops the varied partnerships that we need to develop a way to help the troubled technological institutes in the former Soviet Union," said Domenici. "It involves Russian and Ukrainian scientists and engineers in peaceful, nonmilitary projects. It encourages collaboration between several of our federal agencies, and it partners the national labs with private industry."

Contribution to national security

US Senator Jeff Bingaman also voiced support for the new program, saying, "I believe it is important that we help the defense industry of the nations of the former Soviet Union to convert to serving the commercial needs of their consumers. Doing this is a cost-effective contribution to our national security."

In a parallel development, the Inter-Laboratory Advisory Board (ILAB) was established as an agency through which the DOE labs will work with USIC as a single unit. Tom Hunter, Director of Sandia's Energy and Environment Sector Center 6900, is among the 10 DOE lab representatives comprising the ILAB. Tom's alternate on the board is Dave Nokes, Manager of Surety Program Office 5091.

Los Alamos National Lab Director Sig Hecker spoke at the charter signing on behalf of all DOE lab directors, saying the formation of ILAB "will mean a streamlining of the variety of processes and procedures now used for cooperative projects with the labs. For industry, ILAB will provide one-stop shopping for US companies that decide to join USIC."

- Howard Kercheval

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MARTIN MARIETTA

Fun & Games

Softball - The Sandia Laboratories Softball Association (SLSA) is sponsoring its first President's Pre-season Softball Tournament April 23-24 at the Airguard and Manzano fields. The event will be a round-robin tournament, divided into men's high, men's low, women's, and co-ed divisions (depending on the number of teams entered). The tournament is open to all teams, even if your team isn't in the SLSA league. Cost is \$60 per team. Deadline to register for the tournament is April 18 in the SERP office. Make checks payable to SLSA. If you have questions, please call the league president, Don Wrobel (6319), on 891-8409.

Horseshoe pitching - The Horseshoe Association is planning its first fun-tournament of the season for Memorial Day at the Coronado Club. To prepare for the tournament, and to teach those of you who have always wanted to learn horseshoe pitching, association members will be happy to provide after-work instruction for anyone interested. Contact Lyle Kruse (5861) on 271-8930 or Tom Towne (12361) on 898-2700. Retirees can contact Bob Schuch (ret.) on 344-4622.

Sandia, Lockheed to test networks for Pacific Bell

Hope to dramatically reduce design times

By Mike Sheehan

Lab News Correspondent

Working under a two-year joint project, Sandia scientists have teamed up with engineers from Lockheed Missiles & Space Company to develop new applications for high-speed information networks.

Partially funded by Pacific Bell's CalREN (California Research Education Network) program, the Sandia/Lockheed partnership will focus on two key projects: collaboratively designing wire cable harnesses using a concurrently shared electronic whiteboard, and creating large-scale military simulations based on virtual reality technology. The Advanced Research Projects Agency (ARPA) is a CalREN partner in the simulation project.

Distributed design environment

"Both Lockheed and Sandia were already working independently on distributed computing and high-speed networking projects, so joining forces to win this Pacific Bell project was a good fit," says Rich Palmer of Scientific Computing Dept. 1901. "Lockheed actually submitted the proposal, and will be the project leader. The CalREN funding will pay for high-speed networking costs between Lockheed's Palo Alto and Sunnyvale facilities and our Livermore site as the two companies collaborate on the concurrent collaborative design and military simulation projects during the next 24 months."

One project funded by CalREN involves developing a distributed design environment in which engineers at remote sites can work together using the new high-speed Synchronous Optical Network (SONET) that operates at 155 megabits per second. Many phone companies are in the process of installing this new telecommunications technology as part of their networks utilizing emerging Asynchronous Transfer Mode (ATM) switches.

To test ATM/SONET's utility, Lockheed selected wire cable assemblies—used to connect different stages of a missile or route electrical cables in aircraft—for the CalREN project. Currently, designing a wire cable assembly manually can take more than a year. Designers hope to dramatically reduce that time by developing effective concurrent collaborative design capabilities.

"The project's main goal is to help Lockheed validate a distributed design environment it has already been working on with Stanford

University and Sandia," Rich emphasizes. "In a missile, engineers need to design where the cable harness fits, the thickness of the wires, what type of material must be used, and other parameters. Today the work is done mostly by hand without the assistance of intelligent computer systems. Creating a distributed information environment by which design and manufacturing personnel at different locations can work cooperatively in a shared electronic environment will greatly reduce the turnaround time." Louie Tallerico and Robert Hillaire (both of Manufacturing Initiatives & Center Integration Dept. 8205) are helping with this aspect of the project.

According to Rich, Sandia will benefit from the project by creating and fine-tuning a distributed design capability that will help future inter-lab work. "The CalREN funding enables us to test out the concept of knowledge-based concurrent engineering in a truly distributed environment between different institutions," he explains. "This capability is important because it will allow engineers at Livermore, Albuquerque, and other sites to work together at a distance via very high-speed networks."

From war games to video games

The second joint project will feature development of advanced military simulations that incorporate virtual reality technology. Today's computer networks limit the number of electronic battle pieces to less than 100 planes, tanks, trucks, and artillery during a simulation—unrealistic by modern warfare, where 10 times as much ordnance may be involved. Using ATM/SONET's increased speed and wider bandwidth, Lockheed and Sandia expect to develop advanced simulations capable of handling 1,000 objects controlled or monitored by participants located across the nation.

ARPA is interested in extending such a capability to simulation networks sponsored by the Department of Defense. "The Department of Defense currently has a network for Distributed Interactive Simulation (DIS) that enables it to stage battle scenarios, where, for example,

an F-14 Tomcat attacks a tank, and people sitting at different video monitors can watch the result," Rich explains. "To make the battles more realistic, DIS needs to include up to 1,000 objects that can communicate their movements to every other piece. Sending that many messages back and forth requires a very high-speed network."

The ARPA Defense Simulation Internet (DSInet) is a worldwide network that transmits simulations between numerous sites. However, this network is rapidly running out of network bandwidth due to the number of simulations that must run simultaneously. Lockheed has had to address the same problem in its simulation environment. As part of the CalREN project, Lockheed, in collaboration with ARPA, will develop ATM "middleware" for the transmission of DIS protocols across ATM networks.

All three benefit

Network security, always a key issue, is especially critical over public ATM networks. Lyndon Pierson and others in Networking and Communications Development Dept. 1954 have developed a prototype ATM encryptor for use between Sandia/New Mexico and Sandia/California. That prototype device, as well as one supplied by the government, will

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be used during simulation demonstrations to test ATM network security, ultimately for the protection of company proprietary as well as government classified information.

Rich describes the Lockheed/Sandia project sponsored by Pacific Bell as a win-win-win situation. "The simulation project provides Lockheed with additional resources to validate ATM/SONET's ability to handle high-capacity simulations, and it allows Sandia to expand its leadership role in this important telecommunications technology," he points out. "Pacific Bell has great interest in the project results because the demonstration could be used in commercial applications such as ultra-advanced video games, where up to 1,000 players could fly planes, drive tanks, and fire artillery in a realistic 3-D environment. Telephone companies have targeted entertainment as a key future market." ●



PRODUCING a video about their school were these Portola Avenue School fifth graders. They were assisted in the production by Sandia/California Volunteers Sheila Akins (8275), in back at left, and Bud Pelletier (8275), back, right. Also shown is teacher Vana Born and some of her students who worked on the project. Other Sandians interested in being School Links volunteers should contact the Public Information Office.



FIRST DONATIONS from Sandia/California's New Gifts and Grants Foundations were made recently. Thomas Harrison (8417, center), here presents a check for \$2,500 to the Chabot College DARAJA Program, which mentors African-American students. Accepting are DARAJA Director Carolyn Greene and Chabot President Raul Cardoza. Sandia also granted \$5,000 to the Children's Theater Workshop to assist with its marketing program.

Comet update

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a similarly unique opportunity for us to validate our computer code."

Since presenting their first reports at a scientific conference last fall (*Lab News*, Dec. 3, 1993), the Sandia group has continued its work on calculating the comet's impact. In addition to David, the group consists of Mark Boslough (also Dept. 1433); Tim Trucano, Allen Robinson, and Mike McGlaun (all of Computational Physics R&D Dept. 1431); and Marlin Kipp (Computational Physics & Mechanics Dept. 1432). They reported their latest results at the Lunar and Planetary Science meeting in Houston on March 15.

The comet was broken up by Jupiter's strong gravitational field during its last close encounter in the summer of 1992, and now consists of a long string of dozens of fragments that astronomers have likened to a "string of pearls." Considerable uncertainty remains as to the size and nature of the fragments. Images obtained from the newly repaired Hubble Space Telescope in January placed an upper limit of 4 kilometers on the diameter of the fragments. All are expected to plunge, one by one, into Jupiter's atmosphere over a period of five days (July 17-22). (See "Five days of astronomical collisions.")

The Sandia researchers are concerned with the processes expected to cause the comet pieces to disintegrate as they travel through Jupiter's atmosphere and with coupling of the impact energy to the atmosphere. They're using the Sandia CTH and parallel CTH computer codes originally developed to model nuclear weapon blast effects and now widely used to model a variety of highly energetic events.

The fragments are expected to plunge, one by one, into Jupiter's atmosphere over a period of five days.

The latest Sandia scenario

The Sandia codes now make the following predictions for the last seconds of life of a hypothetical 3-kilometer comet fragment:

When the fragment first encounters the uppermost reaches of Jupiter's atmosphere, it will penetrate as a rigid object, creating a bow shock ahead of it like that at the tip of a super-

Five days of astronomical collisions

The Sandia scenario for Comet Shoemaker-Levy 9's crash into Jupiter's atmosphere is expected to repeat itself many times over a five-and-a-half-day period in July.

