Working with Industry, Universities

Sandia Chosen to Lead DOE Center for Synthesis and Processing of Advanced Materials

In today's highly technological world, it's no secret that leadership in materials science and engineering is crucial to essentially every US industry and the economic, environmental, and military health of the nation.

To help strengthen R&D efforts in this field, Sandia researchers are pursuing an advanced materials initiative, supported by DOE, that focuses on developing the technologies needed to produce high-performance materials and molecules.

Although in the past the US has been the undisputed leader in Materials Science and Engineering (MS&E), that leadership is now threatened by competition from other countries, especially Japan and Western Europe. In a recent study, the National Research Council noted that the US continued to be the leader in innovation, but was falling behind in synthesis and processing.

"There should be an emphasis on synthesis of new materials, and work on processing should stress science and technology relevant to manufacturing," the study concluded.

"One of our goals is to control materials from the atomic structure up to macroscopic dimensions."

It was this conclusion that prompted Congress to appropriate funds this year for a DOE Center of Excellence for the Synthesis and Processing of Advanced Materials. Sandia was chosen to lead the distributed center, which will involve research at 11 DOE labs. The materials initiative encourages cooperation with industry and is funded by DOE's Office of Basic Energy Sciences. Sandia's R&D will be carried out by Solid State Sciences 1100, Microelectronics and Photonics 1300, Materials and Process Sciences 1800, and Combustion & Applied Research 8300. (All of these organizations contributed to the proposal.)

The Center's goals will be to determine the principles that control the synthesis and processing of materials, to develop specialized equipment and sensors, to reduce the time span and cost of commercializing materials, to document the principles learned, and to transfer new technologies to industry, says Fred Vook, Director of Solid State Sciences 1100.

Total initial funding for the Center of Excellence, which supports research at Sandia and the other DOE labs, is $5 million. The center is managed by George Samara, Manager of Condensed Matter Research Dept. 1150.

GEORGE SAMARA (left, 1150) and Jeff Tsao (1144) review data related to molecular beam epitaxy (MBE), a process for growing crystalline overlayers on a substrate. This process is accomplished with special equipment in background.

"One of our goals is to control materials from the atomic structure up to macroscopic dimensions," says George.

Scientifically Structured Materials

Researchers associated with the Center will concentrate on such problems as how to produce atomically structured materials for devices such as solar cells, infrared detectors, high-frequency transistors, and optical modulators. Atomically structured materials are "grown" one atom at a time, like a layer cake, with layers a few atoms to 100 atoms thick, explains Fred. (See "Sandia Researchers," page five.)

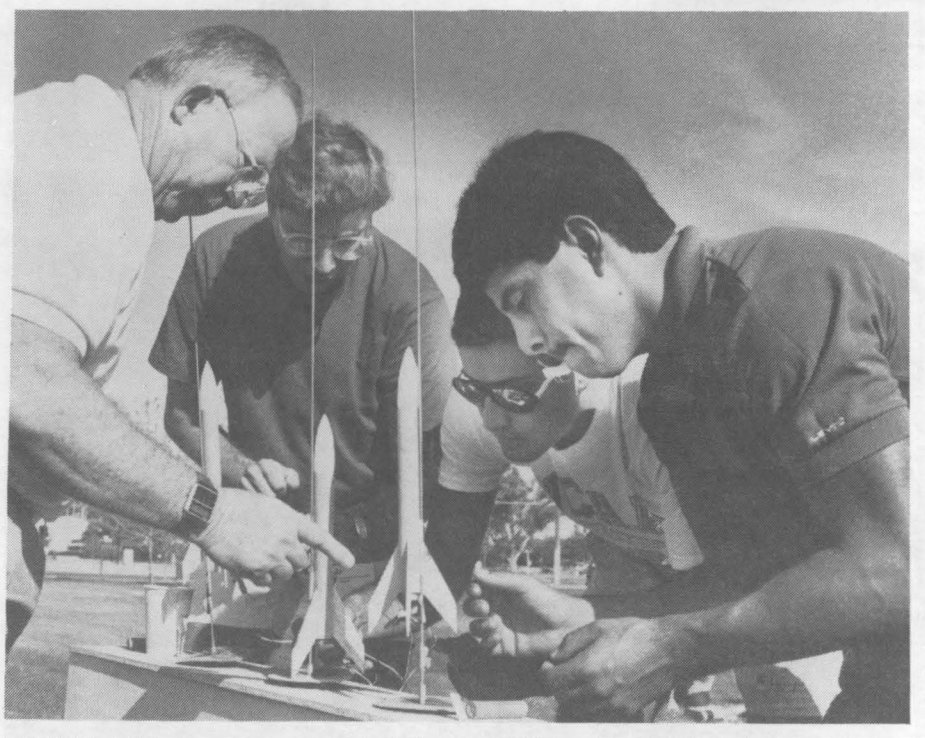
These atomic layers are generally produced by one of two processes: metalorganic chemical vapor deposition (MOCVD) or molecular beam epitaxy (MBE). CVD is the growth from the high-temperature vapor phase of a coating onto a substrate to get certain electrical, mechanical, or optical properties; MBE is the growth of a crystalline

(Continued on Page Four)

How Sandia Technology Protects Weapons from Terrorists — Page Eight

LAB NEWS

VOL. 43, NO. 17 SANDIA NATIONAL LABORATORIES AUGUST 23, 1991



TEACHERS become rocketeers during the DOE-sponsored Teacher Opportunities to Promote Science (TOPS) summer institute. Setting up on Kirtland's Hardin Field are (from left) Richard Sanchez, Director of Aerospace Education Workshop for Teachers at UNM, who directed the TOPS rocket projects, and teachers Bernard Leverett of Hobbs and Richard Salaz and Dennis Garcia of Artesia. TOPS gives teachers from rural New Mexico an opportunity to improve science and math skills and take hands-on activities and materials back to the classroom. The TOPS program at Sandia is coordinated by Sharon Holmes (3511).

For Your Benefit

Albuquerque-Area Employees And Retirees to Get HMO Option

Albuquerque-area Sandians and retirees will soon have the option to join a health maintenance organization (HMO) — the Lovelace Health Plan — with coverage to become effective Jan. 1, 1992, as an alternative to the Medical Care Plan (MCP) indemnity plan administered by Mutual of Omaha.

There will be an open enrollment period in October during which employees and retirees can choose to join the HMO or to continue receiving their medical benefits under the indemnity plan during 1992. (Open enrollment periods will be held each fall so employees and retirees can choose their coverage for the following calendar year.)

HMOs have become increasingly popular in recent years. Sandia, Livermore employees have had the HMO option for 20 years, notes Linda McEwen of Benefits Systems and Health Care Planning Div. 3545; about 50 percent of employees and retirees there now elect this option.

Premiums Fully Covered First Two Years

As negotiated with the employee unions in Albuquerque, Sandia will pay the full monthly premium for the first two years for most persons who choose the Lovelace Health Plan (the only exceptions are certain part-time employees and certain retirees who now pay part or all of their medical care premiums). Sandia, Livermore employees pay part of the HMO monthly premium — the amount in excess of the cost to Sandia for the indemnity plan. The premium-sharing policies will become identical at the Albuquerque and Livermore sites after the second year of offering the Lovelace

(Continued on Page Ten)

This & That

Sandia Degrees – A recent report from Personnel Information Systems Div. 3532 shows how many Sandians have degrees and in what fields (as of July 25). Some random observations about our "severely educated" folks (those with doctorates):

Sandians have 1,371 doctorates. Although we call Sandia an engineering lab, Sandians have more doctorates in the sciences, 703 (including math and computing), than in engineering, 639. Here's a short list of the number of Sandians with doctorates in specific disciplines: physics, 321; mechanical engineering, 225; electrical engineering, 146; chemistry, 145; chemical engineering, 92; nuclear engineering, 82; materials science, 59; math, 54; and computing, 51.

No other disciplines have as many as 50 doctorates. Surprisingly (at least to me), Sandia even has 23 folks with doctorates in the humanities.

* * *

Fablab Words Sought – Assistant Editor Charles Shirley says he learned a new game while on vacation – it's called Balderdash. The idea is to score points by making up definitions (for real words) that opponents will accept. One of the following definitions is real, and one is an imaginary one that he fell for – you guess which is which. Is a "tinnock" the front pleat of a kilt? Is "scrumpox" a disease associated with football, spread by close contact during scrimmage? See next issue for the answer if you don't want to look 'em up.

I'm betting you creative Sandians can come up with some fine, six-bit, high-tech-type words and definitions that sound like they should mean something in the context of our work, but don't (in this game, you can even make up the words). Send your candidate words and definitions to "This & That," Div. 3162, and I'll print any real gems.

* * *

No Basket Case – Ken Frazier (3161), editor of *Sandia Science News*, recently sent out a letter to people on his mailing list, asking recipients to return the letter if they wanted to continue receiving the publication. The letter also said, "If you don't care to remain on our mailing list, toss this letter in the most convenient wastebasket." Albuquerque Mayor Louis Saavedra – a strong recycling proponent – returned the letter so he could stay on the mailing list, but the "wastebasket sentence" was circled and this handwritten note was added: "Shame on you. Think Recycling!"

* * *

Rough Voyage – Occasionally a dumb question deserves a dumb answer. A letter to the *Wall Street Journal* a few weeks ago recalled a 1947 cable sent to the US Embassy in La Paz, Bolivia, asking when a certain ship could dock there – La Paz is a city at an altitude of 12,500 feet in a landlocked country. The reply: "Terrain difficulties would seem to make such a trip inadvisable at this time."

* * *

Honest Salesman – I hope the TLC (Total Life Concept) folks will forgive me for printing this, but I noticed that a young fellow selling cotton candy at the local ball yard got lotsa smiles and probably even made some sales with this line: "DEEEEEEEE-LICIOUS – Who Cares About Nutritious?"

•LP

To Strengthen Joint Contributions

Sandia, DNA Form Strategic Alliance

Sandia and the Defense Nuclear Agency (DNA) have established a strategic alliance to promote cooperation in research, development, and testing related to national security missions.

A memorandum of agreement, signed Aug. 19 by Sandia President Al Narath and Maj. Gen. Gerald Watson, DNA Director (see photo below), strengthens collaboration in nuclear weapon effects testing and design and evaluation of survivable systems). The agreement encourages technology transfer and staff interaction between the two organizations, mutual access to complementary and unique facilities, teamwork in professional staff development, coordination of programmatic responsibilities, and efficient use of limited resources.

Noting that collaboration between DNA and DOE dates back to the 1960s, General Watson said, "This is an unparalleled opportunity to allow us to pool our resources and, in the process, strengthen the contribution we make to national defense."

Al pointed out that Sandia's Hermes III project is the result of joint technology development with DNA and Sandia.

Pressure from Declining Budgets

"We are living in a day and age of increasing pressures, not the least of which is coming from declining budgets for defense," said Al. "Nonetheless, recent events in the Soviet Union indicate that national security is a matter to be taken as seriously as ever. More will be expected of us in the future, and we will be expected to do it with less."

Principal areas of collaboration will be various technologies that support underground testing, aboveground testing, and development of survivable systems that operate in hostile environments. Specifically, the alliance will focus on improving underground test beds, improving instrumentation and diagnostics for both aboveground and underground testing, and developing new simulation facilities and advanced pulsed power and radiation source technologies.

DNA is responsible for DoD matters concerning nuclear weapon system acquisitions, nuclear weapon effects on weapon systems, and nuclear weapon safety and security.

LAB NEWS

Published Fortnightly on Fridays

SANDIA NATIONAL LABORATORIES

An Equal Opportunity Employer

ALBUQUERQUE, NEW MEXICO 87185-5800
LIVERMORE, CALIFORNIA 94550
TONOPAH, NEVADA
NEVADA TEST SITE
AMARILLO, TEXAS

Sandia National Laboratories, a prime contractor to the US Department of Energy, is operated by Sandia Corporation, a subsidiary of American Telephone and Telegraph Co.

LARRY PERRINE, Editor (505/844-1053)
CHARLES SHIRLEY, Assistant Editor (846-5542)
LINDA DORAN, Writer (846-6888)
JOHN GERMAN, Writer (844-7842)
RANDY MONTOYA, Head Photographer (844-5605)
MARK POULSEN, Photographer and Production Coordinator (844-5605)
JANET CARPENTER, Editorial Assistant (844-7841)
DAWN THATCHER, Assistant (844-7841)
LAB NEWS FAX, (505/844-0645)
BARRY SCHRADER, Livermore Reporter (415/294-2447; FTS 234-2447)

STRATEGIC ALLIANCE between Sandia and the Defense Nuclear Agency (DNA) was formally established Aug. 19 when Sandia President Al Narath (left) and Maj. Gen. Gerald Watson (DNA Director) signed the memorandum of agreement at Sandia. The alliance promotes cooperation in research, development, and testing related to national security missions.

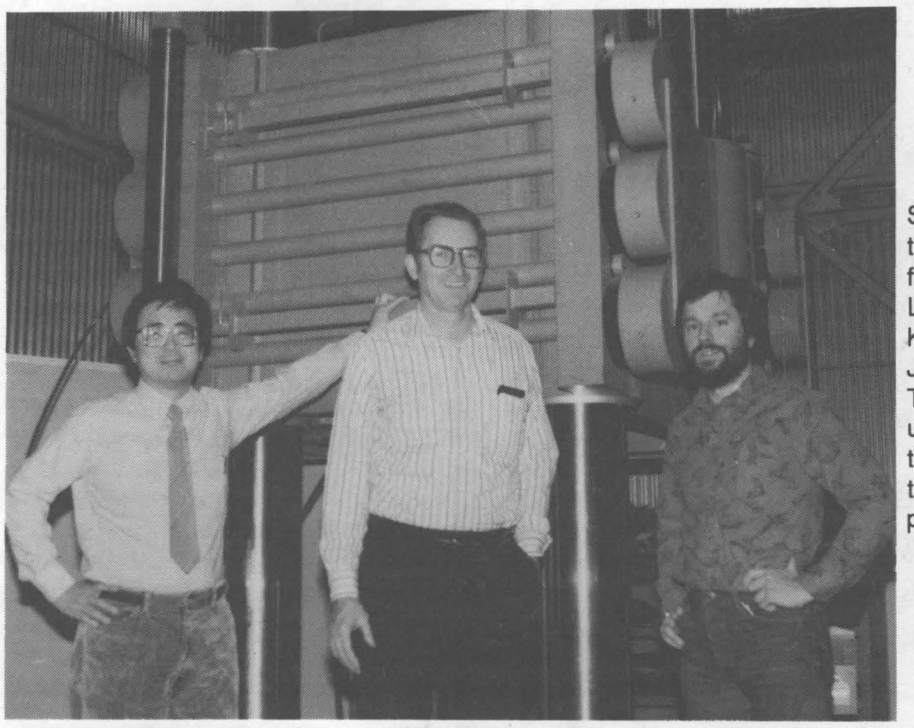
Grams to Kilotons

Sandia Facilities Are a National Resource for Materials Testing

Under one roof in Experimental Mechanics Div. 8246 are mechanical testing facilities that measure force in grams or kilotons, computer-controlled facilities that do multiaxial materials testing, test systems that span a dozen decades of strain rate, and a full complement of laser diagnostics — and these are just a sample.

