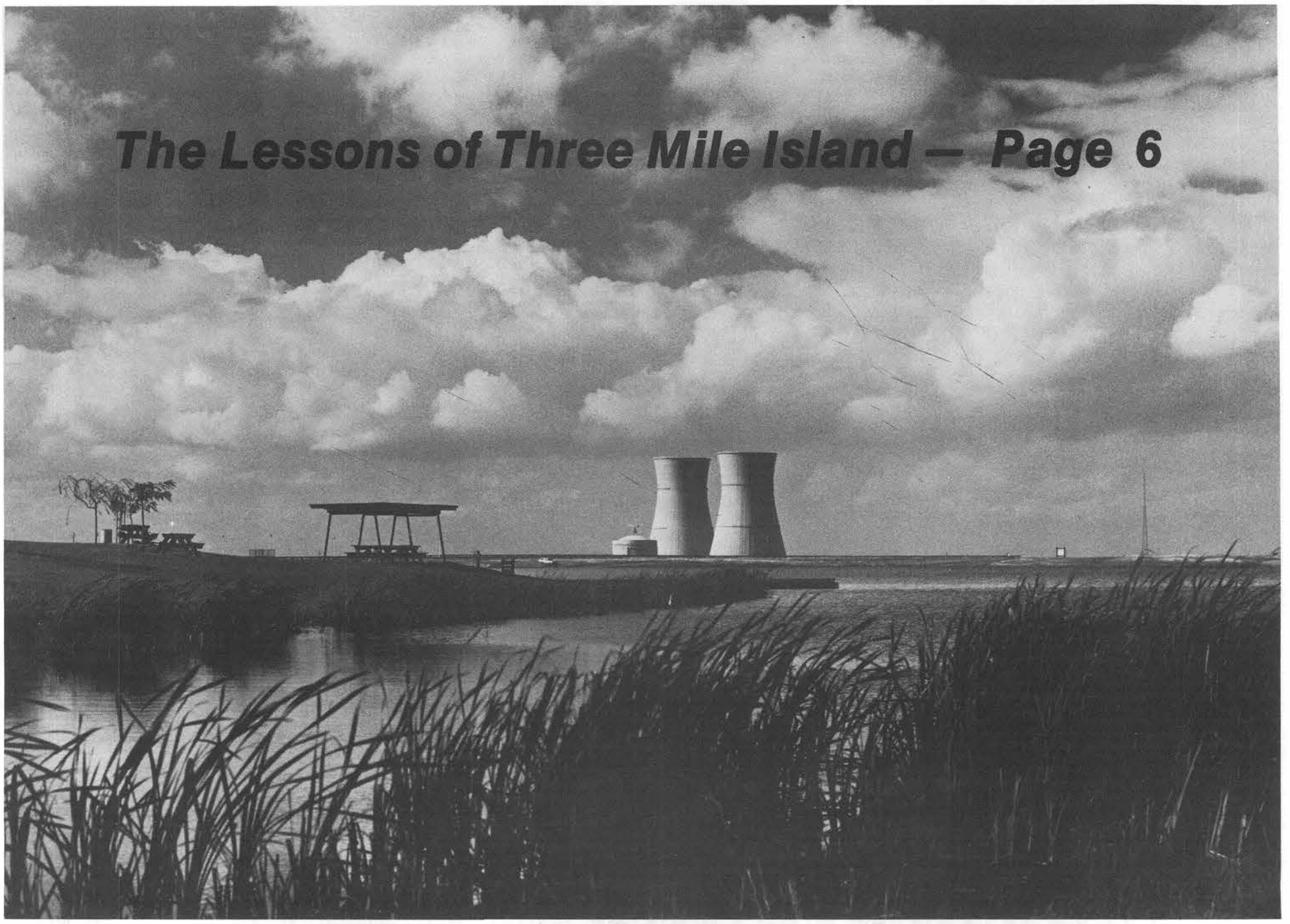


LAB NEWS

VOL. 31, NO. 19 SEPTEMBER 21, 1979

SANDIA LABORATORIES • ALBUQUERQUE NEW MEXICO • LIVERMORE CALIFORNIA • TONOPAH NEVADA

New Technology Developed for W86 Fire Set

W86 FIRE SET prototype is examined by John Stichman, Division 2167 supervisor, and Ed Leeman, project leader. The new fire set, incorporating optoelectronics technology, will be used by the Army's Pershing II earth penetrator missile system.

A new optoelectronics technology has been developed by the Microelectronics Directorate 2100 for use in the W86 earth penetrator warhead. The weapon was recently authorized for Phase 3 engineering development for the Army's Pershing II missile system.

Work is centered in Firing Subsystems Department 2160 under C.B. McCampbell.

Light emitting diodes (LED's), fiber optics, photodiodes, and other optoelectronics components hold great promise for weapons applications, says John Stichman, supervisor of Advanced Subsystems Division 2167, responsible for the W86 Fire Set.

"The fact that optical links can achieve high noise immunity and complete electrical isolation prompted our interest," John says. "The lengths of communication links in fire sets are small — usually less than a foot — but the isolation requirements are extremely stringent. Department 2160 has addressed and answered very specific questions of

(Continued on Page Two)

Afterthoughts

Turnabout--A New Mexico rancher has written a letter to the editor of the New York Times that makes a rather sharp point: "I read with interest, and some alarm, your account in the May 13th edition of the rats attacking a citizen in your fair city. My alarm was triggered by the inference that some action was to be taken against the entire rat population. This is certainly unfair, and I am grateful that we are more civilized out here in this part of the country. At one time we were just about as ignorant. We have, at times, population explosions of coyotes, wolves or other predators; but clear thinking members of such organizations as Defenders of Wildlife, Sierra Club, Wilderness Society and a multitude of others have pointed out how fortunate we should feel to contribute our lambs and calves to the care and feeding of these poor animals. The fact that we now support more of these animals than ever before in our country's history attests to the success of our program.

"Since the great majority of the members of these associations come from the large population centers such as those along the eastern seaboard, I surely expect them to join us in this fight to save our rats. Surely rats have as much entitlement to life as coyotes and other creatures. To identify and punish the guilty rodent is one thing--but to poison indiscriminately certainly will upset the delicate ecological balance. DON'T TAMPER WITH OUR ECOSYSTEM! ...Sincerely, Wm. J. Waldrip, President, Rat To Life Society" (and general manager of Spade Ranches).

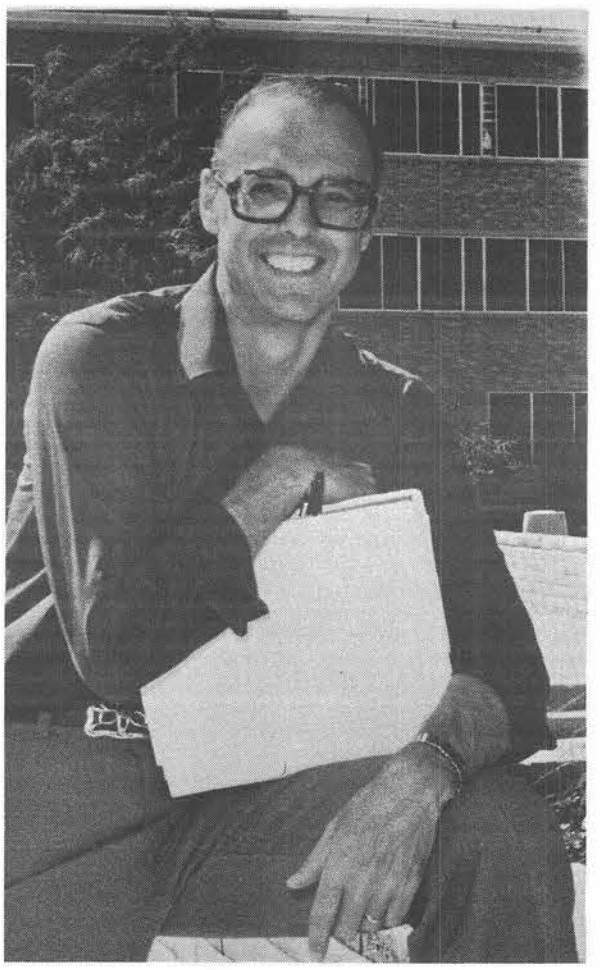
* * *

The mysterious west--Bob Casper (2154) received a package from an outfit in North Carolina addressed thusly: "Sandier Labs, Attention: Robert Casper, KASB East, Alberta, N.M. 87185."

* * *

"Whatever you can do, or dream you can do--begin it. Boldness has genius, power and magic in it." Goethe *js

Supervisory Appointment



DICK TRAEGER to manager of Geo Energy Technology Department 4740, effective Sept. 1.

Dick came to Sandia from a teaching post at UNM in 1963 and joined the Labs' materials research group. Previously, he had performed research for the Goodrich Company in Cleveland, Ohio.

He was promoted to division rank in the late 60s and, in 1973, moved into the present 2000 organization to work in hybrid electronics technology. In 1977 he shifted to the energy field, heading a division doing process research in coal liquefaction and oil shale retorting. His newly created department will investigate geothermal energy resources and related geosciences.

Dick acquired BS, MS and PhD degrees, all in chemical engineering, from respectively the Univ. of Wisconsin, Case Western, and UNM. He is adjunct professor at UNM and is active in the American Chemcial Society, the American Institute of Chemical Engineers, and IEEE.

Off hours, Dick plays tennis, backpacks and cross country skis. The Traegers' three sons are away at school, but one daughter remains at home with them in the northeast heights.

Continued from Page One

New Technology for W86 Fire Set

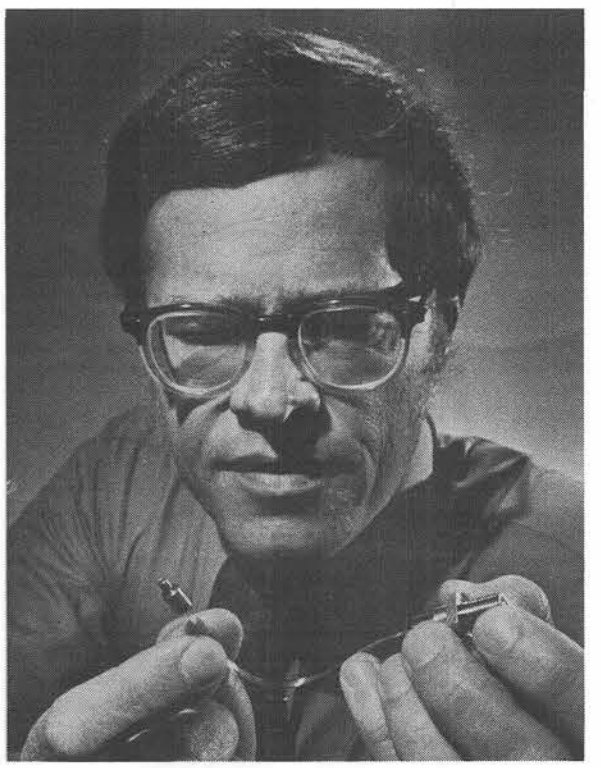
applicability, producibility, design techniques and weapon safety."

The Pershing II Earth Penetrator missile system is unique — it must survive missile launch/reentry environments plus the shock of earth penetration. Several constraints and requirements are placed on the fire set. In particular, the "fire" command, produced externally to the fire set, must be received in the fire set exclusion region during its severest mechanical shock — while the missile payload is penetrating the earth's surface.

"Optical coupling appears to be well suited to this application," John says. "Prototype couplers using LED's and photodiodes have been built for the Pershing II W86 warhead. They have survived mechanical shock tests to levels of 8000 g's, and more severe tests are planned. In the next stage of engineering development we will be looking at fiber optics with multiple fibers for enhanced reliability as coupling links."

Technology for the optical couplers and fiber optics has been contributed by Ken Hessel's Special Applications Division 2152.

Ed Leeman (2167) is the W86 fire set project engineer.



KEN HESSEL and his Special Applications Division 2152 contributed optical couplers and fiber optics to the W86 fire set.