Of the comet's 11 largest fragments, the first (designated C) is expected to enter the Jovian atmosphere after midnight MDT July 17 and the last (designated W) in the early morning hours of July 22. (Exact times have large "error bars," which everyone hopes will be greatly reduced by July.) Each day from July 18 to 21 one to three of the other large fragments will strike Jupiter.

It's possible that disturbances to the atmosphere from the early impacts (including those from even the smaller fragments) may obscure potentially visible effects of the later impacts, says Mark Boslough

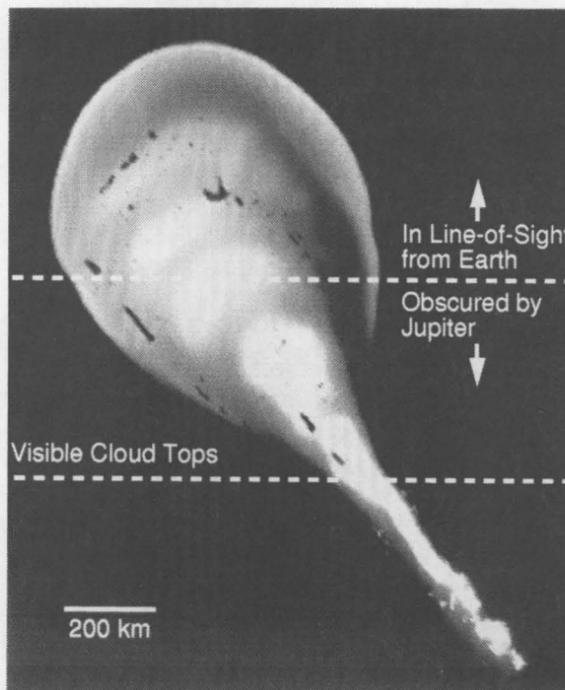
(1433), so there are many uncertainties.

Of course for any potentially visible effects to be observable from Earth-based telescopes, darkness is needed at the telescope's location. Since these events are taking place during Northern Hemisphere summer, when daylight hours well exceed nighttime hours, Southern Hemisphere locations have a somewhat preferable opportunity for observing Jupiter at moments of comet-fragment impacts.

No one expects any effects to be visible to naked-eye observation. Probably the most likely effect amateur astronomers with good telescopes could detect, says Mark, would be a possible gradual change in the appearance of the Jovian atmosphere due to debris from the collisions. — Ken Frazier

sonic aircraft. After a few seconds, the comet will penetrate deeper into the planet where the hydrogen/helium atmosphere is thicker.

The pressure will increase, deforming the



GIANT FIREBALL predicted by latest Sandia simulations is 600 kilometers in diameter and extends far above Jupiter's visible cloud tops 65 seconds after comet entry. The upper horizontal line is at 400 km altitude and indicates the limb of Jupiter, meaning the upper part of the fireball may be observable by earth-based telescopes. Cometary debris, appearing here as small, dark patches, is lofted and dispersed throughout the volume of the fireball.

fragment and causing instabilities to develop. After a few more seconds, the instabilities will cause the fragment, traveling at 60 kilometers per second, to break up catastrophically, depositing most of its energy into the planet's atmosphere.

By this time, the comet will have passed beneath Jupiter's clouds, but it will have left a trail of hot high-pressure air and cometary debris behind. This column of hot gases will expand explosively into the surrounding atmosphere, creating a fireball that grows upward supersonically at speeds approaching that of the impacting fragment, only in the opposite direction.

A column of hot gases will expand explosively, creating a fireball that grows upward supersonically.

After about one minute, the fireball will be 600 kilometers in diameter and still growing. The gas at the top of it, more than 900 kilometers above the Jupiter cloud tops, will be heated to more than 3,000 Kelvin by the shock wave.

Tantalizingly close to the limb

Early estimates of the comet's orbit had predicted it would hit well on Jupiter's back side, preventing any direct observations and forcing astronomers to rely upon space probes and possible weak reflections of light off Jupiter's closest moons. Updated orbits calculated from new images taken by the improved optics installed in the Hubble Space Telescope put the impacts tantalizingly close to the limb of Jupiter — its horizon as seen from Earth.

"In fact," says David Crawford, "some of the fragments will not disappear behind the planet until they have already entered the thin upper atmosphere 400 kilometers above the clouds. Less than a minute later, the top of the hot fireball will rise back into view," he says.

The Sandians are not yet prepared to predict whether the fireball will be bright enough to be seen from Earth. Even though its temperature will be more than half that of the sun's surface, the fireball will not be big enough to be optically thick unless it contains a sufficient amount of material from the comet. However, David says the fireball will emit light at other wavelengths that can be detected and used to validate the Sandia predictions.

Intel CRADA

(Continued from Page 1)

the diffusion furnace lead to contamination that causes quality problems with manufactured chips. Process or hardware changes may be recommended that could lead to a 50-percent reduction in particle contamination.

(5) Failure analysis — Sandia has developed unique methods for tracing the location of faults in integrated circuits. In this project, the Labs will transfer this knowledge to Intel to help the firm quickly determine the cause of failures, thereby reducing manufacturing costs and improving quality and profitability.

Keeping the US at the forefront

Paul Percy, Director of Microelectronics & Photonics Center 1300, says this new CRADA will help keep the US microelectronics industry at the forefront of advanced technology. This is

the second Sandia/Intel CRADA. An agreement signed last year covers advanced processing and is with Intel's Components Research group in Santa Clara, Calif.

Sandia has had a formal working relationship with Intel's New Mexico plant for more than a year. "During that time," Paul says, "the two companies have established excellent rapport, working on projects that have enhanced Intel's water conservation efforts and quickly resolved several short-term process and equipment issues."

An Intel scientist also works on-site at Sandia's Center for Contamination-Free Manufacturing, a new industry initiative within the Labs' Microelectronics Center.

The new agreement complements Sandia's work with SEMATECH, a consortium of US semiconductor manufacturers and the Department of Defense. Its mission is to address technical challenges required to keep the US number one in the global semiconductor industry.



Technology Ventures builds toward helping companies

Martin Marietta's new Labs' commercialization entity

Political, educational, and business leaders participated in the ground breaking for a 50,000-square-foot building for Technology Ventures Corporation April 7 at the University of New Mexico's University Center Research Park.

Technology Ventures Corporation (*Lab News*, Feb. 4) was established by Martin Marietta Corporation to support start-up and expanding technology-based companies — especially to promote the commercialization of technology from the national laboratories, primarily Sandia, and the research universities in New Mexico.

In becoming Sandia's management and operating contractor for DOE last year, Martin Marietta committed to establish and fund TVC at \$1 million a year for five years and also to construct a building for it. The building will also be used by representatives of venture capital firms and other organizations that support technology commercialization.

At the ground-breaking ceremonies, at the northwest corner of University and Stadium SE, dignitaries hailed the new nonprofit corporation as a welcome indication of Martin Marietta's dedication to bringing Sandia technologies to commercial fruition for the benefit of the nation's technological might and the state's economic livelihood.

Sherman McCorkle, president of the new corporation, hosted. He said TVC has already signed memorandums of understanding with

four venture-capital groups and is engaged in numerous other relationships with companies. He said the building is expected to be completed by the end of this year.

Other speakers included Martin Marietta Vice President and TVC Chairman Dan Peterson, New Mexico's US Senators Pete Domenici and Jeff Bingaman, US Representative Steve Schiff, Sandia President Al Narath, UNM President Richard Peck, Albuquerque Mayor Martin Chavez, and a representative of Governor Bruce King.

Domenici referred to the New Mexico national labs as "gigantic treasures of science excellence and superior engineering technology," but he said they must meet the challenge



TECHNOLOGY VENTURE — Dan Peterson (right), Vice President of Martin Marietta Corporation and Chairman of Martin Marietta's nonprofit Technology Ventures Corporation, talks with Sandia President Al Narath at conclusion of ground-breaking ceremonies for TVC's building.

of sharing their technologies more aggressively with private enterprise or face shrinking prospects. He and other speakers said they felt the challenge could be met.

— Ken Frazier

Headquarters gives 'thumbs up' to Labs' diversity plan

Sandians on Secretary O'Leary's calendar next week

Sandia's diversity program is getting special attention these days from DOE Headquarters in Washington.

Corlis Moody, Director of DOE's Office of Economic Impact and Diversity, has visited sites throughout the DOE complex to appraise their diversity programs. She attended Sandia/New Mexico's first-ever Executive Forum on Diversity in November, which brought together business leaders, city and state government officials, and community leaders in an effort to take Labs

diversity efforts into the surrounding community. (*Lab News*, Dec. 17, 1993)

Apparently Moody was impressed with what she saw, says Mike Robles, Director of Diversity Leadership Center 3600. Energy Secretary Hazel O'Leary's office called March 4 requesting that Mike and several other Sandians meet in Washington to talk about diversity at Sandia.

O'Leary may use Sandia's diversity plan as a model for other DOE sites, says Mike. "Sandia

is doing some things that other sites in the DOE complex are not doing," he says. "The Secretary wants to hear firsthand the details of our Strategic Diversity Plan." (See "Sandia's diversity program in a nutshell.")

On April 19 several Sandians, including Labs President Al Narath and Executive VP Jim Tegnella, will present Sandia's diversity plan to O'Leary, Moody, and other members of O'Leary's staff. Kathy Carlson, Kirtland Area Office Manager, also plans to attend.

The presentation will cover Labs diversity work in such areas as community outreach, technology transfer, education outreach, supplier relations, and work force diversity plans, says Mike.