"The days are past when I'd have to qualify our test capabilities by starting with 'For a lab our size . . .,' " says Wendell Kawahara, 8246 Supervisor. "We are now a national resource for materials testing."

Wendell is in a good position to know; he is past chairman of DOE's Interagency Manufacturing Operations Group (IMOG) Subgroup on Mechanical Testing. He and Bob Reese (2742) are now editing the Society for Experimental Mechanics' *Handbook on Structural Testing*.



STANDING IN FRONT of the 2-million-pound test frame in the Materials Test Lab are (from left) Wendell Kawahara, John Totten, and John Korellis (all 8246). This piece of equipment is used for high-force applications, such as static simulation of high G-forces on penetrators.

Experiment and Theory Are Close-Knit

Other Division 8246 staff members include Dan Dawson, Beth Fuchs, John Korellis, and John Totten, and a group of STAs who are versed in mechanical design, computer programming, electronics, and optics. Consultants from the faculties of UC Berkeley, Stanford, and other top universities contribute to continually improve capabilities. Having the experimental, theoretical, and analytical mechanics staff in one close-knit department gives experimental research direction and focus, says Wendell.

DOE and qualified industrial customers can utilize Sandia's mechanical testing capabilites to avoid the expense of purchasing their own capital equipment and the delays involved with having to train their own staffs, notes Wendell.

To help get the word out to industry, Wendell recently wrote an article for the technical trade publication *Closed Loop*. The nine-page article focuses on quantifying strain rate, temperature, and the moisture-dependent nature of polymers for a DoD customer, the Army Ballistic Research Lab.

Tough Tests for Many Customers

Sandia has also performed challenging tests for other DOE facilities, including Los Alamos, Lawrence Livermore, Oak Ridge, Mound, and Allied Signal, and for outside labs such as SRI (Stanford Research Institute) and the Navy's David Taylor Research Lab.

Last month, the division conducted a DOE Technology Transfer Short Course on Materials Testing, which featured in-depth lectures about creep and superplasticity, composites, and laser interferometry. Soon, the mechanical testing laboratory will be reclassified as an administratively controlled area, making it easier for international researchers to use the facility. •

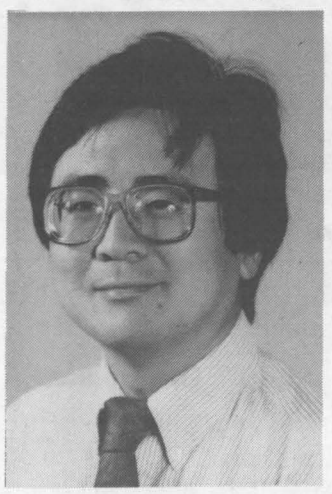
SANDIA LIVERMORE NEWS

Supervisory Appointments

WENDELL KAWAHARA to Supervisor of Experimental Mechanics Div. 8246.

Wendell joined Sandia, Livermore's Applied Mechanics Department in 1978 after his doctoral studies. He did finite element analyses for three years, and later focused on experimental mechanics. More recently, he has supported project groups in mechanical testing and worked on internal R&D programs, mainly in material modeling.

Wendell has a BS in mechanical engineering from the University of Colorado, an MS in applied mechanics from UC Berkeley, and a PhD in experimental plasticity from Yale. He is also a PhD recruiting team member for Sandia at UC Berkeley.



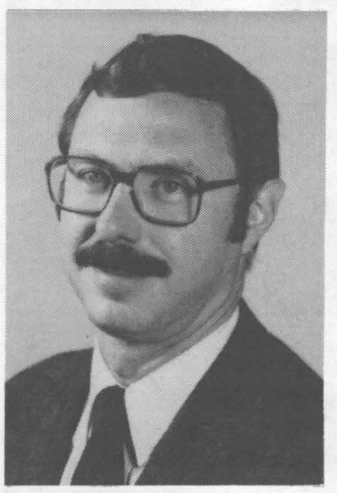
WENDELL KAWAHARA

Wendell is a member of the Materials Research Panel for the DOE University Research Instrumentation Program, former chairman of DOE's IMOG (Interagency Manufacturing Operations Group) Subgroup on Mechanical Testing, and a journal reviewer. He is active in the Society for Experimental Mechanics, American Society of Mechanical Engineers, and American Society for Metals.

Wendell enjoys beachcombing and reading. He and his wife, Lydia Lo, have a daughter and live in Pleasanton.

L.A. "AL" WEST to Manager of Test and Model Labs Dept. 8480.

Al joined Sandia, Livermore in 1971 as a surface scientist in the Materials Department, performing research on hydrogen-getters. Later he moved to Advanced Systems to work on nuclear safeguards technology.



AL WEST

In 1977 he was promoted to Supervisor of Exploratory Chemistry Division II, and from there he moved to the 8000 Planning Staff. In his most recent assignment, he served as Supervisor of Advanced Systems Div. 8431, working on the nuclear directed-energy weapons program.

For the past two years, Al has served as technical advisor during construction of the Defense Engineering Laboratory complex at Livermore, due for completion in mid-1992.

Al has a BA from the University of Oregon and an MS and PhD from UC Berkeley, all in chemistry.

He is a member of the American Defense Preparedness Association, American Chemical Society, and American Physical Society. He enjoys woodworking, sailboating, and amateur winemaking. He and his wife Carol live in Castro Valley.

Congratulations

To Shawn and Robert (8453) Core, a son, Anson M., July 31.

To JoAnn (8522) and Wally Sandelin, a son, Tyler Jacob, Aug. 5.

To Sheryl Johnson (8542) and Ken Buck (8512), married in Stockton, July 27.

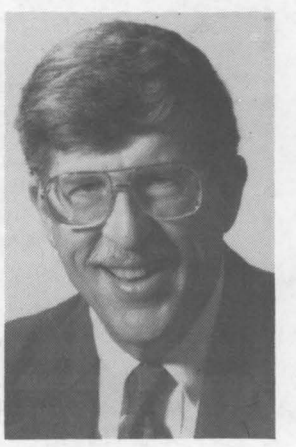
Sympathy

To Teresa Lee (8533) on the death of her father in Vacaville, Calif., June 28.

To Bernice Mills (8314) on the death of her mother in Hendersonville, N.C., July 10.

To Jim Mitchell (5356) on the death of his father in Sparks, Nev., June 30.

Recent Retiree



Jay Gilson
8100A 36

Sandia Gets Two New Initiative Awards from DOE

Sandia's expertise in materials research was recognized recently when two new initiatives in materials science received DOE Basic Energy Sciences awards.

The awards provide startup funding for new research in FY93.

Thermodynamics and structure of complex polymer blends will be the focus of an initiative called "Blends of Macromolecules with Nanophase Separation," which is managed by Oak Ridge National Laboratory and includes participation by Sandia, says John Curro (1813). ("Nanophase" refers to the extremely finely dispersed structure of many polymers, says John.)

Similar to metal alloys, polymers can be blended to get certain physical properties that are not present in either pure component. However, the behavior of polymer alloys is more complex than metal alloys.

Sandia's proposal is to develop a thermodynamic and structural theory of polymers, and to test those theoretical predictions with the results of X-ray scattering and neutron scattering experiments, says John.

Charge Transfer and Magnetism

The other new initiative is managed by Sandia, Livermore and will examine "Charge Transfer and Magnetic Interactions in Alloys: Theory of Compositional and Magnetic Correlations."

The goal of the project is to predict the chemical order of alloys — that is, the atomic patterns at different temperatures and concentrations and their effect on material properties, explains Duane Johnson (8341), who developed the proposal.

Chemical order typically changes as a function of temperature and concentration, says Duane, and tends to increase at lower temperatures. Predicting the outcome with computer models could save years of time that would otherwise be spent testing new ideas in the laboratory. This information could then be used to assist in the design of better materials — for example, lighter aircraft alloys.

Assisting Sandia will be researchers at the Oak Ridge lab, who will provide atomic data from X-ray scattering and neutron scattering experiments, and researchers from the Physics Department of the University of Cincinnati.

Funds for the new initiatives awards come from the Materials Science Division of DOE's Office of Basic Energy Sciences. Since the awards were first issued in FY87, Sandia has won six, notes Fred Vook (1100).

"Peter Mattern (8300) and I manage Sandia's Basic Energy Sciences Program and we're very proud of these awards, because they recognize scientific innovation and provide us with a benchmark with respect to other laboratories. So far, Sandia has received the most New Initiative awards."

RICK SCHNEIDER (1144) adjusts a mass flow controller on the gas manifold of a reaction chamber where materials are "grown" through a process known as metalorganic chemical vapor deposition. Researchers at the DOE Center of Excellence for the Synthesis and Processing of Advanced Materials, managed by Sandia, will study ways to control the atomic structure of materials with diagnostic tools that measure key variables such as temperature, surface composition, fluid dynamics, and dominant chemical reactions. The materials initiative encourages cooperation with industry and is funded by DOE's Office of Basic Energy Sciences.

Materials Science Is an Increasingly Important Field

Although Sandia has always had a strong core competency in research and development of new materials for weapons and energy uses, such as strained-layer semiconductor superlattices and advanced composites, materials science is quickly becoming recognized throughout government and industry as a field that is vital to US economic prosperity.

"It's hard to imagine any technological advancement without materials research," says George Samara, Manager of Condensed Matter Research Dept. 1150. Whether it's microelectronics, optoelectronics, lighter aircraft, faster computers, or corrosion-resistant substances — virtually any new technology is made possible with better materials.

The US Office of Science and Technology Policy, the Department of Commerce, and the Department of Defense all put advanced materials R&D at the top of their lists of national critical technologies; the lists were published recently in *New Technology Week*.

In addition, both of New Mexico's senators, Jeff Bingaman and Pete Domenici, are sponsoring bills calling for federal support of materials research. One bill, called the "Advanced Materials Synthesis, Processing, and Commercialization Act of 1991," provides for a coordinated federal R&D effort to ensure US leadership in the development and utilization of advanced materials.

The other bill, called the "DOE Critical Technologies Act of 1991," provides for strong DOE support of development of technologies considered critical to US economic prosperity and national security.

(Continued from Page One)

Materials Center

overlayer on a crystalline substrate using a controlled vacuum evaporation technique.

Both of these processes can be greatly improved with the help of diagnostic tools that control the quality of the resulting atomic structure by measuring such key variables as temperature, surface composition, fluid dynamics, and the dominant chemical reactions, says George.

Center scientists will also study complex polymers — how they grow, how they cross-link, and what their fractal structures are. (Fractals are geometric shapes or patterns within an object that repeat themselves over and over again at larger or smaller magnifications. Fractals are found in nature in such diverse places as mountain ranges, river tributaries, polymer chains, and fern leaves.)

Processing of such complex materials depends on the interplay between chemical reactions and physical processes such as phase separation. Polymer alloys, blends of two or more polymers, are particularly promising as new materials with improved properties. Though alloys are well-known in metallurgy, little is known about the factors that control the properties of organic alloys.

The Center will also address many challenging problems in the synthesis and processing of ceramics. Scientists will explore new ways to control the properties of ferroelectric ceramics as well as develop new advanced ceramics (such as cubic boron nitride, the second-hardest substance after diamond).

Additionally, the Center will focus on nanophase materials and other emerging materials and processes. Nanophase materials are clusters of a few tens to thousands of atoms with unique properties determined by their small particle size. They represent a new class of materials with many potential applications such as catalysis, pollution control, hazardous waste isolation, and electronics. Researchers will use sophisticated engineering and processing techniques to produce them.

Working with Industry, Other Labs

Along with Sandia, research will be conducted at several other DOE laboratories, including Ames, Argonne, Brookhaven, Lawrence Berkeley, Lawrence Livermore, Los Alamos, Oak Ridge, Pacific Northwest Lab, the Solar Energy Research Institute (SERI), and the University of Illinois Materials Research Lab. "A key goal of the Center is to maximize the effectiveness of the total program by drawing on the strengths of each labora-

(Continued on Next Page)

Writing a Page in the 'Recipe Book'

Sandia Researchers Learning How to Grow New Materials

Success in developing microstructures for electronic devices such as computer chips has given birth to a new goal in the materials science community. "No longer do we merely wish to characterize the nature and behavior of materials, we want to design and grow them for specific purposes," says Peter Feibelman of Condensed Matter Theory Div. 1151.

Peter and fellow Sandia physicist Gary Kellogg of Surface Sciences Div. 1114 recently combined to demonstrate that atoms move about on certain metal surfaces by interchanging with atoms of the underlying metal rather than simply moving around on top of the surface. This knowledge could make it easier for materials scientists to develop such things as unusually strong metals, highly reflective X-ray mirrors, and specially tailored catalyst materials.

"To achieve such goals," notes Peter, "we must not only be able to predict how 'tailored' materials will behave, but also learn how to grow them. That is where our work could make an important difference."