LAB NEWS

Published every other Friday

SANDIA LABORATORIES

An Equal Opportunity Employer

ALBUQUERQUE, NEW MEXICO
LIVERMORE, CALIFORNIA
TONOPAH, NEVADA
Editorial offices in Albuquerque, N.M.
Area 505 264-1053
FTS 475-1053
ZIP 87185
In Livermore Area 415 422-2447
FTS 532-2447

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LEAP Supported

Multi-Service Center Is Hub of Social Action

LIVERMORE NEWS

VOL. 31, NO. 19 LIVERMORE LABORATORIES SEPTEMBER 21, 1979

Campaign Set For LEAP '79

A briefing of solicitors begins this year's LEAP (Livermore Employees Assistance Plan) fund-raising drive on Monday, Oct. 1. Solicitors will then contact each person individually during the week-long campaign.

Brochures describing the 1979 program already have been distributed, and special informational meetings are being held for those employees who joined SLL since last year.

Chairman Marlin Pound (8214) feels the $65,000 target (up $5,000 from last year) set by the Committee is realistic: "LEAP provides a convenient means of supporting agencies that help make our community a better, healthier and less threatening place to live, so we all benefit. You'll notice that our campaign slogan, 'LEAP '79 Is Us . . . All of Us,' says this, only in a different way."

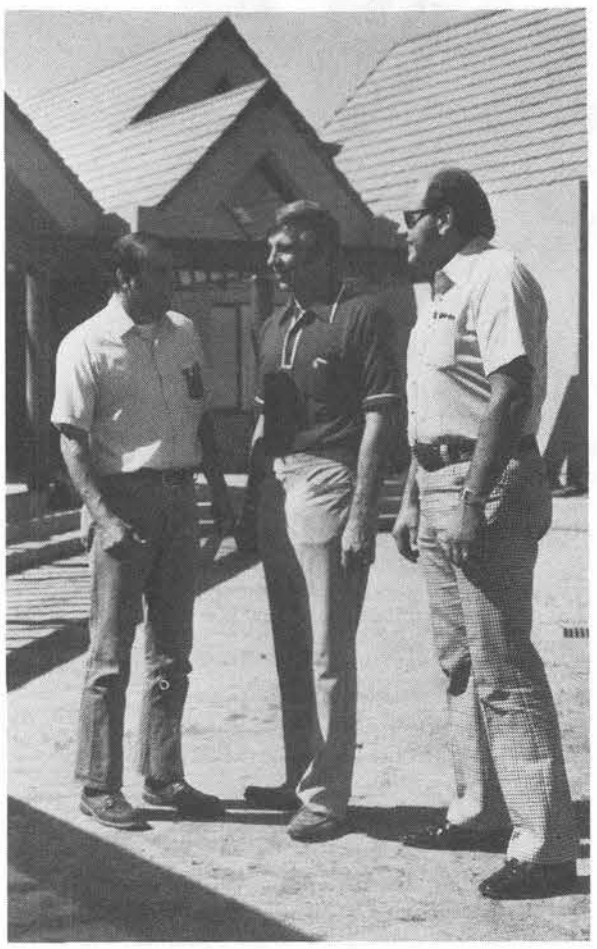
In allocating LEAP funds, the Committee considered a number of proposed beneficiaries and voted support to nine local service agencies (versus seven last year), in addition to the United Way of the Bay Area (200 agencies) and 15 national health agencies through the Bay Area Combined Agencies Drive (CHAD). This is the breakdown:

	Percent Allocations
LOCAL AGENCIES	18
Valley Emergency Fund Center	5.5
Buenas Vidas Youth Ranch	5.0
Hotline	3.0
Tri-Valley Haven for Women	3.0
Valley Connection	.5
Children's Emergency Council	.3
Health Care Center	.3
Nurses Welfare Fund	.2
Good Samaritan Home	.2
NATIONAL AGENCIES (CHAD)	24
UNITED WAY OF THE BAY AREA AGENCIES	58
Total	100

Three of the local agencies are new on the list: The Children's Emergency Council, active in the Komandorski Village area, provides emergency assistance to families and individuals regardless of age (not as its name implies), including food, clothing and medicine. The other two are located in Livermore's new Multi-Service Center (see accompanying article).

As LEAP Chairman, Marlin says he has become more knowledgeable and better acquainted with the agencies serving our community. "I've seen firsthand and I'm impressed with what LEAP dollars are doing. I'm also impressed with the number of dedicated volunteers, many of them Sandians. This volunteer effort does much to make each dollar invested in LEAP go farther.

"When the solicitor comes by for your pledge, please consider a LEAP Share — only six-tenths of one percent or approximately one-hour's pay a month. But whatever amount you give, it will be useful in helping others — on the national scale through CHAD, in the Bay Area through the United Way, and right here in our Valley. Your support matters."



LIVERMORE'S NEW MULTI-SERVICE CENTER is a model for meeting community social needs. Six agencies housed in the Center will receive LEAP support this year, with funding going directly to four and to two through the United Way of the Bay Area. LEAP Committee members during a visit to the Center are (from right) Robert Everett (8152), Marlin Pound (8214) and Andy Cardiel (8423).

Under steep, tiled roofs that give the appearance of a friendly village, Livermore's recently opened Multi-Service Center brings together 18 separate but interrelated social agencies. Some public, some private, the agencies range from crisis aid programs and health clinics to counseling services and a county welfare office.

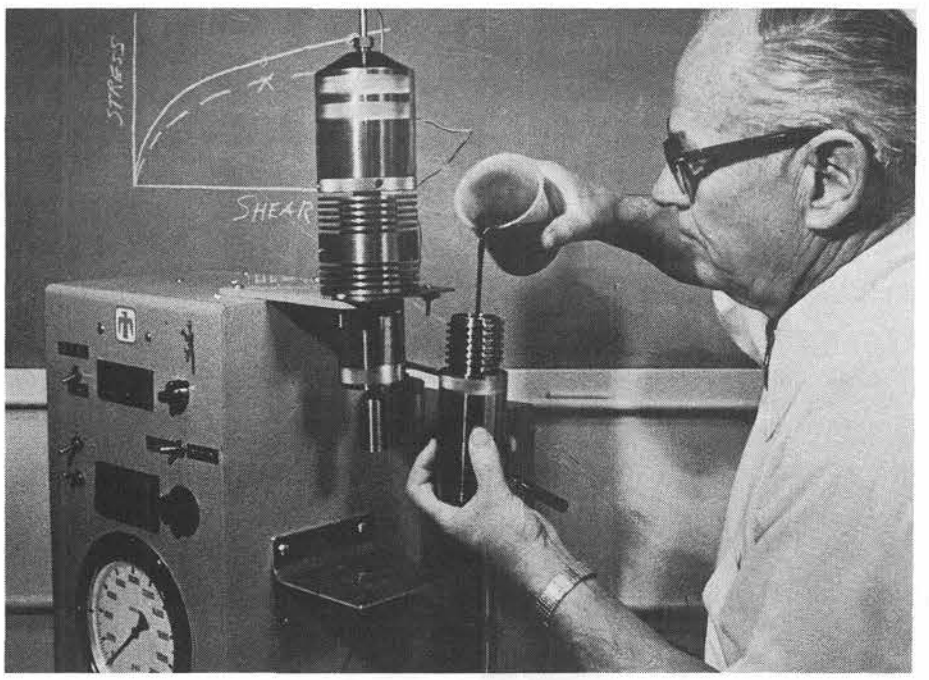
This year's LEAP program funds will directly support four of the agencies located here, while an additional two agencies will participate through the United Way:

- Good Samaritan Home offers an emergency services program to local residents needing food and other support in crisis situations.
- Health Care Center operates a clinic which focuses on low-income, medically indigent Valley residents, providing outpatient medical care and related services.
- Hotline provides a 24-hour switchboard for calls from persons in distress and focuses on drug and alcohol abuse counseling.
- Tri-Valley Haven for Women provides shelter for women and their children who are victims of domestic violence and other crises.
- Family Service (UW agency) offers counseling slanted toward mental problems, divorce, and parent/child relationships.
- Valley Volunteer Bureau (UW agency) recruits from the community and matches volunteers to the needs of nonprofit agencies and organizations as well as to those of the aged and handicapped.

Good Design

All too often, the person seeking social assistance is confronted by The Instituion — big, forbidding, bewildering, in fact and in spirit. The design of the Multi-Service Center goes against this institutional intimidation with small shop-like spaces for the various agencies, all presenting a warm and inviting appearance. It's been well received by both the professional staff and by those who come for assistance. Says Dave Dent (8257), a LEAP committee member, "It seems a model of how people who need help should be received — cordially."

1979 SLOW PITCH CHAMPIONS. Four co-ed teams competed for the SLL slow pitch softball title. After winning the second half of the season, this team went on to capture the overall championship: (from left) Roger Everett (8152), Joel Groskopf (8272), John Smugeresky (8314), Mike Stefanski (8413), Lupe Martin (8161), Alan Nagelberg (8312), John Lippold (8316), Gerry Giovacchini (8413), Pete Dean (8265) and Carl Melius (8341). Not shown: Scott Dougherty (8265), Annette Hicks (8333), Tabo Hisaoka (8271), Gale Hudson (8111), Larry Kirkbride (8423), Ken Lee (8271), and Gary Whitten (8463).



BOB REINEKE of Drilling Technology Division 4735 pours drilling mud into the test cell of a newly developed portable viscometer. The entire system — packaged in a high-temperature, high-pressure vessel — weighs just 60 pounds and will be field-tested later this year.

Drilling Technology

New Technology Tells How Thick the Mud

A portable viscometer which measures rheological (flow) characteristics of drilling mud under simulated borehole conditions as deep as 20,000 feet has been developed by Sandia Laboratories.

Laboratory and field tests with water- and oil-based muds of known viscosity show that the instrument, basically a rotational viscometer, can provide on-site measurements within two centipoise (cp) of known value. (Viscosity is measured in cp units. Water has a rating of one; 30-weight motor oil, which is more viscous, has a rating of 200 at room temperature.)

The instrument provides viscosity measurements from 1 to 300 cp at temperatures from 70°F to 500°F, at pressures up to 12,500 psi, and at shear rates up to 1000 per second.

"For shallow wells with low temperatures and pressures, viscosity measurements performed at atmospheric conditions are satisfactory for predicting drilling mud performance," says Bob Reineke of Drilling Technology Division 4735.

"However, with the increasing interest in drilling geothermal wells and in drilling oil and gas wells to greater depths, it becomes important to measure and evaluate the rheological properties of drilling fluids under increased temperature and pressure. Tests show that mud characteristics under atmospheric conditions are vastly different from those under deep downhole conditions."

The new viscometer, which weighs 60 pounds, consists of a conventional rotational viscometer packaged in a high-temperature, high-pressure vessel. This "test cell" is installed in a metal cabinet which also houses controls as well as digital and gauge readouts for fluid temperature, pressure, and shear rate. The viscosity reading is visible through a window at the top of the test cell.

For a test, the cell is lifted out of the cabinet and its lower section unscrewed. Seventy milliliters of fluid are poured into this section which is then reattached to the upper half. The cell is then reinserted into the cabinet.

The rotational motion necessary to produce the shearing action on the fluid is transferred through the vessel wall by a magnetic torque coupler which spins the rotor. Motor speed is controlled by an electronic control circuit.

Pressurization is accomplished by a hand-operated hydraulic pump that injects a clear silicone oil into the test cell. This oil is lighter than the mud and does not mix with it.

Heating is by film-type resistance heaters mounted in the cabinet and close to the test cell. Temperature is measured by a thermocouple inserted into the vessel. The heater assembly is capable of 750 watts and will bring the test cell temperature to 500°F in 45 minutes.

Water-based and oil-based muds were used for laboratory tests. Field tests were performed on oil-based fluids used in an 18,000 foot deep oil/gas well in southwest Louisiana and in a geothermal well in Brazoria County, Texas.

Results show that, in general, water-based muds become much less viscous as temperatures increase until certain critical temperatures (somewhere between 200°F and 320°F, depending on the type of mud) are reached. Then they quickly become much more viscous, or gel-like, and are not usable. Tests also show that pressure increases do not affect viscosity of water-based muds.

