



THESE young people are Sandia's summer people. Some are still in high school, some are on their way to or are in college, and some are graduate students. A job at the Labs for the summer often spells the financial difference between

going to college or not, and association with Labs people and work sometimes helps define a career field to be pursued.

LAB NEWS

VOL. 30, NO. 15

JULY 21, 1978

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

Downhole Steam Generator

New Concepts for Project Deep Steam

Project Deep Steam (LAB NEWS, March 31, 1978) aims at the economic recovery of heavy oil in deep reservoirs where current technology does not allow profitable recovery.

The heavy oil is a thick, tar-like substance. Currently, this oil is being recovered from shallow wells (about 1000 ft. deep) in California by pumping surface-generated steam into the reservoir to drive out the remaining oil.

The surface steam generators are fired with fuel oil. About one barrel of oil is burned for every three recovered. Air pollution problems plague the operation and expensive scrubbers are required to clean the emissions from the boilers.

One of Sandia's goals in the new program is to develop a downhole steam generator to operate at depths of 2500 to 5000 ft. Such a system could be used to recover an estimated 1.6 billion barrels of oil now residing in the country's "depleted" oil reservoirs.

Early conceptual work in Project Deep

Steam is being performed by a team led by Ron Fox of Thermal Processes Division 5737.

"We're looking at several downhole steam generator concepts," Ron says. "This device will have to fit inside existing well holes—no more than 7" in diameter. To be effective it must have an energy output of 10 to 20 million Btu/hr and operate at pressures up to 3000 psi. Several approaches have been proposed by industry.

"An electric heater might work, although it would probably be expensive. A hydrogen-oxygen burner similar to a rocket motor might generate the energy we need. Here again, cost is a question. We're looking at both of these concepts from a technical and economic basis."

The best solution according to the oil industry—and the toughest technically—is a steam generator that uses the crude oil in the formation being steam flooded. But a number of problems exist with this approach. For example, a new kind of

burner or heat exchanger will have to be devised which can mix air and oil and achieve efficient combustion.

The theory of combustion at these pressures has not been developed, however. Combustion chamber pressures required correspond to those currently on the frontiers of the rocket industry. Additional problems arise because of high exhaust pressures and low quality fuels. Also, the in situ oil requires pre-heating before ignition, and this is another area requiring study.

"In addition," Ron continues, "combustion particles and corrosive liquids could impair the permeability of the formation. We're studying these areas now. The Sandia wind tunnels are useful here in examining porosity and permeability of model oil field reservoirs. The highly instrumented wind tunnels also help explore the relationship between formation structure and permeability."

[Continued on Page Seven]

Supervisory Appointments

NESTOR ORTIZ to supervisor of Fuel Cycle Risk Analysis Division 5413, effective July 1.

Nestor has been at the Labs for 15 months, first as a member of the technical staff in the Nuclear Fuel Cycle Systems Safety Division 5412 and, more recently, with Nuclear Fuel Cycle Facility Analysis Division 5414. His new responsibilities include analysis of the environmental impact of nuclear fuel cycle accidents.

Before coming to Sandia, Nestor headed the Nuclear Engineering Department for the Puerto Rico Utility Co., and worked for the AEC in Germantown, Md., for two and a half years. He earned his BS in EE from the University of Puerto Rico and MS and PhD in nuclear engineering from MIT. He is a member of the American Nuclear Society and the Wind Energy International Society.

Nestor's off-the-job activities encompass many Sandia-sponsored activities—softball, volleyball and basketball. He and his wife Regina have two daughters and live in the NE Heights.

* * *

ERWIN "Stew" STEWART to supervisor of Plant Maintenance Section 9712-2, effective July 1.

Since joining Sandia in 1956 and until April of this year, Stew has been a refrigeration and air conditioning mechanic with Plant Maintenance groups. His most recent assignment was with Plant Engineering as a material analyst. He owned his own refrigeration business in Albuquerque before coming to the Labs. His section is responsible for electrical, refrigeration and plumbing maintenance.

Stew attended Albuquerque High and later went to refrigeration school. He also served three years in the First Marine Tank Battalion. In his spare time, Stew operates a ham radio and works in his garden. He and his wife Marilyn have a married daughter, a son enrolled at UNM, and one grandson. They live in NE Albuquerque.

* * *



NEW SUPERVISORS—Nestor Ortiz (5413), standing left; Tom Hunter (5312); Marshall Berman (5411), seated left; and Stew Stewart (9712-2).

MARSHALL BERMAN to supervisor of Reactor Safety Studies Division 5411, effective July 1. He joined Sandia in January 1969 as a staff member with the underground testing organization, where he designed containment systems for underground tests. Three years ago he transferred to the nuclear reactor safety group where his work has been concerned with thermal hydraulics, accident analysis for light water reactors, and post-accident heat removal. In his present position, Marshall's group is concentrating on modifying the RELAP 4 code to perform reactor safety studies.

Before coming to the Labs, Marshall worked in Michigan, doing research on re-entry vehicles, optical guidance systems and radar cross sections. He earned a BS in physics from the University of Michigan and a PhD in nuclear physics from Wayne State University. Marshall is a member of the American Physical Society and the American Association for the Advancement of Science. His leisure time activities include building and gardening projects at

home, photography, and he also coaches a soccer team.

Marshall, his wife Nancy, their two sons and infant daughter live in Glenwood Hills.

* * *

TOM HUNTER to supervisor of WIPP Experimental Programs Division 5312, effective July 1.

After earning a BS in ME from the University of Florida, Tom came to the Labs in January 1967 as a member of the last class in Sandia's TDP program and received his MS in ME from UNM. Under Sandia's DSP, Tom later earned an MS and PhD from the University of Wisconsin in nuclear engineering. His work at the Labs has been associated with weapons testing at NTS, where he served as project leader on numerous weapons effects tests. He also worked on reactor safety research programs and in the initial formation of the Waste Isolation Pilot Plant project.

Tom has just returned to the Labs from Madison, Wis., where he attended the university. He and his wife Miriam and their three children live in the SE Heights.

Retiring



Ramon Aguilar (3430)

Death

Gene Forsythe, product acceptance gage designer in Project Design Definition Division V 9656, died July 12 after a long illness.

He had worked at Sandia Labs since July 1958.

Survivors include his widow, two sons, two stepsons and a stepdaughter.



It's a little far fetched, but since nothing else seems to be working, maybe we should accept William Moore's suggestion and adopt the pickle as a symbol of international peace. Moore, VP of Pickle Packers International, puts it this way: "Pickles are gentle and humble and there's nothing more harmless looking. And who can rattle sabers while munching a crunchy pickle?" (One question, Mr. Moore: was the pickle you had in mind sweet or sour?)

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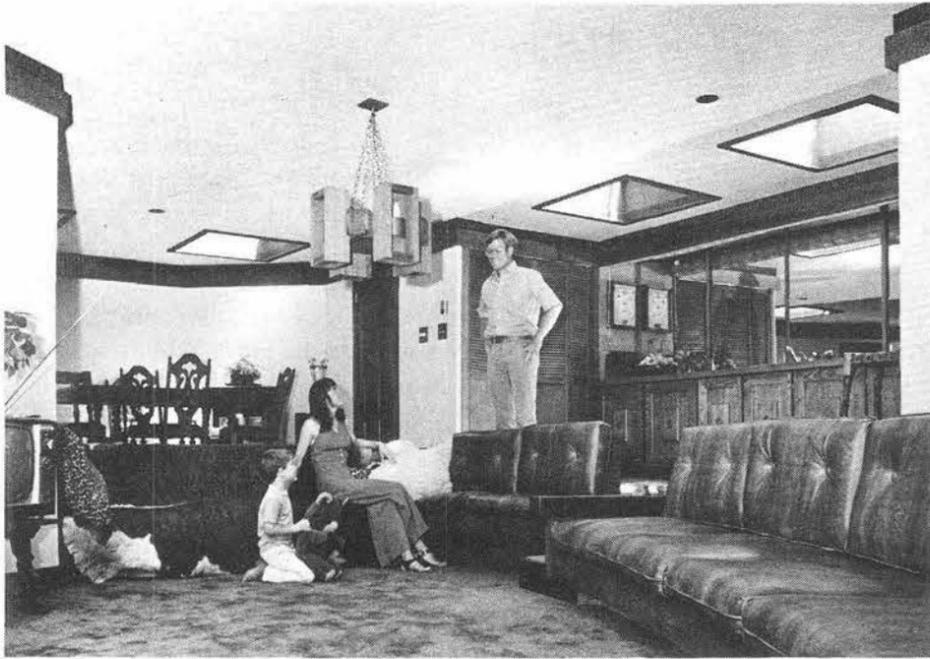
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chuck cockelreas & norma taylor write

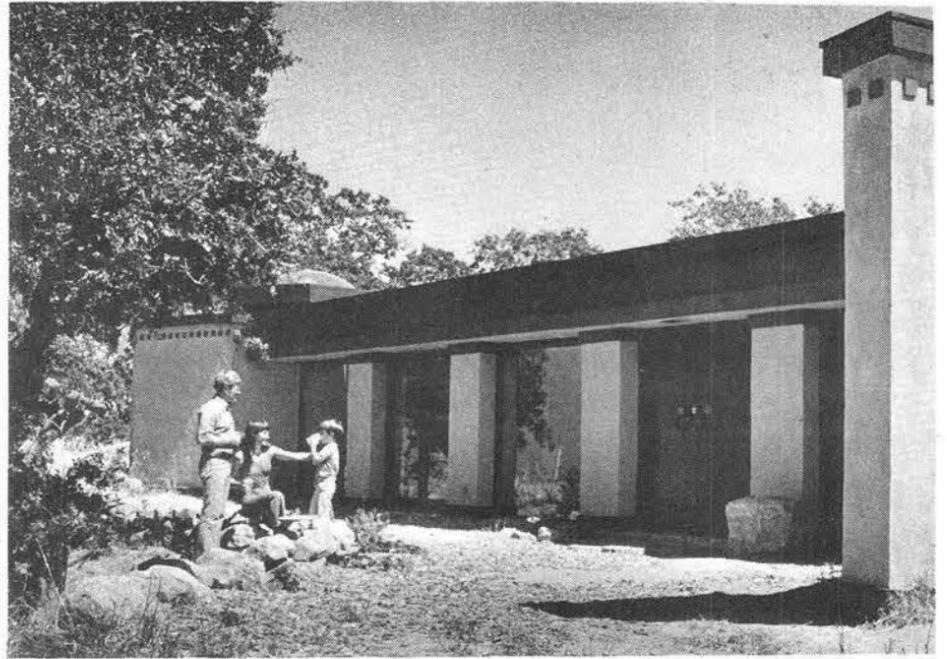
bill laskar does picture work

so does russell smith

bruce hawkinson & lorena schneider report livermore



LIVING AREA in Pete and Joanne Dean's home features 16-foot, curved recessed couch, chandelier and kitchen cabinets, all built by Pete.



THE DEAN home has a sweeping view of the valley near Brentwood.

LIVERMORE NEWS

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LIVERMORE LABORATORIES

JULY 21, 1978

Energy Saving Home Goes Underground

When Pete Dean (8265) began building his new home three years ago on acreage overlooking the valley near Brentwood, the first thing he did was bulldoze out a side of the hill.

"We wanted a low maintenance house that was simple to clean; one that would fit in with the site rather than just sitting on the hill; and, most important, one that was energy saving—easy to heat and cool to keep our utility bills down," says Pete. "It sounded kind of wild when the architect came up with the idea of going underground but turned out to be ideal for what we wanted."

The house, which rather resembles a snail's shell, has about 1500 square feet, is constructed of steel and concrete with a wood, dirt-covered roof. Inside walls are plaster-covered, outside stucco, and thermal pane picture windows run across the entire front.

Pete, with the help of wife Joanne, did most of the work himself evenings and on weekends and vacations. After the six-foot wide footings were in, the cement block walls were laid, the 18 corners in the outside walls were formed, and the entire 12-inch thick wall was filled with concrete. (Wide footings and solid walls were needed for extra strength.) Then the wall was plastered with plastic cement and coated with a waterproofing compound. Next, eight-inch steel I-beam supports for the roof were hoisted into place. When the roof was completed, Pete built the inside forms and poured the floors. In the meantime, he was putting in the plumbing and electricity.