"When we started the diversity programs at Sandia, we were challenged to be a model in the DOE complex," he says. "This meeting may be the first indication that we are succeeding."

— John German

Sandia's diversity program in a nutshell

Sandia Quality Leadership Council — Members of Labs upper management who meet once a quarter to set directions, policies, and strategies for managing diversity.

Diversity Leadership Committee — Labs directors who plan, set strategic goals, and look ahead three to five years to anticipate future diversity issues.

Corporate Diversity Team (CDT) — A cross-section of employees who look at data, analyze issues, and set tactical goals.

Diversity Action Teams — Created by the CDT to be its working arm, tackling work force issues and implementing changes. (*Lab News*, April 1, 1994)

Diversity Leadership Integration Team — Expert managers from throughout Sandia writing a Strategic Diversity Plan that covers all aspects of diversity at Sandia.

Executive Forum on Diversity — Periodic conferences with local business leaders, city and state government officials, and community representatives to discuss and plan for improving Sandia's diversity performance in the surrounding community.

Diversity champions and partners — Ordinary Sandians who receive one-day ("partners") or three-day ("champions") training in diversity. Purpose is to create a network, or "critical mass," of Sandians to act as spokespeople and advocates of diversity throughout Sandia. It is hoped that 800 to 900 people can be trained within three years.

Outreach committees — Six outreach committees do recruiting, provide educational programs for minority youth, attend job fairs in the community, and provide mentoring, job training, and counseling to employees. (*Lab News*, July 26, 1991)

Education outreach — Various community educational programs aimed at encouraging young people, often minority students and young women, to pursue careers in science and engineering.

Take Note

Academic Year in the USA International (AYUSA), a non-profit student exchange organization, is looking for host families for foreign exchange students coming to New Mexico. If you are interested in hosting a high school exchange student, please call Margaret Keller (AYUSA) on 265-9136.

The Juvenile Diabetes Foundation, a non-profit organization supporting research for a cure for diabetes, is looking for volunteers to write letters to members of Congress to request support for diabetes research. Please call Lelia Beth Lukens on 299-1271 for more information.

Less-than-lethal

(Continued from Page 1)

nuclear assets, says Dennis. (See "Why explore less-than-lethal?")

Sticky foam, for instance, is a tenacious, tacky, non-hardening thermoplastic foam originally developed to counter possible terrorism at US nuclear strongholds. In its stored state the foam is slightly more dense than water; when expelled it expands 35-50 times its original volume, adheres to its human target, and immobilizes him.

"Sprayed at arms or legs, a suspect would stick to himself and anything he touches, including the floor," says Tom Goolsby of Access Delay Technology Dept. 9611, lead researcher on a prototype sticky foam gun now

being tested at Sandia. In demonstrations, says Tom, he sometimes steps into a wad of sticky foam and challenges observers to remove the shoe from the floor. "They can't do it," he says.

The Sandians first experimented with a sticky foam gun attached to a backpack device (foam stored on the officer's back). But the NIJ wanted more portability. As a compromise the researchers developed a one-piece, 20-pound shoulder-slung device, which carries less foam but is still effective.

First use likely in prisons

The gun is most likely to get its first use in US prisons, where corrections officers must occasionally remove unruly prisoners to inspect cells. "If a prisoner refuses to leave the cell, prison officials have a series of steps they have to go through, including negotiation," he says. "If the prisoner still refuses, a 'cell extraction'

team puts on protective gear — body armor, helmets, heavy boots, and shields — and goes in and physically subdues the prisoner, handcuffs him, and hauls him out."

Corrections officers and prisoners often get hurt in the melee, says Tom. Last summer a corrections officer at the New Mexico State Penitentiary was hospitalized when a prisoner slashed his jugular vein with a shard of glass from a broken TV set.

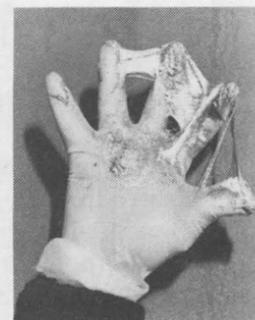
Tom says a sticky foam gun could prevent many such injuries. "You'd shoot the sticky foam in there and the prisoner would have a hard time fighting you," he says.

The gun might also be useful for subduing small-scale riots in prisons and keeping prisoners away from security controls. Perhaps eventually, some version of the gun might be used by law enforcement agencies to apprehend suspects.

One "sticking point" with sticky foam, says Tom, is that it takes a good long while to clean up. Recent Sandia tests have identified non-toxic, nonhazardous agents to clean sticky foam off people and equipment, he says.

Because of these cleanup issues, spraying gobs of sticky foam into a crowd might not be

(Continued on next page)



STICKY FOAM is a tacky, non-hardening plastic foam originally developed by Pete Rand (1811) as part of the Labs' Nuclear Security Program.



FOAM FOR FELONS — Jeff McDowell of Access Delay Technology Dept. 9611 sprays a mannequin with sticky foam using a new sticky foam gun he built and helped test. The gun is among a relatively new class of "less-than-lethal" weapons for law enforcement that temporarily disable, rather than kill, their human targets. It is likely to get its first use in US prisons. (Photo by Randy Montoya)

Labs investigates criminal justice technologies

As the nation's war on crime intensifies, a variety of Sandia-developed technologies may eventually prove useful to the law enforcement community.

Labs sensing technologies may one day help keep track of criminals on probation, parole, or pre-trial release, for instance. As prisons become increasingly overcrowded, judicial officials are looking for an affordable means of punishment other than jail time. "Electronic monitoring" is an attractive alternative in some cases.

Today's electronic monitoring devices — wrist and ankle attachments that help authorities keep track of offenders — typically communicate with the offender's telephone and tell authorities only when he or she is at home. Researchers are working on a cooperative research and development agreement (CRADA) with Spectrum Industries (Santa Clara, Calif.) to create devices that update authorities on the whereabouts of an offender at any time. (Technical contact: John Browning, 9351)

Sandia is also working with major banks and credit card companies on ways to dis-

courage bank card fraud. A CRADA is under way with Citibank to find ways to readily detect credit card alteration. (Technical contact: Ric Davis, 5848)

The Labs recently completed a project with the Puerto Rico Administration of Corrections to provide prison population projection modeling, and the Minnesota prisons system has solicited Sandia's help in developing advanced technological security systems that allow it to "do more security with less funding."

Labs information processing technologies may help law enforcement agencies follow drug traffickers, simulate crimes, examine evidence, and keep track of arrest and drunk driving records. They may also help identify illegal aliens who commit second or third offenses, a major challenge in some border towns.

Image processing technologies may also help the National Center for Missing and Exploited Children improve its image-aging algorithms, used to electronically enhance pictures for widely distributed flyers.

Why explore less-than-lethal?

The military has been quietly studying less-than-lethal weapons (called "disabling technologies" in military circles) for more than a decade, exploring such options as low-energy lasers that cause temporary visual impairment, low-frequency sound emitters that cause disorientation and nausea, and super-slippery anti-traction substances that make roads and runways impassable.

But the need for less-than-lethal capabilities in law enforcement is clear. The National Institute of Justice less-than-lethal program is aimed at developing such capabilities.

Not only should less-than-lethal weapons allow suspects to be brought in for questioning relatively quietly, they also could reduce the chances that a law enforcement agency would be held financially liable when an officer uses force to stop a threatening suspect. Liability costs may be the single most inhibiting factor in law enforcement today, says Dennis Miyoshi (5800).

However, Dennis emphasizes, less-than-lethal technologies are not substitutes for deadly force. In many cases, deadly force will always be the only safe option for police officers in split-second, threatening situations. A less-than-lethal capability simply gives officers one more option.

"Sandia has developed a number of nuclear security technologies over the years that we believe can be translated and put to civilian use, particularly in law enforcement," he says.

E-mail latest Sandia 'information superhighway' vehicle

Options available for variety of Labs needs

By Howard Kercheval

Lab News Staff

No one who has looked at the Labs' growing demand for e-mail services could doubt that Sandians are rushing the entry ramps to the national information superhighway in numbers matching those of other groups across the country.

The interest and growth in Labs e-mail connections is just part of the effort to increase the flow of information at Sandia. For example, the new mail sorter in the mailroom and a new mail stop system hurry paper on its way to individuals, and there's been an explosion in the number of Voicemail connections.

Interest in e-mail began growing about the same time as interest in Voicemail. And the agent of both was replacement of the old telephone switching equipment and extensive rewiring, which made more Sandians aware of the services available — services that had not been available to many of them because of limited infrastructure.

'Gateways' tie systems together

Tom Obenauf of Information Systems Development Dept. 10326 says that right now there are four major e-mail systems in use at Sandia — Office Vision, cc:Mail, SMTP (Simple Mail Transfer Protocol, which includes Somnet), and All-in-One. Two other e-mail-user pockets use Word Perfect Office and Microsoft Mail, and Microsoft

has a keen interest in making more of its products available to Sandians.

"What we'd like to do is let people be able to choose whatever product makes the most sense for them to use to accomplish their business objectives

and not have to worry about the problem of 'Now, how do I talk to somebody else who is using a different mail system?'" says Tom.

The answer to that dilemma is an electronic translator called a gateway that allows users to move from one mail system to another seamlessly. "The goal," he says, "is to make sure that eventually everybody in the corpora-

"The goal is to make sure that eventually everybody in the corporation is reachable electronically."

(Continued from preceding page)

the best way for officers to silence a riot. For larger-scale disturbances, Sandia is investigating a water-based "aqueous foam" that expands to 500 times its original volume and can fill rooms or isolate people in a crowd if necessary.