However, oil-based fluids become thinner at higher temperatures and more viscous at higher pressures. "Therefore, during drilling, the borehole pressure effect tends to partially offset the thinning effect of the borehole's high temperature," Reineke says.

As part of its technology transfer efforts, Sandia has made design information on the instrument available to all interested parties.

Retiring

Jack Shoup (2520)

Labs To Instrument Oil Shale Projects

The Department of Energy has named Sandia to instrument three in situ oil shale recovery experiments being conducted in the Grand Junction, Colo., area.

The project, which will have a small office at DOE's Grand Junction office, involves use of various sensors and data acquisition techniques to "monitor, control, diagnose, and evaluate bed preparation and product recovery experiments," says Al Stevens, supervisor of Oil Shale Projects Division 4734.

Oil shale, found in large quantities in several western states, contains a dark grey organic material called kerogen. When heated to about 900°F the kerogen reacts to form shale oil. Although shale oil is different in some respects from conventional petroleum, it can be refined into more petroleum products.

Underground processing, or retorting, of oil shale requires creation of a 20 to 25 percent void in the oil shale bed either by mining or by removal of overburden, evenly distributing this man-made porosity through the shale by explosive fracturing, and finally generating heat for the conversion process via combustion. Freed by heat, the kerogen trickles to the bottom of the prepared bed and is then pumped to the surface.

"Instrumentation of oil shale field experiments is vital," says Stevens. "The work provides needed details about the extent of fractures and voids created during bed preparation , optimum rock fragment size and permeability distributions, and what percentage of kerogen has been recovered."

The three experiments which Sandia will instrument and monitor near Grand Junction are being carried out by Geokinetics, Inc., Occidental Oil Shale, Inc., and Los Alamos Scientific Laboratory. All are receiving major DOE support.

Sandia has been conducting similar field work for the past four years.

Estimates of the amount of kerogen trapped in oil shale in the U.S. range from 600 million to 1.2 trillion barrels. Currently, U.S. daily consumption of oil is about 19 million barrels, half of which is imported.

HANDSOME HATBAND is the remains of a 48-in.-long black-tailed rattlesnake which was blocking the path to the aerial cable site in Coyote Test Field. Brian Joseph (4552) killed it with a shovel, skinned it, cured the skin and made the hatband. The snake had nine rattles.

Western Auditors Complete No. 26

Not long after Western Electric took over Sandia (from LASL), the practice began of the annual WE audit of Sandia. Last month, the 26th such audit was undertaken by a team of WE auditors.

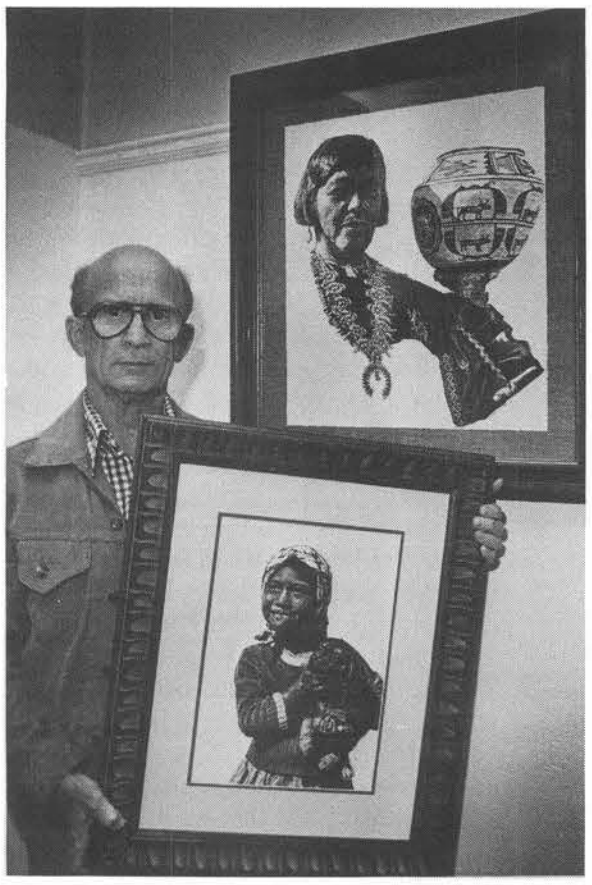
Basis for the audit is found in the contract between DOE and WE. It states that WE shall review Sandia's practices in a number of areas. For example, the Labs' policies and practices concerning salaries, wages, personnel, certain employee benefits and reimbursement of employees' travel and living expenses should reflect both Western and Bell Labs normal practices.

Another area of audit interest involves procurement, and policies and practices here are checked to see if they are in accord with agreements between Sandia and DOE. Our system of accounting and property control is also examined.

The annual audit is a major undertaking, and this year's team of 11 auditors spent more than a month at Albuquerque, Livermore, and Tonopah. Vern Husa from WE's Mountain/Northwestern Region in Denver and Frank Henke of the Kansas City Works shared overall responsibility for the audit.

Policies Procedures and Anlysis Dept. 3210 hosted the audit, with George Beller (3212) handling arrangements. The audit will be completed after the end of the fiscal year, and a final report issued after that.

WESTERN ELECTRIC auditors were at Sandia last month for their annual audit of Labs practices and policies. Standing in front, from left, Nick Osman, Don Zurovsky and Lou Carnazzo; back row, Frank Henke, Vern Husa, Terry Barnhart, John Holecsek and Leo Graham. Alex Laubach, Dan Griffiths and Jim Gogola at Livermore didn't make the picture.



FIRST PRIZE is the award given to Tech Art's Jim Walston (3155) at the State Fair for his mixed media portrait of a Tarahumara Indian girl. Jim also recieved a special award for the hanging portrait entitled "Zuni Olla Maiden." Jim has been an artist at the Labs for 23 years.

"She was wide-eyed with laughter." Not exactly a common literary description but apparently accurate, none-the-less. Researchers at the Air Force Academy have discovered a clearcut correlation between how funny cartoons are and how widely the pupils of our eyes dilate. The funnier the cartoon, the more the pupils dilate.

Take Note

The GSA is again offering for sale a collection of used cars and trucks, 130 in all, on Sept. 26. Former government vehicles, the collection includes pickups, sedans, carryalls, vans, a horse trailer and a number of four-wheel drive wagons and trucks. Hours of inspection are 8:30 a.m. to 3:30 p.m. on Sept. 24 and 25, and 8:30 to 9:15 a.m. on the day of the sale. The vehicles may be inspected at GSA's motor pool, 1800 12th St. NW, and the sale will be conducted at the Indian School auditorium, 1000 Menaul NW starting at 9:30 a.m. Offers are by "spot bid" — you write your offer on a card, then it and others are collected and high bid prevails.

***

Ski Swap chairman Norm Elliott (5627) called to report that the Swap, sponsored by the Sandia Peak Ski Patrol, is being held earlier this year, Oct. 12 to 14. At the Swap, skiers consign ski equipment to the Patrol to be sold. Consignment takes place Oct. 12 from noon to 8 p.m. The sale itself takes place Saturday, Oct. 13 from 9 to 4 and, on Sunday the 14th from 2 to 4 p.m., customers return to pick up their check and/or unsold equipment. It all takes place in the Agriculture Bldg. at the State Fair Grounds. The all-volunteer Patrol charges a small commission on items sold, and proceeds are used to purchase medical supplies and rescue equipment for use at Sandia Peak.

***

Major General William Hoover takes over this month as DOE's Director of Military Applications, a post held since 1975 by Major General Joseph Bratton. Gen. Hoover joins DOE from the post of commander of the Air Force's Technical Training Center in Colorado. He is a graduate of the Naval Academy. Gen. Bratton moves to a new assignment with the Army Corps of Engineers in Atlanta, Georgia.

Gary Shepherd (2642), who runs the Neighborhood Drama Project for kids in the South Broadway area, is now rehearsing a "western" production scheduled for presentation in mid-November. He could use some help with costumes — boots, hats, shirts, etc. for 7th-11th grade kids.

Also, Gary needs some electronic expertise — someone to build a voice distorter, a black box to put between a mike nd amplifier to give a couple of his performers strange and weird voices. If anyone can help, call Gary on 4-1450.

* * *

Energy expert Llewellyn King, editor of *The Energy Daily,* will speak on the subject at the Hubert Humphrey Elementary School (near Academy Hills & Eubank) at 7:30 p.m. Friday, Oct. 5. His talk is sponsored by Americans for Rational Energy Alternatives and the Trinity Section of the American Nuclear Society. After the talk, a reception is planned at the Tanoan Country Club, @ $2/person. Call Joy Lutheran, 4-6855, if you wish to attend the reception.

***

Mopeders (mopedants?) take note: the Air Force, i.e. Col. Daigle of the Security Police, has issued a revised traffic code stipulating that while on KAFB operator's licenses are required for moped operators, that protective headgear is also required, that mopeds may be operated on bike paths only when "the vehicle is powered by human propulsion," and, lastly, the moped's headlight must be on, day and night.

***

In a recent ceremony in the office of Ward Hunnicutt, Director of Plant Engineering 3600, three Sandians were awarded certificates of completion of Sandia's five-year Plant Maintenance Apprenticeship Program. Graduating were Woody Edwards and Al Santistevan (both 3613) and Jerry Walters (3612).

Three Mile Island:

What Lessons Can the Nuclear Industr

(Ed. Note. The dust has settled, the hearings go on and on, and even those close to the subject of nuclear power remain unclear about just what transpired at Three Mile Island. Jack Saunders, associate editor of LLL's Newsline, prepared this article for that magazine and has given LAB NEWS permission to reprint it.)

Now that the sensational reports, I-told-you-so's and defensive mutterings have cooled down, the nuclear industry is beginning to digest the hard-won lessons of last spring's accident at Three Mile Island. With any ordinary technology just reaching maturity an injury-free outcome to an incident of a type some had prophesied would be apocalyptic might have been counted as a reassuring test — albeit an expensive and unwelcome one. But nuclear energy is no ordinary technology. In the view of LLL Director Emeritus Edward Teller, nuclear technology's special place in the American psyche may stem from its first demonstration more than a third of a century ago when the atomic genie burst from the bottle with sword in hand. If that is the hook-up in any important segment of the public mind, the fact that the connection is unfounded doesn't help. It only spotlights the frequently made observation that nuclear power's public education efforts have measured up neither to the task nor to the stakes.

While Three Mile Island was clearly a public relations nightmare, a quiet and detailed explanation of just what happened at Harrisburg informs the layman that nuclear power plants are far more tolerant of human error and equipment malfunction than is commonly understood. The mishaps of Three Mile Island, nuclear engineers explain persuasively, can be avoided in the future if the lessons of TMI are given a chance to work. Whether political wrangling and an unsettled public opinion will allow the full value of those lessons to brighten a dimming U.S. energy picture is still a question.

LLL nuclear engineer Ernie Hill, who also sits on the Nuclear Regulatory Commission's Atomic Safety and Licensing Board, was in Washington as the Three Mile Island episode unfolded. Garth Cummings, another LLL nuclear engineer, worked in the nuclear safety field for the old Atomic Energy Commission and helped write the Rassmussen report on the risks of a nuclear accident. Both are familiar with the Babcock and Wilcox pressurized water reactor that ran into trouble at Three Mile Island. Their combined background and connections gave LLL staff members some of the earliest and most thorough briefings available to anyone on the TMI incident.

Human beings both caused and complicated the Three Mile Island event. There is widespread agreement on that. Edward Teller, on a nationwide radio program a month after the accident, said that had he been presented with a hypothetical scenario for Three Mile Island prior to the incident, he could not have felt confident that serious injuries could be avoided. That none occurred, he said, is reason to credit nuclear technology, not indict it.

"Considering what people did to that plant," adds Ernie Hill, "the equipment performed admirably."

To scale the event to the experience of the average motorist, Three Mile Island was like parlaying a broken fan belt into a cracked engine block — hard for the attentive driver to do, lacking some very unfortunate circumstances. Exactly what did the power plant operators do to blunder a routine maintenance matter into nuclear energy's worst accident?