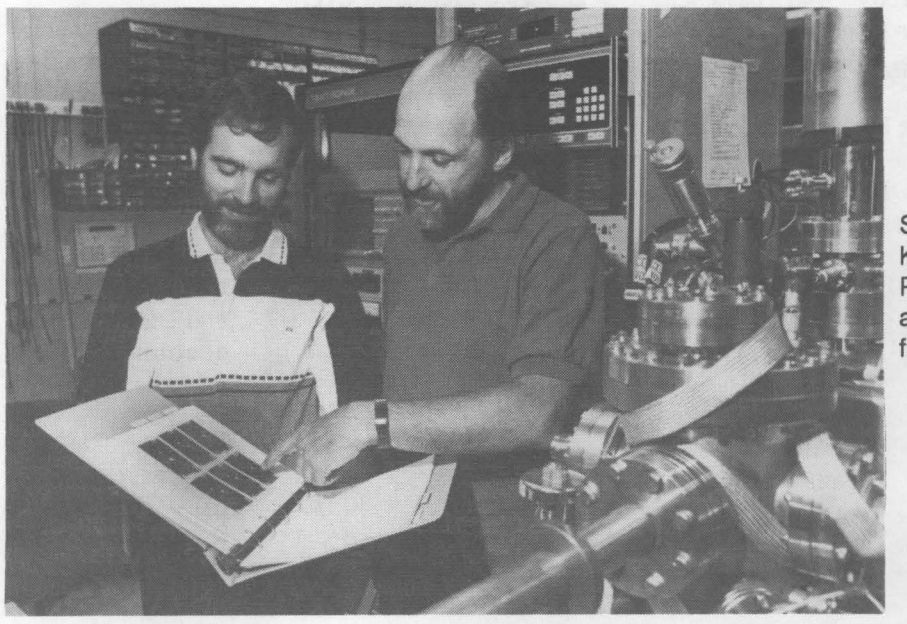
Many materials required for new microelectronic applications must be constructed one atomic layer at a time. Materials specialists therefore need to understand, on an atomic scale, the mechanism by which metal atoms diffuse, or spread out on a surface.

The Success of a New Theory

The conventional view of diffusion on metals was that atoms roll around like marbles on the underlying bumpy surface, until they group together into compact little islands. In this picture, atoms move to new positions on a surface by following the path that requires the least energy, essentially moving from "valley to valley by climbing over mountain passes."

New investigations by Peter and Gary indicate that this intuitive view can be wrong. Peter, a theoretical physicist, began work on a novel diffusion mechanism in 1989. His previous calculations had predicted a rather high energy requirement for a single aluminum atom to hop about on an aluminum surface as compared to what early experiments suggested.

Peter proposed that this was because what appears to be a hop by a single aluminum atom might actually involve a motion of two atoms where an atom that starts out on top of the crystal moves down into it while an atom of the crystal simultaneously moves out onto the surface. This diffusion by "atomic substitution," explains Peter, "is favorable because it minimizes the degree to which diffusion involves the rupture of chemical bonds." The result might be called a "concerted exchange/displacement process."



SANDIA SCIENTISTS Gary Kellogg (left, 1114) and Peter Feibelman (1151) examine images and data from a field ion microscope.

Early last year, Gary decided to see if the prediction of a novel diffusion mode could be verified using field ion microscopy. Because the exchange process favors diffusion only in special directions on a crystal surface, Gary thought he would be able to see what diffusion mode occurs by making a map of all the sites "visited" over time by a diffusing atom. By this means, he showed that the substitutional mechanism is operative for platinum atoms on certain platinum surfaces. Though Peter's calculations were for aluminum atoms moving on aluminum, metals with similar outer electron configurations behave similarly.

Teamwork Plays Key Role

Fred Vook (1100) attributes the success of discovering this new diffusion process to teamwork. "Peter's advanced computational model produced a convincing prediction," he says, "and Gary's ability to observe individual surface atoms and their location made it possible to gather the physical evidence."

Gary says of the collaboration, "My maps or his theory alone would probably not have persuaded the scientific community, but the two together were enough proof — even for the skeptics."

Many studies of substitutional diffusion have followed Sandia's original work. The exchange/displacement effect has been established now for platinum, iridium, and nickel atoms. Sandia studies have also shown that the effects apply on heterogeneous surfaces, for instance platinum atoms on a nickel surface, and also that they occur at a fairly wide range of temperatures, down to 175 K. A soon-to-be published study shows that two-atom pairs also migrate by a series of displacements and exchanges and that they do so more easily than single atoms.

Future studies will include efforts to determine "laws" that successfully predict when the substitution process will occur and when it won't, says Peter. "Our hope is that we will end up with a page in the recipe book on how to make materials." •DT

(Continued from Preceding Page)

Materials Center

tory in new relationships of teamwork and cooperation," says George.

Another goal is to involve industry and universities in the Center. Agreements are either in place or being initiated with several institutions, including Dow-Corning, Eveready, Hewlett-Packard, Nanophase Technologies, Norton, Raytheon, Saphikon Corp., SEMATECH, the Massachusetts Institute of Technology, the University of Cincinnati, Cornell University, and the State University of New York at Stony Brook. •LD

Sympathy

To Hazel Rodriguez (221) on the death of her father-in-law in Espanola, July 9.

To Rita Padilla (221) on the death of her mother in Albuquerque, Aug. 6.

To Thomas Gallegos (2481) on the death of his mother in Albuquerque, Aug. 6.

To Ronald Glaser (5172) on the death of his father in Tucson, Aug. 12.

Sandia News Briefs

Imaging Technique Pinpoints Weaknesses in Electronics

Sandia researchers have developed an imaging technique to pinpoint weaknesses in integrated circuits caused by ionizing radiation.

"The goal is to diagnose weaknesses in state-of-the-art, high-performance integrated circuits so they can be redesigned for greater radiation hardness," says Kevin Horn (9351).

Called single event upset (SEI) imaging, the technique is so precise that it can isolate malfunctions in single transistor components. Such detailed characterization could be used to design more reliable circuits for use in satellites and space equipment.

As integrated circuits become ever smaller in size and are packed more tightly, the problem of radiation-induced failure becomes more acute. Sandia researchers have applied ion microbeam techniques to the study of radiation-induced upsets and produced "maps" of the upsets, which are then compared with the circuit designer's blueprint to pinpoint the exact location of the upset.

Labs Communicators Win Publication Awards

Several Sandia communicators have received 1990 publication awards from the New Mexico chapter of the Society for Technical Communications, a professional organization of technical and scientific communicators.

In the art category, Jerry Gorman (3155) won Best of Show for his Trident Submarine Missile entry. Other winners in the art category were: John Bell (3151) for his Saturn X-ray Simulator entry; Jim Walston (3151) for his Strategic Plan cover design; Gene Clardy (3151) for his recruiting folder cover design; George Dooley (3155) for his Fire Ant and Submarine Launched Ballistic Missile exhibits; Jerry Gorman for his Earth Penetrating Weapon and Depth Bomb entries and his Submarine Launched Ballistic Missile exhibit; and Cynthia Figueroa-McInteer (3151) for her artwork in *Sandia National Laboratories — Forty Year History*.

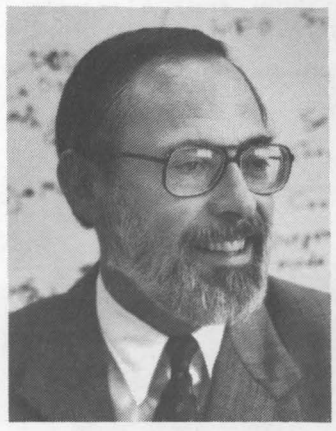
In the publications category, the winners were Jim Leonard (4520), Jan Gaunce (3155), and Carl Hamberg (contractor) for *Sandia Technology*; Necah Furman and Tonimarie Stronach (both 331) for *Sandia National Laboratories: The Postwar Decade*; Jim Mitchell (3160), Rod Geer (3163), and Mike Lanigan (3155) for *Recollections for Tomorrow*; Larry Perrine (3162) and staff for the LAB NEWS; Marty Noland, Jacqueline McWilliams (both 3151), and Fay Ganzerla (3155) for *Photometrics at Sandia National Laboratories*; and Mary Monson, Carmen Drebing (both 3151), and Fay Ganzerla for *Microsensor Research at Sandia National Laboratories*.

Profiles of New Vice Presidents and Directors

In this issue, the LAB NEWS profiles several new vice presidents and directors who "assumed command" on Aug. 1. Other new VPs and directors were profiled in the Aug. 9 issue.

GERRY YONAS to Vice President of Systems Applications 9000.

Gerry joined Sandia in 1972 as Supervisor of the Electron Beam Physics Division. In 1973, he was promoted to Manager of the Plasma and Electron Beam Physics Research Department and initiated Sandia's particle beam fusion program. In 1978, he was named Director of Pulsed Power Sciences.



GERRY YONAS

Gerry left the Labs in 1984 to serve as chief scientist and acting deputy director of the Strategic Defense Initiative Organization in Washington, D.C. He was President of Technologies and Senior Vice President of the Titan Corporation from 1986 until he returned to Sandia in 1989 to head the Labs' Technology Transfer and Special Projects Directorate. In November 1989, he became Director of Management Staff 400 (now Laboratory Development 4500).

"I see my role of VP 9000 as primarily leadership of the work-for-others sector; secondly, as a member of the Sandia management team dealing with a rapidly changing environment; and third, as an organizational VP," says Gerry. "I hope to spend as much of my time as possible on strengthening our customer base and enhancing the national impact of our programs. I believe that I can do this best by fully implementing total quality management."

He continues, "I expect that the rapidly declining defense budgets, the changes in our perception of military and economic threats, and the global competitive forces on US industry will all have a strong impact on Sandia. I hope we will be able to contribute our core technological strengths to new national initiatives by working through alliances."

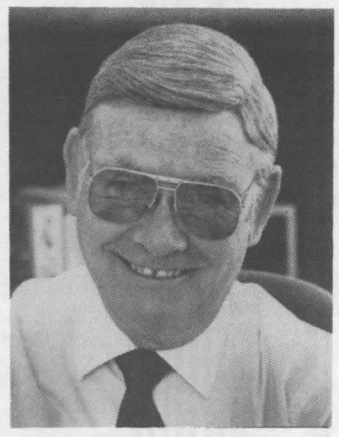
Gerry received his BS in engineering physics from Cornell University and his PhD in engineering science and physics from the California Institute of Technology. While at Caltech, he worked at the Jet Propulsion Laboratory. Before joining Sandia, Gerry headed the electron beam research department for Physics International Company. He is a Fellow of the American Physical Society and an Associate Fellow of the American Institute of Aeronautics and Astronautics.

Gerry and his wife Jane have two daughters and live in the North Valley. He says the high points of his career include beam-focusing experiments, first shot on PBFA-I, the SDI experience, and returning to work at Sandia in 1989.

"My vision of the future for the Labs is a flexible, responsive contributor, catalyst, and team member that provides technologies and systems solutions that deal with complex long-term issues, such as military and economic competitiveness," says Gerry. "I am convinced that one area that deserves greater national emphasis is transportation, and I intend to help develop a Strategic Transportation Initiative (STI). Many of our technology and system engineering strengths, such as sensors and information management, can be applied to both military and non-military programs. Indeed, the creation and application of multiple-use technologies will be critical to providing affordable solutions to both."

PAUL STANFORD to Chief Financial Officer and Vice President, Org. 100.

"Many changes have occurred in the financial arena," says Paul. "There has been increasing Washington pressure for financial accountability. It's becoming more and more timely to understand the intent of Congress and DOE in fiscal accountabilities and responsibilities.



PAUL STANFORD

"The fiscal side of the company has always been important, but its significance will increase as Washington decides how to have oversight of its contractors," he says. "In Organization 100, we want to help get Washington the information needed to acquire a feeling of control and management responsibility."

Paul began his accounting career in 1957 as a US Government Auditor working with the Armed Forces Special Weapons Project. He joined Sandia in 1959 as a staff auditor in contract auditing, where he dealt with multimillion dollar procurements. In 1965, he became Supervisor of General Accounting, Plant Accounting, and Accounts Payable.

Paul moved to Supervisor of the Contract Audit Division in 1967 and was promoted to Manager of the Auditing Department in 1969. He was transferred in 1975 to Manager of the Budget and Financial Planning Department. In 1982, he was appointed Controller of the Labs.

Paul received his BBA in Accounting from Texas Tech University. He was certified as an internal auditor in 1959 after attending a special auditing school at the American University in Washington, D.C. From 1959 to 1968, Paul was a captain in the New Mexico Air National Guard, serving as finance officer. He belongs to the National Association of Accountants.

Paul enjoys walking, traveling, golfing, and fishing. He and his wife Betty have two adult children and live in southeast Albuquerque.

* * *

DONA CRAWFORD to Director of Scientific Computing 1900. In this position, Dona will oversee three departments responsible for computing at both Livermore and Albuquerque.

DONA CRAWFORD

Last year the Labs announced that the Sandia supercomputers would be consolidated in Albuquerque, and Dona has been responsible for coordinating much of the effort to ensure a smooth transition. She has also been working on external collaboration and funding efforts. In her new position, Dona says her goals are to "provide leading edge production supercomputing to the Laboratories' staff and to work closely with research computing employees in Org. 1400 to ensure that we have the right balance between production and research. Major emphasis will be placed on high-performance networking."

Dona came to Sandia, Livermore in 1976 as a technical staff member, initially working on numerical analysis and applications programs in the Computing Department. Later she became a systems analyst and manager for the VAX computer system, teaching VAX courses, and serving as a computer systems consultant. Next she led the Cray Time-Sharing System (CTSS) project in Livermore.

She was promoted to Supervisor of the Operating Systems Division in January 1985. As supervisor, she encouraged her division to move toward UNIX and other standards and was instrumental in acquiring state-of-the-art supercomputers and storage equipment. In July 1990, she was promoted to Manager of Computations Dept. 2910.

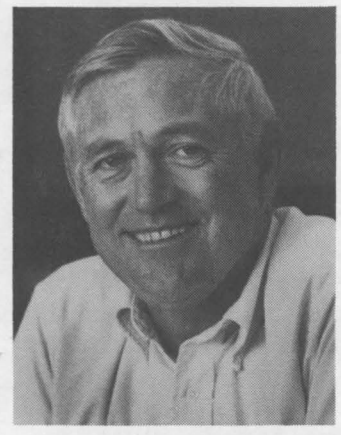
Dona earned a bachelor's degree in math from the University of Redlands, an MA in German from Middlebury College's campus at the University of Mainz in West Germany, and an MS in operations research from Stanford University through Sandia's One Year on Campus (OYOC) program.