Aqueous foam like soap suds

"It looks and feels like kitchen soap suds, except with larger bubbles," says Tom. "It doesn't stop people from breathing or moving, but it does isolate people — leaders and followers in a riot, say — both visually and acoustically."

Aqueous foam is also a good fire retardant, he says, which makes it perfect for riot situations in prisons and on streets. A similar foam was adopted by the Department of State a number of years ago for embassy protection.

Sandia is also investigating a variety of "smart gun" technologies to reduce the likelihood of an unauthorized user pulling the trigger of an officer's gun, says Dennis.

Training first step in productive use of e-mail

Because of the burgeoning use, training is a vital step in efficient, productive use of e-mail. Beverly Ortiz of Information Systems Development and Training Dept. 10323 says the following training is available, or planned, on the various systems and networks in use at Sandia:

- For the Somnet system, publications will be available soon on Sandia Line. The information will cover not only Somnet per se, but Somnet as a means to communicate with people on the Internet.

- Training on Internet usage is being considered because many Sandians now want to communicate with people outside

the Labs — at the Kansas City Plant, DOE offices, Pantex, and other places.

- For Office Vision, there are live classes and self-study courses with documentation.

- A major thrust in the next few months will cover personal computer mail products, specifically cc:Mail and Microsoft mail.

Because different people prefer different educational paths — some like live classes, some prefer reading a book, still others prefer self-study courses — many training options are available.

"We'll be announcing them in the *Weekly Bulletin*," says Beverly.

tion is reachable electronically, and you don't have to worry about what e-mail system they're using."

An electronic directory including all Sandians and contractors — which is already operating — makes mail flow through the various systems. "To send mail to somebody, all you have to know is the person's name," he says. "You don't have to know what system that person's on or how to address it; you just put the name on it and the system takes care of routing it."

Beverly Ortiz of Information Systems Development and Training Dept. 10323 says the universal introduction of e-mail will change the way business is done at the Labs. Employees will be able to do more than just tap out messages; they will be able to share information in their computers, such as spread sheets, data base files, word processing files, and graphics files.

"For example," says Beverly, "in our center, we're looking at something that will enable you to sign on to the e-mail system and generate a time card or purchase request, and have it all done electronically — no more paper. We want to improve the way we do business, and cut out a lot of lost paper work and time delay."

Another application being examined is travel arrangements, she says. When Thomas Cook Travel is making travel arrangements for Sandians, instead of faxing details, they could be e-mailed.

The NIJ estimates that 10 to 12 police officers are killed each year with their own firearms. A gun that wouldn't fire when taken from an officer could save lives and millions of dollars in retraining costs and survivor benefits, according to Doug Weiss of Real-time Monitors and Controllers Dept. 2337, lead researcher for Sandia "smart gun" technologies.

Typically, an electronic chip or other sensing device implanted in the gun would determine whether the user fits a predetermined set of characteristics. If the gun doesn't "recognize" the shooter, it won't fire. "The set of authorized users might include the officer, the officer's partner, or any member of the officer's precinct," he says.

DOE sponsored a year's worth of exploratory work on smart gun technologies, and the NIJ recently decided to continue the research. Two gun manufacturers have shown interest in the project.

"We are not producing a smart gun, but we are exploring various technological possibilities for smart guns," says Doug. ●

"That's where we'd like to be, but in the interim, we're going to try and get people first to think about e-mail sort of like you think about Voicemail now — it's just a communication method that seems to make sense in today's business environment and for the future," she adds.

Beverly says the system would allow Sandians to correspond electronically with people off the laboratory sites by providing access via the Labs' various e-mail systems to Internet, the international e-mail network connecting government agencies, commercial businesses, educational institutions, and other entities.

Tom says that of the 12,287 Sandians and on-site contractors — as of April 1 — 6,328 had some sort of e-mail capability, including about 950 at the California site. This marked a milestone for Sandia: For the first time, more than half the entire organization is reachable through electronic mail.

The project to rewire the Labs with copper and fiber optics cable, headed by Bob Dougherty of Communications Programs (NM) Dept. 1906, has increased communications options dramatically.

The vast majority of Labs e-mail flows on the "black" — unclassified — network, and part of Bob's project has been to increase the amount of black wiring. Black wiring is being installed in Bldgs. 836 and 821 now, and will be installed in other buildings as current work is finished. E-mail can be accessed through ISDN (Integrated System Digital Network) phones, as well as through computers.

The focus, says Tom, has been to try to install new wiring and features that wiring can support, like e-mail, geographically rather than by organizations.

Handling 'junk' e-mail

But while she is a big fan, says Beverly, enthusiastic e-mail users must take care not to abuse the system. It is so easy to use, she says, that subscribers have to guard against things like sending routine messages out to potentially large audiences, creating electronic junk mail.

Just like bulletin boards are now used in buildings, messages of a general nature — which some recipients might consider to be "junk mail" — will be put on e-mail bulletin boards for perusal by those interested, at their convenience.

"Potential problems like that are being examined by a subgroup of our e-mail team," she says. "There're a lot of organizations that want to communicate with others, and we all have a tendency to get information overload." ●

Employees apply quality principles successfully

What do you think?

"What Do You Think?" features employee responses to questions posed by the Lab News. The idea is to give Sandians an opportunity to voice their opinions and thoughts about various issues — some serious and some not so serious. Some responses have been lightly edited and condensed to meet our maximum word limit.

The current question: "How have you applied quality principles to your work as an individual, and have your work habits improved as a result?"

I have used personal defect checklists as one type of quality improvement metric. For example, I set a goal that all meeting notes for one team had to be out within seven days of the meeting. Over four months, I decreased from eight to zero defects. Several internal customers also commented on my improvement. Next, I will reduce the cycle time by decreasing my goal.

Suzanne Weissman (6000)

Recently, I was given the opportunity by my manager to redesign my office workspace. Making sure I got the suggestions and input from some of my co-workers, we all contributed to the design and layout, and now I have a truly professional and work-efficient area. More important, I did notice a subtle improvement in the morale of the entire office. What we accomplished was to create a healthier and happier work atmosphere and one in which we all were involved, causing pride in our department. And all I did was ask. It was definitely a win-win situation.

Nancy Campanozzi (12660)

You can ask my boss about my work quality, but I know I've applied quality principles to my education. Several weeks ago, while verbally agonizing over a test I was going to be

Attention, Secretaries & OAAs: What do you think?

Here's the next question:

Because this is Secretaries' Week, we decided to ask secretaries and office administrative assistants (OAAs) specifically what you think about a Sandia issue. **If you could change or improve one thing in your department, center, or division, what would it be, and why?** The Lab News will print reasonable responses anonymously if you prefer.

We'll be calling some secretaries and OAAs and asking you personally to respond to the question. If you agree, we'll fax you a one-page answer sheet (with guidelines) that you can complete and fax back to us. Other employees are also welcome to respond — not just the folks we call. If you'd like to respond, please call us for a form on 844-7841 or 844-7522.

taking that evening in my systems analysis class, my next-door office neighbor, Gene Smit (12911), gave one of his usual "confidence boosters" stating, "Don't worry, most professors will let you do a repeat if you really bomb a test." I promptly said, "I don't do repeats. I do it right the first time." We immediately burst out laughing and Gene boasted, "Spoken like a true quality professional." As for improvement of my work habits, as a result of applying quality principles, I got a B on that test, but I'm sure

after I apply the techniques I learned in root cause analysis (not to be confused with psychoanalysis), I will get an A on my final.

Janet Ratliff (10104)

Quality principles have been helpful to me by making quality an objective in my daily work activities. If one makes quality his objective in all of one's daily work activities, it follows that work productivity will increase and personal job satisfaction manifested.

Name withheld by request

The single most important aspect of quality, in my opinion, is knowing clearly what my customer wants. This provides a focus to my work and helps avoid wasteful diversions. I call my DOE customer often to be sure he is happy with the way I am heading, and change direction to better match his priorities when needed.

Ron Lipinski (1145)

Congratulations

To Toni (2752) and Rick (7815) Pierson, a son, Micah David, March 15.

To Suzette (3544) and John Brooks, a son, John Tyler, March 16.

To Deborah and Matthew (6331) Kozak, a son, David Matthew, April 7.

Welcome

Albuquerque — Anthony Farino (1324), Samuel Key (1561)

Other New Mexico — Joanne Lawry (7573)

Minnesota — Scott Jones (6216)

New Jersey — John Sullivan (1153)

Texas — Larry Schneider (1243)

Wisconsin — Theresa Brown (6331)

Sandia News Briefs

Scholarships available to minority students for T-VI administrative assistant degree

Sandia is offering four \$1,000 scholarships to help minority students obtain administrative assistant degrees from Albuquerque Technical-Vocational Institute (T-VI). Scholarships will be awarded beginning with the 1994 fall semester. Minority students planning to enroll in a full-time (12-18 hours) administrative assistant program at T-VI are eligible to apply for scholarships. Recipients will be required to attend school full time and work part time (15-20 hours a week) at Sandia during the program. The objective of the program is to encourage minority high-school students to make post-high-school education a part of their aspirations and to promote personal growth through on-the-job training. Information about the program is available from Ann Murphy, General Employment and Staffing Support Dept. 3533, on 844-8976 or Diana Cole, Secretarial Services Dept. 12111, on 844-0817.

American Ceramic Society recognizes Richard Brow

Richard Brow, Glass and Electronic Ceramics Dept. 1845, will receive the Karl Schwartzwalder-Professional Achievement in Ceramic Engineering (PACE) award from the American Ceramic Society (ACerS) at the ACerS annual national meeting in Indianapolis April 24-27. The Schwartzwalder-PACE award is presented annually to recognize outstanding young ceramic engineers for achievements significant to the ceramics profession and the general welfare of the American people. Richard is currently studying the short-range structure of novel glasses and how that structure can be manipulated to obtain specific thermal, optical, and chemical properties. He is a Sandia Science Advisor volunteer.