A capsule summary: In nuclear power plants, high pressure steam flows through turbine blades that turn a standard electric generator, the same mechanism that produces electricity in conventional power plants. After the steam has made a pass through the turbine blades, it condenses to water and must be pumped back through the system to collect more heat for another pass. In the case of a nuclear reactor, that fresh heat is picked up when the water passes through a steam generator where it flows around tubes that contain a separate water system, water that continually flows through the reactor core to become a 700°F heat source.

The Three Mile Island incident started when a pump that is supposed to push condensed turbine steam back through the steam generator was shut down.

Without a steady supply of water from the plant's turbine side flowing through the steam making apparatus, heat on the separate reactor side would build up. So the power plant, as it was designed to do, protected itself by immediately shutting down the turbine. Then, also without human intervention, the control rods slid down into the reactor core, stopping the nuclear fission reaction. All of that went off perfectly within seconds of the condensate pump shutdown. So far, so good. The standard response to what is considered a routine maintenance nuisance went flawlessly and automatically.

But even after a so-called reactor scram, the core continues to give off heat for some time. At least some water must continually feed through the core, pick up that heat and carry it away through the steam generator to avoid a temperature build-up in the reactor. So when the main feedwater apparatus is disabled, as happened at Three Mile Island, there are auxiliary pumps that supply enough cooling to avoid danger. Any two of three auxiliary pumps will handle the job, so a failure there is backstopped also. But on the morning of March 28 — and, apparently for the purposes of a maintenance operation — all three auxiliary feedwater valves at Three Mile Island had been closed off, "in flagrant violation of the technical specifications," says Ernie Hill.

Without the auxiliary feedwater, the steam generators boiled dry in about five minutes. About that time, however, a beleaguered operator realized the situation and hastily opened an auxiliary pump valve. That sent relatively cool water cascading over 700°F metal tubes inside the dried up steam generator — tubes that held radioactive water from the reactor core. Some of the tubes were damaged, opening a release path for radioactive steam to escape the plant.

Before the tubes ruptured, however, pressure inside the tubes had been building up and so a relief valve on the primary coolant loop had popped open as it is supposed to do. But after burping up enough radioactive water to reduce the pressure back toward normal, the valve failed to close — the first failure of the plant's emergency equipment.

Because the relief valve remained open, water escaped through it. A water level reading taken at the valve continued to read high while, in fact, radioactive water was leaking out of the primary system and onto the floor of the containment building. The water level inside the reactor primary cooling loop was falling. And dwindling pressure caused the emergency core cooling system to come on according to design. But the operators, still reading the false high water level registered at the stuck relief valve, intervened and turned off the ECC.

"That's when the fat got in the fire," says Garth Cummings. "They were losing water out of the relief valve and yet they weren't making up any water through the back-up system. So now you had two independent cooling systems running out of water because of separate human errors."

Lesson number one of Three Mile Island might then be that nuclear power needs critical systems that are fully automated like those that caused the turbine to trip and the reactor to scram when it was necessary that they do so, unhindered by human hunches.

Hill, who spent 1977 heading research into a so-called "large LOCA" or "large loss of coolant accident" at the Lawrence Berkeley Laboratory, points out what may have been faulty logic behind the planning for such mishaps: "It's painfully obvious now with the benefit of hindsight that not enough attention was paid to how you manage the small loss of coolant accident. The feeling was that with a small LOCA, you've got time to do something. Now it turns out that time just creates the chance for operators to make mistakes. With the large LOCA, you don't have time to do anything. You design everything to go off automatically."

Harrisburg lesson number two flows from the first: nuclear power plant operators need more training. On his nationally broadcast interview on Three Mile Island, Teller wondered how safe air travel would be if pilots were "technicians earning $20,000 a year." Those who operate nuclear power plants, he said, must become professionals with training, standing and compensation comparable to those at the controls of jetliners."

Lesson number three: There is room for improving the instrument systems that report the conditions in all parts of a nuclear power plant. According to Garth Cummings, it is hard to overstate the role of the false level indication in the Three Mile Island episode. The reactor coolant level was falling rapidly. Thousands of gallons of radioactive water were flowing onto the floor of the containment building. The core was approaching the temperature where damage occurs. And all the while, operators were getting a reading that said the coolant system was full.

Cummings further suggests that better instruments inside the containment dome would have made easier work for those who for several days speculated — "in the blind," according to NRC records — about what was going on inside the reactor building.

A fourth lesson of Three Mile Island, Hill points out, is the need for definite rules spelling out just who is in charge when a nuclear power plant is in trouble. The Harrisburg plant is private property, owned by the stock holders of a private corporation. While nuclear power plants are clearly under the regulatory authority of the NRC, the law of the land says the U.S. government cannot seize control of private property without due process. Who held final authority at Three Mile Island? No one was ever certain. And

Learn?

how are liabilities to be charged when decisions made in an informal joint fashion affect the lives and property of bystanders? Working that one out is a high priority project now underway in Washington.

Lesson number five is one Hill returns to when discussing any and every facet of Three Mile Island: Communication during the episode fell apart. At every juncture, he says, the straight facts failed to come across, creating the false impression that a near catastrophe was narrowly averted. It is that impression, not the event itself, that was the disaster, Hill says, and the victim was the U.S. energy program.

The communication problem is a thorny one, Hill concedes, and cannot be solved simply by issuing more press releases. Attempts to resolve it, he suggests, should begin with a close examination of the barriers and flaws that were so apparent in the days of Three Mile Island.

•Communication between the utility and the government was faulty, Hill says, due doubtless to the peculiar relationship between the regulator and the regulated, an inherently imperfect one when it comes to candor.

•Worse, he says, was the communication between authorities and the press, foul-ups there attributable to too many people with too little information talking too much. And yet, when an attempt to remedy that situation included official insistence that all communication with the press be funneled through one spokesman, the press reported that officials were stone walling. And still there were leaks.

•Ironically, those who most closely obeyed the ban against unauthorized statements were those who, in the ordinary course of events, would have fed the informal information network that keeps the scientific community posted during such episodes. "I spent that first weekend in Washington," recalls Hill, "and there was virtually no information coming in from Harrisburg. The press was putting out a stream of wild speculation and the entire technical community was left in the dark."

While the public image of nuclear power was badly bent as a result of Three Mile Island communication problems, the facts of the case are not especially difficult to explain. Hill and Cummings tell the story in a cogent and fascinating manner. They do not soft peddle the mishap. Hill stresses that it was "a very serious accident." But unlike most commentators, Hill and Cummings can account for what went wrong and they are specific about what can be done to prevent a recurrence.

"I'm not terrified of radiation because I understand it," says Cummings. And the listener can sense that the confidence is not false bravado. Unfortunately, only a tiny fraction of the public has ever had the chance to discuss nuclear power with anyone who knows much about it. On a recent jet flight, B-Division physicist Larry Shaw found himself sitting next to a stridently anti-nuclear housewife. When the plane touched down, the woman was pro-nuclear. Recounts Shaw: "I just asked her, 'What are your worries? Let's take them one by one and talk about them." The woman's reaction when their talk was over: "Why don't they tell us all this on television?"

VIDEO PLAYBACK CENTER, also known as VPC, is now open for business in Bldg. 632, room 14. It's aimed chiefly at Sandia students who need to make up a missed session of a course previously videotaped, e.g. INTEC, or who may wish to review course material. But it's also for "drop-in learners" says Olivia Harris (right) who is VPC librarian and will demonstrate to new comers how the equipment works. Olivia is discussing a tape with Cathy Riley, who handles INTEC videotaping, and Don Schubeck, who designed the Center. All work in Education & Training Div. 3522.

Bill Bristol

Bill Bristol Departs Sandia Credit Union

Following medical advice after his second heart bypass operation, Bill Bristol, the Credit Union's General Manager announced to the Board of Directors that he will be taking disability retirement in January of next year. C.L. "Red" Turner, Associate Manager since 1969, has been elected to succeed him.

Bill joined the Credit Union in February 1968 as Assistant Manager, bringing with him 14 years of experience in consumer finance and banking. He had attended Oklahoma City Univ. and Southern Methodist.

In 1969, he was appointed General Manager & Treasurer and has since held that position. In the decade that followed, Bill has seen Credit Union assets multiply four-fold, from 10 million to over 40 million dollars. Loans and shares experienced similar growth. In 1970, the Credit Union was finally able to move out of the barracks into its own modern facility and, in 1975, the Livermore branch was able to move into its own building. Many new services have been made available. The in-house computer installed during this time gives members faster service with up-to-date figures on all transactions.

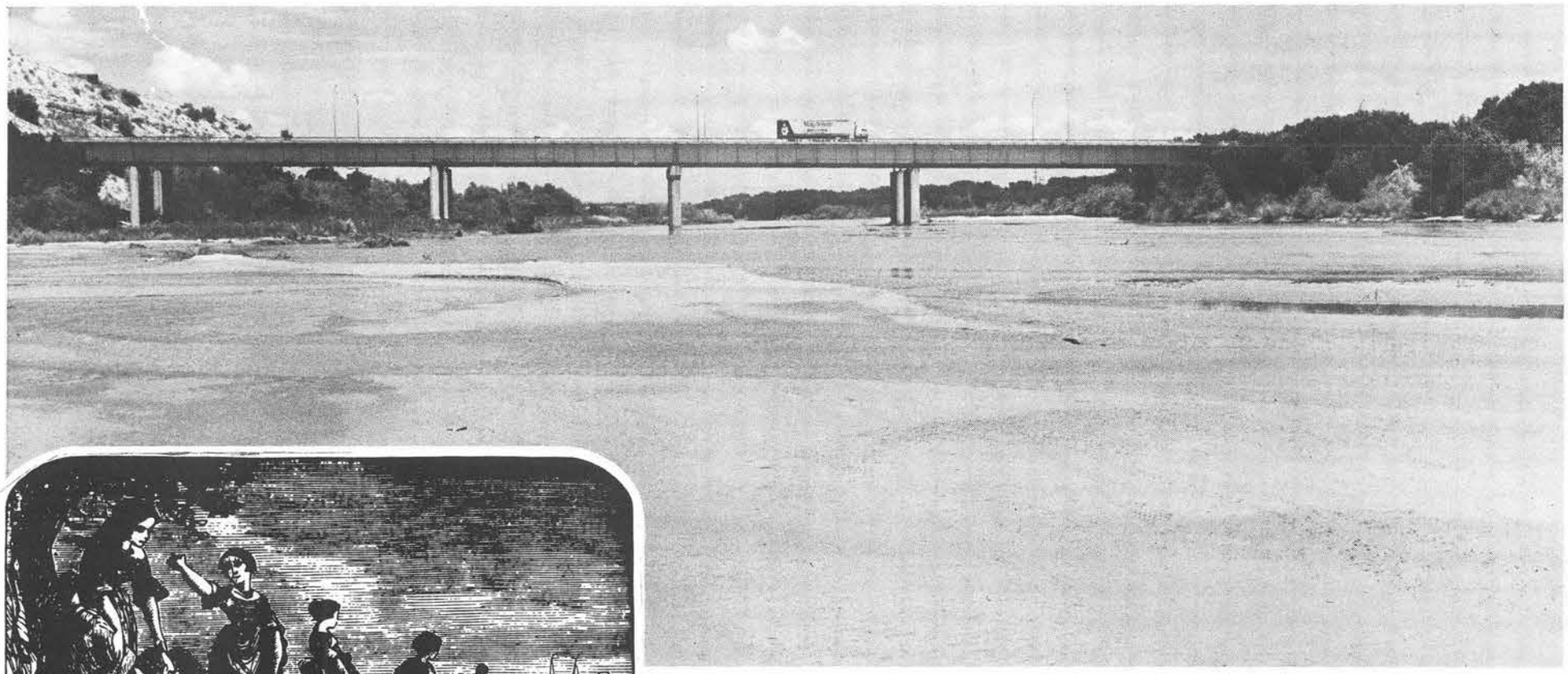
Bill relates that he has no specific plans for the future, save one. "I'm working on regaining my health. That's number one."

Runner Saves Drowner

After you've been running for a while, you begin to collect events: the live rattlesnake you jumped over, that big black dog you finally nailed with a rock, the day you got caught miles out in a hail and lightning storm, and so on. Now Don Peterson of Computer Aids Division 2424 has had a running experience he'll not soon forget.