She and Bob Dibble, a UC Berkeley professor, have two children and reside in Livermore. Dona enjoys classical piano and devotes much of her spare time to her children's activities, such as Scouting, soccer, and teaching Sunday School.

* * *

GARY BEELER to Director of Components 2500.

Gary joined Sandia, Livermore in 1964 as a transfer system engineer in the Reservoir Development Division. He also worked as a project engineer on the W71 Spartan program. He was with the Systems Advanced Development Division from 1971 to 1974, working on advanced bomb concepts.



GARY BEELER

In 1974, Gary was promoted to Supervisor of the B77/B83 Systems Development Division. In 1984, he was promoted to Manager of the Electromechanical Components Department in Albuquerque. He transferred to the B90 Systems Development Department in 1989. In 1990, he became Acting Director of Systems Development.

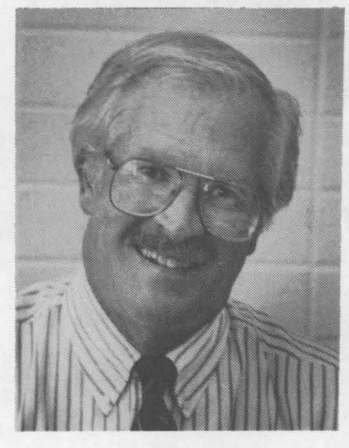
"The diverse technologies represented in Org. 2500 are critical to our nuclear weapons work," says Gary. "They also offer exciting opportunities to work with private industry. Teaming with industry for both weapons production responsibilities and technology transfer opportunities will be important."

Gary has a BS and an MS in mechanical engineering from the University of Washington. He enjoys golfing, camping, fishing, and church activities. Gary and his wife Tamra have two children and live in NE Albuquerque.

* * *

RON ANDREAS to Director of Electronic Subsystems and Parts 2300.

Ron joined Sandia in 1963 as a member of the Advanced Data Systems Division, where he worked on sampled data systems and digital filters. In 1969, he transferred to the Advanced Arming, Fuzing, and Firing Systems Division. He was promoted to Supervisor of Exploratory Systems Division II in 1971 and worked with navigation, guidance, and con-



RON ANDREAS

(Continued from Preceding Page)

trol systems. In 1984, he was promoted to Manager of the Exploratory Systems Department. His recent responsibilities included synthetic aperture radar and image recognition applications.

"I'm looking forward to my new assignment," says Ron. "Organization 2300 expects an increasingly diverse set of customers in the future, and our organization will need to be flexible and competitive."

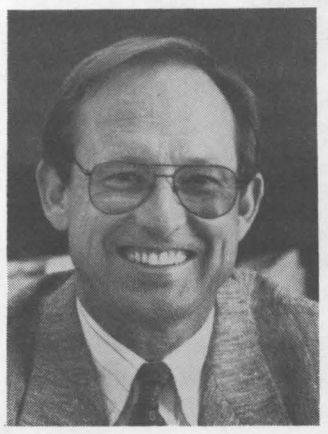
Ron's degrees are in electrical engineering: a BS and an MS from the University of Kansas and a PhD from UNM through Sandia's Doctoral Study Program.

Ron enjoys golf. He and his wife Carolyn have four children and live in NE Albuquerque.

* * *

TOM HUNTER to Director of Nuclear Waste Management and Transportation 6300.

Tom joined Sandia in 1967 as a member of Full Scale Support Division I in the NTS Management and Support Department. He worked on technology development for underground nuclear tests and developed techniques for high fluence testing. In 1968, he joined the Advanced Systems Development Division, where he did vulnerability studies of weapons systems. Tom was appointed Supervisor of the WIPP Experimental Programs Division in 1978 and, in 1983, Manager of the Nuclear Waste Repository Technology Department.



TOM HUNTER

"We intend to strengthen our roles with our current customers in civilian and defense waste management," says Tom. "Further, we want to use our experience in these areas to broaden our programs with the DOE in related waste-management activities. Sandia has a big role in the nation's nuclear waste program. We now want to be an organization that makes a difference in the future progress made in these areas in this country and throughout the world. We want to be an organization where each person feels important and that his or her contributions really matter."

He has a BS in mechanical engineering from the University of Florida and an MS in the same field from UNM. He has an MS and a PhD in nuclear engineering, both from the University of Wisconsin. He is an adjunct professor at UNM and a Bosque Farms councilman.

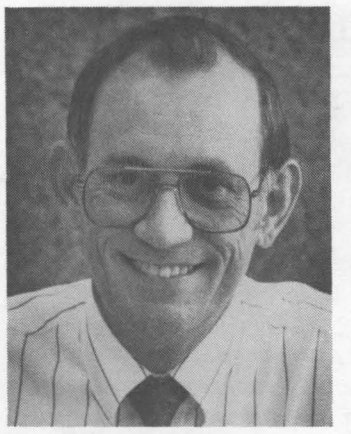
Tom enjoys skiing, auto mechanics, and church activities. He and his wife Miriam have three children.

* * *

PAUL PEERCY to Director of Microelectronics and Photonics 1300.

Paul joined the Labs in 1968 as a member of the Quantum Electronics Research Division, where he conducted research on lasers and laser physics. He has also worked in the Condensed Matter Physics and Physics of Solids divisions. Paul was promoted to Supervisor of the Ion Implantation Physics Division in 1976 and was appointed Manager of the Ion-Solid Interactions and Radiation Physics Research Department in 1986. He transferred to the Compound Semiconductor and Device Research Department in 1988.

"I see microelectronics and photonics as critical areas at Sandia," says Paul. "They are enabling technologies for modern high-performance systems, and the military, economic, and environmental security of the US relies heavily on advances in these technologies. The microelectronics and photonics program must provide Sandia the technology base to satisfy its national security mission in nuclear weapons, its advanced technology needs for DoD reimbursable programs, and its missions in energy, environment, and industrial competitiveness."



PAUL PEERCY

He continues, "Sandia not only needs a strong internal program, it also needs a strong national industry to meet the Labs' needs in microelectronics and photonics. We must work closely with our internal customers, and we must also work with industry through technology transfer and programs such as SEMATECH and the Advanced Manufacturing Initiative."

Paul's degrees are in physics — a BA from Berea College and an MS and PhD from the University of Wisconsin. Before coming to Sandia, he was at AT&T Bell Labs. He is a Fellow of the American Physical Society and of the American Association for the Advancement of Science, Senior Member of the IEEE, chairman-elect of the Electronic Materials Committee of the Metals, Minerals, and Materials Society, past vice president of the Materials Research Society, a member of the Solid State Sciences Committee of the National Research Council for the National Academy of Science, and a member of the DOE Council on Materials Science. He also serves on advisory boards for several universities.

Paul enjoys tennis, photography, hiking, gardening, and church activities. He and his wife Cathy have two sons in graduate school and live in the NE Heights. •JC/DT

feedback

Q: There are problems refueling EZ-GO carts at the Motor Pool near Bldg. 873. In the first place, the instructions are confusing. When a person begins the refueling process by inserting the special key into the control box near the gasoline pumps, he is asked to enter the mileage, among other things. However, the carts do not even have odometers, yet the system insists on having a number entered here.

Furthermore, there are some potentially important instructions printed on the fuel control box that have been obliterated by the ravages of time and weather.

Adding oil is also confusing. There are two bins of fresh oil, one marked "vehicles" and one marked "scooters." However, some people call the EZ-GO carts scooters rather than vehicles, while my Webster's Seventh New Collegiate Dictionary *defines scooters as two- or three-wheeled automotive vehicles. (This whole process reminds of me of Alice in Wonderland when she finds the bottle marked, "Drink Me.") In fact, the process is so unclear that one person put oil into the EZ-GO gasoline tank — the usual procedure for a two-cycle engine.*

Refueling should not be so traumatic. What is the difference between a cart and a scooter? Instructions should be clear and posted where needed, not buried in an SOP that is not available at the time of refueling.

A: Thank you for your concern. Refueling should not be so traumatic. Cart operators should thoroughly understand and follow the requirements and instructions in the General ES&H SOP, *Use of Powered Carts (GN470016)*, prior to using a cart. Understanding the cart and its equipment is an important requirement of the SOP.

Instructions, labels, and other information at the fuel island are being updated to better meet our customers' requirements. Cart operators who need assistance at the fuel island may use the intercom at the island. Motor Pool technicians will also provide assistance upon request.

Jim Martin (3400)

Q: I am concerned about some possibly unsafe practices involving Sandia's women employees. In the area where I work, it is common practice to place a couch in the rest room to be used by employees for medical reasons. Most frequently, I have seen this done for pregnant women. However, although a rest room is more private than other places, it is not the most pleasant place to be, and no matter how clean it is, a rest room is likely to contain harmful bacteria.

I know of another situation that seems more serious. Women who return to work soon after giving birth frequently pump their breasts at work so they can breastfeed as long as possible. The majority of women at Sandia do not have the luxury of a private office, and the common solution has been to use rest rooms for this purpose. New safety procedures have directed that eating and drinking should not be done in rest rooms, yet I would bet there are still women using breast pumps in rest rooms at Sandia. Feeding young infants breast milk obtained in this environment seems like a health risk to me.

Could Sandia designate private areas apart from rest rooms to be used for these purposes? I realize space is short, but it seems possible that an unused room or office might be found in most buildings to accommodate the unique needs of working moms.

A: I share your concern about the issues you raise. As you have noted, space, like time, seems to be at an all-time premium at Sandia, and it is not likely that designated areas can be provided to completely address these needs at this time. In addition, most medical problems requiring intermittent rest or privacy are of a relatively short-term nature.

However, employees might consider the following alternatives:

- The Medical Directorate is often able to arrange the placement of a couch in a convenient area for individuals requiring intermittent, recumbent positions. This may involve a rest room on occasion, but can also be accomplished in other work areas, depending on available space. Consulting with Sandia's physicians or medical administration personnel would be an initial step in testing the viability of this recommendation.
- Likewise, for women who breastfeed, Medical may be able to help line supervisors identify a private area employees might use intermittently for this purpose.
- Medical also has space available in Bldg. 831. Though this is not as convenient as space in the work site, it does provide an option. We often provide intermittent care to assist employees with special needs such as breastfeeding.

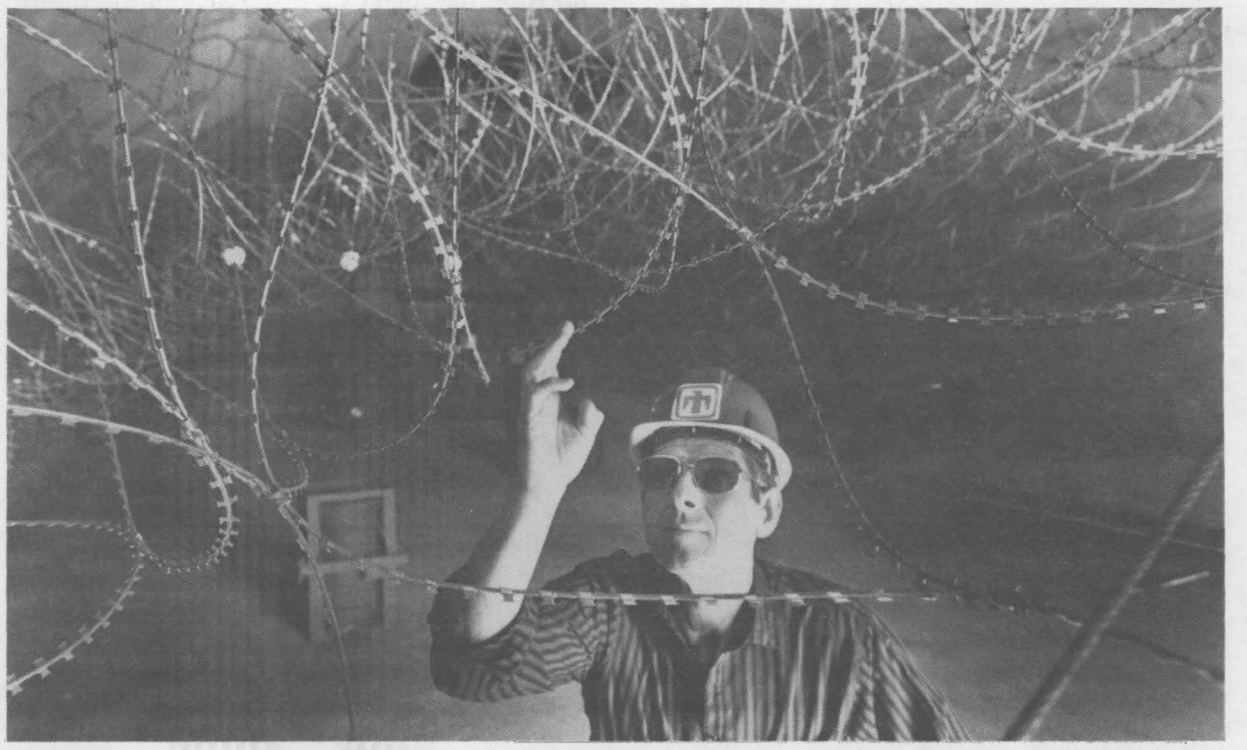
Again, I am appreciative of your concern and will share your feedback with our staff to assure that they will respond with an appropriate amount of sensitivity.

Dr. Larry Clevenger (3300)

Making It Tough on Adversaries

Sandia-Designed Security System Protects Nuclear Weapons from Terrorists

(Editor's Note: The following article isn't about new technology, but about some Sandia-developed technology that has worked well for years to ensure that nuclear weapons are properly safeguarded. We believe that reviewing such developments in vital areas from time to time can enhance our understanding of Sandia's historical role, especially for newer employees.)



PROJECT ENGINEER JOHN MOYER (9521) inspects coils of concertina wire that are lowered to cover weapon containers inside a storage igloo.