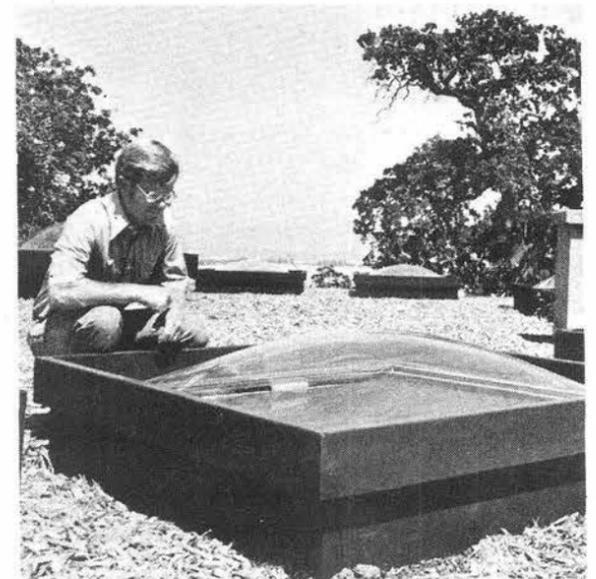
"I soon learned that if you want anything special, it's either going to cost a

fortune or you have to do it yourself. For instance, the French doors in front would have cost \$600 if I hadn't made them myself," says Pete.

The basic feature is that the living area (living room, kitchen and dining room) consists of one large room. In fact, the wall between that area and the sleeping area is insulated like an outside wall so that the heat can be turned off in one part or the other. In addition to the insulation provided by the earth surrounding the house, 10-inch insulation was placed in the ceiling and three-and-a-half-inch insulation was placed between studs fastened to the inside of the concrete walls.

Eight skylights provide light to those portions of the house underground. In the evening the skylights can be opened to allow rapid ventilation of the entire house and, in colder months, they are actually part of a passive solar energy system. The house is designed so that the sun shines upon the floors in the winter, and the mass of concrete in the walls and floors is warmed. To minimize heating during summer, sun screen shades are placed on the skylights. Because the front of the house faces north, the sun never shines in the large front windows. By the reckoning of the utility company, the Dean's utility bills are less than half of what they would ordinarily be for a house this size.

Pete also built a lot of the furnishings, mostly in redwood. In the kitchen, mirrored sliding doors that extend all the way to the countertop reflect the outside, giving a panoramic view of the valley. Another impressive project is the built-in, 16-foot long, recessed living room couch in a curved design.



SKYLIGHTS on earth-covered roof provide light for Pete and his family in those portions of the house underground. They also allow for rapid ventilation and are part of a passive solar energy system.

A separate, two-car garage and horse stable match the house, and the underground design keeps Pete's workshop cool in summer and warm in winter. He says the garage is oriented due south so that when total solar energy does become feasible it will be possible to mount solar collectors on the garage as well as on the house.

"I enjoyed the challenge—I wanted to build my own house once in my life," he comments. "And I wanted it to be different. Surprisingly, though, a house underground turns out to be more expensive than one above ground because of the structural requirements placed on the walls and roof."

Take Note

Andy Stark (8312) is among 600 successful candidates (out of 4200) who passed the California bar examination given this spring. He has worked for over four years on home correspondence courses and recently received his LLB degree from Blackstone School of Law in Chicago.

Andy also holds a BS in chemistry from UNM. He has been with Sandia for over 19 years, nine in Albuquerque in initiator and detonator design work and, since 1967, at SLL where he's currently in the powder metallurgy lab working in the characterization and analysis of various metallic and nonmetallic powders.

Take Note

Bob Easterling of Statistics and Human Factors Division 1223 has been elected a Fellow of the American Statistical Association. Formal announcement of the election will take place in San Diego next month at the 1978 annual meeting of ASA. Bob has been at Sandia since 1967, with two years on assignment with the Nuclear Regulatory Commission in Washington, D.C., as a statistical advisor. He acquired BS, MS and PhD degrees in statistics from Oklahoma State.

A page of history will turn over with the return to the U.S. Forest Service in November of the site of Project Gasbuggy—the first experiment designed to stimulate natural gas production with a nuclear explosive. The site, located near Farmington, NM, saw the detonation of a 29 kt nuclear explosive 4,227 feet underground

in a natural gas formation in December 1967. Gasbuggy was part of AEC's Plowshare program to develop peaceful uses for nuclear explosives. Site restoration work begins next month and, upon completion, the area will be suitable for public access. A monument will mark the Gasbuggy site.

Cecil Land of Solid State Device Physics Division 5133 will be in Oklahoma City Aug. 4 accepting an honorary degree from Oklahoma Christian College. The College is conferring an Honorary Doctor of Science degree upon Cecil as "an expression of the high esteem in which you are held...by professional colleagues..."

Cecil has been at Sandia since January 1956. He holds 9 U.S. and 37 foreign patents for ferroelectric devices.

Fun & Games

Soccer—This game has taken off like gangbusters, and now the C-Club would like to organize some adult soccer teams for both men and women, experience not necessary. If you're interested in playing or coaching, give Bob Giersberg, C-Club Recreation Mgr., a call on 4-8486.

Running—Bob is also setting up a 10,000-metre fun run for Saturday, July 23. Participants should show up at the running track northwest of the gym by 7:45 a.m. There is no entry fee. The run—a little over six miles—follows roads on the Base.

We plan to get a supply of La Luz Trail Race (Aug. 20) forms. Call LAB NEWS, 4-1053, if you want one.

Out-Of-Hours Enrollment

Enrollment period for the Out-Of-Hours program is July 31 through Aug. 11. Catalogs will be at all gates in the yellow containers by July 27.

Enrollment Starts Monday For T-VI Classes

Pre-registration for T-VI's fall trimester runs from July 24 through Aug. 11, while registration itself takes place Aug. 30 and 31 for those accepted into classes.

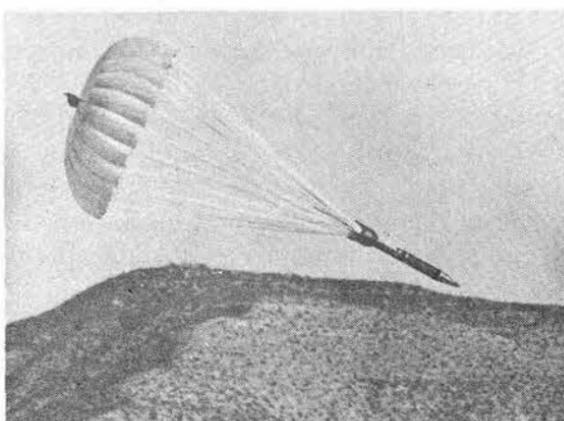
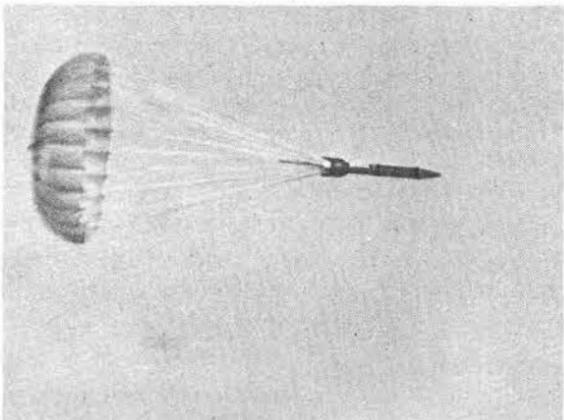
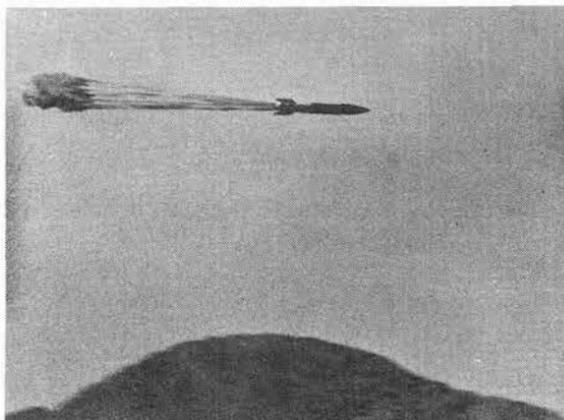
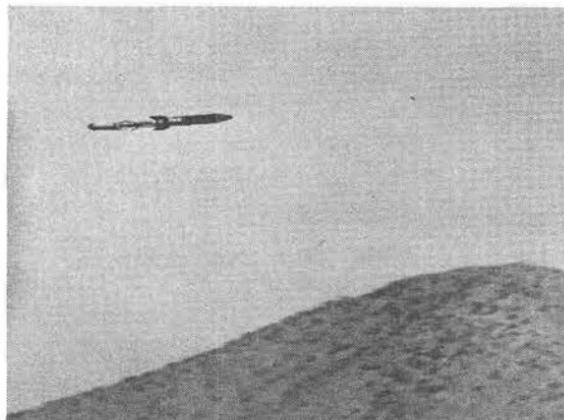
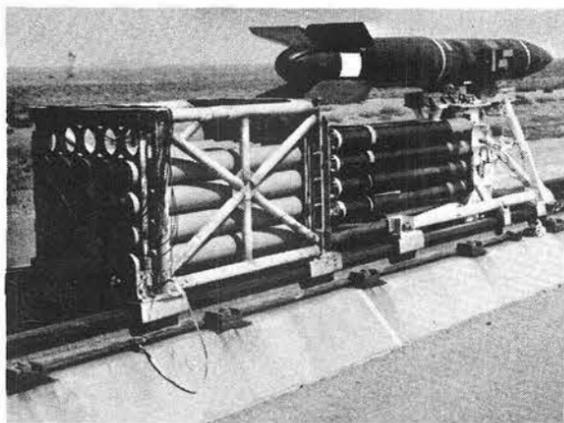
Sandians may enroll in T-VI evening courses on a cost-free basis provided the course is job-related or relates to a job to which the employee may logically aspire.

Pre-registration forms and T-VI catalogs may be obtained from Ruth Brooks of Education and Training Division I 3521, Bldg. 632. The T-VI forms as well as Sandia enrollment cards must be validated by Division 3521 if you wish to take the course at no cost. T-VI classes start Sept. 11.

Swimming—Swim classes for adults are now being offered by the C-Club. Sign up by calling Bob Giersberg, 4-8486.

Heavy rules—We've received a set of "Gymnasium Rules to be Enforced" whose length precludes full publication. Therefore, we'll pass on to you only those rules covering activities in which, by our observation, Sandians have been particularly nefarious. For instance, you may no longer "stick chewing gum on the floors or walls," nor "eat or drink in the ... sauna" (someone must have caught you and your baloney sandwich in the act). And, modern psychotherapy notwithstanding, "Participants may not purposely damage issued racquets by striking the walls, floors, or kicking the strings" (so you'll have to take it out on your opponent, assuming he's smaller than you). And "Non-athletic clothing may not be worn when using the gym" (the distinction between non-athletic and athletic being largely olfactory). Finally, "...no one may smoke in the gym," a rule that we've here quoted before with the observation that it appears to apply solely to you and to me, but not to the gym staff. For your complete copy of the rules, send \$5 in a plain brown envelope to LAB NEWS (cash, no checks).

Skiing—When the sport is done in the winter and you have to start planning for it in July, well that says something about the sport. But that's where we are with skiing, and the first Coronado Ski Club meeting for next season will be a membership party at the C-Club pool on Tuesday, Aug. 15, with swimming, picnicking (bring your own), and Ski Club Fair. And club officers will be there to talk about trips, discounts, lessons, repairs, ski exercises, equipment, and membership. A "super door prize" will also be awarded. President of the Coronado Ski Club is Frank Biggs (5231).



NEW B61-3, 4 PARACHUTE undergoes successful sled test at Mach 1.3 in Area III. Kevlar material used in the chute has twice the tensile strength of steel. The sled streaks down the track and the test unit is ejected vertically to desired altitude where the parachute is deployed. Some 40 development tests have been completed. The program now moves to pre-production testing with parachutes fabricated and packed by AF contractors. Several more tests are planned on the Sandia sled track and at Tonopah Test Range with drops from aircraft. Parachute project is centered in Parachute Systems Division 1332 under Carl Peterson. Bill Pepper is project leader. Photometrics Division 1556 provided photographic coverage.

1700: Nuclear Security Systems

The mission of Nuclear Security Systems 1700 is to develop security systems that will prevent malevolent acts involving nuclear material. In specific terms, that means devising methods to keep nuclear weapons out of the hands of terrorists, to foil the sabotage of nuclear weapons, and to prevent the diversion of materials from the nuclear fuel cycle to weapon programs in violation of the non-proliferation treaty.

"The major DOE Safeguards R&D activities," explains 1700 Director Bill Myre, "are split between Sandia and LASL. At Sandia we concentrate on physical protection. LASL is responsible for nuclear materials measurement and accounting."