Trotting along a river bank near the Univ. of Rochester in New York, where he is a visiting scientist from the Labs, Don was hailed by a woman who pointed out a man floating in the river. The man appeared to be alive, so Don walked into the river until the water was too deep, then swam the rest of the way and pulled the man to shore. By that time, university security officials were on the scene, an ambulance arrived, and the victim was taken to the hospital, waterlogged but alive.

The victim was fortunate in his choice of rescuer. Don is a veteran of many rescues, having served for a long time with the NewnMexico Mountain Rescue Council. This is the first victim he's pulled out of the water, however.



VISTA NEW MEXICO — We've come a long way crossing the Rio Grande. Before 1902, when the first wooden toll bridge was built near Old Town, women on the west side of the river either waited for the ferry or pulled up their skirts and waded across to attend Mass on Sunday mornings. (Drawing by Beadle, 1873.) Twin I-40 bridges (above) were built in 1962, cost $831,000 each. Steel girder deck trusses are 1280 ft. long, 10 ft. high. The I-25 bridges which cross the river north of Isleta were built in 1973. The longest and widest of the Rio Grande bridges, they employ prestressed concrete girders more than 2300 ft. long, costing $1,225,000 each.

Retiree Job Reference Service

Got A Job To Be Done?

Almost daily, people drop by the LAB NEWS office to look through resumés in the Retiree Job Reference file. The service was initiated by us in August 1974. Its aim: to put Sandians and DOE people who need jobs done in touch with those Sandia retirees who could do them. Many using the service are themselves retirees.

Here's how it works. The retiree fills out the form on this page and mails it to the address shown. The completed forms are on file in the LAB NEWS office (Bldg. 814, Rm. 6) for Sandians to refer to.

Questions about the service are not handled by telephone. Persons interested in using the file should come to the LAB NEWS office, look through the resumés (compiled in a loose-leaf binder), and make their own decisions about whom to contact.

Some of the current services on file include: auto repair, watch repair, house sitting, typing, cabinet work, painting, carpentry, yardwork, general handyman, electrical, artist, musician, camera repair, office machine repair, landscaping, coin appraisal, appliance repair, furniture maker, plumbing, chair recaning, jewelry repair and design, gunsmith, refrigeration-AC, and instrument maker.

RETIREE JOB REFERENCE SERVICE September 1979

Circle one or more:

Appliance Repair Auto Repair Carpentry Child Care Electrical
General Handyman Hauling Housework Painting Plastering Plumbing
Radio/TV Repair Typing Yardwork Other _____

Name (print) _____ Phone _____

Address _____ City _____ Zip _____

Describe your skills(s). Mention relevant training, experience, licenses, references (optional), etc.

_____

_____

Do you have your own transportation? _____

Do you have your own tools? _____

Comments _____

Signed _____ Date _____

Mail to: LAB NEWS, Div. 3162, Sandia Labs, Albuquerque, NM 87185

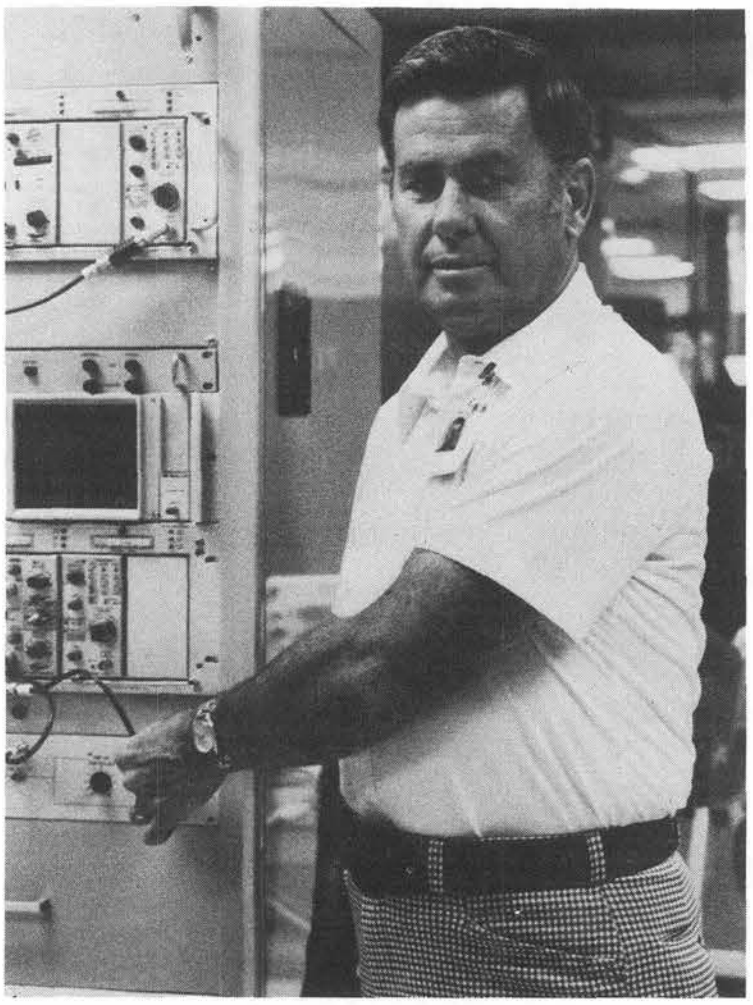
CHARLES VELASQUEZ (1471) is one of some 500 Sandians who regularly donate blood to United Blood Services. Since he started in 1972 and gives a pint every six to eight weeks, Charles recently reached the five gallon mark and was honored with this plaque of appreciation. The bloodmobile is at Sandia Medical Bldg. 831 every Tuesday. If you would like to donate, make it over there anytime between 8 and 3:30.

MILEPOSTS
LAB NEWS

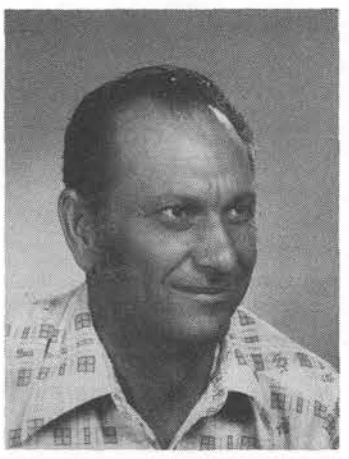
SEPTEMBER 1979

Cleo Kerr-4713 10

John Cantwell - 3522 15

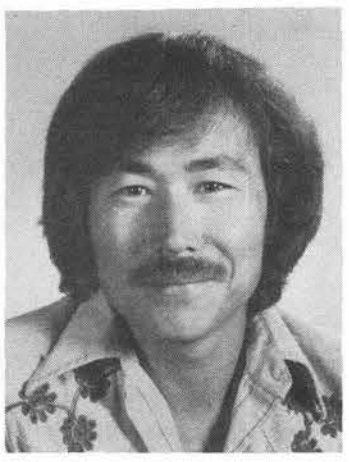


Donald Markwell - 1244 25



Fidel Salazar-1473 10

George Corbell-3426 10



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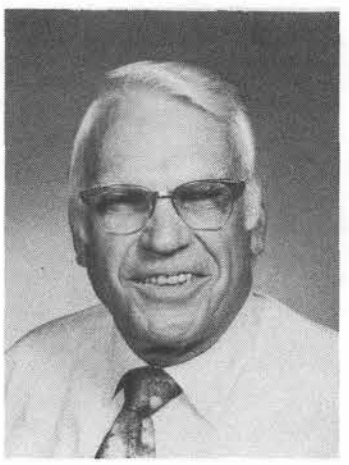
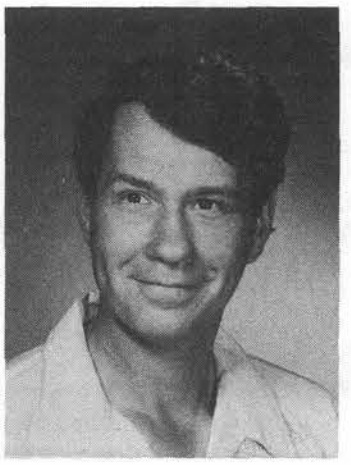
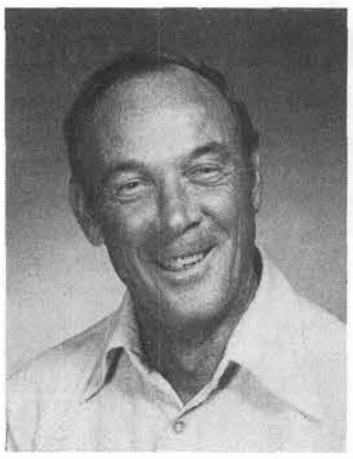