Outside, the weapon storage igloo looks like a typical bunker — a mostly hidden structure buried in a slope, with a heavy front door, warning signs, and padlocks.

But inside, beyond the multiple-deadbolted door (which is operated by a coded power lockout system), the igloo is a maze of barbed concertina wire. Smoke generators can fill the room in seconds with an irritating visual obscurant. And the weapons stored inside are kept in heavily bolted containers with tiedowns and hard-to-access locks.

The purpose of these barriers, designed at Sandia, is to prevent terrorists from gaining access to nuclear weapons. A modified version of the barriers is used by NATO and the US Army to thwart would-be intruders.

"Even a high-security lock on a door is nothing to a terrorist," notes project engineer John Moyer (9521). "He can blow that off in seconds with an explosive."

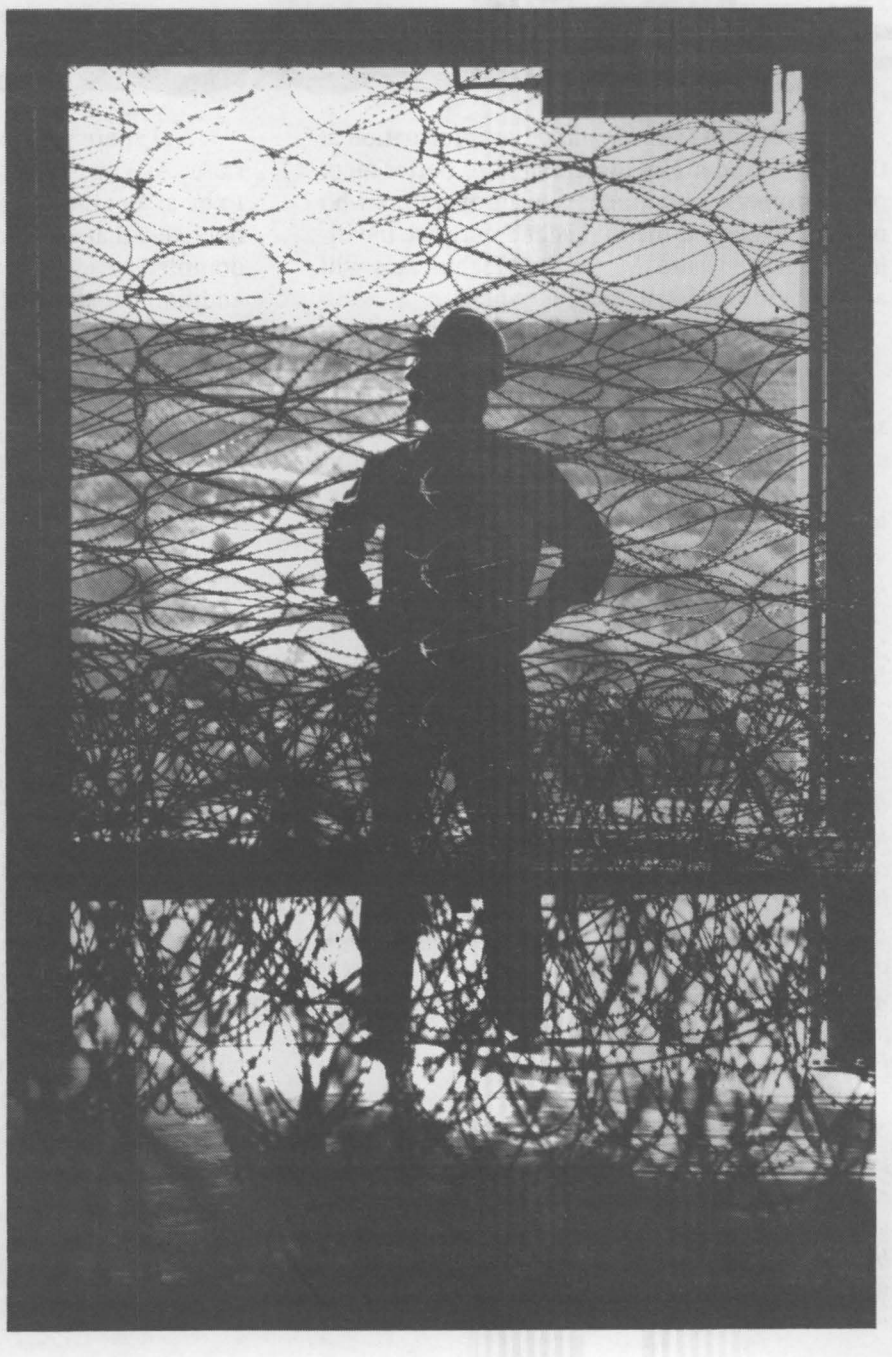
Commandos Can't Get Past Barriers

That's the bad news. The good news is that in tests, trained Army commandos have not been able to get past the overall system before the clock ran out and they were — in theory — eliminated by military guards. That's a welcome thought to military officials, who are responsible for keeping such weapons from falling into the wrong hands.

Sandia first got involved in weapon theft prevention in the 1970s in a study for DoD called *Forward Look*. Later, in October of 1978, Sandia hosted a worldwide security systems meeting called "Octoberfest" to demonstrate the initial hardware system.

In the early 1980s, as a result of both the 1978 demonstration and escalating terrorist activity in Europe, Sandia received an urgent request from the Commander-in-Chief of the US Army in Europe to upgrade the security of weapon storage igloos. Though the research was initially funded by DOE, subsequent funding to perfect the technology came from DoD.

John Kane, now Department Manager of Survivability and Security 9520, first came up with the overall concept, known as IADS (Igloo Access Denial System). The Army later initiated an official program to improve European storage site security, and named the program WADS (Weapon Access Delay System). It was managed by a Project Officers Group from the Army's Program Manager for Nuclear Munitions (PMNUC) Office in New Jersey.



NASTILY BARBED concertina wire is only one of the barriers designed by Sandia to thwart terrorists from gaining access to nuclear weapons. This doorway, examined by John Moyer (9521), is held shut by multiple deadbolts and is accessible only by using a special code. Other weapon-protecting barriers include smoke generators that serve up a visual obscurant and heavily bolted containers with hard-to-access locks. The multiple barriers work in synergism, meaning that their net effect on an intruder is much greater than the sum of their individual effects. Sandia first got involved in weapon theft protection in the 1970s. (Photo by Randy Montoya, 3162)

"Even a high-security lock on a door is nothing to a terrorist. He can blow that off in seconds with an explosive."

WADS embraced the IADS hardware and security principles, but was customized by the Army to meet specific needs. These included a few hardware substitutions and additional safeguards developed by the Army.

Sandia provided assistance with component design, system integration, testing, program management, and initial hardware procurement, and continues to provide technical expertise as needed to maintain and operate the system, notes John Moyer. In the United States, Sandia coordinated with PMNUC; in Europe, Sandia worked with the Provost Marshall's office, the US Army in Europe (USAREUR), and the Army Corps of Engineers, all located in Germany.

System Used at NATO Storage Sites

The Army has since installed the WADS security system in most of its NATO nuclear weapon storage igloos, as well as in continental US weapon storage sites.

To validate the system, the Army conducted three major tests, starting at Sandia in 1981. A second test was conducted at Navajo Army Depot in Arizona, and the final, full-scale test series, complete with specially trained commandos who at-

(Continued on Next Page)

Sandians to Serve in Washington

Andrews and Woods Named ASME White House Fellows

Two Sandians have been chosen to serve one-year assignments in Washington, D.C., as part of a Fellows program that allows scientists and engineers to provide technical expertise to the nation's policy-makers.

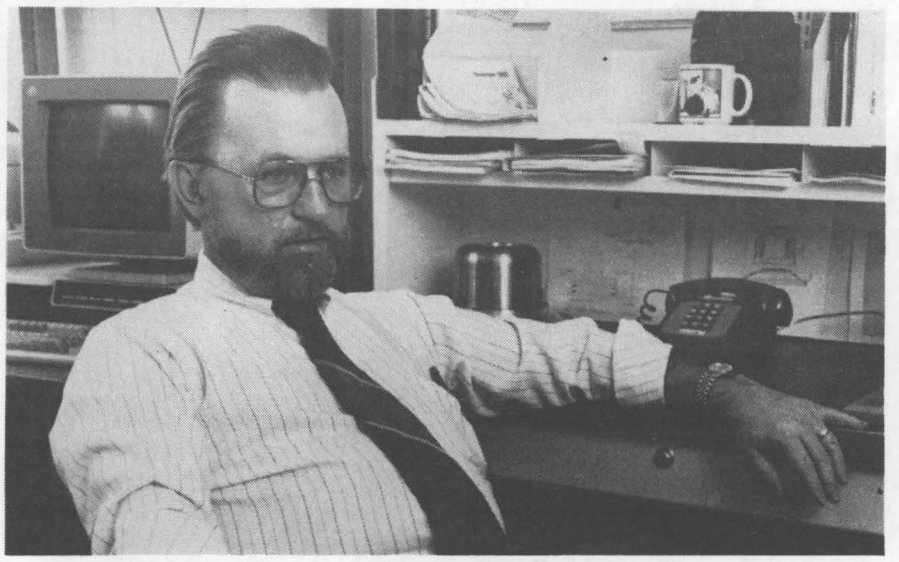
The Congressional and White House Fellows Program was created to allow researchers to assist the nation's policy-makers and contribute, in a practical way, to national and international technical issues, says Del Olson (5500), chairperson of Sandia's Congressional and White House Fellows Committee. Each year, national technical societies select a few of the nation's top researchers to work directly with congressional committees and subcommittees and with White House staff.

Reporting to the White House

Arlan Andrews (2364) has been selected as the 1992 White House Fellow of the American Society of Mechanical Engineers (ASME). The Fellow program will allow him to spend a year on the staff of the President's Office of Science and Technology Policy. OSTP staff members serve as advisors to the President on science and technology policy, review the R&D budgets of the National Science Foundation and the departments of Energy, Commerce, and Interior, and work with Congress to set research priorities consistent with the president's science and technology goals.

Arlan is currently an ASME Fellow at the Department of Commerce's Technology Administration. He serves on a team of analysts who are evaluating a list of critical technologies published recently by the White House OSTP. That list establishes the critical issues for US R&D efforts in the coming decades.

Arlan has BS, MS, and ScD degrees in mechanical engineering from New Mexico State. He was with AT&T Bell Labs for 25 years before coming to Sandia in 1989. He holds five patents, is a licensed professional engineer in North Carolina, and is a member of the Science Fiction Writers of America.



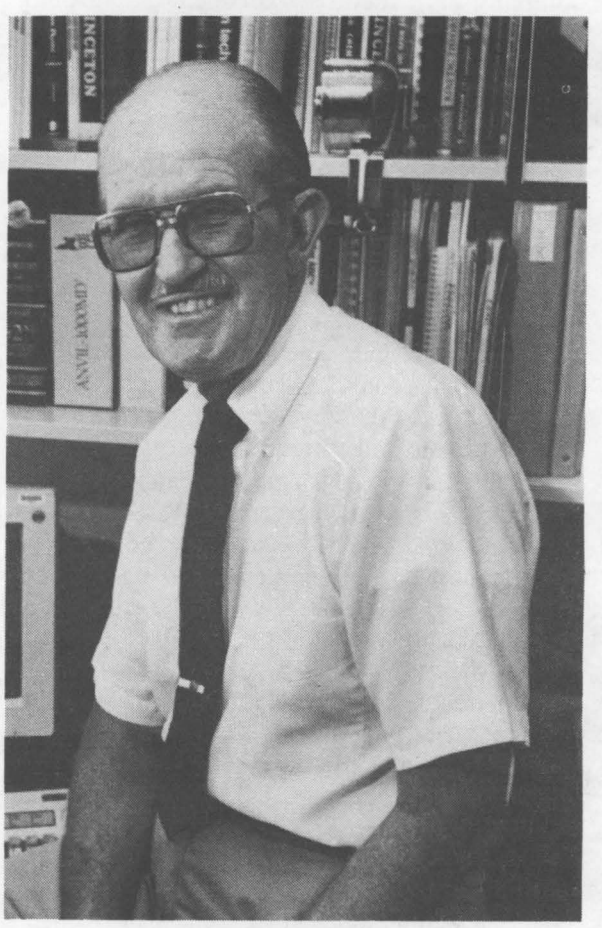
ARLAN ANDREWS

Aiding Congress

Bob Woods (9231) was selected as one of two 1992 ASME Congressional Fellows. The Congressional program, similar to the White House program, allows engineers to share their input and knowledge with Congress while learning how public policy is formulated.

Bob earned three mechanical engineering degrees — a BS, MS, and PhD — as well as an MA from Princeton University. He joined Sandia after receiving his doctorate, initially working in upper atmospheric research and the design of instrumentation for such research. His recent work includes managing a program on mechanical energy storage, developing instrumentation for monitoring air pollution, designing equipment for surveillance satellites, and designing instrumentation for satellite astronomy.

A licensed professional engineer in Pennsylvania and New Mexico, Bob is president of the Princeton Club of New Mexico, a Fellow of the British Interplanetary Society, and a member of the American Physical Society, Tau Beta Pi, and Sigma Xi. As an ASME member, Bob has been a member of the Public Affairs Committee and chairman of the Education Committee of the ASME New Mexico Section. •DT



BOB WOODS

(Continued from Preceding Page)

Weapon Igloos

tempted to break into the igloo, was conducted at Fort McClellan, Alabama.

John Moyer says the system works because of "synergism," meaning that the combined effect of all the barriers working together is much greater than the sum of their parts. From a practical standpoint, it means that, even if a terrorist could get beyond one barrier, such as the deadbolted door, the collective impact of all the other barriers would make it virtually impossible to steal a weapon before being apprehended.

Only a military guard with the proper equipment can lift the blanket of concertina wire that surrounds the weapon containers. The visual obscurant is remotely controlled.

John Kane notes that the project embodies all the qualities of the new corporate culture at Sandia. These include working on a project of national importance, pooling talents from different organizations, teaming with DoD, receiving outside financial support, utilizing the can-do attitude of Sandians to accomplish a task on an extremely tight schedule, and transferring a new technology to private industry.

In this case, he notes, Unidynamics, a Phoenix-based company, developed a commercially available version of the chemical smoke generator designed at Sandia.