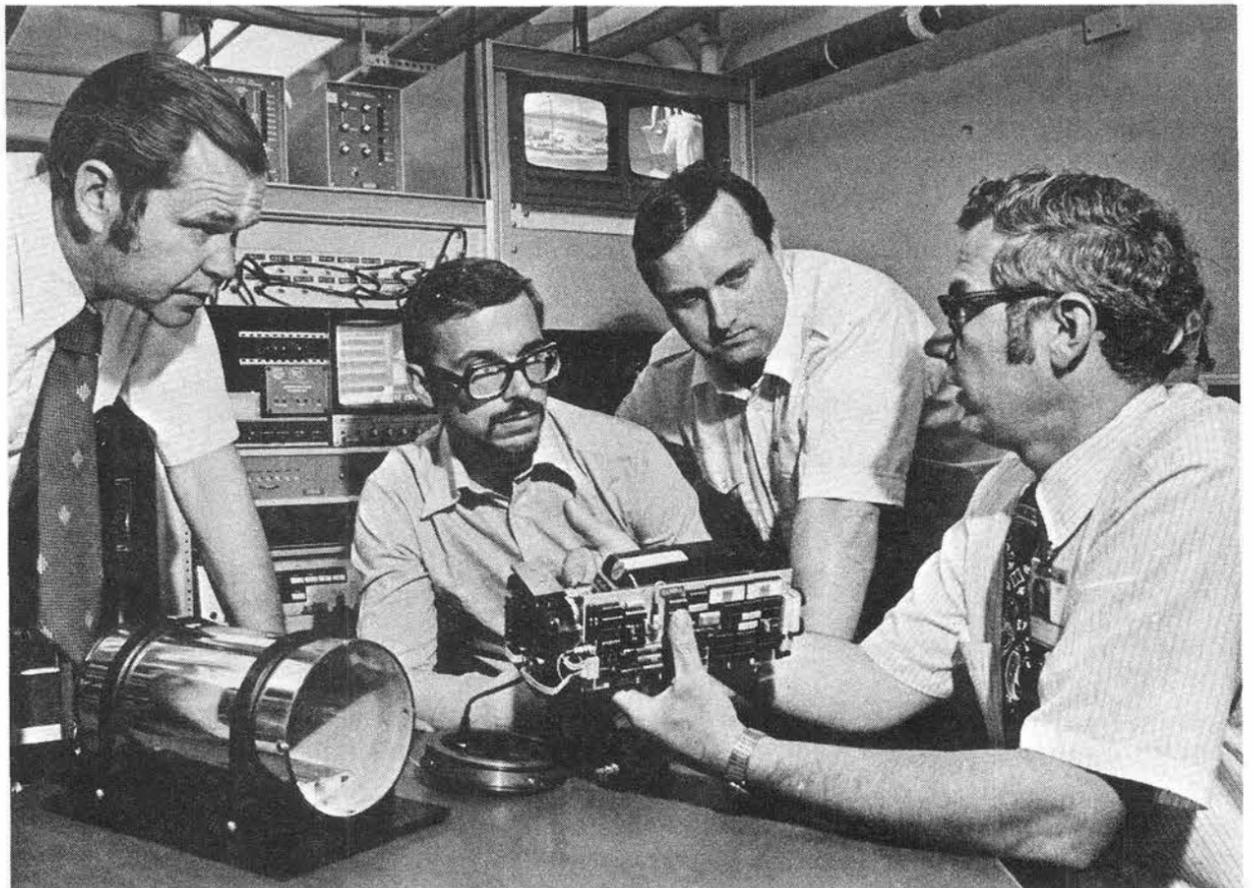
Sandia's involvement with safeguards goes back a long way, but major emphasis began in the early 1970's when the AEC, now DOE, asked the Labs to help upgrade its transportation systems—the shipping containers, the trucks and railcars used to ship government-owned nuclear materials, the escort vehicles, and the communication systems that link all vehicles to a nationwide control center.

More recently, safeguarding the security of facilities, both military and civilian, has received increased attention. "We're evaluating all kinds of commercially available products," Bill Myre told us, "detection and assessment systems, barriers, entry control devices and locks, to name a few. We're working with manufacturers, providing the results of our evaluations and suggesting modifications which would provide required performance in system applications. When the results of this activity suggest it, we do some development work ourselves. For DOE, we assisted in the installation of an improved perimeter system at one of the ALO production facilities. For the military, we've designed, produced and fielded a spectrum of security components—and we do troubleshooting of installed systems for them, too."

1700 considers the transfer of knowledge to those responsible for facilities protection an important part of their program. To this end, they have published three in a series of handbooks—one on intrusion detectors, one on entry control, one on barriers. Volumes covering seals and locks will be coming out soon. Over a thousand sets of handbooks have been distributed here and abroad.

"In addition," Bill explains, "we're sponsoring workshops to instruct handbook users in applying protection technology to their specific needs. In the last year we've worked with Security and Safeguards people from DOE Area Offices and many of their contractors. The Nuclear Regulatory Commission has asked us to consider similar workshops for their licensees and, in cooperation with the International Atomic Energy Agency (IAEA), we'll be conducting an international physical protection workshop in Albuquerque this fall.

"With the growing concern over proliferation of nuclear weapons abroad," Bill sums up, "we're developing highly reliable, long-lived surveillance and containment



FROM GERMANY, two scientists recently came to Sandia to discuss a joint U.S./Federal Republic of Germany R&D program on safeguards for nuclear material transportation and facilities. Here, 1700 Director Bill Myre, left, and Jim Nye (1754, seated right) discuss a Sandia-developed surveillance camera purchased by the FRG for evaluation with Deiter Sellinschegg (seated center) and Erbo Moennich.

instrumentation for the IAEA. While the equipment is often different from that used to thwart terrorists, the objective is still deterrence."

For the future, Bill feels Sandia's involvement in Safeguards will be limited only by our ability to commit resources in view of overall Labs' responsibilities. "We're already limited by the size of our

staff," he says, "and we're becoming recognized as the leaders in physical protection systems because of the breadth of our approach. We can look at the complete problem—from paper design through hardware development to proof testing. It's the same approach that has proved so successful in the development of weapons."

feed **back**

Q. Can't the Labs do something about smoking and non-smoking areas? The smoke in our area from cigarettes is both unpleasant and unhealthy.

A. If you are experiencing problems in your work area with smoke accumulation, Plant Engineering should be called to check out the ventilation system for proper functioning.

If there is still discomfort for the non-smokers in your work group, every effort should be made to separate smokers and non-smokers where feasible. It is also incumbent on both smokers and non-smokers to exercise the utmost mutual consideration. Sandia is aware of the problem and some actions are underway (our stockrooms now carry "Thank You For Not Smoking" signs for use at individual work locations.) Other signs have been placed in our conference rooms that say "Smoking? Consider Others" and a No Smoking area has been identified in the new cafeteria. Mutual thoughtfulness and consideration are needed. Sometimes these are not easy, but they're worth a try.

Q. How about putting at least one shower in each of the major buildings?

I and, I'm sure, others would ride bicycles to work, but we must consider our fellow workers, particularly during the summer.

A. We do have showers in a few locations and at the Base Gym. However, it is not practical from a construction/space/code standpoint to install a shower area in each major building as you suggest. Locations of existing showers may be obtained from Sam Johnson or Walt Norris, Div. 9751, ext. 1158.

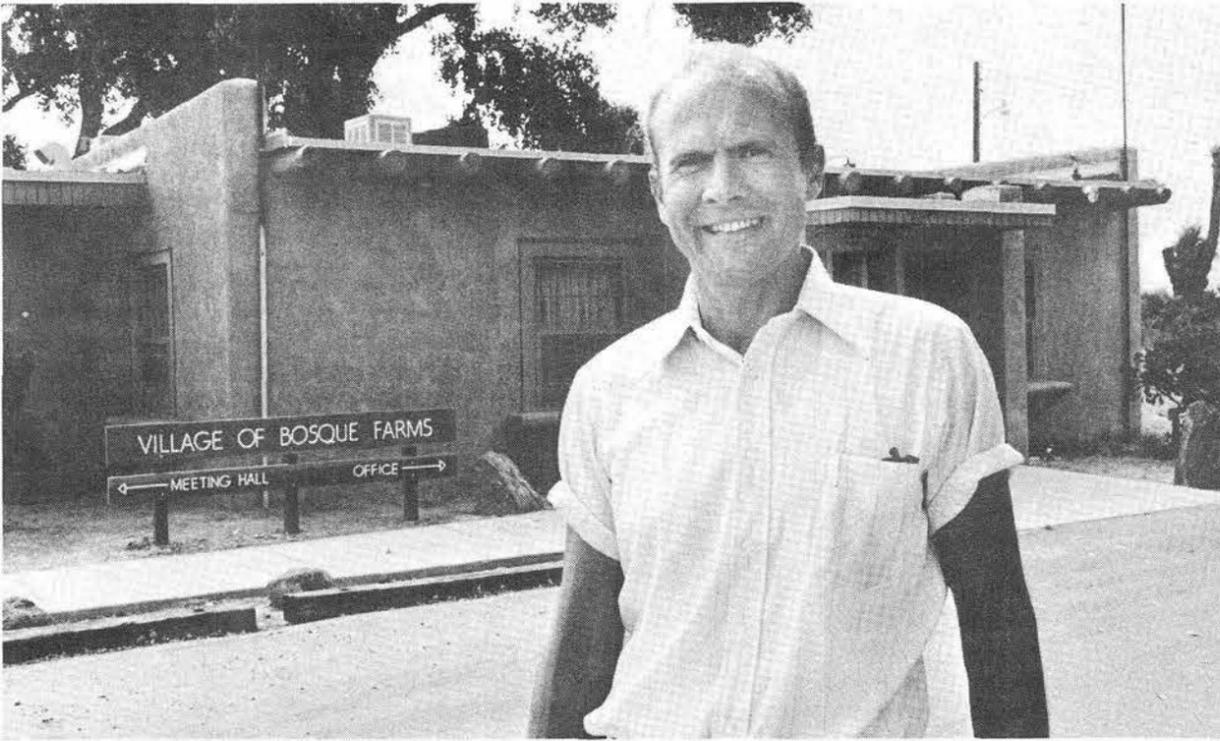
R. W. Hunnicutt—9700

Q. How about some fresh or dried fruit in the vending machines?

A. Your suggestion of dispensing dried or fresh fruit has been discussed with the contractor. This has been done in the past when fresh fruits are in season. He informs us that fruits were not "best sellers," but they will be glad to try again. The 880 vending machine area will be the first to be stocked.

J. R. Garcia—3500

Speakers



BOB FISHER

Bob Fisher is Mayor of Bosque Farms

Bosque Farms is a small village (three square miles, 3200 population) 27 miles south of Albuquerque astride Highway 47 on the east side of the Rio Grande. About 100 businesses are located on both sides of the highway as well as two large dairies and a feed company. Residents, most of them working in Albuquerque, tend small alfalfa farms, raise a few head of cattle and keep a horse or two. It is a rural community, quiet in comparison with the noise and traffic of Albuquerque.

Bob Fisher (5833) is mayor of Bosque Farms. He was elected after the village incorporated in 1973, will serve until 1980.

"I won't run again," Bob says. "It's a matter of spare time. I don't have any."

At Sandia Bob spends his days working in the Melting and Solidification Lab in Area III, drives to Bosque Farms after work and spends several hours on village business each evening. The mayor's office is located in an old-but-renovated adobe residence.

Events Calendar

- Through Aug. 27 — "Boeing-Boeing," Barn Dinner Theater, 281-3338.
- July 21-23—"That's Entertainment," ice skating show, Tingley Coliseum, 7:30 p.m., Sunday at 3:00 p.m., tickets at the door.
- July 21-23, 28-30—"I Do, I Do," Albuquerque Civic Light Opera, Popejoy Hall, 8:15 p.m.
- July 21-23—"Tea and Sympathy," Corrales Adobe Theatre, 8:30 p.m., 898-1943.
- July 25, 26—Various dances and feasts at Acoma, Cochiti, Laguna, San Felipe, Santa Ana and Taos Pueblos.
- July 29, 30—Bluegrass Festival, Isleta Lake, 293-6192.
- July 29, 30—40th Annual Spanish Market, Santa Fe Plaza.
- July 29, 30—National AAU Diving Meet, Johnson Gym, 7 a.m.-7 p.m.
- July 31—UNM Lecture Under the Stars by film maker Jane Morrison, SUB Ballroom, 8 p.m.

"The village has seven employees now," Bob says, "four police officers, two office workers and a maintenance man. More than half of our \$200,000 budget goes into the police effort."

"Before incorporation, our area averaged about two burglaries per day. They're rare now. And we've really cut the accident rate on our part of Highway 47. We estimate 10,000 cars drive through Bosque Farms daily. These are commuters and they're in a hurry. I guess we're known as a radar trap now, but we've cut the accident rate by half."

As mayor of Bosque Farms, Bob is concerned about quality of life in a rural environment. He feels that the job of the village council and mayor is to maintain rural quality while providing police and fire protection, promoting proper land use and zoning planning.

"The council recently passed a new zoning ordinance," Bob says. "It allows for residential development with lot sizes at a $\frac{3}{4}$ acre minimum. We don't have a large animal ordinance—people here like horses and cattle—and we want to keep it that way. We'll keep the dirt roads, too, although some heavily traveled roads have been paved."

Road maintenance used to be a problem, Bob admits, but the town acquired some surplus heavy equipment and a maintenance schedule is now in effect.