Students become science investigators through Sandia's Manos program

From Feb. 28 to March 25, more than 200 local Hispanic middle-school students became science investigators in the four-week Manos (the Spanish word for hands) program sponsored by Sandia's Educational Outreach Department and the Labs' Hispanic Leadership and Outreach Committee. Manos is designed to encourage Hispanic students to pursue careers in science and engineering. Now in its third year, the program emphasizes the "hands-on" nature of the workshops and classes designed to draw students into the investigation of science. Students sign up for chemistry, computer literacy, electronics, mathematics, or physics workshops. More than 80 Sandia Hispanic scientists and engineers have volunteered to teach these workshops. Student projects included making digital clocks, writing computer-generated newspapers, and conducting other experiments to make learning fun.

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

April 28 is 'Take Your Daughter to Work Day'

On Thursday, April 28, parents all over the country will be taking their daughters to work. Sandia's Women's Program Committee endorses this national event and invites Sandia mothers and fathers to bring daughters ages 9-15 with them to work on April 28 to learn about the different jobs women hold at Sandia. Individuals are responsible for getting their daughters special passes to enter the technical area. Special activities are being planned. Additional information about activities at Sandia/New Mexico will be announced in the April 25 *Weekly Bulletin*.

Research shows that compared with boys the same age, adolescent girls may experience a loss of confidence and somehow forget how competent they can be. Adolescence is the age span when many boys become vocal and extroverted in contrast to girls who may undergo a sharp drop in self-esteem.

According to the Ms. Foundation, approximately 500,000 girls nationwide accompanied their mothers and fathers to the workplace last year. National "Take Your Daughter to Work Day" encourages girls ages 9-15 to be "visible, valuable, and heard."

Feedback

Q: I would like to compliment the Sandia Quality Organization for efforts in the first annual President's Quality Award contest. Quality initiatives are (and should be) here to stay. I offer two constructive criticisms in pursuit of continuous improvement.

• My organization was disappointed that the award examiners did not follow the process they originally prescribed, in that they did not conduct field interviews with the finalists. I assume the examiners were overwhelmed with the number of applicants, and therefore were unable to allocate the time required for such interviews. It seems unreasonable, however, to make the award based solely on a three-page application.

• I am aware that the Malcolm Baldrige Award criteria do not allocate points for "originality" or "initiative." The national laboratories, however, have always looked to take technology to new levels and we should assume this leadership role in quality areas as well. Using the best available technology and methodology of others is good business practice, but we should also strive to recognize and reward initiative in quality. While I fully subscribe to metrics for self-measurement and to benchmarking against other "best-in-field" organizations, I believe the true leaders in quality are the innovators who are looking to take the competition to a higher level, and willing to take some risk. Future award criteria should recognize originality and initiative.

A: Since we are currently gathering feedback for improvements to the President's Quality Award (PQA) process, your input is greatly appreciated. One of the modifications being considered is the addition of one or two pages to the application specifically for data. Your suggestion of field interviews for the finalists will also be considered, but will depend on the availability of resources. The published PQA Guidelines for 1993 stated that additional data might be requested to clarify information. Due to the high number of applications submitted, there was not adequate time or resources to conduct such interviews.

The PQA, like the Malcolm Baldrige Award, purposely avoids being prescriptive to encourage creativity and innovation in satisfying the award criteria. Your point is well taken and will be considered by the PQA Design Team in improving the application guidelines and future PQA training. As you indicated, Sandia is looked at as a leader in cutting-edge technology. These capabilities are only valuable if they are directed toward achieving customer satisfaction.

Maureen Baca (12909)

Q: I suggest you reconsider the merits of creating an organization number that exceeds four digits. Numerous forms used throughout the corporation, including Facilities, Finance, Personnel, Medical, to name a few, are set up for four digits. Far more computer programs — Facilities space assignment, MSR requests, Requests for Service, budget allocations, finance data bases, medical and payroll data bases, and so on — are set up for four digits. I suspect it will be very costly to reprint the forms and reprogram all the data bases to accommodate the new 10000-plus organizations.

The previous system of going to less than four digits when required stayed within the confines of our current system. Perhaps we should continue to use that. Again, I recommend you revisit the pros and cons of going beyond four digits. The impact is considerable. The indirect and hidden costs may be much larger than anticipated.

A: The organization change was precipitated by the Oct. 1 reorganization. The old four-character organization number was not able to accommodate 11-12 divisions except by using the old 100, 200, 400, etc. to identify a division. Organization 100 had worked as an

identifier for the Chief Financial Officer's division prior to October 1993, because none of the Org. 100 centers had more than nine departments. However, on Oct. 1, 1993, three centers were moved to the Chief Financial Officer's organization and at least one of these centers has more than nine departments.

A team with a wide representation was formed to develop alternative organization identifiers. Team members considered three alternatives:

- Four-character alpha-numeric organization identifier, with position one denoting division, position two the center, and positions three and four the department.
- Five-character numeric organization identifier,

with positions one and two denoting division, position three the center, and positions four and five the department.

- Eight-character numeric.

The various options were presented to the vice presidents for a decision, and a majority chose the five-character numeric organization identifier.

To turn back now would be expensive and could lead to many other problems in the mainline administrative systems. I suggest that in the future, the owner of the data items or central administrative computing be contacted before incorporating corporate data fields in local data systems.

Ralph Bonner (3500)



HEADS UP — A photographer (above) gets a straight-on shot of a Russian Antony An-124 cargo plane on a ramp near Kirtland's Base Operations as others (right, background) line up for a tour of the huge aircraft. The plane delivered four Topaz II reactors — one of which is being off-loaded onto a flatbed truck in the photo below — like the two Phillips Laboratory received from Russia in 1992. The reactors are undergoing non-nuclear tests by a team of researchers from Phillips, Sandia and Los Alamos national labs, and the University of New Mexico's Engineering Research Institute. Frank Thomé (6403) is Sandia's Topaz International Program Manager, representing Phillips Lab while on assignment under provisions of the Intergovernmental Personnel Act. Five other Sandians also have management roles supporting the Topaz program, in the areas of operation and testing of the reactor, and safety evaluations. The arrival of the An-124 — larger than the US C5 Galaxy and second in size only to another Russian-built aircraft — drew a large crowd of the curious March 31, and the section of Gibson Boulevard at the north end of the airport's north-south runway was closed for about 10 minutes the following morning because of the powerful thrust created as the huge plane powered up its engines for takeoff.

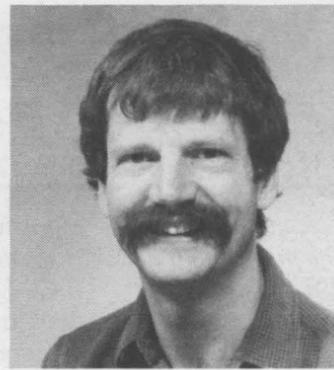


Mileposts

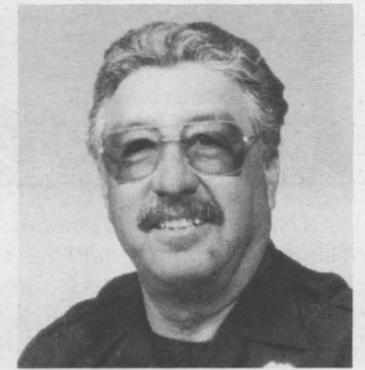
April 1994



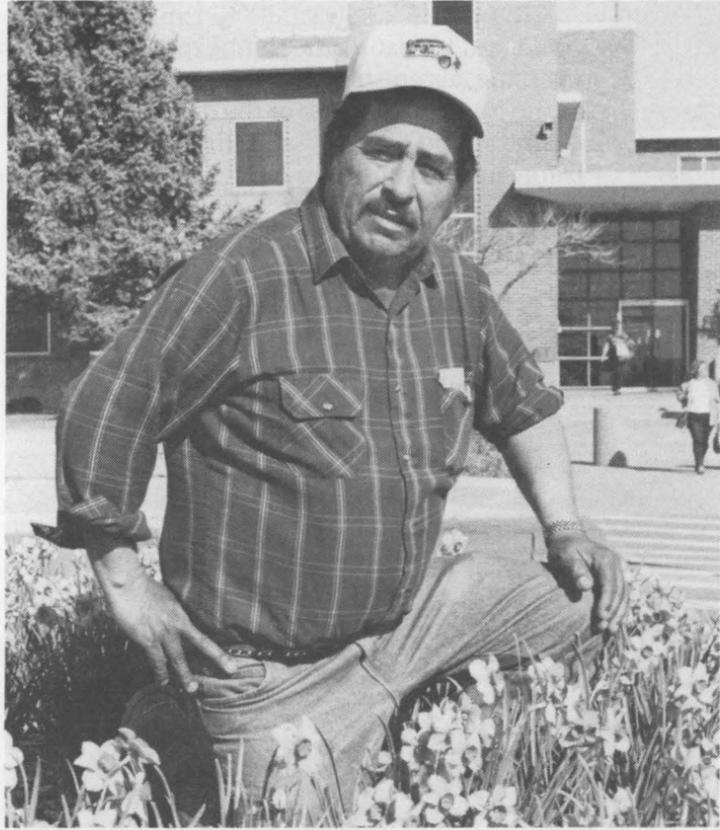
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William Davidson
2161 15