Pete Komen-2343 25

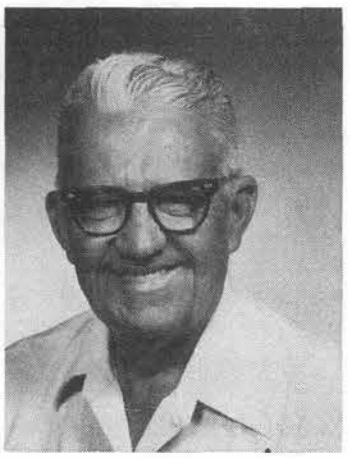


Alan Sehmer-1556 10

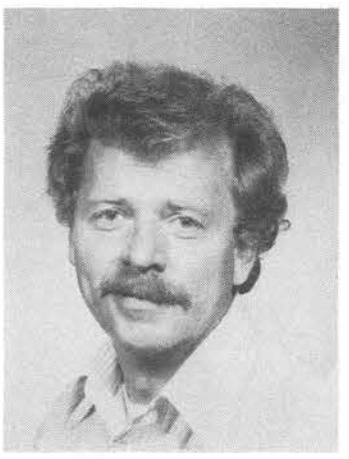
Bobbie Welch-3421 10



Kelly Davis-1554 25



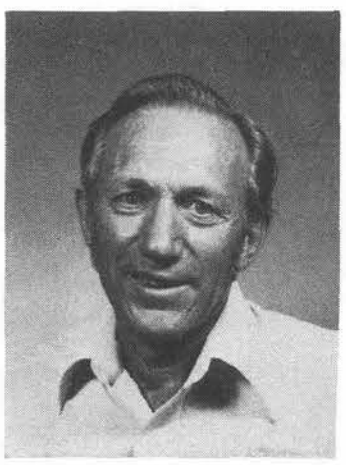
Thaddeus Stetz-1424 25



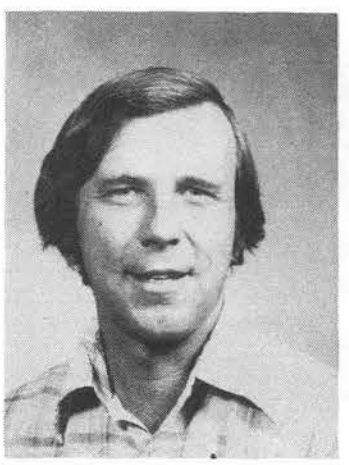
Eugene Koenig-1541 20

Bob Petersen - 2553 25

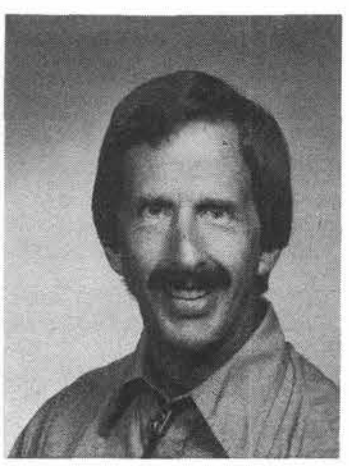
Patricia Self - 3733 15



Bob Butler-1231 25

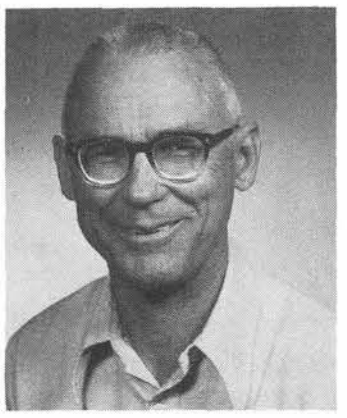


Tommy Simpson-1482 15

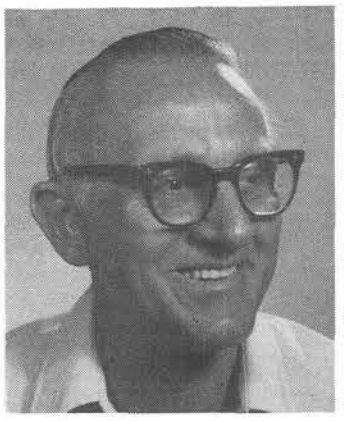


Carl Peterson-5632 10

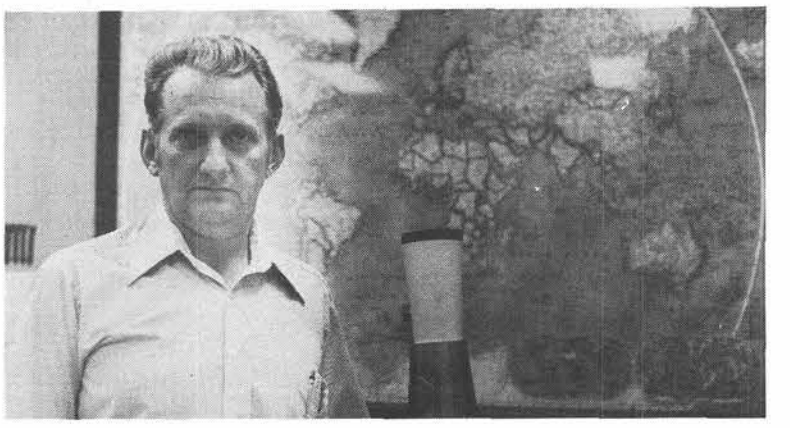
Vivian Lenz-8423 20



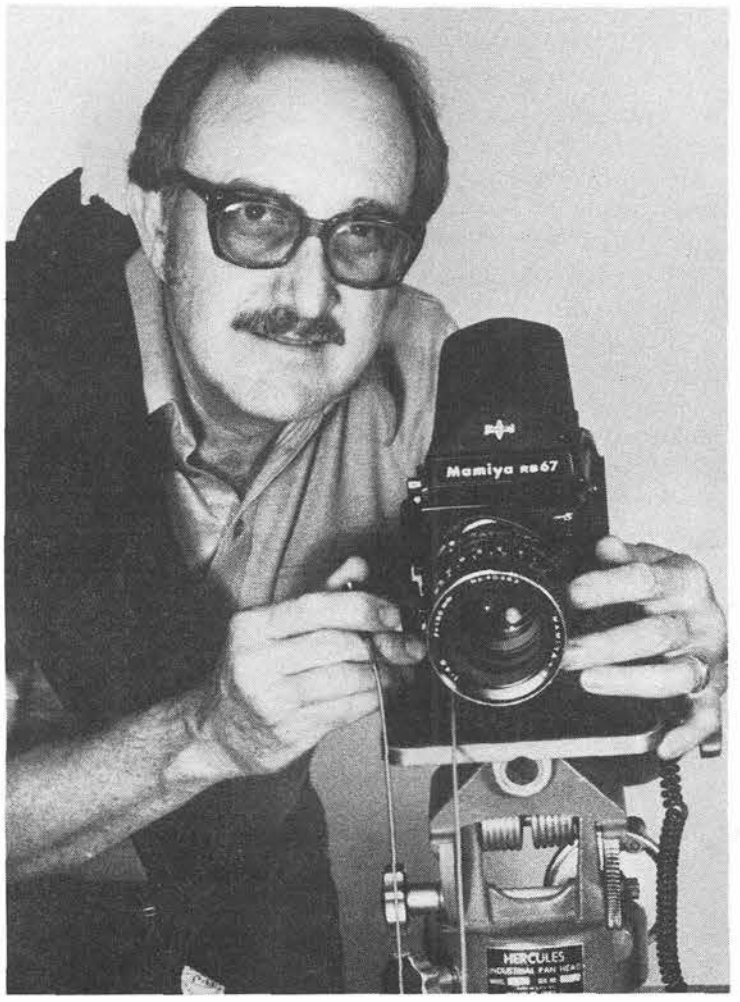
Dale Haskins-4719 25



Charles DeMoss-1471 20

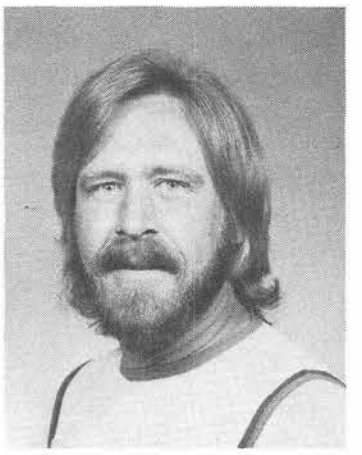


Robert Hostetler - 1244 25



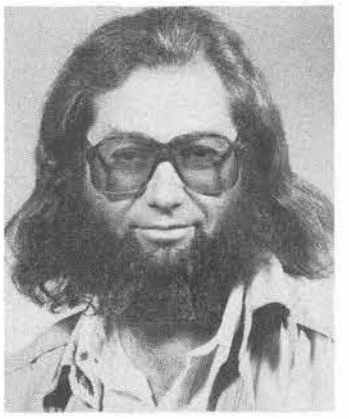
Louis Erne - 3155 25

Jim Porter-2651 30

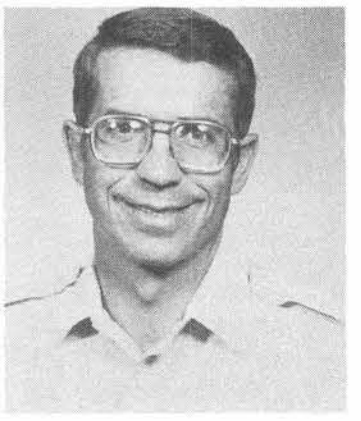


Dave Zagar-4244 15

Emma Daniel-2140 15

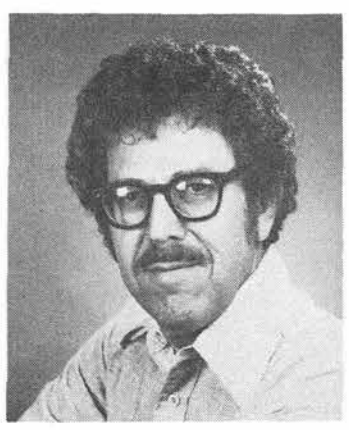


Darrell Hicks-5531 10

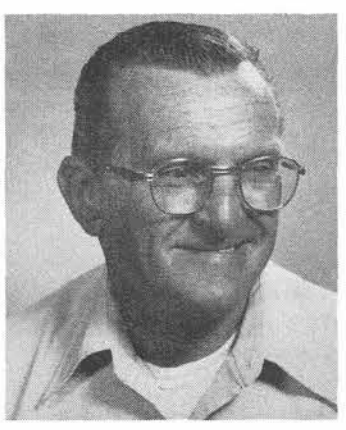


George Connor-2626 15

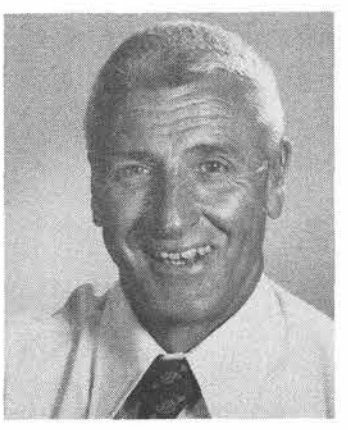
Gary Beeler-8152 15



Bill Brown-8161 20

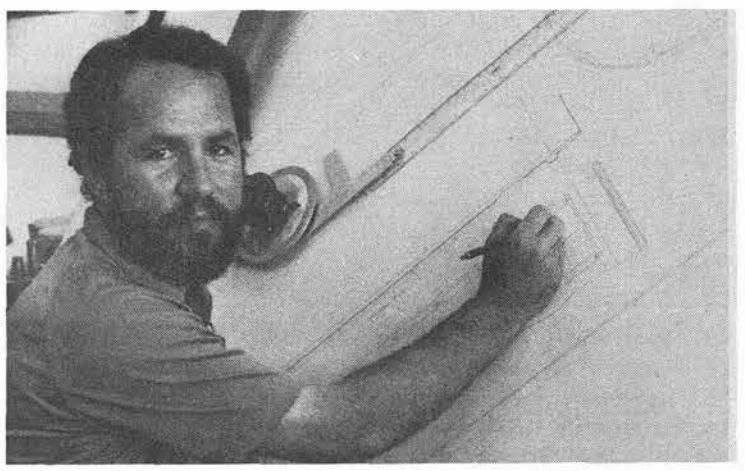


Harry Conrad-1483 15

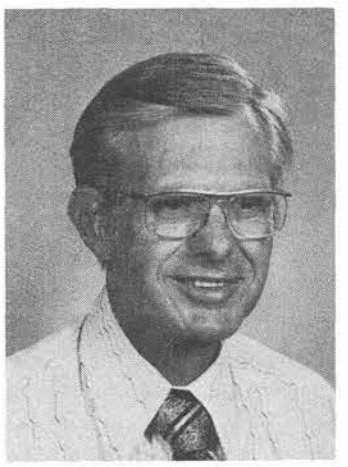


Mel Snyder-6021 30

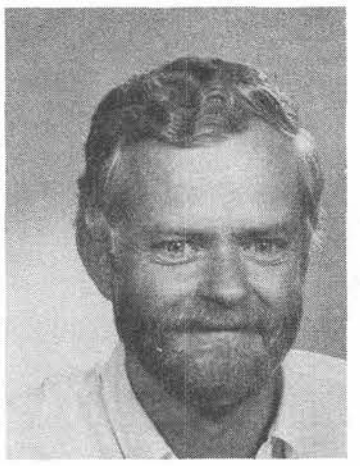
Norman Smith - 3426 30



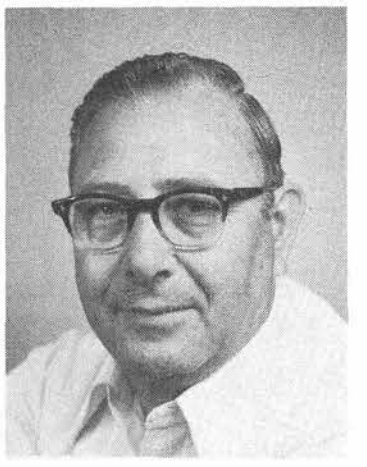
Walton Errickson - 2456 15



Stan Reynolds-1535 30



Dave Northrop-4732 15



Jim Martin-8256 20

Sympathy

To Imogene Lord (3713) on the death of her mother in Arkansas, Aug. 31.

To Cecil Land (5133) on the death of his mother in Oklahoma, Aug. 31.

To B.C. Brown (1485) on the death of his mother-in-law in California, Aug. 27.

Congratulations

To Charlene Peeples (3154) on the occasion of her marriage to Bernard Argo, Aug. 17.

To Bob (2153) and Mrs. Sanchez, a son, Francisco Tomas, born Aug. 23.

Studies in England and the U.S. are putting the lie to the old vaudeville chestnut that married people don't really live longer — it just seems longer. After 21 years of studying the statistics, one researcher concluded that "among men and women of every age, married people on the average live longer than the single, the widowed, or the divorced."

JUNK•GOODIES•TRASH•ANTIQUES•KLUNKERS•CREAM PUFFS•HOUSES•HOVELS•LOST•FOUND•WANTED•&THINGS

CLASSIFIED ADVERTISING

Deadline: Friday noon prior to week of publication unless changed by holiday. Mail to: Div. 3162 (814/6).