"We're even mowing weeds along the roadsides," he says.

A village has the same problems as a city, Bob adds. He and the council worry about taxes, budgets, water, rising costs, and cooperation with county, state and federal agencies.

"Like a big city," Bob says, "we have planning commissions, surveys, and long-range goals. We learn as we go along."

To do the job, Bob talks at great length with villagers of varying viewpoints. "We always have complaints," Bob says. "This is the nature of government. I get satisfaction from solving problems and keeping complaints to a minimum. Occasionally, the job is fun. One of these days, though, I'm going to have to take some time off and go fishing."

A. K. Hays, T. D. Padrick and R. E. Palmer (all 5215), "New Pumping Techniques for Improving the Efficiency of the Atomic Iodine Laser"; J. B. Moreno (5212), "Computer Model for Pulsed H₂-F₂ Amplifiers and Oscillators"; E. L. Patterson, G. N. Hays, J. M. Hoffman, R. A. Gerber (all 5212), and F. K. Truby (5215), "Beam Quality Measurements of Sandia's HF Oscillator-Amplifier Chain"; G. C. Tisone and G. N. Hays (both 5212), "High Quality Discharge Initiated SF₆-HI Oscillator-Preamplifier System for Extraction of Energy From an Electron-Beam Initiated H₂-F₂ Amplifier"; A. Owyong (5214), "High Resolution Stimulated Raman Spectroscopy of Gases," 10th International Quantum Electronics Conference, May 29-June 1, Atlanta, Ga.

J. W. Nunziato (5131), "The Propagation of Plane Waves in Granular Media," Joint U.S.-Japan Symposium on Continuum Mechanical and Statistical Approaches in the Mechanics of Granular Materials, June 5-9, Tohoku University, Sendai, Japan.

N. J. DeLollis (5813), "Bond Fatigue Study"; R. J. Martinez (5813), "Effect of Activated Oxygen Plasma on Polymer Weight Loss," DOE Interagency Adhesives Symposium, June 6-7, LASL.

B. Granoff (5731), "Mineral Matter Effects in Coal Liquefaction," 85th National AICHE Meeting, June 7, Philadelphia.

R. P. Stromberg (5714), "Solar Passive Buildings in New Mexico," Albuquerque Exchange Club, May 3.

K. L. Swanson (9636), "Think Metric," Adams Middle School science club, May 3, St. Mary's School science classes, May 15, and Eisenhower Middle School history class, May 25.

L. P. Robertson (1758), "Brasil—A Sleeping Giant," New Futures School social studies class, May 11, and Sandia Kiwanis Club, May 30.

F. E. Tennant (9571), "Glass Blowing," St. Mary's School science classes, May 16.

H. C. Monteith (5411), "UFO's and Their Mission to Earth," Adams Middle School science club, May 17.

T. F. Marker (6010), "The Oil Industry—Fact and Fiction," Exchange Club of Albuquerque, May 19.

N. J. DeLollis (5813), "Travel in Italy," New Futures School social studies class, May 24.

G. H. Miller (5216), "Science History—Fact and Fancy," Exchange Club of Albuquerque, May 26.

H. R. Shelton (3521), "What Does Your Bumper Sticker Say?" Old Town Optimist Club, May 31.

K. S. Neuhauser (5335), "Some Effects of Nitrogen Source on Anaerobic Growth of *Chromobacterium violaceum*," American Society for Microbiology Annual Meeting, May 14-19, Las Vegas, Nev.

S. T. Picraux (5111), "Quantitative Depth Profiling of Disorder in Si on Sapphire: Influence of Annealing Ambient," 153rd Meeting of Electrochemical Society, May 21-26, Seattle.

J. M. Alcone and W. Kennish (both 5723), "Analysis and Design of Integrated SHAC Systems Via Classical Control Theory," Workshop on the Control of Solar Energy Systems for Heating and Cooling, May 23-25, Hyannis, Mass.

R. W. Bild (5821), "Determination of Trace Metals in Biological Materials by Neutron Activation Analysis"; B. T. Kenna (5824), "Principles of Neutron Activation Analysis," UNM Medical School Seminar, May 24.

R. G. Dosch (5824), "Application of Titanates to Defense Waste Decontamination"; D. R. Tallant (5821), "American and Curium Recovery from Nuclear Waste Using Inorganic Ion Exchange Materials"; B. T. Kenna (5824), "Removal of Trace ¹⁰⁶Ru in Nuclear Waste Processing," Sandia ITS Workshop, May 25, SLA.

F. L. Vook (5110), "Implantation Metallurgy," Solid State Sciences Panel, National Research Council, June 2, Oak Ridge National Laboratory.

S. K. Lyo (5151), "Resonant Trapping of 29 cm⁻¹ Phonons in Ruby," Topical Conference on Dynamical Processes in the Excited States of Ions and Molecules in Solids, University of Georgia, June 2-3, Athens.

G. J. Simmons (5120), "Some Projectively Planar Two-Fold Triple Systems," Symposium on Combinatorial Mathematics and Optimal Designs, June 5-9, Ft. Collins, Colo.

L. C. Beavis (2353), "Thermal Desorption from Molybdenum, Copper-Beryllium, and Some Ceramics," NASA Workshop on Molecular Shield, Marshall Space Flight Center, June 12-13, Huntsville, Ala.

R. A. Schmidt (5732) and T. J. Lutz (5163), "K_{1c} and J_{1c} of Westerly Granite—Effects of Thickness and In-Plane Dimensions"; R. H. Marion (5846), "The Use of Indentation Fracture to Determine Fracture Toughness," ASTM 11th National Symposium on Fracture Mechanics, June 12-14, Blacksburg, Va.

S. C. Levy (2523), "A Study of Some Parameters Affecting the Performance of Ca/CaCrO₄ Thermal

Continued from Page One

Project Deep Steam

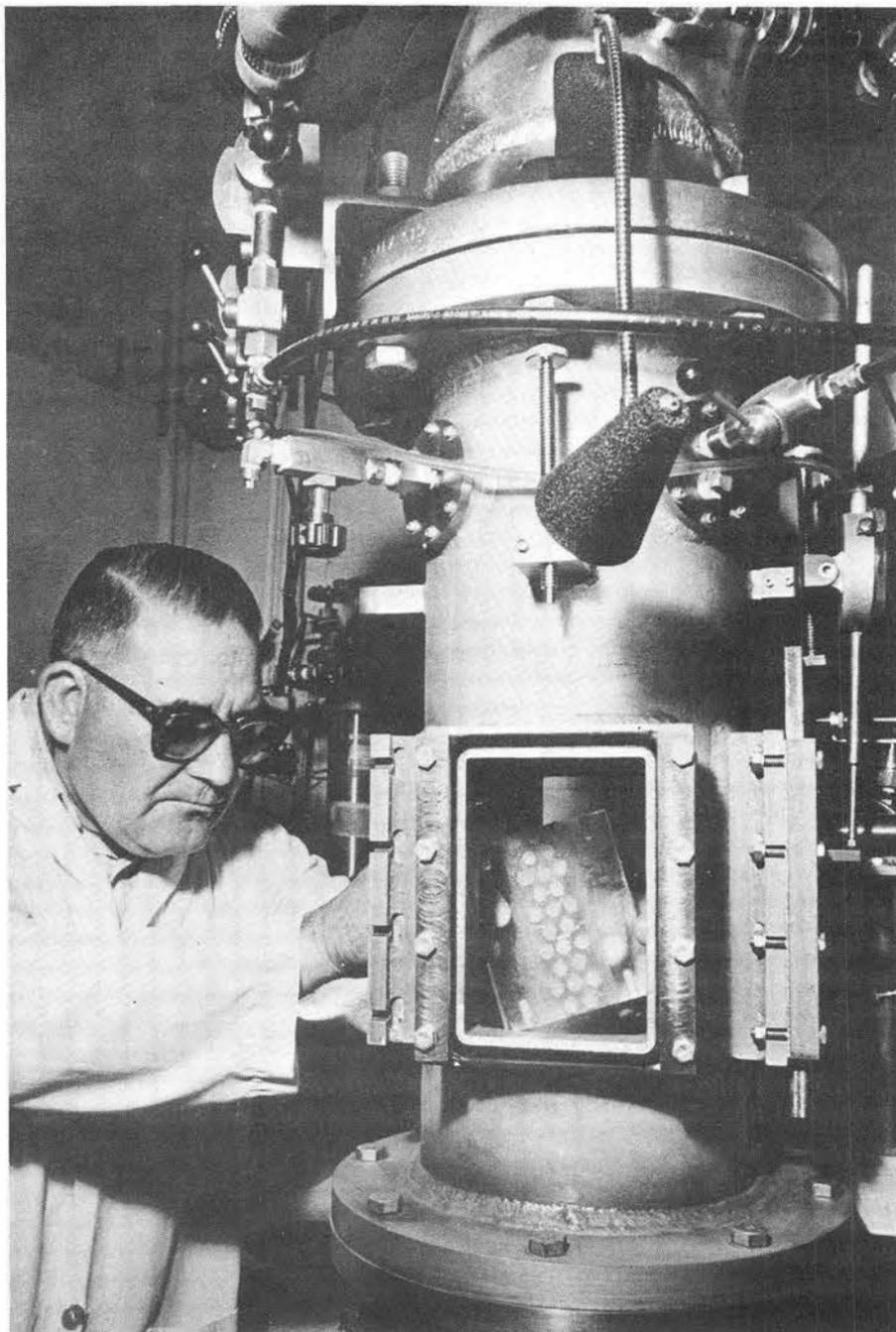
Ron lists a number of advantages to the downhole steam generator concept:

- Decreased air pollution
- Inexpensive fuel for the steam generator
- No heat loss—it's created where it's used, downhole. (Heat loss is the major concern of surface generated steam systems).

Still, materials need to be developed for the deep recovery operations. Materials problems are increased in deep reservoirs of heavy oil because of higher temperature and pressures and the high sulfur content of most heavy oils. Corrosion resistant materials are being investigated for use on many components and seals. Hard surface materials are also being investigated.

"For example," Ron says, "Department 5830 people have successfully vapor deposited a hard titanium diboride coating on valve stems used in a coal liquefaction reactor, and valve life has increased ten-fold. The approach may be useful in the steam generator where erosion problems are severe.

"Much of our work is in early stages," Ron says, "but it's progressing rapidly. We are working with the manufacturing and oil industries very closely. Our aim is to develop concepts and designs to field test a prototype downhole generator in early 1980."



POROSITY and permeability of model oil field reservoir is checked in a small wind tunnel by Paul Montoya (1262). Data collected will be applied to analytical models for computing enhanced recovery of heavy oil by use of high pressure steam.

Cells"; S. C. Levy, "Stack Force Measurements During Discharge of Thermal Batteries"; D. M. Bush and D. A. Nissen (both 2523), "Thermal Cells and Batteries Using the Mg/FeS₂ and LiAl/FeS₂ Systems," 28th Power Sources Symposium, June 12-15, Atlantic City, N.J.

R. A. Hill, A. J. Mulac, D. P. Aeschliman (all 5216), and W. L. Flower (8351), "Temperatures from Rotational-Vibrational Raman Q-Branches"; A. Ouyang (5214), "High Resolution Stimulated Raman Spectroscopy of the ν_1 Band of CH₄," Molecular Spectroscopy Symposium, June 12-19, Columbus, Ohio.

R. L. Clough (5811), "Computer Modeling of Polymer Radiation Chemistry," Fifth International Symposium of the Chemistry of the Organic Solid State, June 13-16, Waltham, Mass.

R. Goldman, D. Schade, P. Eaton (all UNM) and W. J. Spencer (8300), "Intraperitoneal Programmable Insulin Delivery in a Diabetic Male on Chronic Peritoneal Dialysis," VIIIth International Congress of Nephrology, June 18-23, Montreal.