Other Sandians who helped manage the project were Jim Jacobs, now Director of Facilities 7800, and Herman Mauney (ret.).

Many Sandians contributed to the design of the project. The smoke generators were developed by Joe Roesch (9514), Frank Gurule, Lloyd Melick, and Al Tucker (all ret.), with support from Electromechanical Subsystems Dept. 2540. The smoke generator command firing system was developed by Leroy Sparks (361), Dick Case (dec.), John Biesterveld (9513), and Mike Moulton (6612).

Marty Kodlick (3431) designed the IADS door lock system. Neil Botsford (2541), Gene Zucuskie, Jim Reed (both ret.), and Pat Sena (5122) helped develop the original concertina blanket system. •LD

Congratulations

To Ann and Kent (5166) Meeks, a son, Jason Michael, May 4.

To Joy Johnson (2853) and Gregory Scallen, married in Hollidaysburg, Pa., June 15.

To Pamela and Robert (1414) Palmquist, a daughter, Lara Johanna, June 29.

To Angela (3435) and Phil (3435) Gonzales, a son, Andres Alejandro, July 27.

To Robyn and Douglas (2341) Bentley, a daughter, Lorin Elise, Aug. 13.

ENGINEERING LEADERS — Pam McKeever (right, 7823) and Roger Zimmerman (2741) have been named to leadership positions in the New Mexico Society of Professional Engineers (NMSPE). Pam is the new president of the state organization; Roger is president of the Albuquerque chapter. The NMSPE is dedicated to the advancement of public welfare and the engineering profession.

(Continued from Page One)

New HMO Option

HMO, says B.J. Jones, 3545 Supervisor.

The Lovelace Health Plan was chosen by Sandia based on competitive bids requested from all qualified area HMO providers. The benefits offered by Lovelace include a multispecialty physician group practice, accessible services with extensive facilities in Albuquerque and Santa Fe, a comprehensive health education program, and a unique Senior Options Plan. The Lovelace Health Plan has about 123,000 members.

Ranked among the nation's "super clinics" by *Prevention Magazine*, Lovelace provides more than 40 medical specialties including the Regional Diabetes Program, Home Health Care Programs, and services for everything from allergies to urgent care. Lovelace has a network of more than 280 primary care physicians and specialists.

By joining the HMO, employees/retirees and eligible dependents agree to receive all of their company-paid medical care benefits through Lovelace physicians and facilities, except in special cases. These special cases could include emergency treatment while out of town or a Lovelace physician referring a member to an "outside" physician or facility.

Facilities in Albuquerque and Santa Fe

In addition to its main Medical Center on Gibson Blvd., Lovelace has 12 neighborhood family practice and urgent care facilities in Albuquerque and Santa Fe, including a new multispecialty facility at "Journal Center," and other specialized facilities for physical therapy, occupational medicine, pain treatment, and chiropractic services.

Officials at Lovelace say that Family Medical Care and Urgent Care services on Rio Bravo and Tramway will soon be expanded to better serve clients in areas south and east of Albuquerque. Sandians and retirees in the Santa Fe area will be able to take advantage of the Lovelace Alameda and St. Michael's offices.

Lovelace offers a variety of classes to promote member well-being. Such classes include parenting, Lamaze, exercise for pregnant women, nutrition, weight management, and stress management. Members are charged varying copayments for these classes.

Lovelace will also offer Sandia retirees the Lovelace Senior Options Plan. This plan alleviates the hassle of Medicare claim form filing by having Lovelace officials complete and file the forms. Other benefits, such as special foot-care help, are included with this option. About 9,800 seniors are now on the Lovelace Senior Options Plan.

Sandia's Benefits Department will hold a series of meetings in and around Albuquerque in October for all Sandians and retirees. Details about coverage, options, and costs will be discussed, and ample time will be allowed for questions and answers. The schedule for these meetings will be announced soon in the LAB NEWS. Employees and retirees are encouraged to hold their detailed questions until these meetings. If there are questions that cannot wait, employees and retirees can call Lovelace on 262-7363, ext. 8190.

"Assembling all the information to get the competitive bids and then evaluating them was a real job," says B.J. "We had great teamwork between Benefits Dept. 3540 and Purchasing Dept. 3710. Linda McEwen [3545] and Nora Armijo [3718] deserve special mention for their work."

•LP/DT

What They Are, How They Work

Health Maintenance Organizations

A Health Maintenance Organization (HMO) is an organized health care system that provides comprehensive health services, including preventive care and health education. Care is provided in exchange for a fixed monthly premium often paid partially or completely by employers.

Prepaid HMO plans offer a substantial economic incentive for keeping HMO members well. Because they work within a budget established by prepayments, doctors and hospitals are encouraged to keep costs in line and members as healthy as possible.

HMO plans use continuing reviews to manage hospital stays, and there are no fee schedules for surgery. Members choose a doctor associated with the HMO as their primary care physician. This physician coordinates all of the member's care — prescriptions, inpatient care, treatment by specialists, etc.

There is also no deductible followed by percentages that must be personally paid out of pocket (such as 20-percent co-insurance). However, Sandia's new Lovelace HMO plan requires employees, retirees, and dependents to pay $5 for office visits, $5 for a prescription, $100 per hospital admission, and $20 for psychiatric outpatient visits. Except for these and other "copayments" for special services, there are no medical bills.

HMOs are not new. Such plans have been around under different names since the 1930s. Kaiser-Permanente in California was among the first HMOs and is still the largest with 3.5 million members nationwide. About 33 million US citizens participate in HMOs, according to a Lovelace Health Care update.

The prepaid plan has evolved with differing organization structure, sponsorship, and health care delivery procedures. Though details of benefits and administration vary from plan to plan, all HMOs are: (1) comprehensive — offering a wide range of expert care through one program; (2) voluntary — serving as alternatives to other types of health coverage; and (3) prepaid — fixed fees are paid in advance monthly installments that do not change during the contract period. •DT

feedback

Q: A Weekly Bulletin *item on June 10 listed obsolete service awards to be sold at an auction June 15, including wall clocks, mantel clocks, wallets, tie bars, watches, stick pins, tie tacks, belt buckles, cameras, camera cases, camera lenses, desk sets, travel alarm clocks, calculators, key rings, Heishi jewelry, Nambé bowls, and a remote toy truck with controls. Why aren't these items available on site to be purchased by employees?*

A: The items auctioned June 15, 1991, were those remaining after a well-publicized sale in July 1990. The first sale was made to Sandia employees via a drawing because there were generally more requests to purchase most of these items than remained. I'm sorry you missed out.

Ralph Bonner (3500)

Q: The "Street Closings" section of the Weekly Bulletin *would be far more useful if I could find the street numbers and letters on the maps in the Sandia directory.*

A: Good idea. We'll do it (add streets to map).

Herb Pitts (3100)

Met After 32 Years of Writing

Judy Mead Has Pen Pal for 48 Years

A serendipitous drawing of names in a junior high school classroom during World War II led to a lifetime friendship between a girl in the US and a girl in England. Judy Mead (300A) and Doris Slattery have been pen pals for 48 years. Judy is ES&H and Quality Coordinator for Systems Evaluation 300.

Judy and Doris write to each other every three weeks. When she began writing to her new pen pal, Judy was in junior high in Ft. Morgan, Colo., and had an interest in England because she had relatives there. Doris lives in Oldham, England, a suburb of Manchester.

Judy and Doris's first letters were censored because of the war. The V-mail envelopes were delivered marked with "opened by censors," but Judy says seldom was anything crossed out. Doris described the bombings and food shortages during the war.

Judy and Doris were born in 1932, Doris in March and Judy the following December. "Doris is the sister I never had," Judy says.

The first time Judy and Doris met was in 1976, after 32 years of writing. Doris came to the US and brought her lifelong friend, Jean Cox, well known to Judy through Doris' letters. Both Doris and Jean are retired civil service workers. "It was instant like," says Judy. "We knew right away that we'd be the best of pals."

Judy went to England in 1978, and not more than two years has passed between visits since then. Whenever Judy and her husband Keith (ret.) go overseas, they stop in England to see Doris and Jean and their families. Judy plans to visit next in October.

The latest visit was last May, when Doris came to Albuquerque. "It still feels like Doris is right next door, no matter how much time goes by between visits," says Judy.

TIMELESS FRIENDSHIP is toasted by pen pals Judy Mead (center, 300A), Doris Slattery (left), and Jean Cox. Doris and Jean came to Albuquerque from Oldham, England, last May to visit Judy and her family.

Judy got married first and Doris married within a year. Doris named her daughter Julie after Judy's daughter Julia. "We know each other's children well," says Judy, "but they don't have pen pals."

The pen pals send special gifts to each other. The year Elizabeth II was crowned, Doris sent Judy a special coronation edition of the King James Bible. Judy sends Doris things unique to the Southwest, such as Nambéware.

"This friendship is one of the nicest things that's ever happened to me," says Judy. •JC

UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS

Deadline: Friday noon before week of publication unless changed by holiday. Mail to Div. 3162.

Ad Rules

1. Limit 20 words, including last name and home phone.
2. Include organization and full name with each ad submission.
3. Submit each ad in writing. No phone-ins.
4. Use 8½ by 11-inch paper.
5. Use separate sheet for each ad category.
6. Type or print ads legibly; use only accepted abbreviations.
7. One ad per category per issue.
8. No more than two insertions of same "for sale" or "wanted" item.
9. No "For Rent" ads except for employees on temporary assignment.
10. No commercial ads.
11. For active and retired Sandians and DOE employees.
12. Housing listed for sale is available for occupancy without regard to race, creed, color, or national origin.
13. "Work Wanted" ads limited to student-aged children of employees.

MISCELLANEOUS

ELECTRONIC TYPEWRITER/WORD PROCESSOR, Smith-Corona PWP40, dictionary, autospell, built-in memory for 21 pages, other features, $200. Carrick, 266-0191.

COLOR TV, 25-in. Heath console, solid-state, $150 OBO. Stueber, 299-2414.

PIANO, 7 yrs. old, Queen Anne style, cherrywood, $1,200. Anderson, 281-5086.

GAME TABLE, bumper pool & card table combo, balls, 6 cue sticks, w/wall rack, $175. Miller, 268-5992.

PSE 29-IN. DRAW COMPOUND BOW, w/quiver & arrows; Thomson Center 50-cal. muzzleloader; Winchester Model 94 30-30, w/side mounts. Gallegos, 293-8885.

REFRIGERATOR, kitchen set, master bedroom set, lamps, rocking chair, TV, VHS camcorder, wood/glass table. Wilcoxen, 296-8965.

INTERPLAK, home plaque removal instrument, without brushes, new, still in box, $30. Sisneros, 299-6408.

WOOD AND TILE TABLE, Southwestern style, seats 4, upholstered chairs, $425. Maldonado, 843-7243.

METAL STORAGE SHEDS (5), 8.5 x 9.5, $80/ea.; super-single waterbed, $150; brown love seat, $40; side-bagger lawn mower, $150. Greer, 831-0019.

IRISH WOLFHOUND, 7 yrs. old, free to good home. Jones, 296-3998.

GOLF EQUIPMENT: pull cart, carry bag (rain cover, fur-lined), umbrella; storm door, 36-in. wide, brown, upper sliding glass/screen combo. Branstetter, 292-5978.

SECTIONAL COUCH, 3-piece, oatmeal color, bought at American Furniture, $400. Maldonador, 892-3653.

ANTENNA, multi-band vertical amateur, $35; Johnson Matchbox antenna tuner, $25; free tube-type transmitter & receiver. Melick, 867-2860.

HOME GYM, Prolink II, 200-lb. stack, cable-driven, leg press, pec deck, bench, does everything, new, $1,300 OBO. McVey, 839-4612.

FIFTH-WHEEL TRAILER, '89 Royales International, take over payments, financed at SLFCU. Aguilar, 857-0605 after 6 p.m.

CAR SEAT, $30; extra-sturdy walker, $25; oriental rug, 6' x 9', rust, navy w/cream, $200. Cashwell, 275-0708.

CAROUSEL SLIDE PROJECTOR, Kodak, $150; cash register w/stand, Hugin/Sweda, $650; round tables, w/4 chairs, $125. Schultz, 275-9349.

USED COLLEGE OF SANTA FE BOOKS, Portfolio class text, $5; Fundamentals of Marketing, $30; Economics study guide, $10. Scharnberg, 345-1523.

DRIVER BOARD, VGA autoswitching display, analog/TTL outputs, 256K RAM, up to 800x600 resolution, 16-colors mode, $55. Hale, 298-1545.

COLEMAN GENERATOR, 2,700-watt power pack, used once, $300. Cotinola, 836-3531.

SUITCASE, woman's, 8" x 29" x 21". Martello, 881-7835.

COMPUTER, 286-10MHz, 2Mb RAM, 20Mb hard drive, 1.2Mb & 360Kb 5-1/4-in. floppy drives, mono, $700. Balk, 281-9083.

CHROME REAR BUMPER, from '78 Dodge truck, fits all full-size Dodge trucks made since '78, $10. Moss, 299-5149.

CAR-TOP CARRIER, 15 cu. ft., Sears, used once, $60. Bland, 265-6286.

HOBIE CAT, 16', trailer, $1,300 OBO. Cyrus, 898-4038.

KENMORE GAS DRYER, $75; set of weights, w/bar, no bench, $1,500. Rimbert, 299-3525.

KODAK CAROUSEL, Model 750H, w/5-in. lens & 50x50 Da-Lite projection screen, both in original boxes. Wagner, 823-9323.

OLYMPUS OM-1 CAMERA, w/50mm & 28mm Zuiko lenses, Vivitar flash, & leather case, $250. Dippold, 821-5750.

80-200mm ZOOM LENS, w/55mm Skylight filter & case, Olympus or Pentax mount, $60 OBO. Mesibov, 898-3725.

AIR CONDITIONER, Sears, window model #106, w/manual, needs freon charge, $125 OBO. Demos, 294-6492.

FLUTE, sterling silver Gemeinhardt, w/French keys & low-B key, $1,000 OBO. Lemen, 293-3487.