RULES

1. **Limit 20 words.**
2. **One ad per issue per category.**
3. **Submit in writing. No phone-ins.**
4. **Use home telephone numbers.**
5. **For active and retired Sandians and DOE employees.**
6. **No commercial ads, please.**
7. **Include name and organization.**
8. **Housing listed here for rent or sale is available for occupancy without regard to race, creed, color, or national origin.**

MISCELLANEOUS

SANDIA LABS CAP, new shipment in, $4.25, LAB NEWS office, Bldg. 814. South Hwy. 14 Village Project.

ZENITH COLOR TV, 25", '69 model, working condition, $75. Alvis, 298-3906.

CARTOP CARRIER, Sears 6 ft., sealed & weatherproof, best offer. Hymer, 293-6029.

APACHE CAMPER, fold-down '72 model, no canvas, elect./gas refrg., 5000 BTU heater, awning, sleeps 6, elect. brakes, $1790. Breding, 298-5314.

END TABLES, coffee tables, handmade from redwood burls. Hesch, 256-0161.

ELECTRONIC ORGAN, Baldwin w/fun machine, $1200 ($1795 new); 90-piece Noritake china, $150, and more. Hines, 299-1314 after 5.

NATURAL GAS room heater, free standing, vented, 15,000 BTU, w/blower, vent pipe & gas line. Ottinger, 242-7935.

VIVITAR LENS, 200 mm, used twice, $100. Chavez, 881-3832.

CAMPER SHELL, fits SWB, slide front window, rear door, paneled, lighted, asking $250. Paylor, 877-8953.

RECORD PLAYER, movie camera, lights, projector, antique iron bed, collector's telephone. Barsica, 298-5270 after 5.

MAGAZINE BINDERS for Road & Track magazine. Each holds one year. Have 11, some for older, larger issues. Christensen, 292-1491.

HUMIDIFIER, console type, 2 spd. with humidstat, $50. Hohimer, 821-1459 after 5.

CLARINET, Yamaha, $85. Johnson, 884-8250.

TIRES, 155-13, white Sdwl, less than 500 miles, Goodrich, 4 for $65. Abel, 296-6089.

TRACTOR, Kubota L260, plow, blade, $3000; Leica IIIF camera & case, $125; Sears 5HP rototiller, $150. Class, 281-3836.

CONSOLE PIANO, Lowrey French provincial, cherry, classic legs, matching bench, tuned regularly, $1000. McIlroy, 299-4977.

SHAG CARPET, 9x12, light green, $25; Kenmore zig-zag sewing machine, $50. Cox, 294-8084.

DOUBLE BED, frame, mattress, box springs, $30. Esch, 292-0754.

CONCERT ORGAN, Baldwin Orga-Sonic, Leslie speaker, solid walnut cabinet & bench, asking $750, consider offer. Lyon, 299-9423 or 884-8515.

TRUMPET, Reynolds w/case and manual, $75; firewood, pinon and spruce mixed, $75/cord. Valdez, 821-1503.

SCREEN/STORM DOORS, 2 each, 80x32 in., new, Croft, one left, one right. Cihak, 345-3124 after 5.

SINK CUTOUTS, $1.50; bike child carrier, $5; auto trailer towing mirrors, $9; Airstream flag rack, $7. McGuckin, 299-1342.

PUPPIES, AKC reg., two litters, West Highland white terriers, German short hair pointers. Smith, 384-2396.

GEESE, 3 months old, alive or cleaned determines price. Dees, 869-6949.

PUPPIES, parents both half pit bulls, available early Oct., $15. Granger, 869-2528.

TABLE, wrought iron, glass top, 4 chairs, $50. Wilkinson, 821-0053.

JEWELERS CROWN 8" pro arbor, $60. Mason, 299-2836.

HANGING LAMPS, ornamental wrought iron, $10. Trade Milwaukee hand grinder for motorized screwdriver. Gonzales, 836-0224.

COMBINATION STORM DOOR, aluminum, less glass, 30x80", $15; aluminum screen door, 32x80, $10. Denish, 256-1559.

BASKETBALL season tickets, 2 each for Lobo games. Padilla, 345-7660.

REMINGTON RIFLE, 30-06, with 4X scope, $235. Ingram, 299-6111.

MG MIDGET tonneau cover, new, $45; striping kit, $15; apart. size Panasonic refrig., $100. Barnard, 831-4114 evenings.

TUBE FIREGRATE, Heat-A-Grate, model 1817S, 6 tubes, blower unit. New $120, sell for $60. Stevens, 299-6086.

DRILL PRESS, floor model Craftsman w/½ HP motor. Burd, 884-9133.

PUPPIES, Irish Setter, AKC, parents available for viewing, $50. Slater, 294-5858.

POWER BOAT, 18', fiberglass, blue and silver metalflake, 455 Olds engine, Berkely jet, heavy duty tandem trailer, $5500. Perryman, 294-6113.

DALMATIAN, female, watch dog, papers, $75 or best offer. Bryant, 821-1671 after 5.

GUITAR, Recco, $50; Formica kitchen table w/4 chairs, $25. Madsen, 294-3235.

BROWNIE UNIFORM, size 8, 2 blouses, jumper, pants, belt, socks, orange tie, $18. Shenk, 296-6015.

GARAGE SALE, refrigs, camper tiedowns, motorcycle tire, exercycle, ping pong table, tools, bikes, much more. Myers, 6924 Christy NE, Academy Acres.

FREEZER, Sears 31 cu. ft. upright, catalog $450, sell for $200. Cafferty, 898-3102.

POOL TABLE, regulation size, 7/8" slate, $275. Ward's freezer, 21 cu. ft., 3 yrs. old, $185. Ward, 869-3580.

SAILBOAT, Hobie, 10 ft. hull, 16 ft. mast, 7 ft. boom, yellow & white, 110 lbs., $290. Cover, 881-3860.

FURNACE, forced air, propane gas, 100,000 BTU input. Bush, 281-3773.

EAR RINGS, diamond, 1.10 ct total weight for pair, $695. Schmidt, 299-7305.

CHAIRS, two Broyhill rust-color high-back, $50 each. Wilson, 268-6287.

OVEN BROILER, reversible table-top, $20; 36" entry door, $15. Laskar, 299-1024.

BICYCLE, boy's 20" 10-spd., $30; Puma cleats size 6, $8; hiking boots, Munari, size 6, $10, also K-Mart size 8. Guilford, 255-6294.

STEREO & CASSETTE player, AM/FM, Panasonic, 2 speakers, $250; Craig car cassette, $75. Owen, 296-8044.

THREE MOTORS, 115 VAC, 1750 RPM, 1/3 HP, $85 lot; fireplace screen for 30x47" opening, $30; garage door hardware, complete set, $50. Felzman, 344-2029.

DRILL PRESS, Craftsman commercial floor model, 3/4 HP, under warranty. Schroeder, 344-1011.

SEWING MACHINE, 401 Singer, recently overhauled. Cabinet/bench needs refinishing. Electric portable Sparton sewing machine in case, $30. Tabor, 299-5272 or 293-5928.

MICROWAVE, Sears, infinite power settings from 90 to 625W, 1.3 cu. ft., under service contract, $295. Atkins, 298-5762.

SKIS, K2 255 soft, 200 cm w/Saloman 555 Equipe and brake, $175; boots, Nordica Astral Slalom, 11M, $60. Boberschmidt, 266-4579.

REFRIG, Frigidaire, 2 dr., 14 ft., $200. Maloney, 821-6661.

BRICKS, used, standard size, concrete, about 1600, $80. Hueter, 242-1620.

SAILBOAT, Southcoast 22', swing keel cruiser, poptop, galley, head, trailer, etc. $4000. Cave, 299-5066.

PUPPIES, German shepherd, male & female, black & tan, 10 wks. old, $200 each. Kramm, 281-5379.

TIRE CHAINS, never used, L78-15, one pair, $30. Bedeaux, 299-2789.

COVER for boat, new, Sears, fits boats 16-16½', 70-77" beam, cost $90, sell for $65. Cook, 869-6921.

TIRES, wheels & hubcaps for F350 Ford truck, wheels w/7.50-16 tires, $35 ea. or $120 all four. Abbin, 296-7678 or 883-8665.

CAMPER for pickup, self-contained, cabover, shower, gas, 110 VAC, refrig., stove, heater, carpet, jacks, $2300. West, 299-7314.

CAMPER, cabover, 9', self contained, '71 Security, ref., shower, furnace, jacks, water heater, 3 beds, $1650. Martinez, 293-2301.

HEADER MUFFLERS, 1 pr. used on '66 Mustang 200, will toss in repairable headers, $20. Kepler, 298-5652.

WASHER, Sears Kenmore, 4-cycle, $90; tire chains to fit 600x14 Datsun tires, $15. Falacy, 293-2517.

TRAVEL TRAILER, '78 Prowler, 31', AC, $6000 or take up payments. Rupe, 281-1694.

'77 TITAN mobile home, 14x52, in adult park, 2-BDR, 1 bath, front kitchen, covered patio, storage, car port, refrig. AC. Parker, 293-8389.

GARAGE SALE, kids & adult clothing, kitchen counter tops, misc. household items, tomorrow 9-5, Sun. 10-5. Moulton, 3325 Britt NE.

BED OF WORMS, total or part; 6x6 new fiberglass hot tub; 4500 CFM evap. AC, 1 yr. old. Liguori, 256-3613.

FLOOR BUFFER, electric. Orear, 256-1941.

OLYMPUS 35 mm f2 Zuiko wide angle lens, new w/guarantee, $149. Buck, 296-5963.

WASHER & DRYER, heavy duty Kenmore, harvest gold. Bontrager, 883-4742 after 5:30.

TRANSPORTATION

'76 BMW cycle, saddle bags, 20,000 miles, $2200. Rooks, 294-6113.

BICYCLE, 20" boys high rise, $30. Eckelmeyer, 296-2148.

'76 FORD F-250, 4WD, LWB, PS, PB, dual tanks & batteries, 38,000 miles. Walla, 299-2209 after 5:30 or weekends.

'75 CHEVY pickup, 6 cyl., 3 spd., ½ ton, SWB, 18-19 mpg, HD suspension, 16" tires, below whlsle. at $1900. Canfield, 299-9628 after 6.

'73 MERCURY MB, 61,000 miles, AC, PS, PB, AM/FM radio, white w/blue interior, all power options, trailer hitch. $1200, Breding, 298-5314.

'76 CHEVY van, 125" whlbse., AC, PS, AM/FM-tape, customized, 47,600 miles, $3950. Lanes, 294-7635.

'75 VW BUS, 7 pass., AC, radio, cptng., sun screens, trlr. hitch. Pryor, 344-2931.

'65 CORVAIR Monza, 70,000 miles, 12,000 on engine. Blue book, $3200, asking $2300. Barth, 266-4876 after 5.

'73 HORNET 2 dr, AT, PS, PB, AC, 55,000 miles, 258-in. 6-cyl. engine, $1575. Miller, 268-5992.

'78 DODGE OMNI, 4800 miles, 26-28 mpg city, AC, 4-spd. Afanasjeus, 296-4527 after 5.

'72 VW pop-up camper, $2195. White, 293-2219.

'71 VEGA Htchbk., dark blue, lifetime Penneys battery. West, 281-3460.

'72 DATSUN B110 coupe, 35 mpg, $1000 or trade for Datsun pickup. Hesch, 256-0161 evenings.

'78 HARLEY DAVIDSON, 1200cc, windshld., luggage rack, foot pegs, crash bars, selling cheap. Hartzell, 292-5726.

'77 SUZUKI GS400 w/fairing and luggage rack, 6300 miles, $1050. Nielsen, 881-4159.

'77 GMC pickup, 6 cyl., 42,000 miles, $2700 or best offer. Green, 266-8866.

'75 HONDA four, 11,000 miles, price negotiable. Sena, 296-5619.

'75 MAZDA RX4, 31,000 miles, blue, $2500 or best offer. Weart, 345-7300 or 765-2632.

'77 GMC 3/4 ton camper special, 4-spd., HD engine gauges, 8200 GVWR, CB, tape player, asking $4495. Roady, 281-1388.

'58 JEEP WAGON, 4WD, motor and brakes recently overhauled, $2500 or make offer. Ingram, 293-6274.