J. T. Schamaun (1281) and H. R. Yoshimura (5433), "Full-Scale Turbine-Missile Casing Exit Tests"; H. R. Yoshimura (5433), "High-Speed Impact and Fire Test of a Spent Fuel Rail Cask System"; R. W. Ostensen and M. F. Young (both 5425), "Analysis of In-Pile Fuel Disruption Experiments"; D. H. Jensen (2355), "Computer Modeling of the Prompt Fission Neutron Logging Technique"; R. H. Marion (5846), "Development of Be₂C-Graphite-UC₂ Fuel for Pulsed Reactors"; F. W. Kuswa (5244), "Pulse-Power Particle Beam Sources as Fusion Drivers"; W. P. Schimmel (1261), "Effect of Fission Gas Leakage on Heat Transfer Within a Helium Filled Spent Fuel Shipping Cask"; J. E. Smaardy and H. J. Sutherland (both 5167), "Sodium Interaction With Limestone Concrete - Test Results"; G. L. Cano (5422), "First Visual In-Pile Fuel Disruption Experiments"; L. S. Nelson and B. D. Zak (both 5333), "Aerosols Generated by ²³⁹Pu and ²³³Pu Droplets Burning in Air"; R. B. Jones (5413), "Application of Optimal Iteration Strategies to Diffusion Theory Calculations"; R. W. Ostensen (5425), "A Sensitivity Study of LMFBR Core Disassemblies"; R. B. Pope (5433), "Effect of Fission Gas Leakage on Heat Transfer Within a Helium Filled Spent Fuel Shipping Cask"; H. J. Sutherland (5167), L. A. Kent (9337) and D. Dahlgren (5411), "Measurement of the Penetration of Liquid Sodium into Limestone Concrete"; J. H. Renken, S. A. Dupree (both 5231), S. H. Sutherland, J. M. Freedman and G. C. Allen (all 5433), "Waste Trans-

portation Systems"; R. C. Cole (5411), "The Method of Streeter and Wylie for Multidimensional Wave Propagation"; R. J. Lipinski (5425), "Effect of Creep on Thermal Fracturing in Oxide Crusts"; M. F. Young (5425), "Fuel Pin Modeling for the Prompt Burst Excursion (PBE) Experiments"; R. M. Elrick (5422), "Close-In Sampling of Aerosols From Fission Vaporized UO₂ Fuel"; A. S. Benjamin (5411) and D. J. McCloskey (5410), "Spent Fuel Heatup Following Loss of Water During Storage"; P. W. Conrad (5411), "Network Model of Free Convection Within Internally Heated Porous Media"; D. A. McArthur (5423), J. A. Halbleib, Sr., and J. E. Morel (both 5231), "Coded Aperture Imaging in Many-Pin Fuel Bundles"; R. W. Barnard (2355), "Interpretation of Prompt Fission Neutron Uranium Borehole Logs"; S. A. Eisenhower (5422), "SA53A Calculations for Forced Convection Sodium Boiling at Low Power"; J. B. Gerardo (5210), "Status of HF and Iodine Lasers as Laser-Fusion Drivers," 1978 Annual Meeting, American Nuclear Society, June 18-23, San Diego.

J. E. Davidson (3441), "Practical Applications of MORT Concepts," American Society of Safety Engineers Conference, June 19-20, Washington, D.C.

H. H. Madden (5114), "Analysis of Electron Energy-Loss Spectra From Beryllium"; G. L. Kellogg and J. A. Panitz (both 5114), "Surface Analysis of Field-Emitter Samples Exposed to the Plasmas of PLT and ISX"; P. J. Feibelman (5151) and M. L. Knotek (5152), "Interpretation of ESD Data from Chemisorption Systems," 38th Annual Conference on Physical Electronics, June 19-21, Oak Ridge, Tenn.

J. L. Cantwell (3522), "Obsolescence and The American Knowledge Worker: Management Support of In-House Continuing Education," Annual Meeting, American Society for Engineering Education, June 19-22, Vancouver, B.C.

G. E. Barr and S. J. Lambert (both 5311), "Uranium Isotope Disequilibrium in Groundwaters of Southeastern New Mexico and Implications Regarding Age-Dating of Waters," International Symposium of Isotopic Hydrology, June 19-23, Heuherberg, FRG.

A. M. Kraynik (5813), "The Flow Behavior of One-Container Sticky Foams"; P. B. Rand (5813), "One Container Sticky Foams," Gordon Research Conference on the Chemistry and Physics of Cellular Materials, June 19-23, Plymouth, N.H.

P. F. Hlava (5822), "Thermal Battery Reaction

Products," 13th Annual Conference of the Microbeam Analysis Society, June 19-24, Ann Arbor, Mich.

M. T. Buttram and G. J. Rohwein (both 5246), "Operation of A 300 kV, 100 Hz, 30 kW Average Power Pulser," 13th Pulse Power Modulator Symposium, June 20-22, Buffalo, N.Y.

N. J. DeLolli (5813), instructor at Adhesives and Their Applications short course. Presentations included: "Theories of Adhesion," "Designing for Adhesives," "Types of Adhesives for Metals and Plastics," "Adhesives for Special Bonding Applications," "Typical Applications in Bonding Metals and Plastics," "Specifications for Adhesives," "Diagnosis of Joint Failures with Adhesives," and "Discussion of Participants' Bonding Problems," American Chemical Society Short Courses, May 18-19, New York City.

D. R. Anderson (5336), "Seabed High Level Waste Assessment Program Statement," Subcommittee on Oceanography, U.S. House of Representatives, May 15, Washington, D.C.

S. G. Varnado (5735), "Geothermal Well Technology Program"; R. C. Reineke and S. G. Varnado (both 5735), "A Portable High Temperature, High Pressure Viscometer," Workshop on Geothermal Drilling Fluids, May 23, Houston.

D. A. McArthur (5423), "Fission Fragment Pumping of CO Gas Mixtures," First International Symposium on Fission Induced Plasmas and Direct Nuclear Pumped Lasers, May 23-25, Universite de Paris, Orsay, France.

P. C. Lysne (2355), "A Complementary Neutronic-Electromagnetic Logging System for Uranium Exploration," Seminar, U.S. Department of Energy, May 25, Grand Junction, Colo.

S. G. Varnado (5735), "Sandia/DOE Geothermal Drilling Technology Program," Magma/Hydrothermal Drilling & Instrumentation Workshop, May 31-June 2, SLA.

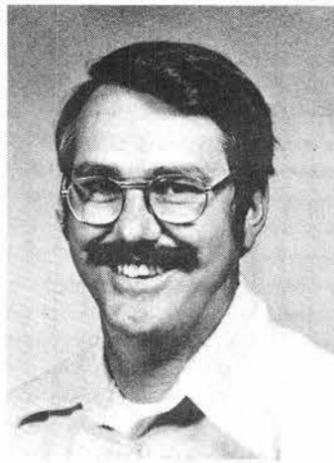
R. S. Blewer (2353), invited paper, "Behavior of Implanted Deuterium in Metals at Ambient Temperatures and at 150 K," June 1, Institute of Physics, University of Aarhus, Denmark; invited paper, "Means of Obtaining Tailored Depth Profiles in Implanted Solids," Physical Laboratory, H. C. Orsted Institute, June 6, Copenhagen, Denmark.

D. W. Schaefer (5152), "Dynamics of Entangled Polymers," Conference on Polymer Physics, June 19-23, New Hampton, N.H.

MILEPOSTS

LAB NEWS

JULY 1978



Raymond Merrill - 5821 10



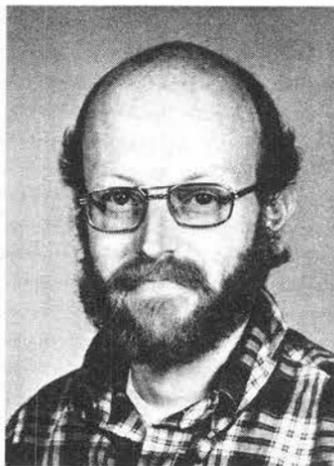
Fred Clifford - 2155

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Jim Kaiser - 1716

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Leander Pickard - 2341 15



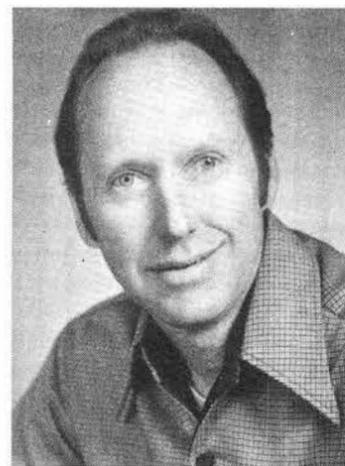
Jerry Shinkle - 2328 15



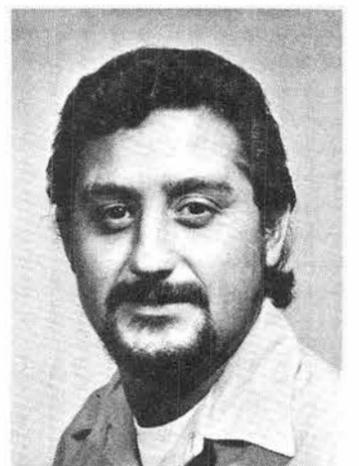
Jim Carrell - 8442 25



Jerry Love - 2335 15



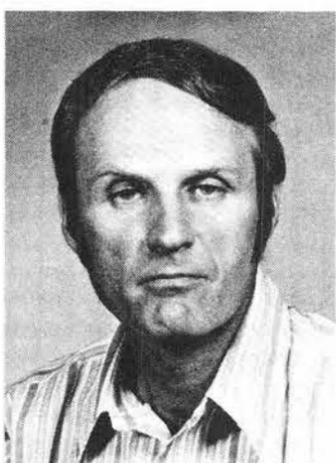
Ralph Kelley - 8411 25



Ernest Aguilar - 3425 10



Chuck Stockley - 8411 25



Wallis Cramond - 5412 15

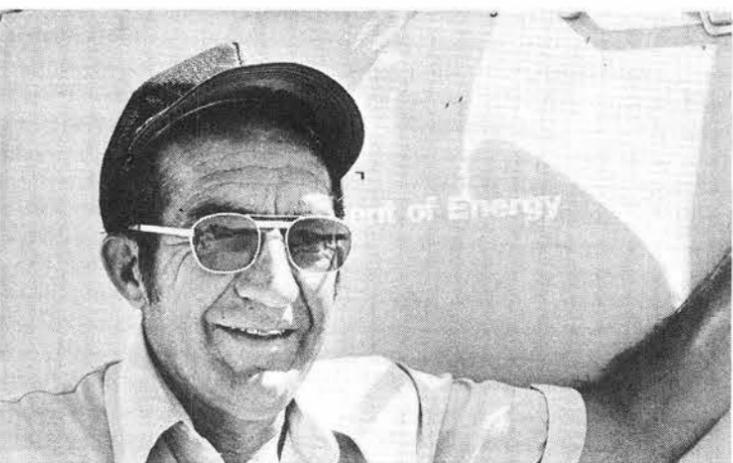


James Ney - 1754 15



Art Porter - 3423

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Abel Lovato - 3421

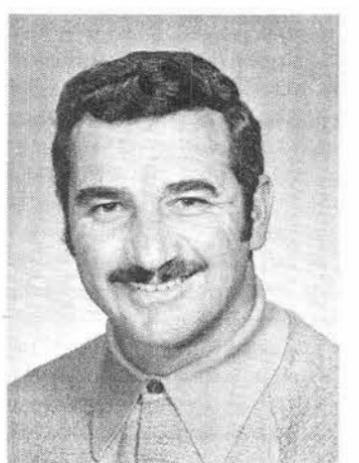
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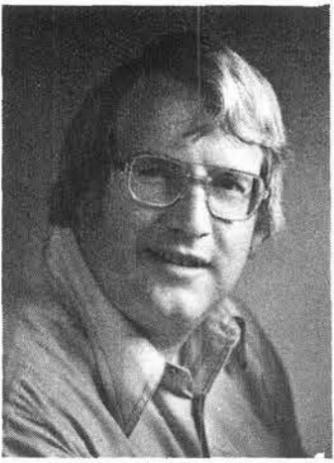
John Daniel - 8265 20