Ruben Garcia
7435 20



Willie Lucero
7813 20



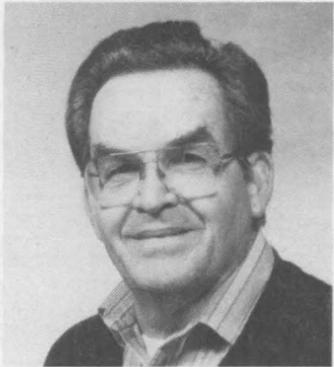
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Marie Iverson
2900 30



Pam Barr
8362 15



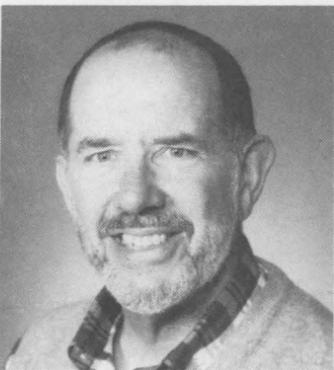
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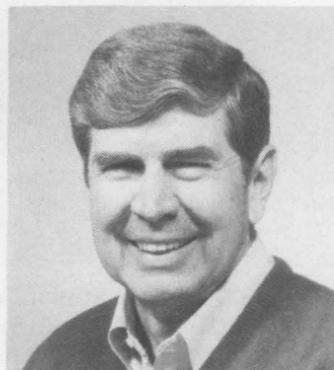
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Mike Ford
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Jake McMichael
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Donald McBride
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Orlando Romero
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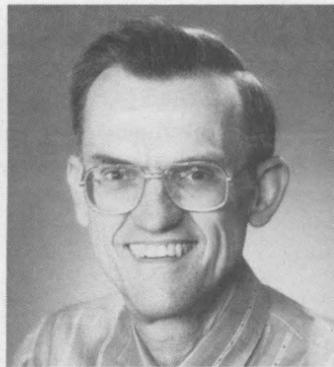
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Darcy Hughes
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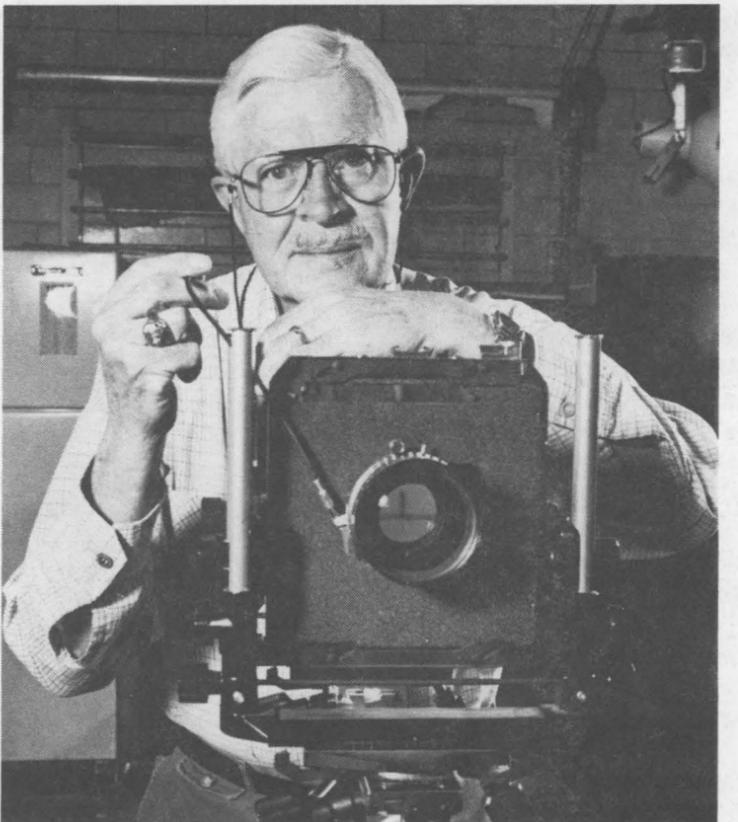
Sean Souther
7616 20



Kenneth Marx
8362 25



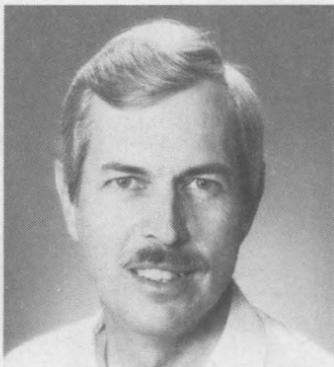
Anthony Trennel
6642 15



Oscar Goodwin
7154 40



Gloria Chavez
7000 15



Dan Tichenor
8413 25



Michael Hightower
6612 15

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

MISCELLANEOUS

- THOMASVILLE DRESSER, pecan finish, \$100; pottery lamp, \$25. Kraynik, 856-1683.
- GITAR PRE-AMPLIFIER, Rockman X-100, complete w/AC adapter and output adapter kit, \$75 OBO; drum machine, DR110, \$50 OBO. Schultz, 275-9349.
- LOOM, four-harness, Leclerc Nilus, w/bench, warping frame, shuttles, etc., \$450. Chow, 281-9235.
- METAL DETECTOR, Rainbow Model RX-70, w/7- and 14-in. search coils, \$89. Smiel, 865-9081.
- EXERCISE BIKE, Schwinn Airdyne, \$275; full-size bed, \$75; antique secretary, \$160; antique bureau/mirror, \$350; Durst enlarger, \$200. Hughes, 265-1698.
- OVERHEAD CAMPER, Mitchell, 11.5-ft., excellent condition, must see, thousands less than comparables, \$3,800. Quintana, 898-6718.
- VIDEO CARD, ATI Graphics Ultra, Mach 8 driver, \$40; Panasonic auto FM deck, \$75; VCR/CATV four-way amplifier/splitter, \$10; software. Brosseau, 869-7335.
- CAMPER SHELL, for long-way mini pickup, window boot, keyed back door, \$175 OBO. Gallegos, 247-9284.
- LYNX GOLF SET, irons, woods, putter, bag, cart, covers, \$400; Browning clubs and bag, \$300; glass display showcase, 6' x 4' x 2', \$275. Montoya, 884-5174.
- YOUTH HELMET, Rhode Runner, new condition; skates, size 5-1/2, very good condition. Sparks, 884-5644 or 880-0324.
- GLASS SHELVING, one 20" x 54" x 1/4", one 18" x 54" x 1/4", three 20" x 48" x 1/4", fifty 18" x 48" x 1/4", \$5/ea. OBO lot. Houghton, 299-3386.
- GOLF CLUBS, Ping Eye-2, Black dot, 1, 3-SW.LW, will split, \$450; Taylor driver, \$40; sliding glass door, w/aluminum frame, 6-ft. wide, \$30. Feng, 275-6639.
- GOLF CARTS, electric, Kangaroo Deluxe, new batteries, battery charger included, good condition, \$350/ea.; nose cover, for '90 Camry LE, like new, \$50. Eifert, 299-3847.
- CEMETERY PLOTS, two, side-by-side, Gate of Heaven-Holy Family section, \$1,750 for both. Aronson, 898-8893.
- SOFAS, baker's rack, metal cabinet, metal shelving, hedge clipper, deacon's bench, bedroom set, sitting-nude picture, Christmas decorations. Johnson, 296-1917.
- MIRROR/DRESSER, good condition, \$45; T-lock shingle, dark brown, \$21/ea. square; Fender amp, Verbolux, \$285. Sanchez, 832-6260.
- TIRES, two Pirelli 185-60-R14-82H, \$15/ea.; two Sumitomo 185-60-R14-82H, \$30/ea. Cropp, 296-1877.
- CAMERA BODY, SLR, Pentax K-1000, \$50; zoom lens, 70-210, \$50; heart-rate monitor, \$35. Lorence, 275-3586.
- YARD SALE, April 16-17, 8 a.m.-4 p.m., 12004 Prospect Ave NE, Juan Tabo/Menaul, furniture, clothing, hardware, photo gear. Brooks, 275-0056.
- PLOTTER, HI DMP-52, single-pin, plots A1, A2, and D-size, stand, fits 8" x 32" space, works great, \$800. McKeever, 299-4050.
- PATIO SALE, April 16, 8 a.m.-5 p.m., 1016 Dakota SE, nice furniture, TV, books, kitchen things, lots of good stuff. Arning, 256-9229.
- COMPUTER, 386SX16, 14-in. VGA, 4MB RAM, 80MB HD, two floppies, software w/original disks and manuals, \$600 OBO. Mann, 343-0524.
- MOVING BOXES, 90-100, \$50; custom draperies, wall-size, w/upholstered boxes and hardware, \$50; Voit rowing machine, \$50; torch lamps, \$10/ea. Daniels, 237-9631.
- COUCH & LOVESEAT, tan/earthtones, \$200; kitchen table, w/leaf and four chairs, \$150; sewing machine, \$150. Rimkus, 281-2048.
- TWO-FAMILY GARAGE SALE, April 16, 5705 La Corrida NE, Tandy computer, clothes, furniture, toys, more. Kemm, 880-0629.
- SPEAKERS, Bose Model 4.2, paid \$200/ea. 2-1/2 years ago, sell for \$160 for the pair. Smith, 896-1173.
- ANTIQUA MILK CANS, two, \$10/ea. Peterson, 256-7514.
- TYPEWRITER, portable, manual, w/carrying case, \$20. Lucero, 899-0521.
- LONDON FOG COAT, girl's size 10, long, mauve, channel quilted, detachable hood never worn, new \$125, asking \$40. Desjardins, 821-2744.
- ROUND TABLE, 60-in., glass-top, bamboo-look, w/four matching cushioned chairs on rollers, Southwestern colors, beige, peach, green, \$200. Seyfer, 292-0179.
- ARCHERY SET; parachute luggage; golf driving net; roll-a-way bed; exercycle; manuals, for '84 Ford van; air conditioner, for 389 Ford. Walsh, 265-7498.
- WATERFALL HOT TUB, one yr. old, \$5,000; desk, bookcase, coffee table, and lamp, Spanish wood, \$200. Ask for Linda. Smith, 344-5886.
- COMPUTER, 80286, 12Mhz, 1MB RAM, 40MB HD, monochrome monitor, baby AT case, \$250. Ellis, 260-1455.
- RECEPTIONIST DESK, w/typing extension, \$45; shotgun shells, 20-gauge; clay targets; 30-30 rifle cartridges. Swahlan, 292-3598.
- WATERBED, twin-size, complete w/heater, thermostat, set of sheets, and two-drawer frame, \$125. Moore, 898-9590.
- PRINTER, HP Thinkjet, small, quiet, \$50; software, Crosstalk communications software, for Windows, unopened, \$45 OBO. Holloway, 294-5815.
- OFFICE DESK, 30" x 60", Formica laminate, \$65; trundle bed, w/head & foot boards, \$50. Thompson, 293-8390.
- MAGAZINES, *Snow Country*, and *Skiing*, free, you pick up; barstool, adjustable height, swivels, high back, \$22. Horton, 883-7504.
- ORGAN, Baldwin Fanfare, w/books and bench, needs tuning, cost \$3,000, asking \$500. Randolph, 299-2057.
- SOFA SLEEPER, queen-size, neutral colors, good condition, \$150. Klavetter, 299-4299.
- WEIGHT BENCH, compact size, adjustable inclined back, leg curls, w/barbell, dumbbells, total 120 lbs. weights, \$75. Shinn, 291-8825.
- MULTI-FAMILY RUMMAGE SALE, April 16 & 17, 8 a.m.-5 p.m., 927 San Pedro SE, furniture, clothes, toys, you name it. Levin, 897-7145.
- COMPUTER, 16 Mhz, 286 PC, 1MB RAM, 40MB HD, two floppy drives, 14-in. VGA color monitor, modem, \$299. Stearns, 298-0444.
- TRUMPET, like new, \$150. Smith, 344-5886.
- STUNT KITE, dual-line control, 8'8" wingspan, rip-stop nylon sail, graphite frame, new \$150, sell for \$75. Montoya, 296-4268 before 9 p.m.
- POOL TABLE, 8-ft., 1-in. slate top, accessories, like new, asking half of new price; over-cab camper, 6-ft., stove, furnace, sink, ice box. Cawfield, 294-5893.
- GARAGE DOOR OPENER, Craftsman, 1/2-hp, two openers, partially assembled, used less than one year, \$90. Quinn, 296-7743.
- MOVING BOXES: wardrobe, \$4/ea.; mirror/art, \$2/ea.; assorted other sizes, 40 total. McNiel, 344-7694.
- FIRST COMMUNION DRESS, white w/veil, beaded headpiece, size 7/8, \$25; AC welder, 295-amp., two ranges, w/wheels, like new, \$225. Stang, 256-7793.