BABY ITEMS & girl's clothes, sizes infant to 24 mos. Bartberger, 823-2843.

ROCKING CHAIR, solid oak, w/seat cushion, $115 OBO. Noack, 298-3590.

VIOLIN, 4/4, made in Germany, w/carrying case & shoulder rest, $275. Jensen, 821-6178.

WINDSURFER SAIL, Neil Pryde, 5.0 RAF, $55. Horton, 883-7504.

GUITAR, Ibanez Roadstar II Series, Crate CR-110 amplifier, $245 OBO; bike rack, Volkswagen Bug, $20. Petruno, 265-1826.

COMMODORE COMPUTER HARDWARE, Plus 4 computer (needs work), color monitor, MPS-802 printer, 1541 disk, $150/all. Roberts, 881-2815.

THOMAS ORGAN, Playmate Color-Glo, 26 variations keyboard, floor pedals, bench, music, $400; Texas Instruments Professional, 256K, dual 5-1/4-in. drives, MS-DOS, software. Padilla, 255-9657.

CANON AE-1 SLR CAMERA, w/case, 4 lenses, telextender, flash, other accessories, $250 OBO. Lawrence, 296-3058.

SNOW THROWER, 25-in., 8-hp, Trac-Drive, $650; gas grill, 42,000-Btu, $100; 24-in. stools, almond w/oak, padded seats, 4 at $100/ea. Kolb, 271-1775.

LABRADOR PUPPIES, AKC-registered, hunting potential, 6 black males, $125/ea.; 1 chocolate female, $225. Knittle, 294-6625.

PELLET RIFLE, Crossman Model 1400 Pumpmaster, .22-cal., w/pellets, $50. Bray, 292-2410.

GARAGE SALE: Aug. 24-25, 10620 Casador Del Oso NE (west of Juan Tabo on Spain, south on Nordeen). Oglesby, 296-5361.

BALDWIN ORGAN, 20+ yrs. old, 2 keyboards, $100. Tapp, 821-3843.

FORMAL DINING ROOM FURNITURE, table, 6 chairs, china cabinet; swivel rocker; Flex-steel recliner. Gaeddert, 294-7723.

FLOOR LAMP, $10; bookcase, $10; steno chair, $6; coffee table, $6; portable picnic table w/built-in chairs, $6. Robinson, 293-7231.

REFRIGERATOR, almond, side-by-side, 3 yrs. old, deluxe model w/ice & water in door, $550. McMullen, 298-2801.

BUNNIES, Siamese mini-lops, black mini-lops, $12; CD player, needs work, $45. Salgado, 883-0749, leave message.

FULL-LENGTH MIRROR, Ethan Allen, maple, $150 OBO. Ramel, 821-0475.

COUCH, love seat, chair, earthtones, $300; coffee table & 2 end tables, $150. Kallenbach, 293-6916.

COUCH & LOVE SEAT SET, $100; metal trundle bed, $35; Kenmore gas dryer, $20. Letz, 293-4525.

ROWING MACHINES (2), single piston, double piston, weighted-wheel exercycle, belt, & control, best offer. Preston, 344-7722.

ROTOTILLER, Troy Bilt, 7-hp, used twice, $950. Bloomberg, 247-9470.

BRADBURY PIANO, console size; radio & record player console. Kent, 256-1221.

LOBO BASKETBALL TICKET, Section 23, Row 32, Seat 10 (6 rows from floor), sell at cost, $268. Sanchez, 298-3130.

HOTPOINT ELECTRIC STOVE, 30-in., almond, self-cleaning oven, free-standing, $150 OBO. Courtney, 865-8912.

PEGBOARD, 4x8x1/4, $4/ea.; misc plumbing, lawn-watering, & electrical materials. Schiess, 262-0379.

GE REFRIGERATOR, 2-dr. w/icemaker, works but lacks beauty, $25; double-tub laundry sink, ceramic, $25. Brandon, 836-5621.

HOT TUB, family size, '86 Sundance Supra-Lounger model, 7' x 7', fully equipped, $3,500. German, 281-1719.

ADULT MYSTERY GAME, "How to Host a Murder: The Watersdown Affair," never used, complete, $15. Lambert, 344-9012.

THREE-PIECE WALL UNIT, traditional, dark oak, inside lighting, 2 w/glass doors, 1 entertainment center, $1,200. Bertholf, 296-7657.

ESCORT RADAR DETECTOR, 3 yrs. old, visor clip, extra power cord, manual, cost $250, asking $95. Stangas, 296-5657.

SOLAR PANEL, w/hot water heater, new, never used, $300 OBO. Rea, 296-4620.

REFRIGERATOR, bottom freezer, Wards, old but runs, $35; utility trailer, 3-1/2' x 7' bed, $25. Aeschliman, 281-1227.

TENT TRAILER, sleeps 8, large windows, 2 tables, stove, sink, '70 Coleman, $400. Wright, 298-4567.

LOBO SEASON BASKETBALL TICKETS (2), Section 12, Row 22, bench seats, w/close-in parking. Myers, 298-2677.

PECAN DINING ROOM SET; 48-in. round glass patio table. Whelan, 265-7660.

KITTENS (5), gray, yellow, 1 calico, free. Waddoups, 865-7952.

BABY ITEMS: crib, mattress, mobile, mirror, changing table, high chair, backpack, bassinet, stroller, sandbox, toys, misc. Korbin, 821-8461.

GRACO STROLL-A-BED, $20; 3 expandable plastic door guards, $5/ea.; potty chair, $5. Liguori, 256-3613.

WIDE WEDS LIGHT ALLOY WHEELS (4), w/high-performance low-profile tires, for BMW cars, $700 OBO. Carson, 281-5115.

CHAIR & OTTOMAN, earth tones, $75; Porter basketball backboard, $25; flute, $150; 5' x 6' custom topper superior camper shell, w/roof rack (Nissan), $1,275. Brown, 298-1303.

MAYTAG WASHER, $125; Maytag gas dryer, $125. Stephenson, 296-9330.

SWING SET, $30; snow tires, P195/75D14, $15; metal windows, 4' x 3', $20; metal barrels, $4; books, 20¢-50¢; toys. Davis, 294-4614.

TRANSPORTATION

'89 MAZDA MPV, gold on black, loaded, $13,000. Salgado, 266-2763, serious calls only.

'84 ELDORADO ENCORE MINI-MOTORHOME, 25-ft., Chevrolet, AC, 33K miles, generator, awning, tilt, cruise, loaded. Baggett, 296-6364.

'76 TOYOTA LANDCRUISER FJ40, stock truck, w/extras, $3,750; '86 BMW motorcycle, loaded, $3,800 book value, sell for $3,400. Johnson, 898-8439.

WOMAN'S 10-SPD. RALEIGH BICYCLE, 26-in., approx. 100 miles on it, $165. Moyer, 881-3879.

'82 HONDA 900F MOTORCYCLE, kept in garage, best reasonable offer. Aguilar, 857-0605 after 6 p.m.

'75 MERCEDES-BENZ 450 SLC, see at KAFB lot, $10,900. Davidson, 293-9486.

'87 FORD RANGER XLT, Supercab, 4x4, 5-spd., V-6, PS, PB, AC, cruise, towing package, rack, toolbox, extras, $8,500. Vernon, 892-6571.

EXPLORER MOTORHOME, 20-ft. Dodge Class C, rebuilt engine & other recent work, new curtains & upholstery, $4,500. Hughen, 296-2600.

'53 CHEV., 4-dr., 6-cyl., 3-spd., PS, one owner, $1,650 OBO. Gorman, 292-7119.

'84 HONDA ELITE 125, 4,200 miles, digital read-out, fold-in headlights, rack, $1,000 OBO. Romero, 864-7254.

'80 EL CAMINO, black, w/camper shell, V-6, standard shift, AC, PS, SS interior, $2,595. Freshour, 275-2206.

'72 PORSCHE 911T, white w/black Carrera stripe, spoilers, alloy wheels, $9,800. Davis, 281-1248.

'85 FORD THUNDERBIRD, turbo coupe, 5-spd., fully equipped, 42K miles, $6,700. Woodall, 296-2391.

'74 OLDS CUTLASS, 2-dr., one owner, AC, cassette tape. Puccini, 821-0121 or 255-0568.

BICYCLES: woman's 10-spd., man's 10-spd., $100/both OBO. Hammond, 294-2045.

'87 TAURUS LX, V-6, AT, loaded, keyless entry, electronics group, warranty through Oct. '92, one owner, $7,000 OBO. Zaorski, 281-9194.

HONDA 700cc SHADOW, water-cooled, shaft drive, 2 yrs. old, 6K miles, garaged, adult-ridden, leather bags, cover, helmet, gauntlet gloves, $2,300. Bray, 292-2410.

REPOS: '84 Buick Regal Limited, 6-cyl., AC, AM/FM stereo tape deck, PW, PL, 107K miles; '89 Dodge Spirit, 4-cyl., AC, AM/FM stereo, 39K miles; '88 Suzuki Katana 600 GXS motorcycle, 25K miles; bids accepted through Aug. 28; we reserve the right to refuse all bids; subject to prior sale. SLFCU, 293-0500.

SCHWINN BIKES, matching man's & woman's, World Tourist models, copper color, $100/ea. Tapp, 821-3843.

'88 FORD BRONCO II, Eddie Bauer, touch 4x4, options, anti-lock rear brakes, book price, $10,400. Miller, 822-8733.

DIAMONDBACK MOUNTAIN BIKE, 12-spd., 20-in. frame, Shimano derailleurs, $195. Pierce, 293-2380.

'81 LINCOLN TOWNCAR, 87K miles, one owner, $2,800. Barton, 299-3738.

'89 GEO SPECTRUM, 21K miles, AC, 5-spd., assumable factory warranty, under book, $4,600. Courtney, 865-8912.

'84 TRANS AM, T-top, 305 engine, AT, new brakes, current emission, 61K miles, $3,500; '65 Ford 3/4-ton pickup, 4-spd., $2,500. Brandon, 836-5621.

'77 DODGE MAXIVAN, AT, PS, PB, carpet, cabinets, CB and AM/FM radios, bed, $2,300 OBO. Tobyas, 877-0354 after 6 p.m.

'83 ALUMINUM BOAT, 14-ft. Gregor, 15-hp Suzuki motor, '89 EZ-Loader trailer. Miller, 883-0218.

'81 CHEV. BLAZER, 4x4, PS, PB, AC, AM/FM cassette, automatic locking hubs, $3,500; 14-1/2-ft. boat, w/trailer, 65-hp Mercury outboard, accessories. Morrow, 281-9607.

'77 FIAT X-1/9 CONVERTIBLE, $1,100 OBO; '71 Datsun pickup, $700. Ghormley, 831-1991.

SCHWINN BICYCLES: boy's 20-in. BMX, girl's 27-in. 10-spd., $80/ea.; man's Bertin 10-spd., 27-in. frame, $125. Hickox, 299-0772.

'76 CELICA ST, Alpine stereo cassette, service manuals, $1,450 OBO. Aeschliman, 281-1227.

'77 DODGE TIOGA II MOTORHOME, self-contained, generator, awning, hitch, 110 AC, TV antenna, microwave, 65K miles, below book, $5,250. Cole, 281-9873.

'79 OLDS CUTLASS SUPREME, AC, AT, PS, PB, new tires, $1,250. Kane, 884-7711.

'77 DATSUN 280Z 2+2, AC, 135K miles, new paint, FM cassette stereo, $2,600 OBO. Snow, 266-8232.

'88 PONTIAC LEMANS, 4-dr. sedan, AT, AC, $3,175. Brown, 884-8581.

'82 TOYOTA TERCEL, 2-dr. sedan, 5K miles on rebuilt engine, new brakes, w/snow tires. Mora, 281-9815.

'85 HONDA CR500 MOTOCROSS BIKE, water-cooled, never raced, $1,300 OBO. Meeks, 292-5915.

BMX DIRT BIKE, 20-in., $65; girl's 20-in. Schwinn banana bike, $40. Brown, 298-1303.

'77 MGB CONVERTIBLE, 82K miles, $2,795 OBO; '83 Pontiac Grand Prix Brougham, 90K miles, AT, AM/FM cassette, all power, $2,995 OBO. Padilla, 831-7331.

'75 DODGE DART, slant 6-cyl. 225 engine, AT, PS, white, $800 or trade for '85-'88 Civic, Colt, Escort. Garcia, 888-4735.

'82 HONDA CIVIC WAGON, 102K miles, 5-spd., maroon w/accent stripes, 37+ mpg, make offer. Zirzow, 281-9896.

'70 VOLKSWAGEN BUG, Baja, AM/FM cassette, rebuilt engine, new clutch, $1,800. Perrine, 293-1429.

'83 PLYMOUTH TURISMO, 57K miles, 5-spd., AC, hatchback, sunroof, $2,000 OBO. South, 294-8675.

REAL ESTATE

4-BDR. HOME, 1-3/4 baths, new roof, Comanche/Eubank area. Cashwell, 275-0708.

3-BDR. TOWNHOME, 2 baths, 1,270 sq. ft., near Alamosa Elementary, storage/garage, utility room, $57,000. Malczynski, 836-0608.

2-BDR. MOBILE HOME, 16' x 30' '84 Marlette, large kitchen, living room, separate laundry, appliances, shaded lot, $18,000. Swanson, 275-9495.

4-BDR. HOME, 1-3/4 baths, den w/fireplace, large game/leisure room, $86,500. Miller, 268-5992.

2.5 ACRES, Manzano Mountains, w/14' x 60' mobile home, 2-bdr., utilities, fenced, Quail Hollow subdivision, $34,000, $5,000 down + terms, will consider trade. Marquez, 831-3088.

3-BDR. HOME, 2-story, 2-1/2 baths, shingle roof, fireplace, in Nor Este Estates, La Cueva High School district, $123,900. Martinez, 821-5906.

3-BDR. CONCHAS LAKE HOUSE, 1,300 sq. ft., 1-3/4 baths, oversize single garage, covered deck, fenced 100' x 100' lot, lake view, $49,500, terms negotiable. D'Antonio, 293-4043.

2-1/2 ACRES, South 14, some restrictions, electric, phone, good water area, $5,000 down, $20,000 REC. Clark, 281-1243.