Alfred Hoge - 2334 30



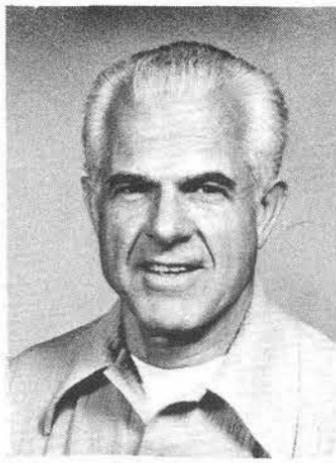
Larry Gallo - 1715 15



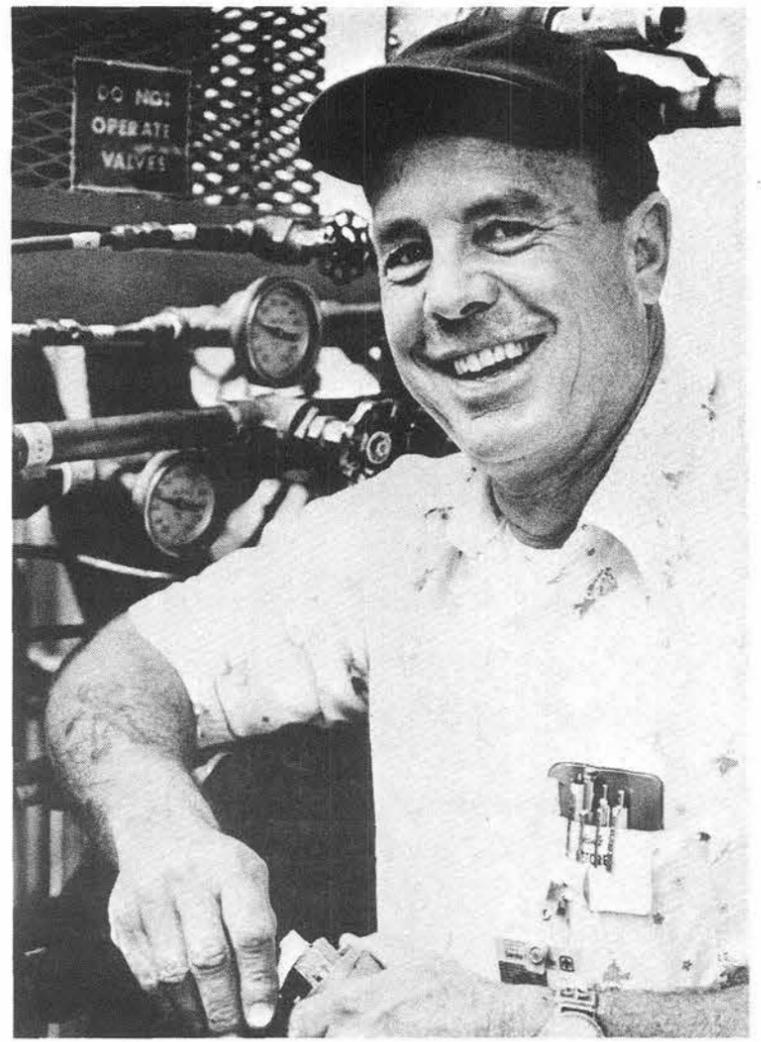
Gerald Henderson - 8153 15



William Morales - 9712 25



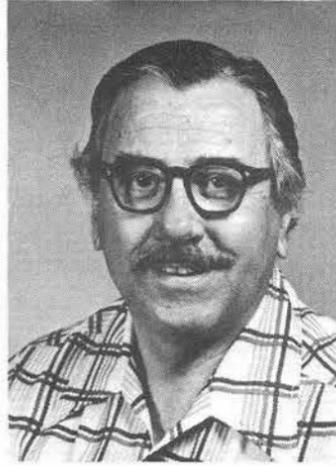
Bruce Coleman - 9625 20



Richard Starkey - 9712 30



Roger Williams - 3172 30



Thomas Eagar - 9351 30



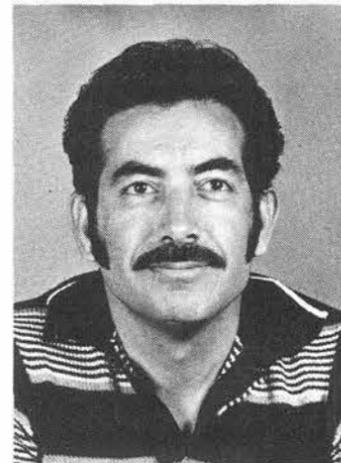
Nita Clark - 9632 20



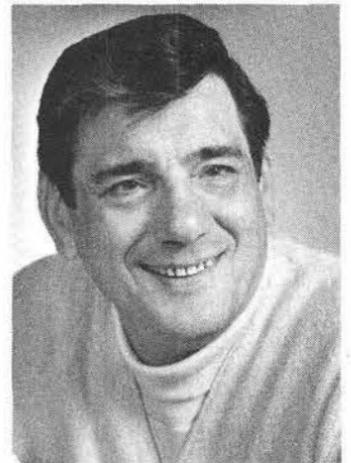
Marie Dremalas - 8161 15



Bob Spence - 9421 30



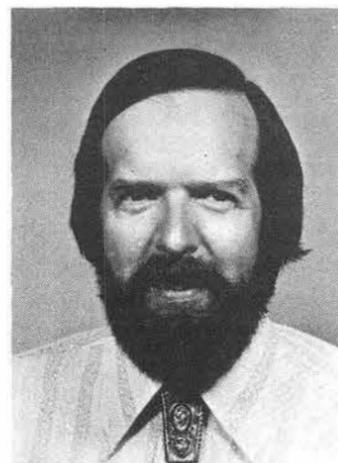
Laudente Gallegos - 3171 10



Ray Leri - 8265 20



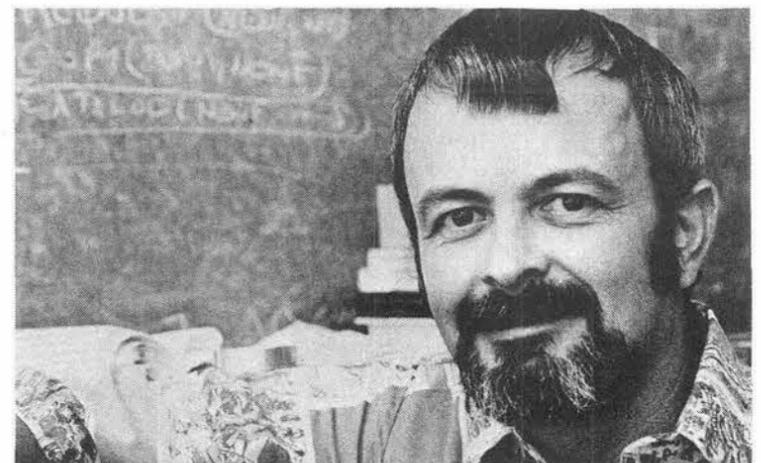
Herminio Molina - 9718 15



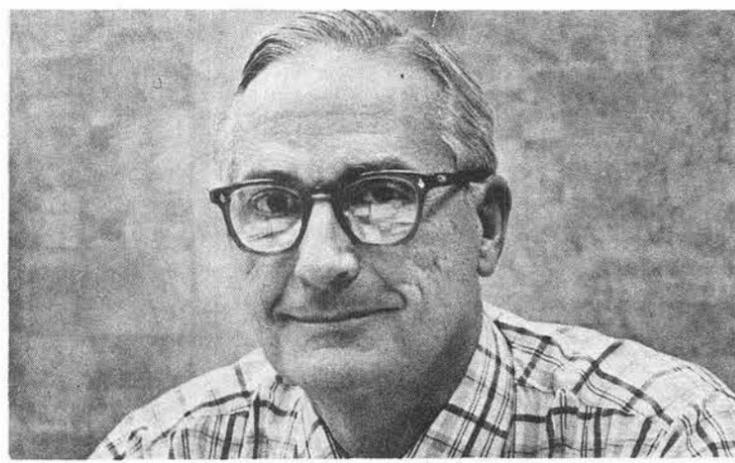
William Paulus - 1758 20



Lenard Wilhelmi - 9658 20



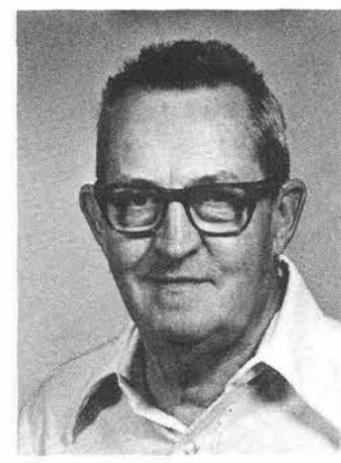
Jerry Alcone - 5742 10



Jim King - 2500 25



Jim Bear - 4336 20



Daniel Callahan - 3735 20

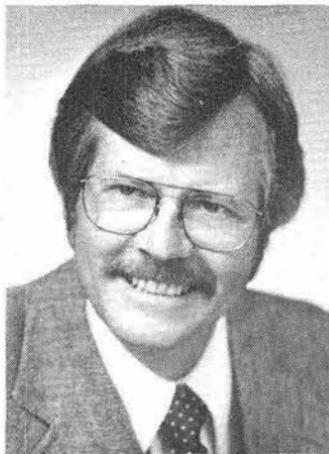


Mariano Gutierrez - 5833 20



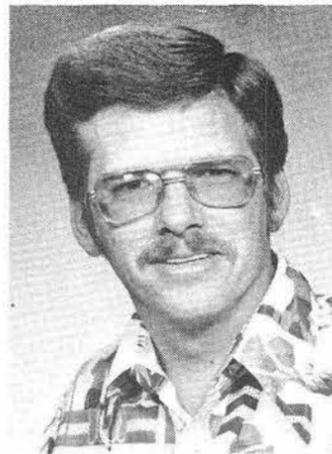
Grover Hughes - 1243

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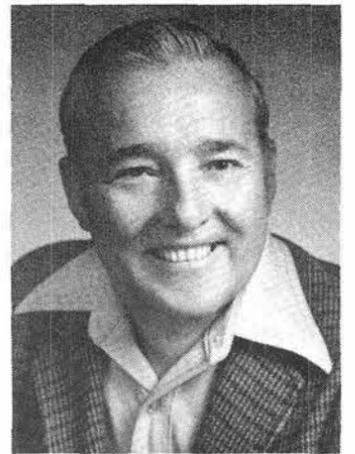
John Marion - 8011

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Dave Barnes - 9421

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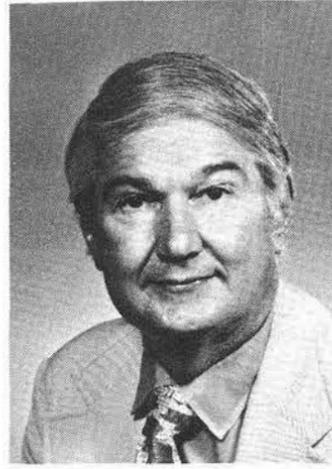
Jim Smith - 8254

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Wayne Olson - 1715

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Herman Mauney - 1730

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Delfinio Jinzo - 3421

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Don Doak - 4363

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Jim Spirup - 8261

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Bob Dougherty - 2351

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Larry Avila - 3422

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Carl Smith - 3422

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Hesa Yano - 8327

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Mel Lagasca - 8411

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Richard Johnson - 2345

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Mike Rogers - 8162

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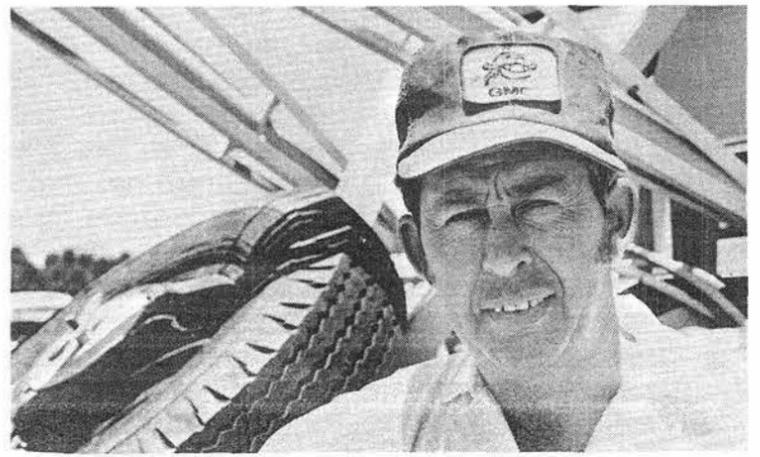
Glenn Folkins - 4336

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Odilia Silva - 3152

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Jose Castillo - 3421

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Retiree Deaths

April-June 1978

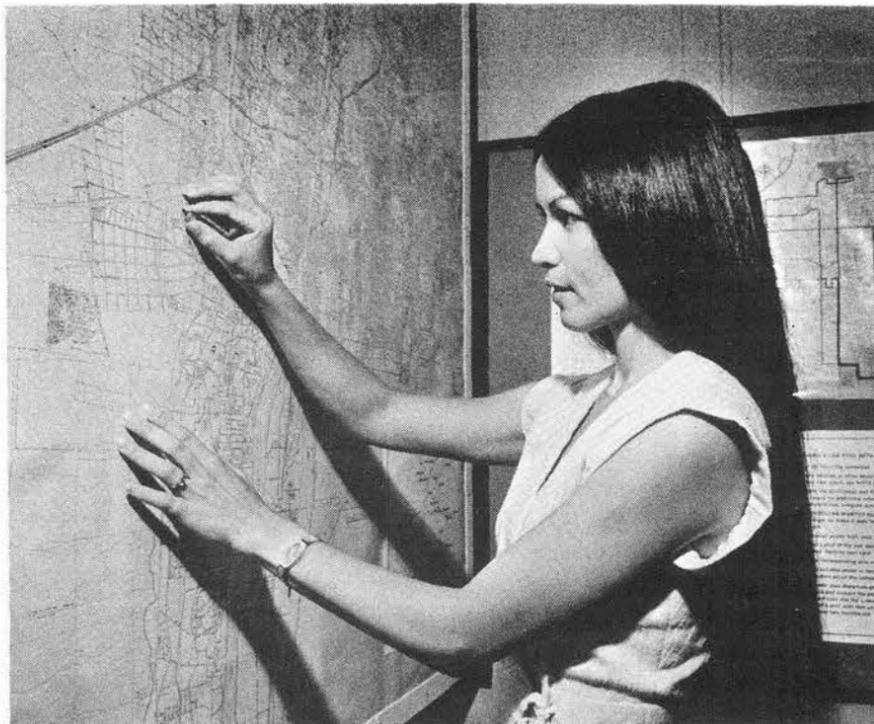
Charles Mitchell (60)	4/27/78
Frank Dausses (67)	5/10/78
Don Lucas (82)	5/27/78
Howard Carmody (80)	5/30/78
William Rehbeck (75)	6/9/78
Hubert Hanen (72)	6/15/78
Jerry Bass (87)	6/19/78

Congratulations

Mr. and Mrs. Robert Sanchez (2153), a son, Felipe Robert, June 16.