'78 MUSTANG II, Ghia pck., AM/FM stereo, 4-spd., 9,700 miles, below book at $4650. Ray, 293-3668.

'74 CAPRI, bronze, V-6, $2000. Randle, 867-2668.

BICYCLES, Schwinn girls 10 and 5 spd. Spray, 884-8453.

'70 INTERNATIONAL 3/4 ton 4WD pickup, cabinet, bed, all options, $2300. Barnette, 298-9227.

'67 FORD pickup, single bed, newly upholstered, $1900. '64 14' camper (for PU), $1100. Will negotiate. Tabor, 299-5272 or 293-5928.

'77 BUICK Estate wagon, AT, AC, PS, PB, AM/FM stereo, CM, 16,000 miles, $5600. Hartman, 293-2862.

'67 MERCURY wagon, good engine but trans. needs help, $300. Hueter, 242-1620.

'72 CORVETTE Stingray LT-1, dark blue, factory AC, 4-sp., asking $10,000; '71 VW Campmobile, motor needs work, $1000. Frederiksen, Amarillo, 806-352-4620.

SCHWINN BICYCLE, 20-in., rare 2-sp. rear hub, $30. Abbin, 296-7678 or 883-8665.

FISHING/SKI boat, 15' Starcraft, 85 hp Johnson outboard, trolling plate, anchor, bait lights, HD trailer. West, 299-7314.

BICYCLE, Huffy, boys small frame, 10-sp., 26" wheels, $35. Wentz, 881-7125.

'71 CITABRIA airplane, 1/5 share, $1800. Payne, 299-5966.

'70 DATSUN 510, 2-dr., AT, radio, $1350. Davis, 266-6395.

'73 COUGAR, PS, PB, AM/FM cassette, 351 engine, new steel belted tires, new paint, $2150. Want 65-67 Mustang shop manual. Hansen, 298-3173.

'71 NOVA SS, 79,000 miles, 2-dr., all power, 2 new tires, bucket seats, $750. Fuentes, 247-1110.

'68 MUSTANG 302 V8, AC. Maciolek, 821-5335.

'68 CHRYSLER Newport, AT, PS, $500. Orear, 256-1941.

'74 FORD truck/camper, 3/4 ton, 360 eng., PS, PB, air, AM radio, low mileage, Idletime 8' camper w/range, oven, $3200. Gumley, 883-6599.

'64 AMC CONVERTIBLE, new top, boot, paint, seats, tires, engine overhauled, $2200. Bennett, 296-8041.

FOR RENT

MAUI vacation rental, 1BR condo completely equipped. Excellent beaches, $190/wk. Schmedding, 821-5999 or 447-5182 in Livermore.

HOUSE 3BR, 1¾ bath, family room, appliances, near Mont. shp. ctr. & schools, dbl. garage, $300 mo. Cafferty, 898-3102.

3 BR, 1¾ bath, frpl., carpets, drapes, range, dbl. garage, landscaping, covered patio, Lomas-La. area, $375 mo. Carlyon, 299-2318.

TOWNHOUSE, new, near Const. & Chelwood, 2 BR, 2 baths, dbl. garage, $385 w/DD, lease. Muir, 883-7933.

CHALET at Taos Ski Valley, 3 BR, 1½ baths, sleeps 8, fully equipped, scenic. Marion, 294-8256.

3-BDR home, NE Heights, 1¾ baths, double garage, sprinklers, covered patio, FP, available 1 yr. lease Nov. 15, $400 mo., $125 deposit. Tabor, 293-5928 or 299-5272.

2-BDR, 2 baths, FP, wet bar, extras, near Carlisle & Candelaria, $320 plus utilities. Bando, 292-2452 after 5.

TOWNHOUSE, 2-BDR, 2½ bath, 2-story, garage, pool, tennis courts, furn. or unfurn. Ebinger, 883-9324.

1-BDR HOUSE w/fenced garden area, near Wyoming gate, $200. Liguori, 256-3613, 517 Virginia SE.

REAL ESTATE

ON Ridgecrest in Siesta Hills, 1/3 acre, corner lot, undrgrd. utilities, $50,000. Fitzgerald, 265-3055.

4BR, 1¾ baths, den w/kiva fp. and built-in bancos, 1900 sq. ft., east of Tramway. Fisher, 299-6697.

4-BDR, 2½ baths, 1950 sq. ft., sunken LR w/FP, study, Eldorado High district, bus convenient, mid-70's. Snow, 296-5148.

3.2 WOODED ACRES, Questa area, low down, $64 month. Whiting, 294-5748.

5 ACRES, 3 miles off N 14, water, septic, electricity, telephone, $5000 under appraisal, Rupe, 281-1694.

3-BDR, 3 baths, study, den, Parkland Hills addition SE, $88,000 negotiable. Pitti, 256-1629.

3-BDR, 1¾ baths, dbl. garage, Roberson, hard wood floors. Loeppke, 299-7338.

WANTED

PASSENGERS to share expense of a 4- to 5-hour weekend/holiday flights to Austin/Houston area in Cessna 182. Dates negotiable. Schkade, 265-5473.

PHONE ANSWERING DEVICE, good quality, ring control, prefer voice-actuated. Desk, typewriter well on left, 3 or more drawers. Mead, 294-2298.

VIOLIN, quarter-size for student, Hawn, 293-6315.

MOUNTAIN LAND near Pagosa Springs, Colo., 1-5 acres, good view, large trees. Borgman, 299-6010.

FEMALE to share new house near Central & Juan Tabo. $100/mo. plus part of utilities. Cox, 294-8084.

AUGUST 78 issue of Heavy Metal. **King, 298-2628.**

RIDE to Sandia from Cedar Crest, will help pay expenses. Kovacic, 281-1754.

FRONT BUMBER for '67 or '68 Mercury Cougar. Bland, 265-6286.

FLOOR BUFFER and filing cabinet. Orear, 256-1941.

DISHWASHER, built-in, good condition, coppertone if possible. Moss, 298-2643.

GOLF CLUBS, used for 14 yr. old beginner. Perkins, 299-8941.

LOST AND FOUND

LOST — brown framed photo-ray glasses; gold & white clip-on loop earring; solar sunglasses, Snoopy lunch box.

FOUND — butterfly pendant necklace; brass key; 8 photo negatives. LOST AND FOUND, Bldg. 832, 264-1657.

Coronado Club Activities

New Board Takes Office

HAPPY HOURS — Tonight a group called Shades of Light makes the happy music while the Club's kitchen staff wheels out beef burgundy and noodles for the buffet. Next Friday, Sept. 28, Martha Kaye and the Trio hold the bandstand while jumbo cut stuffed pork chops top the buffet menu. Happy Hours start right after work on Fridays and run until midnight or so with special prices in effect all evening. To reserve buffet tickets, call the Club office — 265-6791 — by midweek.

TRAVEL — Dates for the Disneyland tour are Oct. 24-28 when the kids are enjoying a teacher's convention holiday from school. The package includes air fare, motels, transfers, admission and rides at Disneyland, a tour of Universal Studios and a boat trip to Catalina Island. Prices are $248 for adults (dbl. occupancy), $225 (triple), $213 (quad.) and $147 for children under 12. See Ed Neidel, travel director, in the lobby tonight between 6 and 7. He also has a Caribbean cruise, packages to Europe, Hawaii and an excursion on the Cumbres and Toltec scenic railroad Oct. 6.

MEMBERS of the new board of directors, elected at the annual meeting Sept. 10, take office this month (see photo). New president is Pres Herrington (1758); Pro Padilla (3743) is VP; Nina Chapman (3533) is secretary; Dick Shepardson (3242), treasurer.

German Class

An additional course, conversational German, is being added to the out-of-hours classes. The class starts Oct. 2 and runs until Dec. 20, meeting Tuesdays and Wednesdays in the C-Club, room B8, from 12 to 1. Joan Winter is the instructor. Call Ruth Brooks in Training, 4-6538, if you wish to enroll.

MEMBERS of the new Coronado Club board of directors are (seated, lr to r) Charlie Clendennin (2651), Frank Biggs (4231), Howard Romme (3243), Nina Chapman (3533), and Bernie Kenna (5812). Standing are Pro Padilla (3743), Pres Herrington (1758), Bob Banks (5000), Frank Gallegos (4500), Dick Shepardson (3242) and Gil Cordova (DOE). Not shown are Pat Crane (DOE) and Bob Doughterty (2351).

Fun & Games

Skiing — The Coronado Ski Club's annual Sandia Peak Walkdown is set for Sunday, Oct. 7. Club members ride the chairlift (starting at 10:30) to the top of the mountain, walk down enjoying the golden aspens and the mountain air whilst heaving rocks off the trail (no fair throwing rocks at supervisors) and, appetites now whetted, are offered hamburgers and beer/wine/soft drinks once the bottom is reached. It's all free to CSC members, $2 for guests. If you plan to go, let Frank Biggs know, org. 4231.

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Golfing — The Sandia Golfing Assn. has four tournaments coming up over the next two months. On Sept. 22 and 23, the SGA Cup, a 36-hole event, will be played at Arroyo Del Oso and UNM South courses. On Oct. 13, SGA will pair with the C-Club's Womens Golf Assn. for a scotch team tournament at Los Altos. Oct. 14 will see an SGA individual tournament at UNM South. Finally, on Nov. 15th, the annual fun tournament will be staged at the Tijeras Arroyo course, and a banquet with awards is scheduled for that evening at the Coronado Club.

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Running — The "M" Mountain 9-Miler run at Socorro is set for Sunday, Oct. 7, at 9:30 a.m. Entry forms are available in the LAB NEWS office.

The first "Sandia Crossing," a 28-mile jaunt from Placitas to Tijeras Canyon over the Crest Trail, took place Sept. 9. Of the 35 or so entrants, seven were Sandians and all seven finished, with times ranging from a bit over four hours to five and a half. They are Henry Dodd (4715), Irv Hall (1223), Terry Bisbee (2654), Pete Richards (5132), Jim Harrison (4311), Mark Percival (4536), and Al Spencer (3611).

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Biking — City police have begun warning bicyclists that not only is it dangerous for them to pedal their way along major thoroughfares during rush hours, but it is also illegal. APD isn't singling out cyclists. The ordinance applies to any slow moving vehicle, "slow" meaning less than 25 mph. "Rush hour" is 7:30 to 9 a.m. and 4 to 6 p.m. Citations haven't been issued, just warnings. Since no rational cyclist uses an arterial when he can employ a residential or, at least, non-arterial route, the new police procedure shold be a matter of little consequence to Sandia bikers.

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Horseshoe Pitching — The Coronado Horseshoe Club has its annual meeting and election of officers planned for Sept. 27, 4:45 p.m. at the Coronado Club. Bob Schuch (4232), current president, announced winners of the tournament held Aug. 25: Leon Bressan (2552) retained h singles crown and Earl Saxton (1556) and Glenn GGES (4311) were winners in the doubles competition.

Events Calendar

Sept. 14-29 — Albuquerque Little Theater, "Same Time Next Year," 242-4315.

Sept. 21-22 — Emanuel Ax, pianist, Popejoy at 8:15 p.m., 277-3121.

Sept. 21-23 — Downtown Studio presents "Beaux & Eros," three plays by Chekov, Pinter and Anderson at the Kimo, 8 p.m., tickets at the door or call 247-4047.

Sept. 23 — Indian music concert by Paul Ortega and Doc Date Navaquaya, Indian Pueblo Cultural Ctr., 8 p.m.

Sept. 24, 25, 31, 1 — Civic Light Opera presents "Sugar," Popejoy, 8:15 p.m., 277-3121.

Sept. 26 — Jesus Martinez performs Latin Folk Music, 8 p.m., Kimo theater.

Sept. 28 to Oct. 7 — Santa Fe Festival of the Arts, NM crafts exhibit, Sweeney Convention Center.

Sept. 29 — "Ireland," a travel film, 7:30 p.m. at Popejoy, 277-3121.

Sept. 28, 29 — "A Slight Ache" and Review Sketches," 8:15 p.m., Kimo, 247-4047.

Through Oct. — Mariposa Gallery, Liz Anderson ceramics, David Dear jewelry, 113 Romero NW, Old Town.