3-BDR. HOME, 2 baths, den w/fireplace, 1,750 sq. ft., large backyard w/inground pool, Mitchell, Hoover, Eldorado schools, $105,000. Lopez, 294-4325.

3,000-SQ.-FT. HOUSE, downtown Belen, separate in-law quarters on 1/3-acre lot, qualify at credit union & take over payments or refinance. Botner, 864-6007.

3-BDR. HOME, extras, 8% fixed, $10,000 down, 3 miles from Eubank Gate, hot tub, skylights, never smoked in, $116,000. Gallegos, 294-0233.

3-BDR. HOUSE, 1 bath, 316 General Stilwell NE, 1-car garage, $55,000. Romero, 291-0465.

PATIO HOME, corner lot east of Tramway off Lomas, near open space, w/views, $49,500. Halbleib, 268-6571.

3-BDR. HOME, 1-3/4 baths, 2-car garage, Chelwood/Lomas area, assumable, $79,900. Serrano, 298-2807, leave message.

2-BDR. HOME, 2 baths, 2-car garage, 1,080 sq. ft., Towne Park subdivision at Chico & Eubank NE, $73,000. Cabe, 293-6895.

PARTIALLY COMPLETED HOME, 4,800 sq. ft., 2-car garage, 1/2-acre lot, 4808 Driftwood NW, 2x6 construction, $48,000. Schmale, 883-4841.

MOUNTAIN HOME on 2 wooded acres, Cedar Crest, N14 frontage, detached 2-car garage w/guest accomodations, $110,000. Carson, 281-5115.

WANTED

MOVING BOXES, wardrobes, dish packs, & boxes w/separators for glasses. Hovorka, 294-6981.

SMALL BICYCLE, appropriate for 5-yr.-old. Hesch, 275-7630.

FEMALE ROTTWEILER, to breed w/4-yr.-old male Rottweiler of Colorado lineage. Apodaca, 821-3406.

CHILES — BIG JIM'S, you bring my bag to Livermore, I'll pay for your bag. Franklin, 415-447-6687.

METRONOME for diligent young piano students. Jung, 292-8245.

CAR COVER for 924 Porsche. Monnet, 865-7941 after 5:30 p.m. & weekends.

HOUSE TO SIT, any time of year, responsible adult. Lee, 1-465-2617.

NIGHTSTANDS, 1 or 2 (circa 1920) & lamps; dresser lamps; slide projector & screen. Benedict, 883-2785.

GOOD HOME for cream-colored puppy, female, 3 mos. old. Rex, 344-6552.

TWO-WHEEL TRAILER, 4' x 5' or larger; 13-in. rims or larger; towbar for Nissan pickup. Yingst, 884-3812.

ROOMMATE, share 4-bdr. NE Heights home, private bedroom & bath, 2-car garage, carpeted, washer/dryer, storage. Low, 299-7395.

'85-'87 VW GOLF OR JETTA, 5-spd., w/AC. Hickox, 299-0772.

SEVERAL TREES to cut up for firewood, will remove for reasonable cost. Zirzow, 281-9896.

Coronado Club Activities

Enjoy Friday Dollar Days While They Last

SUMMER ENDS, and so do Friday Dollar Days at the C-Club. The last two Dollar Days take place tonight, Aug. 23, and Friday night, Aug. 30. The pool and patio are open from 5 to 10 p.m., and the cost is free for members with pool passes, $1 for Club members without passes, and $2 for non-member guests.

SINGING & STRUMMING — Sing along with the Isleta Poor Boys Friday, Aug. 30, from 7 to 11 p.m. Menu items include filet mignon or golden fried shrimp (two plates for $16.95), prime rib ($9.95), chicken teriyaki ($7.95), or salmon steak ($9.95). Reservations recommended (265-6791).

WEEDS WILL WAIT, Labor Day won't. Let the lawn go until next weekend. Instead, come to the Club Monday, Sept. 2, from 11 a.m. to 6 p.m. for a Labor Day Party and official closing of the Club's pool & patio. Play tennis, horseshoes, and volleyball, or swim in the pool. Bob Weiler and Los Gatos play from 2 to 6 p.m., and a patio buffet is served from noon to 5. Admission is free for members and $3 for guests.

PLAY YOUR CARDS RIGHT at the T-Bird Card Group's September meetings, Thursday, Sept. 5, and Thursday, Sept. 19. Meetings take place from 10 a.m. to 3 p.m.

Events Calendar

Events Calendar items are gathered from various sources. Readers should confirm times and dates of interest whenever possible.

Aug. 23 — Zoo Music Series: Cajun sounds of Bayou Seco; 6:30-9:30 p.m., Rio Grande Zoo, 843-7413.

Aug. 23-25 — Antique Show and Sale, presented by Continental Show Ltd.; 10 a.m.-9 p.m., Fri., 11 a.m.-8 p.m. Sat., 11 a.m.-5 p.m. Sun.; Albuquerque Convention Center, 268-5122.

Aug. 23-31 — Los Voladores Aztec Dancers, entertainment includes flyers soaring down and around an 80-ft. pole; call for times, Indian Pueblo Cultural Center, 843-7270.

Aug. 23-Sept. 8 — "The Holdup," comedy by Marsha Norman about two brothers in New Mexico in 1914; 8 p.m. Fri. & Sat., 6 p.m. Sun.; Vortex Theatre, 247-8600.

Aug. 23-Sept. 14 — "Passions & Prayers," an evening of short plays by Joe Pintauro, Theatre-in-the-Making presentation; 8 p.m. Fri. & Sat.; CenterStage, 260-0331.

Aug. 23-Sept. 20 — Exhibit, "Impressions of Nature," features the work of F. G. Hochberg, co-founder of the Nature Printing Society and curator of Invertebrate Zoology at the Santa Barbara Museum of Natural History, images printed directly from natural subjects including plants, fish, and shellfish; 9 a.m.-5 p.m. daily, New Mexico Museum of Natural History, 841-8837.

Aug. 23-Sept. 29 — Exhibit, "The Streets of Mexico: Photographs by Van Deren Coke," photographs taken from 1974 to 1990 capture the social and cultural aspects of street life in older parts of Mexico; 9 a.m.-4 p.m. Tues.-Fri., 5-9 p.m. Tues., 1-4 p.m. Sun.; UNM Art Museum, 277-4001.

Aug. 23-Oct. 4 — Exhibit: "Henry Nadler 1930-1990, A Retrospective"; 9 a.m.-4 p.m. Tues.-Fri., 5-9 p.m. Tues., 1-4 p.m. Sun.; UNM Art Museum, 277-4001.

Aug. 24-25 — Summerfest: Fiesta Artistica De Colores, food, entertainment, arts & crafts; noon-10 p.m., Civic Plaza, free, 768-3490.

Aug. 24-25 — Arts Alive! benefit for the Albuquerque Community Foundation, more than 30 performing arts groups and food from the city's most outstanding restaurants; 7:45 p.m.-midnight, Coronado Center, 881-4600.

Aug. 25 — Sunday Jazz: Latin Jazz Day with Brazil, Salsa Suite, and Las Amigas y su Grupo Ritmo; 3-7 p.m., Oscar Huber Memorial Ballpark in Madrid, N.M., 255-9798.

Aug. 27 — "Fall Gardening," class sponsored by the Council of Albuquerque Garden Clubs, with teacher Robin Mason; 7 p.m., Albuquerque Garden Center (10120 Lomas NE), 296-6020.

Aug. 30 — "The Runts: Rock 'N' Roll Comedy Tour '91," Los-Angeles-based late-night comedy ensemble (majority of group hails from New Mexico), original scripted scenes performed by the Runts headliners and players intermixed with familiar rock 'n' roll performed by "The Whole Damn Band"; 8 p.m., Rodey Theatre, 277-4402.

Aug. 31 — Flamenco artist Rita Romer, performance sponsored by UNM Division of Continuing Education and Baila! Baila! International Dance Studios; 7 p.m., UNM Continuing Education Conference Center (University & Indian School), 265-1858.

Sept. 1 — Exhibit opening, "Horse Tales: An Evolutionary Odyssey," produced by the Natural History Museum in a collaborative program with the Hubbard Museum of the Horse in Ruidoso Downs, tells about the horse from its first appearance in North America to its reintroduction by the Spanish to its modern-day place in the natural world (on display through Feb. 9, 1992); 9 a.m.-5 p.m., New Mexico Musuem of Natural History and Science, 841-8837.

Welcome

Albuquerque — Bertha Armijo (21-1), Teresa Cajete (21-1), Elizabeth Creel (21-1), Karen Herskowitz (21-1), Ernestine Morris (21-1), Patricia Ripple (21-1), Patricia Sanchez (3723). *Other New Mexico* — Carol Wiley (21-1).

Elsewhere: *New York* — Mark Koch (9133).

feedback

Q: As part of Sandia's ES&H initiative, I see the opportunity to impact both our environmental and financial "statements." It seems that it would be so easy to ask each Sandian and contractor to adopt an energy-efficient attitude. For example, I frequently enter a room that is unoccupied or used infrequently, such as a bathroom or utility closet, to find the lights have been left on. I wonder how much energy and money is wasted each day this way. Also, if people are going to be away from their offices for a while, it would be so easy to turn the lights and equipment off. I wonder if the same people don't turn the lights off at home. Since we as taxpayers ultimately foot the bill, I think it is in everyone's best interest to turn the lights off!

A: I couldn't agree with you more. Our electric bill is more than $1 million a month, and we all need to look for opportunities to conserve energy. We should have someone working full time on energy conservation, but I do not have enough people to take on the assignment now, though I suspect that the energy savings would pay the salary of such a person several times over. You obviously have the right attitude. Please be a missionary and share the message with your fellow workers and encourage them to do the same.

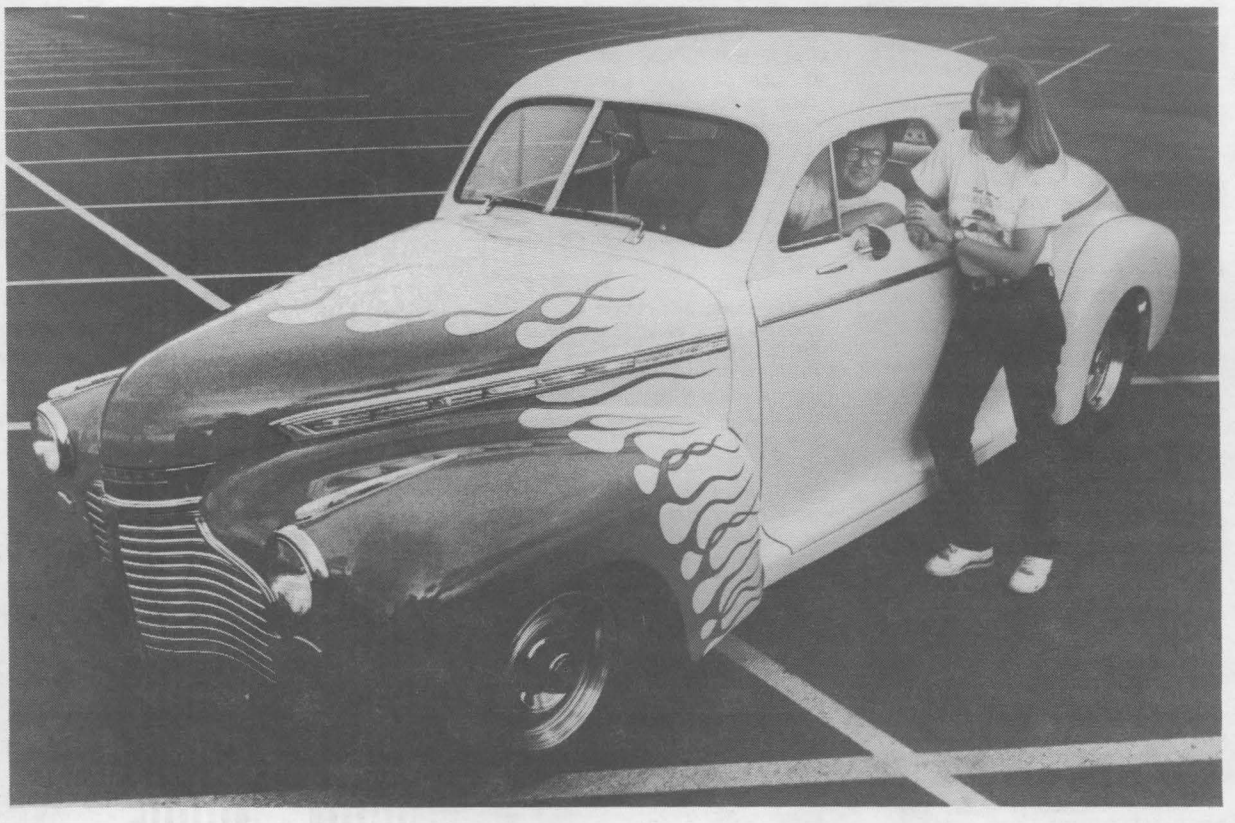
Ward Hunnicutt (7800)

Q: Are there plans to install building access systems, like the one now in use in Bldg. 823, in buildings outside the Tech Area, such as Bldg. 852? This would give employees access during non-operational hours and eliminate "unaccommodating" key service.

A: Even if a building is outside a Tech Area, Sandia is still required by DOE Orders to protect government property. Compliance with these orders includes locking, alarming, and patrolling these buildings.

We have not precluded code and other automated access control systems at these locations. We are currently reviewing two such systems for potential use. However, these systems must meet certain DOE requirements, should be coordinated through Dept. 3430, and are expensive. Installation of one system for evaluation purposes is being negotiated. Meanwhile, we are attempting to enhance key service at all locations.

Jim Martin (3400)



HOT WHEELS — powder blue with magenta flames is the color scheme of Art (9122) and Jean (2752) Sena's street rod, a 1941 Chevy Special Deluxe with a 1970 V-8 engine. Art was recently selected as the New Mexico State Representative of the 50,000-member National Street Rod Association. Art and Jean did all the work on the car except the paint job. Among the features they added are air conditioning, power brakes and steering, and a tilt steering column. Art says a number of Sandians are NSRA members.