Mr. and Mrs. Michael Shannon (Sharon, formerly 5000), a daughter, Jessica Marie, May 8.

Mr. and Mrs. Mike Edenburn (5716), a daughter, Sara, July 3.



WANT TO CAR POOL? Or maybe just get a ride? Two car pool match-up boards, one in the Bldg. 802 lobby and the other in the west corridor of Bldg. 892, help drivers and riders get together with other drivers and riders. Put a numbered pin at your home location, fill out a card with your riding/driving preferences, and wait for a call. Patsy Zmiejko (5310) demonstrates tacking technique.

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4. Use home telephone numbers.
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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

THE END IS IN SIGHT. Bargain book days end on 31 July. Hundreds of paperbacks at 5 cents each. New stocks added daily. LAB NEWS Office, Bldg. 814.

TRASH BAGS. City approved, \$4/box, \$20/case of 6, South Hwy. 14 Project. LAB NEWS Office; Bldg. 814.

30 YARDS of brown & green shag carpeting, \$3/yd. or make offer. Bonzon, 296-3022.

RCA color TV w/AM-FM stereo radio & record player, 24" screen, cherry wood French provincial styling, \$250. Negus, 299-9232.

AURORA miniature car set, tracks, etc., on 4x8 plywood, \$15. Berman, 296-5640.

VW BUG rear bumper w/guards, \$18; Chilton's 1949-71 VW repair manual, \$4. Horton, 298-4449.

HIDE-A-BED, brown, \$60. Campbell, 255-7307.

LUGGAGE CARRIER, zippered, vinyl coated, for station wagon, \$20; fertilizer spreader, \$10; 3HP outboard motor, few hours, \$95. Bradley, 298-2263.

CANON EF camera w/Vivitar 35-105 zoom lens, \$350. Knief, 268-4294.

VIOLINS: 1/2-size, \$75; 3/4-size, \$175. Magnuson, 821-5330.

TWO Sears steel belt G78-15LT mud/snow tires, used 600 miles, cost \$69.81 ea., both for \$100; 4-hole Volkswagen wheels, \$6. Wilkinson, 299-8327.

30 BOUND VOLUMES of American Rifleman, \$150; Conn Caprice organ, \$375; knitting needles, 50 cents/pr. Campbell, 299-4830.

SWING AWAY spare tire & jerry can holder for 1969-72 Chev. Blazer or Jimmy, \$30 or best offer. Myers, 298-2677.

BABY CRIB, net sides, mattress, \$12; stroller w/cover, \$12; GM automobile infant seat, \$20. Rios, 299-8188.

FULL SIZE office file, steel, heavy duty, fire-proof; desk, solid oak, 6-dwr.; table tennis regulation top, accessories. Barth, 345-0172.

SEARS best Craftsman reel lawn mower w/grass catcher, \$55. Hartwig, 298-5048.

HONEYWELL Pentax Spotmatic camera, screwmount, w/f1.4 50mm lens, f3.5 135 telephoto lens, f2.0 35mm wide angle, w/cases & sunshades & skylight filters, \$250.

Brewster, 898-0144.

2 EACH 750x16 6-ply General mud & snow tires; 1 ea. 16" 8-hole split rim; 1 ea. 750x16 8-ply tire. Houghton, 299-3386.

N.M. STATE topographic map pictures printed by Coors, 27"x48" on heavy cardboard suitable for framing, \$3 ea. Reinhardt, 296-1815.

2 EACH A78-13 studded snow tires on rims (fits Datsun) \$20 ea.; tripod for 4" Astronomical telescope, \$5; dress form, \$12; 65 VW rear bumper, \$15. Hart, 255-2133.

TWO German Shepherd males, give away; Vouvier Des Flanders female, give away for price of spaying and grooming. Martinez, 821-8692.

GE REFRIGERATOR, 11.6 cu. ft., \$110; Winchester model 1200 20 gauge shotgun & case, \$140; Reynolds trumpet, mute, \$75; two doghouses, \$20 ea. Chavez, 294-5985.

'77 BETHANY pickup camper: cab high, raises to 6 1/2', 2 dbl. beds, heater, icebox, stove, water/butane tanks, camper jacks. White, 877-4149.

REAR BUMPER, fits Ford Courier or Mazda pickups; new spare tire mounted on rim; jack; locking gas cap. Rozelle, 298-0396.

19" B&W TV, \$100; girl's 20" Spyder bike, racing bars, \$40. Stuart, 265-7315.

TENNIS RACQUETS: David professional, 4 1/2 M, \$15; T-2000, 4 5/8 L, \$10. Shane, 296-4430.

KING SIZE BED, box springs, mattress, frame, Serta-Firm, 2 yrs. old, plus sheets. Neff, 904 Turner Dr. NE.

SWEDISH DESIGN Yamaha studio upright piano, \$850; stereo, walnut cabinet, radio needs work. \$150. Emig, 294-3707.

POKER TABLE, felt cover, seats 6, legs remove for storage. Scheiber, 293-3824.

TIRES: 2 F78-14 Goodyear, 900 miles wear, \$30 ea. Clark, 296-4541.

OVAL RUG, 8 1/2' x 11 1/2', w/fringe, 55% wool, earth tones starburst design, \$40. Bear, 881-7128.

FOUR Chevy 4WD pickup steel wheels, 6 lug, 16.5x8.25, \$20 ea.; 3 tires, 10-16.5, \$5 ea. (or \$90/set). Erickson, 296-0126.

HI-BACK SLAT CHAIRS, need re-finishing, all 5 for \$45; elec. stove, \$75. Schubeck, 294-5666.

TELEPHOTO LENS, Takumar 200mm f3.5, case, tripod mount, manual, Pentax screw mount, \$65. Sutherland, 266-1734.

POLAROID SX70 camera w/leather case, used once, \$75 or best offer. Yaniv, 821-0999.

CHAIN SAW, Mac 15 16", \$75; end tables, coffee table, formica top, \$50 set; folding pool table, \$40. Sandlin, 299-8786.

AIR CONDITIONER, Air Temp refrigerative, 2-ton, fresh air control, 3-spd., thermostat, 220 volt, single phase, \$175. Ruminski, 256-0770.

LITTON microwave oven, \$145; arc welder, \$50; table saw, 7 1/4", \$65; HP 35, \$65; German Shepherd puppies, \$40; skillsaw, 6 1/2", \$25. Sparks, 898-1252.

THAYER CHANDLER artist's water color air brush w/hose, \$30. Mc-

Master, 296-7881.

DUCK, goose, pintail, quail & hawk calls; hunting jacket & other hunting equipment; wholesale prices after 6. Quintana, 268-6594.

LONG TWIN unmatched mattress & box springs, \$40; 24" wheel unicycle, \$17.50; bathroom lavatory, \$4. Stein, 299-8875.

TRAILER, single-horse, all metal covered, single axle, \$400. Kidd, 256-1020.

DRILL PRESS, Sears floor model w/motor & Jacobs 1/2" chuck. Laskar, 299-1024.

STEEL BELTED radial tires, Conti TS771, never mounted, 175x13, 2 at \$30 ea. Lipkin, 881-6038.

STAINLESS STEEL counter top 4-burner stove, \$25; ice box & sink w/spigot for camper; Delta model 6545 temperature chamber. Zucuskie, 881-4086.

7 METAL DISPLAY RACKS, \$3 ea. or all for \$15. Nelson, 881-0148.

FREE KITTENS. Durrie, 298-0209 after 5, 10116 Maya Ct. NE.

1/4 ARABIAN FILLY, sired by Bay Rabus out of Cheyenne Cindy, both Grand Champions. Traver, 898-4255.

GAS DRYER, \$90; washing machines, \$50, \$35; 8x11 oval braided rug, \$20; 11x14 tan rug, \$20; light fixtures. Whitham, 266-9313.

DRAWER type trundle bed, one mattress, \$45. Good, 898-7963.

RECORD PLAYER, automatic, Garrard Type A, Mk II, stereo cartridge, \$25. Winter, 294-1369.

TRANSPORTATION

'76 MONARCH 4-dr., 6-cyl., PS, PB, AT, AC, silver, new radials, below book, \$3450. Buck, 296-5963.

'67 CAMARO, 79,000 miles, 16,000 on new 350 engine, Hurst 4-spd., PS, \$1750. Levy, 299-6286.

'63 GRAND PRIX, 387 4 bbl, PS, PB, PW, more, \$425. Feltz, 294-0175.

'75 FIAT 131 sedan, 41,000 miles, AM-FM stereo, radials, AT, new interior, one owner. Brito, 877-5723.

'73 HONDA CB500, saddle bags, custom seat, \$950 or best offer. Attermeier, 293-7088.

'77 JEEP Wagoneer, 4-wd., PB, PS, AC, all extras. Mickey, 298-7357.

'65 FORD 1/2-ton pickup, 3-spd., 6-cyl., \$450 or best offer. Armijo, 268-7645.

'70 FORD FL-500, 302 V8, AT, AC, PS, 4-dr., new tires, chrome wheels. Stang, 256-7793.

'74 SUBARU, 2-dr. sedan, factory air, below book \$1795, Michelin radials, 4-spd. Melville, 296-3378.

'77 LUV pickup Mikado, 4-spd., less than 5000 miles, under warranty. Lackey, 266-5076.

SAILBOAT: 13' Cyclone, fiberglass, cat rigged, full race rigging, trailer, motor bracket, \$1100 or offer. Walker, 821-0708.

'74 AMC MATADOR spt. cp., AC, PS, PB, tilt steering wheel, radials, \$1600. Yarbrough, 255-4087 or 294-0139.

'75 DODGE window van, 6-cyl. stick, B-100 Tradesman, best offer over

wholesale book. Boulware, 299-8110.

'73 HD Sportster, customized. Trujillo, 255-5053.

'75 VW Silver Scirocco, AT, AM-FM radio, radial tires, 29,000 miles, book value or best offer. McGuire, 345-0539.

'72 AUDI 100LS, 2-dr., air, AM-FM, steel belted radials. Magnuson, 268-5955.

'68 SCOUT, rebuilt engine, 18 mi. hwy., CB, 8-track, many extras, \$1795. Stilwell, 266-3928 after 5.

'76 GLASTON GT-150, 85 HP Johnson, power trim & tilt, full cover, 2 6-gal. tanks, 2 stainless steel teflon props. Wilson, 904 Turner Dr. NE.

'74 DODGE DART, 6-cyl., AT, radio, 2-dr., low mileage, \$2150. Dodrill, 293-3487.

VESPA MOPED, 6 mos. old. Shanken, 256-3785.

YAMAHA, 1972 Enduro, 360cc, \$375. Kelsey, 266-6460.

'74 CHEVY 1/2T longbed pickup, 3/4 ton suspension 454, AT, AC, PS, PB, Cheyenne special pkg., \$2500. Morano, 268-4870.

'74 CUTLASS Olds, 4-dr., 63,000 miles, \$500 cash & take over payments. Hazelton, 766-6474 after 9:30.

'66 CHEV. Carryall, 4-spd., 283V8, set up for equalizer hitch, 5000 miles on 6-ply tires, extra snow tires, \$975. Bush, 281-3773.

'70 MAVERICK, 6-cyl., w/AC & new paint, \$850. Dees, 869-6949.

'73 VEGA hatchback, 4-spd., new radials, battery, air, \$795. Watterberg, 294-6759.

'74 BUICK Century wagon, AT, AC, AM/FM, more, set up for trailer hauling, \$2900 or best offer. McClenahan, 292-3119.

REAL ESTATE

NE HEIGHTS BRICK: 2310 sq. ft., 3-bdr., 1 1/2 baths, lg. den w/fp, lg. lot, RV parking, \$73,500. Ray, 299-1253.

10 ACRES, southwest of city limits, nice terrain, \$500/acre w/terms. Mauldin, 293-2079.

MOSSMAN CUSTOM, A.D.O. golf course, 4-bdr., 2 1/2 baths, study, sewing, pantry, vaulted ceilings & view windows, FM/kitchen, 2500 sq. ft., mid-80's. Stevens, 299-6086.

'71 OLYMPIC mobile home, 12x60, on rental space \$45/mo., south of Los Lunas, partially furnished, need \$6000 cash. Dees, 865-5152.

FOR RENT

NEAR Sandia HS, 3-bdr., 1 1/2 baths, den, carpet, drapes, appliances, \$350/mo. + deposit, water paid. Renken, 296-9713 or 299-1864.