Deadline: Friday noon before week of publication unless changed by holiday. Mail to Dept. 12660, MS 0413, or fax to 844-0645.

Ad Rules

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

- EXERCISE BIKE, Schwinn Airdyne, white, 5 yrs. old, good condition, \$350. Kempka, 822-0898.
- TAILGATE, \$125; rear bumper, \$100. Both for '87 Toyota short bed, 1/2-ton pickup. Baca, 296-8474.
- ANTIQUA BED, full-size, vanity, and nightstand, Jenny Lind, \$250 OBO. Martin, 296-8154.
- NUCLEAR REACTOR TOY TRAIN SET, US Army markings from early 1960s, six cars, track, transformer, good working condition, \$175 OBO. Torres, 294-7273.
- DINETTE SET, four chairs, \$375; brown chairs, \$25/ea.; saw table, \$10; gas log lighter, \$20; luggage, \$75; bookcase, \$35; camera & projector, \$50. Purcell, 296-4986.
- MICROWAVE OVEN, Toshiba, full-size, \$50; stair stepper, \$40; stereo, \$40; small maple desk/chair, \$50. All excellent condition. Gillen, 298-2282.
- COMPUTER, 386DX, 4MB memory, 89 MB HD, 3-1/2 and 5-in. floppies, software, \$600. Adams, 296-6017.
- MATCHING LOVESEATS, two, blue/green, plaid, \$125/ea.; sofa bed, olive stripe, \$175; green armchair, \$75; bunching tables, two, \$50 for both. Banks, 268-7723.
- AQUARIUM, 55-gal., w/custom heavy glass top, \$65. Wallace, 256-1643.
- BUNKBED SET, \$125; two Playschool comforters, twin-size, blue, w/matching sheet sets, curtains, rug, \$50. Mayer, 299-8524.
- TRIPOD, heavy-duty, pan, tilt, good condition, list price more than \$900, good value at \$90. Scott, 281-4332.
- BIKE BABY SEAT, \$15; baby changing table, blue, \$60; potty chair, \$10. Dobranich, 298-4547.
- EXECUTIVE OFFICE CHAIR, \$50; mauve sofa sleeper, \$95; lamps, \$10-\$20/ea. Diltz, 899-0372.
- GARAGE SALE, Sat., April 23, 709 Dakota SE, children's clothing, electronics, more. Stanley, 255-3083.
- WESTERN SADDLE, dusty, but hardly used, paid \$1,000, sell for \$500. Jaramillo, 294-1779.
- PANASONIC SPEAKERS, 36-watt, pair, \$15; camera lens, 28mm, f.28 MD, \$30; teleconverter, 2X, MD mount, \$30. Horn, 821-6721.

TRANSPORTATION

- '85 SAAB 900 TURBO, 5-spd., new clutch, rebuilt transmission, recently replaced turbo, power everything, sunroof, \$4,600 OBO. Schafer, 294-5406.

- '89 CHEV. BLAZER S10, 4.3L V6, FI, AT, loaded, low mileage, excellent condition, \$11,000. Bisbee, 293-0356.
- '84 CHRYSLER DELUXE, 65K miles, \$4,000. Brown, 294-2375.
- '87 NISSAN STANZA GXE, 5-spd., AC, PW, PL, cassette stereo, 113K miles, one owner, very good condition, below book, \$3,500. Lucero, 899-0521.
- '89 HONDA MOTORCYCLE, CBR 600, red/white/blue, 9K miles, good condition, \$2,900. Oberkamp, 888-1981.
- BOAT, '78 Marquis, 19-ft. open bow, 305 Chev. V8 w/OMC outdrive, V-hull, new paint, ski/fishing, excellent condition, \$6,000. Durkee, 255-4211.
- '69 VW BODY, \$300; '61 Chrysler 318 engine, \$300; two VW engines, \$300 complete. Sanchez, 832-6260.
- '93 FORD RANGER, 4x4, Zia Edition, 5-spd., V6, AC, cruise, take over payments. Perez-Romo, 662-0649 call collect.
- '85 MAZDA RX-7 GS, 53K miles, 5-spd., red w/gray interior, AC, cruise, garaged, perfect condition, excellent maintenance, \$4,995. Richards, 296-2272.
- '91 MAZDA MIATA, blue w/hardtop, 30K miles, excellent condition, just in time for the convertible season, \$9,800. Jackson, 291-0584.
- '88 FORD PICKUP, F250-HD, 351 ci, AC, cassette player, 5-spd., sleeper, excellent condition. Morales, 296-0928, leave message. '86 TOYOTA 4x4, 42K miles, 4-cyl., 2.2L engine, camper shell included, excellent condition, \$5,400. Zimmerman, 296-7181.
- BICYCLE, 10-spd., Puch Odysse, like new, \$175. Eifert, 299-3847.
- '92 SUBARU, SVXLS-L Touring, black, 230-hp, all-wheel, max loaded, 46K miles, includes warranty, excellent, below book, \$19,000. Trauth, 281-4197.
- '77 HARLEY-DAVIDSON SPORTSTER, customized, 3-1/2-gal. fuel tank, new tires, new battery, lots of chrome, \$4,500 OBO, will consider trades. Martin, 296-8154.
- '76 GMC MOTORHOME, 54K miles, Zip-Dee awning, dual air, generator, steer-safe, excellent condition, \$29,500. Montoya, 884-5174.
- '35 FORD COUPE, five-window, complete, has been dismantled for off-frame restoration, \$3,500. Steele, 281-5186 after 4 p.m.
- '89 CORVETTE CONVERTIBLE, fully loaded, 23K miles, original owner, like new condition, NADA \$21,575. Martin, 299-8276.
- '86 MITSUBISHI TRUCK, Mighty Max, w/camper shell, 5-spd., 95K miles, one owner, excellent condition, \$2,550 OBO. Henfling, 869-4119.
- RECREATIONAL PACKAGE, Dodge truck, large engine, short-bed, club cab, w/22-ft. fifth-wheel, fully self-contained, sleeps four, many extras. Armstrong, 881-1931.
- ROAD BIKE, Novara Strada, 21-in. frame, brand new, REI list price \$570, sell for \$299. Roth, 344-7060.
- '86 DOLPHIN RV, 22-ft., 4-cyl., Toyota AT, overdrive, 75K miles, 17 mpg, well kept, \$9,500. Randolph, 299-2057.
- '88 TOYOTA CELICA CONVERTIBLE, 79K miles, 5-spd., fully loaded, red w/black top, new top, \$8,400 OBO. Dwyer, 271-1328.
- '65 DATSUN ROADSTER, original Fairlady 1600 two-seat convertible, blue/white, easy daily driver, many extra parts, excellent condition, \$3,200. Nowlen, 296-8680.
- '85 DODGE COLT, 2-dr. hatchback, 4-spd., 59K miles, AM/FM cassette, 32 mpg in city, 36 mpg hwy., \$1,900 OBO. Nation, 298-5605.
- '80 OLDSMOBILE CUTLASS BROUGHAM, original owner, rebuilt AT, new paint, PS, PB, AC, cruise, perfect condition, everything works, \$2,500. Lucero, 856-6293.