LAKE FRONT CABIN, Vallecito Lake near Durango, available day/week, deluxe, 3-bdr., w/fp, fully furnished, vacation reservations. Croll, 881-7235.

2-BDR. unfurn. apt. in duplex, fenced yard, off-street parking, near Base, available Aug. 1, \$200 + utilities. Orear, 256-1941.

CABIN in Taos mountains, deluxe,

WORK WANTED

PAINTING, landscaping, sodding, home maintenance, hauling, repairs; mature college students, have tools & pickup. Stixrud, 298-0478.

LOST AND FOUND

LOST—Ladies' brown-rim bi-focal safety glasses, red plastic glasses' case/w/ contact lens & solution, '78 UofA class ring, lg. link sterling bracelet, men's lt. brown-rim tri-focal glasses. LOST AND FOUND, Bldg. 832, 264-1657.

has everything, sleeps 8. Peet, 294-1250.

CORRALES, 3-bdr., 2 bath, FR, LR, DR, garage, barn, pasture, garden, horses-animals allowed. Holloway, 898-2110.

NE location, 3-bdr. & den Roberson, corner lot, dbl. garage, available now, \$350/mo. plus deposit. Johnson, 821-9564.

WANTED

FREEZER, upright, 20-30 cu. ft., used. Barber, 299-1752.

BED, twin size, white French Provincial w/canopy, good condition, reasonable price. Santana, 294-0536.

LOAN of instruction booklet for Zeiss-Ikon 35mm camera, Ikonta model; will Xerox & return. Horton, 298-4449.

DRUMS: mounted Tom, floor Tom, other accessories. Ellison, 296-6645.

COUCH to match gold carpeting, good condition. Siedner, 256-9417.

VIDEO MONITOR, 10" or larger, cheap, repairable but working preferred. Scott, 281-5715 after 5.

SHOP MANUAL for '72 Olds Cutlass. Rogulich, 292-3815.

SMALL ARBOR PRESS, 1/2 or 1 ton capacity. Laskar, 299-1024.

HOUSEMATE, share 1350 sq. ft. adobe, downtown area, own room, prefer woman 28-45, must love cats, \$147 + 1/2 util. Bloomberg, 255-1920.

DRILL PRESS, use of one w/1" wood bit for drilling about 20 holes. Schubeck, 294-5666.

3M BOOKSHELF GAME "Bazaar," willing to pay reasonable price. Simons, 821-9343.

CARPOOLERS from western Four Hills (I live on Santa Ana), non-smokers. Erickson, 296-0126.

SHOP MANUAL for '65 Mustang, would like to purchase or borrow. Brown, 299-5360.

WINCHESTER 30/30 model 94 carbine; Japanese swords, will pay all cash or trade .22 rifle & cash. Smitha, 881-1001.

SOCCER PLAYERS for adult league, new teams are now being formed, men or women, all levels of experience. Brown, 299-5360.

SWIM FINS, speed style; booties for skin diving, small size. Adams, 256-7265.

CHEST OF DRAWERS, medium or large size. Watterberg, 294-6759.

Vikings Tonight; Mongols Manana

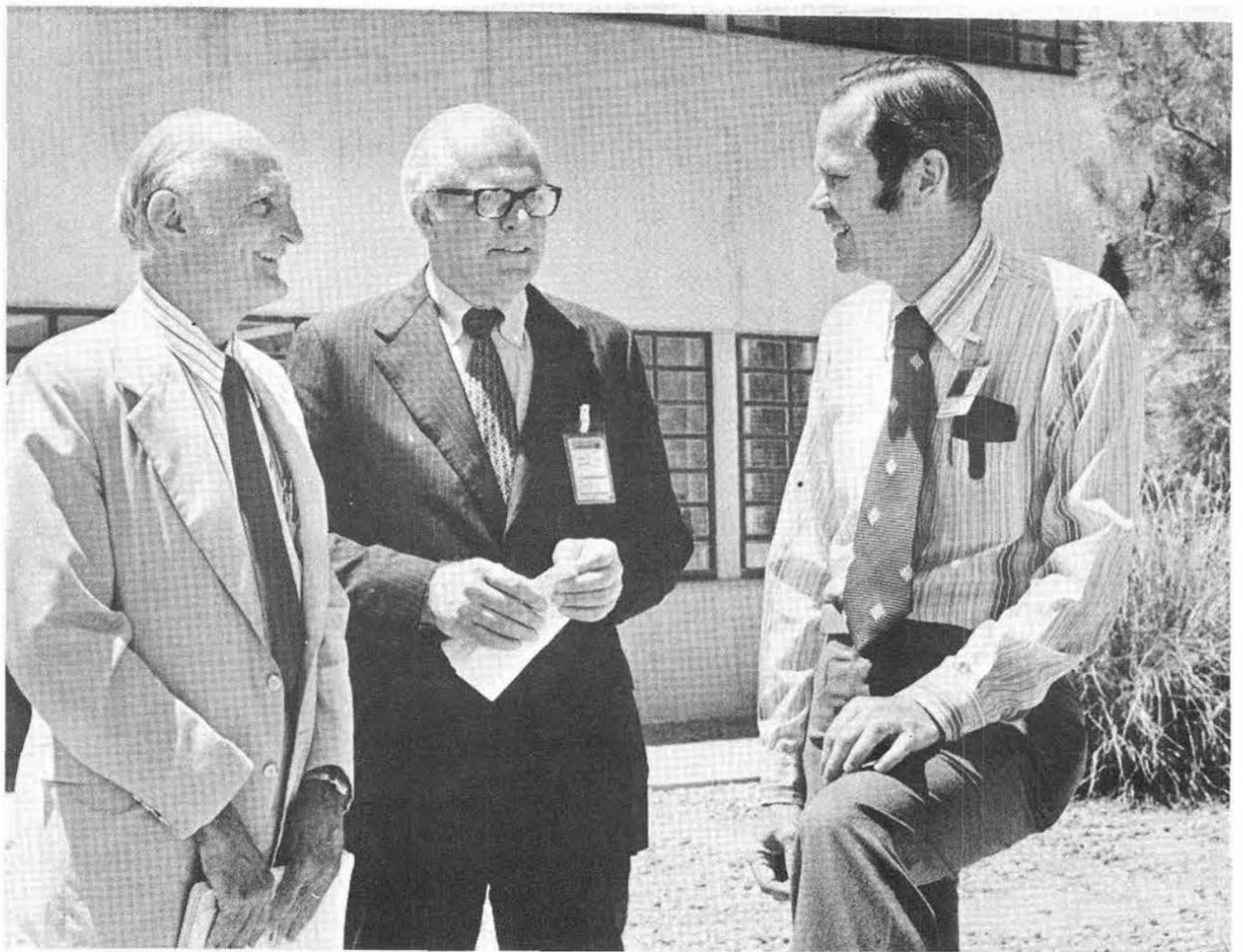
HAPPY HOUR tonight features a giant steamship round of beef buffet and dancing to the Vikings with singer Carol Dorn. The band plays from 6:30 to 10:30. Next Friday's Happy Hour will see curried chicken on the buffet menu, Jeanne Rich and Friends on the bandstand.

TOMORROW starting at 6 p.m. the Club tries a new event called a Mongolian barbeque as La Ultima plays for dancing. You should have tickets for this one already, but you might try calling the Club office—265-6791—right now to see if anyone has cancelled. Good Luck! It's going to be a great party.

A TEEN DISCO is set Thursday, July 27, from 8 to 11 p.m. Member parents should pick up tickets for their youngsters at the Club office.

TRAVEL DIRECTOR Ed Neidel announces a new trip to Disneyland Oct. 25-29, the time when kids will be vacationing while teachers attend their annual convention. The package includes air fare, hotel for four nights, bus transfers, a 15-ride book at Disneyland, a tour of Universal Studios and a boat trip to Catalina Island. Cost is \$209 (dbl.) and \$133 for kids under 12.

Still open are tours to Cancun—seven nights starting Sept. 9 at the Hotel Cancun Caribe for \$366 (dbl.)—and Mazatlan, the Hotel Playa Mazatlan for seven nights starting Oct. 28 for \$275 (dbl.). Ed also has discount rates on excursions of the Cumbres and Toltec Railroad on Aug. 26



AIR FORCE SECRETARY John Stetson was here last week for briefings on Labs programs. President Sparks was host while Bill Myre (at right, 1700) was among those making presentations to the Secretary.

and Oct. 14. See him in the Club lobby tonight between 6 and 7 for the full scoop.

CORONADO WOLFPACK members and families will enjoy a patio and pool party Sunday, July 30, from 6:30 to 8:30 p.m. Free beer, cokes and popcorn will be served.

UPCOMING EVENTS—Single Mingle at the Annex Pool Friday, Aug. 4; Shrimp Peel Saturday, Aug. 19.

Authors

R. C. Hughes (5814), "Laser-Induced Breakdown in H₂O and D₂O," Comments, April 15, 1978, PHYSICAL REVIEW B.

R. L. Fox (5731), "Completion of the Multi-Point Turbulent Equations Using an Approximation to the Mean Value Theorem," Vol. 21, No. 5, THE PHYSICS OF FLUIDS.

W. B. Jones (5835), "Beta Decomposition Processes in Hf-Rich Hf-Nb Alloys," Vol. 9, No. 5, METALLURGICAL TRANSACTIONS A.

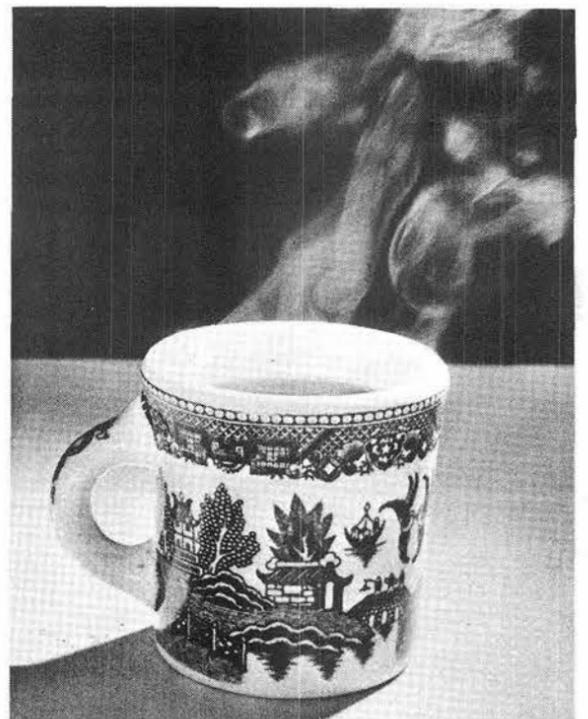
R. G. Trudo and D. J. Puetz (both 2648), "Take an Analog Approach to Tech Control Centers," Vol. 15, No. 7, COMMUNICATIONS NEWS.

M. A. Butler and D. S. Ginley (both 5154), "Temperature Dependence of Flatband Potentials at Semiconductor-Electrolyte Interfaces," Vol. 273, No. 5663, NATURE.

J. C. Cummings, D. P. Aeschliman and A. J. Mulac (all 5216), "Raman Spectroscopy in a CW Chemical Laser," Vol. 19, No. 5, JOURNAL OF QUANTITATIVE SPECTROSCOPY AND RADIATIVE TRANSFER.



Old ideas have a way of cropping up in new settings. Remember the spools of wire we used on the first recorders? "Memory wire" has turned up this time at a school of dentistry where a researcher is using nickel/titanium alloy (Nitinol) in braces to replace the customary stainless steel wire. In time, body heat makes stainless steel go slack—necessitating as many as five wire changes before treatment of crooked teeth is complete. By contrast, Nitinol can be formed into a predetermined shape and heat treated between 800-1100°F. At mouth temperatures of 90-100°F, the wire slowly returns to the shape established at the higher temperatures. This exerts continuous force, and one set of wire is all that's required to align the teeth. That's the theory. We hate to contemplate what happens to the wire (and your teeth) when it has a bad memory.



WITH the makings beginning to resemble, in cost and occasionally in taste, an import from a hungry shiek, Jan Robertson (1500) said "enough!" And she hit upon a coffee brewing process that saves significantly, while the product tastes about the same: after the initial pot is made, leave the used grounds in the strainer and add one-half of the original measure of new coffee grounds. Jan does this twice after the first pot, and the customers remain smiling and happy (she says). There's a fringe benefit, too—you don't have to wash the outfit as often.

Sympathy

To Wally Granfield (1730) and Rick Granfield (2351) on the death of their father/grandfather in Minneapolis, June 28.

To John Haaland (1213) on the death of his mother in Willmar, Minn., July 9.

To Robert Knight (9572) on the death of his father-in-law and mother-in-law in Canada, July 7.

To Louis Roybal (9571) on the death of his brother in Albuquerque, July 12.