REAL ESTATE

- 4-BDR. HOME, 3 baths, solar room, barn, one acre plus, Sandia Park. MaFarland, 281-5346.
- 2-1/2 ACRES, tall pines, water system and electric included, S-14 area, \$34,500, cash discount. Swahlan, 292-3598 evenings.
- 4-BDR. HOME FOR RENT, NE, 1,800 sq. ft., 2 baths, La Cueva District, 2-car garage, security alarm system, Aug. '94-Aug. '95, \$1,000/mo. Schwartz, 856-0836.

WANTED

- MOVING BOXES, reasonably priced or free. Sparks, 884-5644 or 880-0324.
- HOME FOR DOG, German shepherd/collie, 8 mos. old, very nice friend. Ask for Adam Jimenez, 296-9256.
- WITNESS, to car collision at San Pedro/Gibson, March 22, 4:10 p.m. Scharrer, 883-8670.
- TIRE RIM, for '90 Nissan Sentra, 13-in., 4-hole, reasonably priced. Chavez, 293-2202, leave message.
- WORDPERFECT, Version 5.1. Smith, 294-3413.
- OLD TRANSISTOR RADIOS, and older tube-type plastic table radios with speaker louvers, working or non-working. Roose, 296-4129.
- AUTOMOTIVE TOYS or related items, Matchbox, Hotwheels, Corgi, Tonka, etc; slot cars, model cars, built or unbuilt. Torres 294-7273.
- HOUSEMATE, large home, Rivers Edge area, non-smoker, available late July or early August, \$600/mo. including utilities. Johnson, 867-2365.

LOST & FOUND

- LOST: Prescription sunglasses, trifocals in a vinyl case, April 1, in vicinity of TTC or Area 4. Zaffery, 5-9141.

Oom-pah-pah! Polka and feast at German night

Coronado Club Activities

TAKE A BREAK and come to the savory Sunday Brunch Buffet, April 17, from 10 a.m. - 2 p.m. and follow that with the Tea Dance to the music of Bob Weiler and Los Gatos. The new prices for the combination are \$6.95 for adult members, \$7.95 for nonmember guests, and \$1 for children age 4 to 12. Children 3 and under eat free.

THIS IS WHAT you've been waiting for! Friday, April 22, is German Night. The buffet all-you-can-eat menu includes knackwurst and bratwurst (German sausages), sauerbraten (German pot roast), schweineschlegel (roast ham - Black Forest Style), hot German potato salad or

sauerkraut, a variety of vegetables, and full salad bar. It's \$8.95.

BUT THAT'S just the start! Work off all that food with some Oom-pah-pah! "Die Polka Schlingels" provide the music and "Rudy's Schuhplattler Dancers" will perform Austrian and German folk dances. Reservations are recommended for this special evening.

YOU HAVE less than two weeks to join the Coronado Club for one year and get two months membership free. The deadline is April 30. That's also the last day to buy discounted pool passes. The pool will open for the season May 28.

Earth Day festivities take place next Friday

This baboon erases graffiti

If you're looking to have a good time and learn something too, the Earth Day Festival at Hardin Field (Kirtland AFB parade ground) next Friday, April 22, looks to be a can't-miss opportunity.

The entertainment will include the "Endangered Species" bluegrass music group and the "Coyote Canyon Cloggers," both composed of mostly Sandia and DOE employees. But the highlight just may be a baboon that's trained to erase graffiti, says Ken Hanks (6911), one of several Sandians on the planning committee. The baboon is part of a presentation by a group called "Talking Talons" that rescues hurt animals and educates people about wildlife issues.

With the theme of "Pollution Prevention: Today's Gift for Tomorrow," the Earth Day Festival is cosponsored by Sandia, DOE, and the Air Force. Sandians and their families and Sandia retirees are welcome to attend. The festival begins at 11 a.m. and wraps up about 2 p.m.

Food, fun, and serious stuff

Although plenty of fun and food are featured, more than 40 educational displays will emphasize the serious side of Earth Day, notes Ken. Sandia is sponsoring many of these displays along with other groups including the

US Forest Service, US Fish and Wildlife Service, New Mexico State Parks, Keep New Mexico Beautiful/Keep Albuquerque Beautiful, and several more.

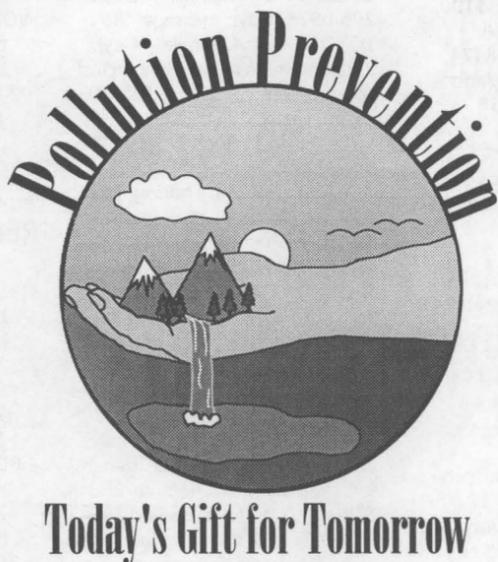
Here are only some of the items/subjects that Sandia will feature: chlorofluorocarbon elimination, renewable energy, oil recycling, electric vehicles, environmentally safe batteries, environmentally conscious manufacturing, environmental restoration, and film-less photography.

All displays will be open throughout the three-hour festival. Food and drink items from the Sandia Cafeteria will be sold from 11:15 to 1. The Coyote Canyon Cloggers will

perform 11:30-12, the Talking Talons presentation will take place 12-12:15, and Endangered Species will play 12:15 to 1:15. Other scheduled activities include a "Seventh Street Hoops" shooting contest that begins at 12:30, and the "treasures from trash" contest judging that starts at 1.

Sandia's participation in the Earth Day Festival is sponsored by Energy and Environment Div. 6000 and Laboratories Services Division 7000. A complete agenda for the festival will be sent to Sandians next week. For more information, call Ken Hanks on 845-9370, Fran Stohl on 844-7991, or Robyn Davis on 848-0969.

— Larry Perrine



Fun & Games

Bowling — SANDOE Bowling Association Bowlers-of-the-Month for February include: Scratch — Milt Stomp (6200), 635; and Margret Tibbetts, 584; Handicap — Stephen Winters (9323), 596 and 671; and Dorothy Castro (DOE), 481 and 673.

Winner of the Four-Game Mixer Tournament March 19-20 at Holiday Bowl was Marcus Weaver, with a 761 handicap series. Second place went to Reyes Chavez (7433), with a 753 handicap series.

Take Note

The New Mexico Chapter of the American Vacuum Society will hold its 30th Annual Symposium April 18-22 at the Albuquerque Holiday Inn Pyramid. Special 30th anniversary commemorative events will be held in conjunction with the symposium. Events include technical sessions with invited presentations by nationally recognized experts in vacuum science and surface chemistry and physics and contributed presentations by Chapter members, a five-day short-course program, and a two-day vendor equipment exhibit. The keynote address on Tuesday, April 19, at 9 a.m., will be given by Charles Holland, President of the Texas Institute for Advancement of Chemical Technology and Professor Emeritus at Texas A&M University. His topic is "Chemicals and Cancer — What are the Facts?" The keynote address is open to the public. An exhibit of scientific equipment will also be open to the public on Tuesday, April 19, 9:45 a.m.-6 p.m., and Wednesday, April 20, 9 a.m.-3 p.m. For more information about the symposium and the keynote address, call Prof. Abhaya Datye, UNM Department of Chemical and Nuclear Engineering, on 277-0477 or Cheryl Brozena on 277-2225.



TAKING MEASURE — Tim Ward (left), an assistant professor at the University of New Mexico, and Bob Schwartz (1846) review results of an ellipsometer investigation of sol-gel deposited strontium cobalt iron oxide thin membranes. These materials are under development as oxygen separation membranes in the newly dedicated Inorganic Membrane Laboratory at the Advanced Materials Laboratory at University Center Research Park. The research is being conducted as one part of a cooperative research and development agreement (CRADA) involving Sandia, UNM, and the Amoco Corporation.

Recent Patents

Vincent Hietala, Stanley Kravits, and Gregory Vawter (all 1322): Digitally Controlled Distributed Phase Shifter.

Vincent Hietala (1322), Jon Martens (former Sandian), and Gert Hohenwarter: Apparatus and Method for Measuring and Imaging Surface Resistance.

Clifford Loucks and Gregory Starr (both 2111): Automated Edge Finishing Using an Active XY Table.

William Swansiger (8712): Non-Reclosing Pressure Relief Device for Vacuum Systems.

Gregory Frye (1315), Jeffrey Brinker (1846), Daniel Doughty (2523), Thomas Bein, and Karin Moller: Coatings with Controlled Porosity and Chemical Properties.

David Andaleon (8111), Leonard Napolitano (8117), Robert Redinbo, and William Shreeve: Fault-Tolerant Corrector/ Detector Chip for High-Speed Data Processing.